A Mixed Methods Cross-Cultural Investigation of Conversational Turn Taking in Families of Children with Hearing Loss

By

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Abstract

This study compares the communicative interactions of families of children with and without hearing loss in Vietnam to those used in Canada as an example of how language socialization practices influence parent-child communication in order for speech-language pathologists to create more culturally appropriate intervention techniques.

Taking a mixed methods approach, quantitative data was collected using the Language ENvironment Analysis (LENA) System conversational turn count (CTC). A protocol to validate the CTC with Vietnamese speakers was conducted as part of this project. Qualitative interviews focused on language were conducted with the children’s parents. CTC for Vietnamese families was found to be valid for use ($r_{18} = .70, p < .001$) and LENA data showed a statistically significant difference between the CTCs of Canadian and Vietnamese children with and without hearing loss ($U = 27, p = .016; U = 217, p < .001$). There was no differences found within the two cultural groups ($U = 108, p = .218; U = 31, p = .140$). Interviews revealed that Vietnamese participants focused on the development of their child’s intelligence, while Canadian participants discussed building their child’s identity. Regardless of cultural background, all of the participants interviewed agreed that children with hearing loss should be treated similarly to their hearing peers, whether the goal was intelligence or identity. The language socialization practices identified through
the interviews provide an explanation for the differences and similarities identified in the LENA CTC results. It is hoped that findings from this project will begin a conversation about the importance of considering language socialization practices in intervention for children with hearing loss.
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1. Introduction

Advances in hearing technology and intervention practices have created a system which allows most children with hearing loss in high-income countries to achieve age-appropriate listening and spoken language skills by the time they enter school (Dornan, Hickson, Murdoch, Houston, & Constantinescu, 2010). In order to attain these communication goals, children must be identified young to capitalize on early auditory brain development, have access to appropriate hearing technology, and be provided with speech and language therapy services to maximize their listening skills so that spoken language can be learned (Geers & Nicholas, 2013; Montes et al., 2017; Yoshinaga-Itano, 2003). Hearing aids or cochlear implants allow the child to access all the necessary acoustic frequencies required for developing speech. As these technologies and services become more readily available across the world, more children with hearing loss are now able to reach their full potential for listening and spoken language.

Unfortunately, some children with hearing loss still struggle to learn to listen and talk. There are a number of reasons why this may be the case. A child may not have access to early hearing screening and detection of hearing loss. Without early identification, the child may miss the critical window for learning to listen and speak (Yoshinaga-Itano, 2003). In some cases, devices like hearing aids or cochlear implants and their maintenance may not be available or affordable (Vo et al., 2017) or the child may have an anatomic anomaly that renders these tools unusable. Furthermore, forty percent of children with hearing loss have additional disabilities that could limit their linguistic potential (Gallaudet Research Institute, 2011).

Even when a child is diagnosed early and consistently wears appropriate hearing technology, ensuring access to appropriate amounts of language stimulation is still essential. Children who are exposed to more language in their early years have better language skills when they reach school (Hart & Risley, 1995; Hoff & Naigles, 2002; Pan, Rowe, Singer, & Snow, 2005; Rowe & Goldin-Meadow, 2009). Therefore, speech-language pathology sessions for families of children with hearing loss often focus on techniques and strategies that enhance language stimulation. It is especially important
that caregivers of children with hearing loss increase their language production because even with hearing technology, children with hearing loss often miss auditory cues as a result of the degradation of a speech signal due to distance or background noise (Leavitt & Flexer, 1991; Wolfe & Schafer, 2008). Increasing parent-child talk provides children with more opportunities to learn language and vocabulary.

Another potential roadblock to achieving listening and spoken language competence could be a cultural difference between the family being served and the professional providing the service. Specifically, the two might differ in their understanding of language socialization practices, the process through which children learn to become full members of their communities by learning how they are expected to communicate and interact (Ochs & Schieffelin, 1984). For example, Canadian parents are known to encourage their children to produce narratives as a display of independence and individuality while Chinese parents teach interdependence through a more didactic approach to communication (Chao, 1995; van Kleek, 1994). When language socialization practices clash within a therapy session, intervention might be negatively affected (Crago, 1992).

Understanding how language socialization practices influence parent-child talk and how this, in turn, affects speech-language therapy is critical for intervention specialists working in diverse communities like Canada. Most speech-language pathologists are white women trained by professionals from high-income Eurocentric countries (ASHA, 2016; Crago, 1992; Marshall, 2000; Rhoades, Price, & Perigoe, 2004). Therefore, most of the widely used strategies for supporting language stimulation for children with hearing loss are rooted in the language socialization practices of one specific cultural group. As the field of speech-language pathology grows around the world and these techniques are imported into therapy sessions in other cultures, it is vital that consideration is given to how appropriate language socialization practices can be integrated into intervention in order to improve participation and success in listening and spoken language for children from diverse cultural backgrounds. Although many authors have written about improving cultural competency in the training of speech-language pathologists in low- and middle-
income countries by increasing disability awareness and building cross-cultural collaborations (Atherton, Davidson, & McAllister, 2016; Wickenden, 2013; Wylie, Amponsah, Bampoe, & Owusu, 2016), very few discuss the importance of language socialization practices as an important variable in intervention.

The present project provides an example of how parent-child talk is influenced by differences in language socialization and sheds light on the importance of considering culture in speech and language intervention for families of children with hearing loss. To address the research objectives, a new technology, the Language ENvironment Analysis (LENA) System, was used to collect information about how often parents and children with and without hearing loss verbally engaged with each other over a day. The LENA conversational turn count (CTC) measure was used to determine whether or not language socialization practices differed between participants who were recruited in both Canada and Vietnam. The LENA System results were then supplemented through a qualitative interview with each child’s caregiver to provide more context for why families may take more or less turns throughout a day. The project is presented here in the form of three academic manuscripts that respond to six main research questions and one preliminary question.

**Preliminary Question**

1. Is the LENA System’s Conversational Turn Count (CTC) valid for use with Vietnamese speakers?

**Quantitative Questions**

1. Do differences exist in the amount of conversational turns between English-speaking Canadian families living in Canada and Vietnamese-speaking families living in Vietnam when the child is typically developing?

2. Do differences exist in the amount of conversational turns between English-speaking Canadian families living in Canada and Vietnamese-speaking families living in Vietnam when the child has a hearing loss?
3. Do differences exist in the amount of conversational turn taking between Canadian families of typically developing children and families of children with hearing loss?

4. Do differences exist in the amount of conversational turn taking between Vietnamese families of typically developing children and families of children with hearing loss?

Qualitative Question

1. From the perspective of Canadian and Vietnamese parents of children with and without hearing loss, what are the perceptions of the language socialization practices they use with their children?

Mixed Methods Question

1. How does interview data about language socialization from parents of children with and without hearing loss in two different cultures help to illustrate potential conversational turn count differences as calculated by the LENA System?

The first paper in the series, “A Concise Protocol for the Validation of Language ENVironment Analysis (LENA) Conversational Turn Counts in Vietnamese,” addresses the preliminary question regarding the validity of using the LENA-generated conversational turn count (CTC) measure with Vietnamese speakers. The LENA software was originally designed for use with English speakers but has since been validated for Spanish, French, Mandarin, and Korean (Canault, Le Normand, Foudil, Loundon, & Thai-Van, 2015; Gilkerson et al., 2015; Pae et al., 2016; Weisleder & Fernald, 2013; Xu, Yapenal, & Gray, 2009). Of the many variables produced by the LENA System, the conversational turn count was chosen as the most accurate representation of parent-child talk in this study. The Vietnamese language is similar to languages for which the LENA System has previously been proven to be valid, and the conversational turn count algorithm relies on acoustic cues that are considered universal, rather than language specific. It was therefore expected that the conversational turn count would be considered reasonably valid for use compared to the gold standard of human coders.
Once it became clear that the LENA CTC could be used with both Canadian and Vietnamese families, the second arm of this project was initiated. In this study, the frequency of LENA conversational turn counts in Canadian and Vietnamese families of children with and without hearing loss were compared. Previous literature has described Canadian parents as encouraging of their child’s verbal interactions, while Vietnamese families have been depicted as more adult-oriented (Johnston & Wong, 2002; Shohet, 2013). It was expected that the Canadian families would participate in significantly more conversational turns than the Vietnamese families regardless of the hearing status of the child participants. Recently published LENA studies have found that American parents of children with and without hearing loss engage in a similar number of conversational turns in a day (Caskey & Vohr, 2013; VanDam, Ambrose, & Moeller, 2012). This outcome is likely due to early identification, access to hearing technology, and early intervention. These same resources were available to the Vietnamese participants in the location where they were recruited (Canadian Infant Hearing Task Force, 2014; Lam, Stringer, Toizumi, Dang, & McPherson, 2016; Nelson, 2015; Vo et al., 2017). No significant difference in LENA CTC was expected between the families of children with hearing loss and those without, regardless of cultural background. These quantitative results are reported in the second paper in the series, entitled “Using the LENA System to Investigate Cultural Differences in Conversational Turn Count.”

Simply knowing if there is a difference in the number of conversational turns in which families participate is not enough information to allow speech-language pathologists to appropriately adjust their intervention suggestions and strategies. Therefore, a qualitative analysis was conducted to examine how the parents from both cultures who participated in this study perceived the language socialization practices that they used with their children. The qualitative arm was designed to highlight similarities and differences in each culture. The results are reported in the third paper, “A Mixed Methods Investigation of Language Socialization Practices in Families Children with and without Hearing Loss in Vietnam and Canada,” as part of an embedded mixed methods study in which the themes from the qualitative arm were used to elaborate on the quantitative LENA results,
thus providing a more comprehensive picture that attempts to explain why the families in the study might communicate differently based on their language socialization practices.

The three papers presented here contribute to the validity of using the LENA system and other forms of automated vocal analysis in cross-cultural contexts, the utility of adopting mixed methods research approaches and designs in examining parent-child communicative interaction to better understand the beliefs and perspectives that might underlie and influence these practices, and the importance of considering language socialization as an important variable contributing to language acquisition in children. By better understanding how language socialization may influence communication and parent-child interaction, professionals working with families of children with hearing loss will be better able to provide more culturally appropriate and adapted intervention, allowing children with hearing loss to achieve the listening and spoken language levels of their peers regardless of their cultural background.
1.1 References


2. Article 1: A concise protocol for validation of the Language ENvironment Analysis (LENA) System conversational turn count in Vietnamese

2.1 Abstract

**Purpose:** To present a protocol for the validation of the LENA System’s conversational turn count (CTC) for Vietnamese (southern dialect) speakers.

**Method:** Ten families of children between 22 and 42 months old, recruited near Ho Chi Minh City, volunteered to participate in this project. Each child wore the LENA audio recorder at home for a full day. Two native speakers listened to ten-minute extracts of the recordings from each family and labeled conversational turns according to the coding protocol. Their results were compared to the findings from the LENA software.

**Results:** A Spearman’s rank correlation test indicated a strong level of correlation between the LENA software and the human coders ($r_s(18)=.70, p<.001$).

**Conclusion:** The LENA System’s CTC provides a reasonably accurate estimate of conversational turns in Vietnamese recordings, showing that this concise protocol can yield significant results. Discrepancies between the coders and the software are discussed and the strengths and weaknesses of the proposed protocol are highlighted.

**Keywords:** LENA System, Vietnamese, conversational turn-taking
2.2 Introduction

The importance of providing copious amounts of quality language stimulation to very young children has been demonstrated repeatedly in the literature (Gilkerson & Richards, 2008; Hart & Risley, 1995). As a result, speech-language pathologists adhering to evidence-based practice frequently advise parents to increase the amount of talk they engage in with their children. In the past, monitoring these interactions was difficult. Many researchers relied on bulky and invasive home video recordings to observe parent-child talk, clinicians often depended on less reliable parent reports or observations during a session, which may not have simulate the home enviro

In an effort to provide more accurate information, the LENA Research Foundation has designed a tool that allows speech-language pathologists to provide more individual feedback to families attempting to stimulate their child’s language development. The Language ENvironment Analysis (LENA) System includes a small audio recording device that can capture a child’s natural spoken language setting over an entire day. Software then automatically calculates how often adults spoke, children vocalized, and turn taking occurred, among other calculations (Gilkerson & Richards, 2009).

2.2.1 How the LENA System Works

A child wears a LENA digital language processor (DLP) in the pocket of a t-shirt, which keeps the microphone a set distance from his or her mouth. The DLP audio records for up to 16 hours. The recording is then uploaded to the LENA software, which automatically analyzes it using an algorithm-driven model. Based on areas of high acoustic energy, the software parses recordings into sound segments. Using features of human vocalizations such as decibels and pitch, it then sorts these sound segments into eight categories: key child, adult male, adult female, other child, TV/electronic sounds, noise, silence, and overlapping sounds. Overlapping sounds can consist of two speakers vocalizing at the same time or vocalizations in a high amount of background noise (Gilkerson, Coulter, & Richards, 2008). Segments falling into this category are
disregarded in the remaining steps of analysis. To improve accuracy, the segments are then compared to training-models created by human coders in the LENA Research Foundation’s transcription corpus (Gilkerson et al., 2008). Segments are further classified as ‘clear’ or ‘unclear’ through a likelihood-ratio test comparing the sound segment to silence. Segments graded closer to silence are marked as ‘unclear’ and are not counted in higher levels of automated analysis. All segments labeled clear ‘adult male’ or ‘female’ are processed by a speech recognition analyzer to estimate the adult word count (AWC). The analyzer is based on 46 English phones, therefore, AWC may not be accurate in all languages because the software employed to calculate it is language specific. Key child segments, representing the child wearing the device, are additionally categorized as either ‘vocalizations,’ defined by qualities such as rhythm, pitch control, and duration reported to represent universal child speech development, ‘vegetative sounds,’ such as sneezing, burping or breathing, or ‘fixed signal sounds’ indicative of emotional reactions like crying, screaming, or laughing (Gilkerson et al., 2008; Oller et al., 2010). Finally, a conversational turn count (CTC) is calculated by identifying all child vocalizations that occur within five seconds of a clear adult segment unless they are separated by an ‘other child’ segment (Oller et al., 2010). See Xu et al. (2008) for more detail.

2.2.2 Existing Validation Studies

Thus far, only a handful of studies have been published validating the LENA System in languages other than English, including Spanish, French, Mandarin, and Korean (Canault, Le Normand, Foudil, Loundon, & Thai-Van, 2015; Gilkerson et al., 2015; LENA Research Foundation, 2008; Pae et al., 2016; Weisleder & Fernald, 2013; Xu, Yapanel, & Gray, 2009). Most of these studies investigated both AWC and child vocalization count (CVC). Only two additionally analyzed the accuracy of the CTC (Gilkerson et al., 2015; Pae et al., 2016). Sample size for these studies ranges from 10 (Weisleder & Fernald, 2013) to 70 in the LENA Research Foundation’s transcriptional corpus (Gilkerson et al., 2008).
Some validation studies selected regions from full day recordings that were fully transcribed (Canault, et al., 2015; Weisleder & Fernald, 2013), while others were coded by humans to compare to LENA results (Gilkerson et al., 2015; Gilkerson et al., 2008). Regions are defined here as continuous sections of the full day LENA recording extracted for analysis. The length of the region coded or transcribed varied across studies. No consensus has been reached regarding how regions can be selected to be most representative of both the activities engaged in over the full day and the distribution of speech sounds. The LENA Research Foundation’s transcription corpus (Gilkerson et al., 2008) and the French validation study (Canault et al., 2015) both selected regions high in child and adult speech. However, Gilkerson et al. (2008) selected their regions using an algorithm while Canault and her team (2015) had volunteers select regions at random. Pae et al. (2016) selected regions from infants in their home environments and toddlers in a clinical setting. Weisleder and Fernald (2013) selected 20 minute regions from the top-, middle-, and bottom-third of the AWC distribution in their sample, and Gilkerson et al. (2015) selected three five-minute regions with the highest CTC in the morning, afternoon, and evening. By spreading regions over the day, the authors hoped these would be more representative of the full day. Gilkerson’s team (2015) points out, however, that selecting regions with extremely high CTCs also increases the potential for more mislabeled segments, resulting in an unrepresentative sample. Other potential causes of mislabeling might include cultural differences in child-directed speech, unusual environmental conditions, unrepresentative sample selection, contextual factors such as time of day, and poor signal-to-noise ratio (Canault et al., 2015; Gilkerson et al., 2015).

There was also variation in the length of each region selected for analysis. Some of the studies sampled one hour per participant (Gilkerson et al., 2008) while others relied on 10-minute samples (Pae et al., 2016). Regardless of the length of the region, how it was selected, or whether it was fully transcribed or simply coded, each of the validation studies found in the published literature to date has identified a significant correlation between the software and human coders for the measure under investigation. The correlation coefficient in these studies ranged from .92, p<.01 (comparing LENA AWC to human coding in English) in the LENA Research Foundation’s transcription corpus.
(Xu et al., 2009) and .64, \( p < .001 \) in Canault et al., 2015 (comparing LENA AWC to human coding in French) with most results falling around .70 when comparing AWC and CVC to human coders in a variety of languages. The only published studies to report CTC correlations were Gilkerson et al. (2015) and Pae et al. (2016). Both reported that it was necessary to remove outliers in order to achieve a correlation between the LENA System and human coders, \( r = .72, p < .001 \) in Gilkerson et al. (2015) and \( r = .67, p = .001 \) in Pae et al. (2016). We, therefore, expected a correlation coefficient in this range for the pilot validation protocol.

Speech-language therapists often find themselves treating families from a variety of cultural and linguistic backgrounds that differ from their own. Finding assessments that can serve these families can be difficult. The LENA System may be a useful tool in evaluating and monitoring the language development of a child regardless of the family’s background. It may also provide clues about what aspects of language acquisition are related to culture and which are universal. This technology, however, is still being refined. In order to rely on LENA results, human coding and validation testing are required. Before the device can be used with diverse linguistic populations, we must be able to show that software built for English speakers can work in other languages.

2.2.2.1 Validating Vietnamese

This study used Vietnamese as an example language in this pilot protocol to validate CTC. It is the first study to use the LENA System in this language. Vietnamese is a monosyllabic, tonal, syllable-timed language (Tang & Barlow, 2006; Romano, Mairano, & Calabro, 2011). Although there are some reduplicated, compounded, and borrowed multi-syllabic words, each Vietnamese word typically equates to a single syllable. Word order and function words compose all Vietnamese grammatical structures (Nguyen, Laurent, Rossignol, & Vu, 2006; Nguyen & Ingram, 2006). Vietnamese is also tonal. Vietnamese tones rely on contrasts in phonation such as creakiness and breathiness rather than on pitch height alone (Pham, 2003). Creakiness is produced when the vocal folds are tightly compressed during phonation causing lower than normal voicing, and breathiness
is related to the amount of air that escapes from between the vibrating vocal folds. These language specific prosodic features should not impact the LENA algorithm for identifying adult and child speakers in a conversational turn. Other tonal languages, such as Mandarin, have successfully been validated for LENA use (Gilkerson et al., 2015). Additionally, stress in Vietnamese is typically secondary to the prosodic properties of phonological tone. Therefore, Vietnamese, like many tonal languages, is considered syllable-timed. Both Mandarin and French are also syllable-timed and both are valid for use with the LENA System (Abercombe, 1967; Canault et al., 2015; Gilkerson et al., 2015; Romano et al., 2011). Accordingly, this rhythm would not be expected to affect our validation outcomes. Finally, Vietnamese phonology is not expected to impact validity outcomes as there is significant phoneme overlap between Vietnamese and English (Tang & Barlow, 2006). It was therefore expected that the LENA System would be a valid tool to quantify conversational turns in Vietnamese.

2.2.2.2 Validating Conversational Turn Count

This study sought to pilot a concise protocol for validating LENA measures that can be implemented with limited resources by clinicians or researchers hoping to make the technology accessible to a wider population. The authors chose to focus on a single LENA result to reduce the time commitment required for analysis. CTC was chosen as the primary outcome measure for this investigation. CTC identifies acoustic characteristics of adult versus child-spoken productions, which tend to be most closely related to the anatomical size of the vocal tract rather than a specific language (Lee, Potamianos, & Narayanan, 1999). As a result, CTC is likely to remain accurate regardless of the individual language.

While all LENA measures provide compelling information regarding child language development, CTC is particularly intriguing. Many researchers believe parent-child interactions are key to children’s language learning processes (Kuhl, Tsao, & Liu, 2003; Warren & Brady, 2007). Children exposed to more child-directed speech in their first years of life have been found to demonstrate higher overall language and vocabulary
levels as well as higher IQs (Hart & Risley, 1995; Hoff, 2006; Hoff & Naigles, 2002; Hurtado, Marchman, & Fernald, 2008; Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002). Turn taking between children and their parents is therefore a noteworthy feature of conversation that appears to have a large impact on child development (Zimmerman et al., 2009). Of all of the LENA measures, CTC most closely represents these parent-child interactions, making it a logical candidate for validation as it is both intellectually useful and language independent.

Validating all of the LENA functions for one language can be a time consuming and expensive process. However, given the known universal features of language and the nature of the LENA System algorithms, an abridged process may allow for accurate validation. This pilot study posed two questions: 1) Based on previous research, can validation for the LENA System be demonstrated by employing a concise protocol with a small sample, reducing the need for extensive validation studies? and 2) Is the LENA conversational turn count (CTC) valid for use with Vietnamese speakers?

2.3 Methods

2.3.1 Participants

Ten families volunteered to participate in this pilot project. All of the families lived in the Binh Duong Province, Vietnam, outside of Ho Chi Minh City, and were monolingual speakers of the southern dialect of Vietnamese. Five of the children had hearing loss, wore hearing technology, and used listening and spoken language as their primary means of communication. The remaining children had typical hearing as defined by passing a distortion-product otoacoustic emission (DPOAE) test. All of the children passed the Nipissing District Developmental Screening (McLay, 1998), indicating that they had no disabilities other than hearing loss. The children ranged from 22 to 42 months of age ($M=30.5, SD=6.9$) and their mothers represented a range of educational backgrounds. See Table 2.1 for demographic information.
Each child was asked to wear a DLP for at least 12 hours on a day when s/he was at home, as opposed to child care, and in good health. While recording, parents were asked to keep a written log of the activities the child participated in during the day and whom they were with.

2.3.2 Training protocol for human coders

Two Vietnamese-speaking volunteers underwent training to prepare them for the task of coding prior to hearing the Vietnamese recordings. Both volunteers had some level of post-secondary education and had some knowledge of communication developmental delays and disorders. One coder was located in Toronto, Canada and had fluent English skills. The other lived in Ho Chi Minh City, Vietnam and had a conversational level of English. The training protocol was completed in English so that coders could become accustomed to the LENA System’s coding methods with data that has already been shown to be valid.

For training purposes, three five-minute regions with high levels of conversational turns were selected from English recordings that were part of a LENA System pilot project conducted in the Childhood Hearing Loss Lab at the University of Toronto. Each coder was provided with a written set of instructions to follow (detailed below). During training, coders could ask questions, refer to each other’s work, and view the software’s results. Training took between three and five hours. After coding the three regions, both volunteers reported feeling confident in their skills and Vietnamese coding commenced.

2.3.3 Coding protocol

In consultation with the LENA Research Foundation, the authors chose to select two contiguous five-minute regions from each participant, in a manner similar to Gilkerson et al. (2015). It was anticipated that a slightly shorter length would prove faster to analyze
while still providing enough data to show significant results. The LENA Research Foundation provided an SPSS script that ranked each region by number of conversational turns and then randomly selected two continuous regions from the middle 20% for each participant. This process prevented human bias in selection and potentially avoided issues related to the high rates of mislabeling by the LENA software in regions with a significant amount of conversational turns. Gilkerson et al. (2015) suggest that their data sample, selected from segments with high CTCs, may have inadvertently increased the chances of locating a labeling error. By sampling from the middle 20%, this pilot attempted to minimize the possibility of encountering false-positives.

Coding was conducted using Transcriber software (Boudahmane, Manta, Antoine, Galliano, & Barras, 2008). LENA recordings can be easily exported as .trs files into Transcriber, an open source program, which allows for the annotation of speech signals. See Figure 2.1 for an example of how the LENA software segments and labels appear within Transcriber.

A three-stage protocol was implemented with guidance from the LENA Research Foundation based on their previous validation experiences (personal communication, Kim Coulter, LENA Research Foundation, August 18, 2013). The two coders each independently calculated a conversational turn count by following the series of steps listed below:

1) Each five-minute region identified by the algorithm was segmented by change in sound type (speaker, electronic sound, noise, etc.). The coders first segmented the region by placing boundaries in Transcriber at the beginning and end of each distinct sound type. No limitations were placed on segment length at this stage. See Figure 2.2 for an example.

2) Each segment was labeled. While the LENA System uses eight distinct labels (male adult, overlapping noise, other child, etc.), this pilot protocol used only three: *key child* (vocalizations produced by the child wearing the DLP), *adult* (collapsed across both male and female), and *other*. “Other” included crying, vegetative sounds, distant and overlapping sounds, TV and electronic sounds,
other children, noise, and silence. Each segment, created by the boundaries set in step 1, was labeled with a letter: ‘c’ representing the key child, ‘a’ representing adult speech, and ‘x’ representing other sounds. See Figure 2.2 for an example.

3) Finally, the coders counted conversational turns. All instances where segments coded as ‘a,’ that were longer than 0.9 seconds, and occurred within five seconds of a segment coded as ‘c,’ that was more than 0.5 seconds long, were counted as a turn. Any segment occurring between speakers was required to be five seconds or less and could only be labeled ‘x’ to be considered a turn. Therefore, ‘x’ segments did not prohibit turns. Utterance lengths were originally set according to LENA specifications, one second for adults and .6 seconds for children (Oller et al., 2010; Personal communication, Krista Ingle, LENA Research Foundation, September 25, 2013). However, during protocol development it appeared that shortening the times by one millisecond yielded more accurate results. The initiating utterance, whether produced by the adult or the child, was labeled with a ‘0’ and the response was labeled with a ‘1.’ See Figure 2.2 for an example. After this step was complete, the coder counted the number of 1s to calculate the number of turns within the region.

The coders did not produce a transcription of the recording. Instead, they coded the elements used by the software to calculate CTC. Validation studies conducted by members of the LENA Research Foundation have used this method in the past (Gilkerson et al., 2015; Gilkerson et al., 2008). Similar to the LENA software, this protocol labeled occurrences of overlapping speech or noise as ‘other.’ Any speaker segments that may have qualified as part of a possible turn were disqualified for having occurred in a noisy auditory environment. This is a limitation of the software as well as the pilot protocol.

Both coders were volunteers and worked on the protocol part-time when it was convenient for them. Coding of the entire data set took roughly two months. Inter-rater reliability was 20%. Seventy-one percent of disagreements between coders were related to a speaker (“adult” or “key child”) vs. “other” label (Step 2 in the protocol). Twenty-one percent of disagreements were over segment length, which impacted whether an adult
utterance or a child vocalization could be counted within a turn (Step 1 in the protocol). Remaining mis-matches were related primarily to coder error on Step 3: failing to count a turn that had successfully been coded. The first author, therefore, identified 108 locations where the coders disagreed with each other on the identification of a turn (per 5 minute region: \( M=5.4, SD=2.9 \)). She then facilitated a videoconference in which the coders came to an agreement on those segments. The meeting lasted approximately 3.5 hours.

2.4 Results

All recordings were collected in June and July of 2014. The recordings ranged from 12 hours to 14 hours 22 minutes (\( M=13 \text{hrs 9mins}, SD=57\text{mins} \)). There was no significant difference in full day LENA calculated CTCs between the children with and without hearing loss (\( U=15, p=.69 \)). This is consistent with previous research comparing the LENA results of children with and without hearing loss in the United States (Caskey & Vohr, 2013; VanDam, Ambrose, & Moeller, 2012). Results from both groups were therefore pooled for analysis.

LENA results for the number of conversational turns per region ranged from zero to five (\( M=2.5, SD=1.54 \)), while the human coders’ results ranged from zero to six turns (\( M=1.75, SD=1.71 \)). CTC results from the human coders and the automated LENA data were compared using a Spearman’s rank correlation test. The findings showed a strong correlation between the LENA System and the human coders (\( r_s(18)=.70, p<.001 \)) (See Figure 2.3). There was no significant difference between the LENA System’s turn count and that of the human coders (\( U=143, p=.12 \)). However, unlike the LENA Research Foundation’s own validation study (Xu et al., 2009), the software’s counts were, on average, .75 turns higher than the coders’. There was no need to remove outliers in the data set, as was done in the Mandarin and Korean studies (Gilkerson et al., 2015; Pae et al., 2016).
Within the audio samples, LENA software reported that 8% of the regions were child speech, 5% were adult speech, 16% were electronic sounds, 3% were silence, and 18% were unclear and distant vocalizations, other children, and general noise like bumps. Fifty percent were labeled as overlapping speech. Due to the nature of the pilot protocol, similar information related to human coding is unavailable. However, of the turns identified by the coders, 33% of the disagreements with the LENA System were labeled as overlapping noise and 8% were labeled crying, other children, or TV, by the software. Three percent occurred when the LENA System labeled an adult as a child. The remaining segments showed agreement between the coders and the machine.

The data was examined post-hoc to identify sound type, if any, between the initiator and respondent in the counted conversational turns. The coders found no segments between the initiator and respondent in 63% of the turns. The remaining turns included intermediary segments that were less than five seconds long and labeled with an ‘x’ in compliance with the protocol. Twenty-three percent of all the turns were separated by noise, 12% were separated by overlap, and 3% were separated by TV. None of the speakers were separated by an ‘other child’ segment.

Half of the analyzed regions were selected from between 7am and noon and half represented times between noon and 8:30pm. According to the daily logs, the selected regions represented activities all families commonly engaged in. Three samples represented play with either an adult family member or another child, three represented eating a meal or snack, and two reported visits with extended family members. The final two samples were shopping and studying respectively. Shopping, like playing, eating, and visiting, appeared on almost every log. Daily trips to the market to buy fresh food are a regular part of life in Vietnam. Study time was seen frequently on the daily logs of children with hearing loss and likely represented times at which parents were focused on teaching their children language skills. Other activities that were regularly reported included napping, which did not create a lot of conversational turns for obvious reasons, bathing, which may not have demonstrated high CTCs because the DLP was removed from the child to protect the technology from water damage, and television viewing,
which is known to reduce CTCs (Christakis et al., 2009). The algorithm was therefore able to select regions that represented the types of activities in which families in Vietnam typically participated.

2.5 Discussion

The correlation between the LENA software and human coders based on 100 minutes of audio provides justification for the use of the LENA generated CTC with Vietnamese speakers. This section addresses issues that arose in the pilot project that may require further investigation, such as coder training and representative sampling. The impact of cultural differences on parent-child interactions and daily living, which may affect LENA analysis, are also discussed.

None of the currently published LENA validation studies detail how their coders or transcriptionists were prepared. By sharing our training protocol here, we hope to make the process more transparent and encourage more discussion around training practices for coding LENA data. Future research implementing training protocols for coders should consider more intensive practice to ensure higher levels of initial agreement. Reviewing the entire data set rather than just possible turns might also be beneficial. Training within the test language may improve results as well.

Although the sample size used in this study was small, the correlation was highly significant ($r=.7, p<.001$), indicating that a larger sample may not be necessary. Moreover, the LENA System software was designed to statistically analyze 10 to 16 hour recordings, substantially longer than a five-minute region. A larger region, like the ones that would be obtained through typical LENA use, would likely show even higher levels of correlation between human coders and the LENA generated CTC in any language (Canault et al., 2015; Xu et al., 2008). While some researchers argue that a correlation coefficient of 0.70 may seem relatively low and could potentially be increased by continued data collection, it is well within the range of correlation results obtained in
studies of other languages (Canault et al., 2015; Gilkerson et al., 2015; LENA Research Foundation, 2008; Pae et al., 2016).

This study yielded positive results for clinicians and researchers who are interested in validating the LENA System in other languages. However, a number of issues arose in this pilot project that may require further investigation. Replicating this protocol with a different set of participants may be of interest in future research. While there was no significant difference between the CTCs of children with and without hearing loss, validating the LENA System with a more homogeneous sample could be explored. Parents of children with hearing loss may have been instructed, during speech-language therapy sessions, to engage with their child in a certain manner that could impact turn taking. The LENA System has been validated for English speakers between 2 and 36 months old (Xu et al., 2009). Future validation for Vietnamese should expand its age range to at least match this age range. Sampling regions from more time points throughout the day may also create an even more representative sample of parent-child talk in Vietnam.

Surprisingly, perhaps, the largest discrepancies between the coders and the LENA software may not be directly related to the phonetic or phonologic make up of the language in question. Culture, as Gilkerson et al. (2015) point out, may play a role in LENA results. For example they explain that, in Mandarin, adult female/key child confusions are common and are likely related to a rise in pitch associated with the use of ‘motherese.’ Due to the simplified coding system used in the current study, there was no way to confirm whether or not a similar coding error pattern occurred in Vietnamese, as the coders did not distinguish between male and female adult speakers. It does appear, however, that a small number of the disagreements between the coders and the LENA System were examples of adults being labeled as children. Vietnamese and Chinese people have been in contact for thousands of years, which has impacted their language use (Alves, 2001; Womack, 2006). Therefore, we could speculate that the likelihood of similar cultural practices around motherese could be expected and the impact of these customs on LENA CTCs could potentially be similar for both groups.
While simplified labeling protocol can be useful, the resulting lack of detail does make it more difficult to describe possible causes for disagreement between the human coders and the LENA results. Although not essential for calculating CTC, asking coders to label the gender of the adult speaker in future validation studies using this protocol may represent a small adjustment that could add significantly to the understanding of the larger LENA analysis. This change would allow investigators to examine issues like the one brought to light by Gilkerson et al. (2015) regarding motherese. Additionally, LENA software does not count a turn if a segment labeled ‘other child’ separates the speakers. Although this pattern did not occur in the present data set, future studies implementing a similar protocol should include ‘other child’ in their labeling scheme to avoid mismatches; aligning the coding methodology more closely with the software program.

Previous literature has noted that a noisy environment can negatively affect correlation between LENA outcomes and human coders (Canault et al., 2015; Xu et al., 2009). Including recordings made in noise in validation is important, however, as the LENA System is designed to capture a child’s natural environment, which is often noisy. Validating LENA results in noise allows for better generalization of results in the natural environment. Future studies may test Vietnamese in a quiet environment to fine-tune the automated software.

Most of the disagreements between the coder-identified turns and the software’s results involved the LENA System labeling a speaker as overlapping noise. Past research has reported similar deviations in agreement when there are a large number of overlapping segments (Canault et al., 2015; Xu et al., 2009). According to the LENA results, 50% of the segments in this sample were labeled as overlapping noise, while only 18% were labeled as such in the Mandarin sample (Gilkerson et al., 2015). While overlapping noise does not always impede the identification of a turn, as mentioned earlier, if an adult and the child are participating in verbal exchanges in a noisy environment, the LENA System will likely label those segments as overlapping noise (and the present protocol would label them as ‘other’). In this case, the potential turns would not be included in the CTC.
This is a limitation of both the LENA System and the protocol, which may be especially salient in Vietnamese homes. As is common in Asia, many Vietnamese households include extended family members. The homes sampled for this study were comprised of two to fourteen adults ($M=4.1$, $SD=3.7$) and up to four other children in addition to the key child ($M=1.1$, $SD=1.2$). We suggest larger families lead to more occasions for overlapping speech, which both the LENA software and the human coders struggled to label. Additionally, the activities the Vietnamese families participated in throughout the day, such as going to the outdoor market, may create more instances for overlapping noise than the American families in the Natural Language Corpus (Gilkerson & Richards, 2009).

In addition to its inhabitants, the physical characteristics of the home itself may also play a role in the amount of overlapping sound recorded by the LENA System. Southern Vietnam is hot and humid, and therefore homes tend to have open windows and large entranceways open to the street. The houses have concrete walls, tile floors, and hard wooden furniture to keep the home cool. This creates loud reverberating environments. Additionally, houses often have tin roofs that generate a great deal of noise during the rainy season, when these recordings were produced. We suggest, in combination, these living arrangements may have had an impact on the accuracy of both the LENA System and the pilot protocol by creating a noisy auditory environment that was difficult to parse. Future studies conducted in other non-Western communities may need to account for the physical home environment when interpreting LENA results.

By disregarding potential turns, CTC results may be underrepresenting the amount of communicative interactions the child is engaged in. Although not significant, the LENA software did overestimate turns compared to the human coders. This might reflect how difficult the coders found distinguishing speakers from background noise. However, slightly overvaluing turns may also be a strength of the software, which allows it to compensate for turns lost to overlapping noise. Given the small sample size in this pilot, further data collection should be completed with Vietnamese families to confirm that this
amount of overlapping noise is not unique to this data set and that a significant number of turns have not been lost.

Alternatively, LENA results that disregard speech segments in noise may be reflective of the amount of language a child is capable of processing. Children with and without hearing loss often struggle to learn language from stimulation presented in noise (Klatte, Bergstrom, & Lachmann, 2013; Manlove, Frank, & Vernon-Feagans, 2001; Maxwell & Evans, 2000). Therefore, LENA results may, in fact, be more representative of what a child is able to understand rather than what has simply been presented. Viewed from this perspective, discounting turns in overlapping segments may be a strength of the LENA System rather than a limitation. Further testing is needed to confirm this hypothesis.

These considerations emphasize the importance of understanding the culture, lifestyle, and environment of those using the LENA System in order to correctly interpret the results. When culture is accounted for, however, this proposed simplified validation protocol could be useful to researchers and clinicians who may have minimal resources to validate basic elements of the LENA System, such as CTC, both quickly and efficiently. This pilot demonstrates that a small sample size can produce a statistically significant result.

2.7 Conclusion

The LENA System is an exciting new tool that can provide detailed information about a family’s language environment. Despite using a small sample size, the results obtained through the pilot protocol presented here show support for the use of the LENA CTC in Vietnamese. This procedure could be adapted by other researchers who are looking for a less labor-intensive method to investigate CTC in other languages. However, more intensive coder training, a slightly more detailed coding protocol, and a larger and more representative sample could add to future research. By validating the LENA device for a variety of languages used by diverse cultural groups, we may eventually be able to
generate a fuller understanding of the universals as well as the individual cultural
practices involved in child language development, which may also help to provide service
to families seeking speech and language intervention.
Table 2.1. Demographics in the validation study

<table>
<thead>
<tr>
<th></th>
<th>Age in months</th>
<th>Gender</th>
<th>Maternal education</th>
<th>Hearing status</th>
<th>Hearing technology</th>
<th>Adults in the home</th>
<th>Children in the home²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22</td>
<td>M</td>
<td>College</td>
<td>Passed DPOAE¹</td>
<td>N/A</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>31</td>
<td>M</td>
<td>High School</td>
<td>Passed DPOAE</td>
<td>N/A</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
<td>M</td>
<td>College</td>
<td>Passed DPOAE</td>
<td>N/A</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>M</td>
<td>University</td>
<td>Passed DPOAE</td>
<td>N/A</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>29</td>
<td>M</td>
<td>&lt;High School</td>
<td>Passed DPOAE</td>
<td>N/A</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>22</td>
<td>M</td>
<td>&lt;High School</td>
<td>Bilateral Profound</td>
<td>Bilateral Hearing Aids</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>36</td>
<td>F</td>
<td>High School</td>
<td>Bilateral Profound</td>
<td>Right Side Cochlear Implant; Left Side Hearing Aid</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>39</td>
<td>M</td>
<td>High School</td>
<td>Bilateral Profound</td>
<td>Bilateral Hearing Aids</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>42</td>
<td>M</td>
<td>College</td>
<td>Right ear: Severe Left ear: Profound</td>
<td>Bilateral Hearing Aids</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>30</td>
<td>M</td>
<td>High School</td>
<td>Right ear: Profound Left ear: Severe</td>
<td>Bilateral Hearing Aids</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

¹ Distortion product otoacoustic emission (DPOAE)
² Not including the key child
This screenshot of Transcriber software demonstrates 1) segmentation and categorization of sounds, 2) the audio file, and 3) interaction information (number of turns, initiating speaker, etc.).
Example Turn*:

**Adult:** Anh, đó thấy chưa? Ai đây con?
Older Brother, you see? Who's this?

**Child:** ai đó?
Who's that?

*This turn was transcribed and translated for example purposes only. The full recordings were not transcribed.

This screenshot demonstrates how Transcriber was used by human coders to 1) segment the audio signal, 2) label each segment, and 3) count turns.
Figure 2.3: Correlation between LENA System’s CTC and human coder’s CTC
2.7 References


3. Article 2: Using the Language ENvironment Analysis (LENA) System to investigate cultural differences in conversational turn count

3.1 Abstract

**Purpose:** This study investigates how the variables of culture and hearing status might influence the amount of parent-child talk families engage in throughout an average day.

**Methods:** Seventeen Vietnamese and eight Canadian families of children with hearing loss and seventeen Vietnamese and thirteen Canadian families with typically developing children between the ages of 18 and 48 months old participated in this cross-comparison design study. Each child wore a Language ENvironment Analysis (LENA) System digital language processor for three days. Automated vocal analysis then calculated an average conversational turn count (CTC) for each participant as the variable of investigation. The CTCs for the four groups were compared using a Kruskal-Wallis test and a set of planned pairwise comparisons.

**Results:** The Canadian families participated in significantly more conversational turns than the Vietnamese families. No significant difference was found between the Vietnamese or the Canadian cohorts as a function of hearing status.

**Conclusions:** Culture, but not hearing status, influences conversational turn counts as derived by the LENA system. Clinicians should consider how cultural communication practices might influence their suggestions for language stimulation. Further qualitative research presented in Article 3 illustrates why such differences might exist.
3.2 Introduction

Language acquisition in children is dependent upon the provision of abundant linguistic stimulation within a context of communicative interaction (Chomsky, 1993; Snow, 1994). While children are faced with enormous variation in their linguistic and social environments (Hart & Risley, 1995; Hoff & Naigles, 2002), the language acquisition process and developmental sequence nevertheless remains robust for almost all children (Chomsky, 2002; Skinner, 2015). Understanding the sources of variation in the language input provided to children is an important aspect of understanding the universalities of language acquisition as well as in providing appropriate intervention strategies for children at risk for language related disabilities.

Parent-child interactions play a vital role in child language development (Hart & Risley, 1995; Hoff & Naigles, 2002; Hurtado, Marchman, & Fernald, 2008; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Kuhl, Tsao, & Liu, 2003; Warren & Brady, 2007). Children who hear more words in their early years of life have been shown to have higher language scores, academic skills, and IQs by school age (Hart & Risley, 1995). Exposure to larger amounts of child-directed speech has also been shown to improve a child’s vocabulary skills (Pan, Rowe, Singer, & Snow, 2005; Rowe & Goldin-Meadow, 2009). The overall quantity of child-directed speech is additionally associated with more diverse and rich language input, aspects of linguistic quality that further influence language development (Hoff & Naigles, 2002).

Quantity and quality of adult-child interactions are affected by a number of different factors. Variables including socioeconomic status (SES) and maternal education levels have been shown to influence the amount and richness of the language input a young child receives (Hart & Risley, 1995; Hoff, 2003; Hoff-Ginsberg, 1994; Rowe, 2008). The caregiver’s literacy level, age, and mental health also appear to result in variation in linguistic input (Pan, Rowe, Singer, & Snow, 2005; Rowe, 2012; Rowe, Pan, & Ayoub, 2005). Although these variables may cause disparities in the amount of communicative interaction and conversational turn taking that occurs within a family, typically
developing children nevertheless achieve language skills following the expected
developmental sequence and range for their age.

Advances in methodology for studying language acquisition, including automated vocal
analysis, have confirmed and added to the research base on the important influences
affecting language stimulation. Weisleder and Fernald (2013) combined traditional
vocabulary testing, automated vocal analysis, and a look-while-listening task (Fernald,
Zangle, Portillo, & Marchman, 2008) to demonstrate that children who experience more
linguistic stimulation at home have faster language processing times. Similarly,
Greenwood, Thiemann-Bourque, Walker, Buzhardt, and Gilkerson (2011) and
Zimmerman et al. (2009) used automated vocal analysis to show that children who
participated in more conversational turns with adults during the day produced more
vocalizations and had higher language outcomes on standardized assessments.
Conversational turn taking is therefore currently regarded as being another important
variable that plays a significant role in child language learning.

A further variable that has been found to influence and shape caregiver-child interactions
is that of culture (Scheifflin & Ochs, 1986). Families from different cultural backgrounds
have been found to participate in different amounts of child-directed speech and expect
different types of responses and behaviours from their children. For example, parents
from Eurocentric cultures regularly engage in child-centred interactions with their
children and encourage them to take the lead in conversations (Golinkoff, 1983; Kuchner,
1981; Schieffelin & Ochs, 1986; Winskel, Luksaneeyanawin, & Yangklang, 2006). In
contrast, Chinese adults are more likely to dominate conversations with children (Chao,
1995; Miller, Jung, & Mintz, 1996; Mullen & Yi, 1995; Wang, Leichtman, & Davies,
2000; Wu, 1985; Xu et al., 2005). Consequently, caregivers may participate in differing
amounts of conversational turns with their children depending on their cultural
background.

This does not suggest, however, that one style of communication is better than another.
While variation observed in parent-child talk across different cultures might lead to
differences in child language input, these do not result in a deficit. Despite variables like SES and culture impacting parent-child interactions, typically developing children in all cultures grow up to be fluent speakers of their native language in roughly the same developmental timeframe (Brown, 1973; Chomsky, 2002; Skinner, 2015).

3.2.1 Parent-Child Talk and Hearing Loss

Children with various types of disabilities may not reach the same language levels as their typically developing peers. A child’s cognitive ability has been shown to influence the amount and richness of the parent-child talk to which they are exposed (Song, Spier, & Tamis-Lemonda, 2013). Parents of children with autism spectrum disorder and Down syndrome, for example, have been found to participate in fewer conversational turns with their children than parents with typically developing children (Thiemann-Bourque, Warren, & Brady, 2014; Warren et al., 2009). Fewer opportunities to participate in conversational turn taking can make language acquisition even more challenging for populations that may already be at risk for language disorders.

Children with hearing loss who have no other disabilities, on the other hand, are cognitively intact (Gallaudet Research Institute, 2011). A hearing loss is a disability related specifically to linguistic access. Without the appropriate technology to hear spoken language, such as hearing aids or cochlear implants, the child will not be able to learn to use spoken language to his/her full potential. It is, therefore, especially important that children with hearing loss receive an appropriate amount of language stimulation. Without adequate language access and exposure, children with hearing loss are at risk for delays in the development of spoken language (Cupples et al., 2016; Tomblin et al., 2015).

Older research showed that parent-child talk often decreased after a child was identified as having a hearing loss (Lederberg & Mobley, 1990; Meadow, 1981; Wedell-Monnig & Lumley, 1980). Upon diagnosis, many parents fall into a cycle of grief that was seen to prevent them from engaging with their child and providing the amount of language
stimulation that they would have given a typically developing child (Moses, 1985; Moses & Van Hecke-Wulatin, 1981). More recent studies, however, suggest that, while parents may still feel grief upon diagnosis, American families of children with hearing loss talk to their children with the same frequency they would use with typically developing children (Caskey & Vohr, 2013; VanDam, Ambrose, & Moeller, 2012). The positive changes in parental input have been attributed to advancements in the early identification of hearing loss, appropriate hearing technology, and early intervention, which together allow children with hearing loss to develop listening and spoken language skills at a similar rate and in a similar developmental sequence to their hearing peers (Geers & Nicholas, 2013; Yoshinaga-Itano, 2003).

Nevertheless, even with early diagnosis and the best hearing technology available, children with hearing loss may be at risk for delays in their communication development as a result of auditory deprivation (Dettman et al., 2016; Niparko et al., 2010). The ear is fully developed at five-months gestation, so that a full-term baby with typical hearing is born with over 20 weeks of auditory exposure (Gordon & Harrison, 2005; Hepper & Shahidullah, 1994; Moon, Lagercrantz, and Kuhl, 2013). Thus, even infants who are fitted with amplification in their first few months of life may still be many months behind their peers in auditory experience. This type of sensory deprivation can cause a language delay that would require an abundance of language exposure to remediate. Additionally, even with the most up-to-date hearing technology, speech in noise or at a distance may cause children to struggle to access the child-directed speech their caregivers provide (Leavitt & Flexer, 1991; Wolfe & Schafer, 2008). Therefore, parents must be conscious of speaking more directly to their children with hearing loss with the aim of ensuring that the child has heard and processed the message auditorily. In order to ‘close the gap’ between the amount of language stimulation a child with hearing loss receives as compared to a typically developing peer, parents are often encouraged to expose their children to significantly more child-directed speech than they would to a typically developing child (Cole & Flexer, 2016). As a result of these intervention suggestions, caregivers of children with hearing loss are expected to engage in conversational turns at a rate similar to, or even higher than, those provided to typically developing children.
3.2.2 Hearing Loss in Vietnam

The prevalence of hearing loss in children under 14 years in the Asian Pacific region remains more than four times that found in high-income countries (Stevens et al., 2011). In spite of this high prevalence, however, in Vietnam and other low- and middle-income countries (LMICs), early diagnosis of a disability like hearing loss is rare (Villa et al., 2003). Public health systems in LMICs must often prioritize more life-threatening health concerns over newborn hearing screenings (Olusanya, Luxon, & Wirz, 2004). Therefore, hearing loss in countries like Vietnam is typically identified later than in more high-income countries like Canada, which can lead to more significant delays in language development and an associated reduction in a child’s ability to participate in verbal interactions (Lam, Stringer, Toizumi, Dang, & McPherson, 2016; Yoshinaga-Itano, 2003). Furthermore, once a child has received a diagnosis of hearing loss, obtaining appropriate hearing technology can be out of reach for many Vietnamese families. Hearing aids, cochlear implants, and their associated maintenance costs are often prohibitively expensive for many families (Vo et al., 2017).

Furthermore, when a variable such as hearing loss, which can have an effect on parent-child talk, intersects with a variable like culture, which also plays a role in caregiver-child interactions, recommendations regarding how language stimulation should be provided may need to be altered. While many families are beginning to access early intervention services, a number of researchers have found that Vietnamese professionals specifically working with children with hearing loss do not currently have the training to provide services at similar levels to those available in many high-income nations (Hang, 2013; International Centre for Disability and Rehabilitation, 2015; Le, 2013; Nelson, 2015; Shin & Duc, 2016; Tran, Ta, Dao, & Hoang, 2013). Therefore, Vietnamese families of children with hearing loss are less likely to be receiving appropriate guidance regarding the language stimulation they should be providing to their child.
Vietnam has enjoyed significant economic growth over the past 25 years (World Bank, 2016). Healthcare and education are becoming more accessible and Vietnamese people are becoming more accustomed to the idea that children with disabilities can be successfully integrated into the community (Mestechkina, Son, & Shin, 2014). As the Vietnamese standard of living rises, the demand for intervention services is also increasing (TNS & United Nations Children’s Fund, 2009). In response to the gap between those who need services and those who are able to provide them, a number of organizations from high-income Eurocentric countries have begun to provide training to Vietnamese professionals working with children with hearing loss (Atherton, Nguyen, & Vo, 2013; Stringer, 2017; Vo et al., 2017). As yet, however, there is very little research on parent-child talk and interaction in families of children with hearing loss in LMICs, including Vietnam that might inform such programs. Many courses developed by Eurocentric organizations to train professionals are based on an incomplete understanding of how parents and children communicate within Vietnamese culture. Similar to Chinese families, parent-child talk in Vietnam tends to be adult dominated (Shohet, 2014). Communication practices like these would be likely to influence the amount of interactions and conversational turns Vietnamese families participate in during the day. Ignoring such an important difference could result in a breakdown in the appropriateness of intervention provided to Vietnamese families (Crago, 1992). In order to be able to offer suitable and supportive recommendations to families of children with hearing loss, professionals working with families from cultures that differ from their own must become aware of the cultural variables that have been shown to influence parent-child communicative behaviors.

3.2.3 The LENA System

Past research examining parent-child interactions was usually conducted via cumbersome and invasive video recordings that required hours to transcribe and analyze (Hart & Risely, 1995; Keller et al., 2007). New technology now allows researchers access to data about a family’s language use throughout the day much more efficiently and unobtrusively. The Language ENvironmnet Analysis (LENA) System is a new
automated vocalization analysis device that can audio record the child’s language environment for up to 16 hours. The child wears a small digital language processor (DLP) in a specially designed t-shirt (Gilkerson & Richards, 2009). When recording is completed, the data are uploaded to a computer via USB, where the software conducts a series of automatic analyses to derive various measures including a conversation turn count (CTC), the measure of primary importance in the present study (Gilkerson & Richards, 2009). The LENA System identifies a conversational turn by locating instances when a child vocalizes within five-seconds of an adult utterance, uninterrupted by another speaker (Oller et al., 2010). Of the measures calculated by the LENA System, CTC is designed to most closely represent caregiver-child verbal interactions, as it is assumed that when adults and children talk in such close proximity they are listening and responding to each other. In addition to CTC and counts of adult words and child vocalizations, the LENA System also provides percentages of the types of sounds that the child was exposed to during the day including meaningful speech from the key child and those around her, distant speech including overlapping noise or faint speech, noise, TV and electronic sounds, and silence, which may also include some faint noise or TV sounds (personal communication, Kim Coulter, LENA Research Foundation, May 4, 2017). The LENA System has been validated for English speakers and the CTC has been validated for Vietnamese speakers (Ganek & Eriks-Brophy, 2017; Xu, Yapenal, & Gray, 2009).

The LENA System has been used extensively to investigate various aspects of parent-child talk and interaction. In addition to intervention programs specifically designed to increase conversational turn taking (Pae et al., 2016; Sacks et al., 2013; Suskind et al., 2013; Zhang et al., 2015), LENA studies have demonstrated how joint book reading and pre-school classes can increase adult-child interactions (Gilkerson, Richards, & Topping, 2015; Wiggin, Gabbard, Thompson, Goberis, & Yoshinaga-Itano, 2012). Television, on the other hand, has been found to have a negative effect on parent-child talk when the child was typically developing (Christakis et al., 2009). Similarly, Ambrose, VanDam, and Moeller (2014) used the LENA System to demonstrate that television negatively correlates with language levels in children with hearing loss. Other LENA Studies have
been conducted to further investigate parent-child talk with children with hearing loss (Ambrose, VanDam, & Moeller, 2014; Aragon & Yoshinaga-Itano, 2012; Caskey & Vohr, 2013; Suskind et al., 2016; VanDam et al., 2012; Wiggin et al., 2012). LENA data have also revealed that the amount of conversational turns taken throughout a day can vary by cultural-linguistic group (Aragon & Yoshinaga-Itano, 2012).

3.2.4 Objectives

The present study provides an example of how families living in different societies might communicate differently with their children, with Vietnam and Canada serving as test cases. The study investigates the LENA derived conversational turn count in an attempt to identify differences in communicative interaction utilized by parents of children with and without hearing loss in both Canadian and Vietnamese cultures. The study addresses four research questions:

1. Do differences exist in the amount of conversational turns between English-speaking Canadian families living in Canada and Vietnamese-speaking families living in Vietnam when the child is typically developing?

2. Do differences exist in the amount of conversational turns between English-speaking Canadian families living in Canada and Vietnamese-speaking families living in Vietnam when the child has a hearing loss?

3. Do differences exist in the amount of conversational turn taking between Canadian families of typically developing children and families of children with hearing loss?

4. Do differences exist in the amount of conversational turn taking between Vietnamese families of typically developing children and families of children with hearing loss?
3.3 Methodology

3.3.4 Participants

This study includes four cohorts: Canadian and Vietnamese children with and without hearing loss. Vietnamese families were recruited with the help of the Global Foundation for Children with Hearing Loss (GFCHL), an American NGO supporting professionals working with children with hearing loss in low- and middle-income countries. Vietnamese children with hearing loss were recruited from the Thuan An Centre for Disabled Children, a government-run early intervention centre for families of children with hearing loss in the Binh Duong Province, near Ho Chi Minh City, Vietnam. Typically developing Vietnamese children were recruited from the Hoa Lan Private Kindergarten, a Catholic preschool, located across the street from the Thuan An Centre. Typically developing Canadian children were recruited through drop-in centres, libraries, and early learning centres in the greater Toronto area. Canadian children with hearing loss were recruited through hospitals, intervention centres, and private practices in Toronto and Windsor, Ontario and Vancouver, British Columbia.

All children recruited for this project were between 18 and 48 months old and had no known developmental delays, regardless of hearing status, as measured by the Nipissing District Developmental Screen (NDDS), which has been shown to be valid for use with diverse cultural groups (McLay, 1998).

All families were primarily monolingual speakers of Vietnamese or English and parents were born in either Vietnam or Canada, respectively. Children with typical hearing were defined as those who passed a noninvasive distortion product otoacoustic emission (DPOAE) hearing screening at 2000, 3000, and 4000Hz using the Bio-logic Systems Corp’s AuDX system. Parents of children with hearing loss reported using spoken language as the child’s primary means of communication and all of these children wore hearing technology. Children were matched for age and gender. Although maternal
education, age of diagnosis, age of amplification/implantation, and type of hearing technology have been shown to affect language outcomes and therefore might impact conversational turn taking, we were unable to match based on these criteria due to underlying differences in the education and healthcare systems of the two countries (Dettman et al., 2016; Hart & Risley, 1995; Montes et al., 2017; Yoshinaga-Itano, 2003). See Table 3.1 for additional demographic information.

3.3.5 Procedure

The first author met with each family in person to obtain informed consent. Meetings with families in Windsor, ON and Vancouver, BC occurred over the phone. Meetings in Vietnam were conducted with the aid of an interpreter and translated copies of consent forms were provided to Vietnamese families. Parents completed a demographic interview and the NDDS in this first meeting. Typically developing children also received a DPOAE hearing screening at this time. Each family was then provided with three DLPs and t-shirts. Parents were instructed to turn the device on in the morning on the days they wished to record, insert it in the t-shirt, and record for at least 12 hours, behaving as they typically would. Twelve-hour recordings have proven to be significantly more accurate than shorter recordings (Warren et al., 2009; Xu, Yapanal, & Gray, 2009). Families recorded on three days over a two-week period when the child was healthy and at home (i.e. not in a childcare setting). Parents chose which days within the 2-week period they wished to record. Each family received a children’s book as a thank you gift for participating.

After the recordings were complete, the first author collected the DLPs and uploaded them to the LENA software for automatic analysis. The 12-hour projected CTC calculated by the software was averaged over the three days to control for variability in length of recordings and variation between days. This averaged CTC count was used in the statistical analyses that follow.
Along with the recruited participants, there were a number of families who were recruited for this study who either did not respond to the authors attempts to contact them, declined to participate (usually due to scheduling conflicts), did not meet recruitment criteria (primarily age, gender, or developmental level), or chose to drop-out of the study during data collection. These families’ data are not included in this analysis. See Table 3.2 for further details.

3.4 Results

Conversational turn counts averaged over three days were collected from 17 Vietnamese families of children without hearing loss (CTC $Mdn=268$, $IQR=135$), 17 Vietnamese families of children with hearing loss (CTC $Mdn=336$, $IQR=414$), 13 Canadian families of typically developing children (CTC $Mdn=968$, $IQR=564$), and 8 Canadian families of children with hearing loss (CTC $Mdn=763$, $IQR=227$). The children ranged from 22 to 47 months and did not differ significantly by age ($H(3)=3.469$, $p=.325$). While the Canadian families had a higher and more homogeneous maternal education level as compared to the Vietnamese families, within the Vietnamese cohorts, maternal education did not correlate with conversational turn count ($r_s(32)=.209$, $p=.236$).

A Kruskal-Wallis test comparing the averaged CTCs as a function of hearing status and culture indicated a significant difference in CTC between the four groups ($H(3)=27.707$, $p<.001$), as shown in Figure 3.1. A series of planned comparisons were conducted to respond to the specific questions posed by this research. Results obtained using Mann-Whitney U-tests indicated a significant difference between the CTCs in the typically developing Canadian and Vietnamese groups ($U=217$, $p<.001$). There was also a

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1 Due to the restricted age range of the participants from whom data were collected, no analysis of correlation between age and CTC was conducted.
2 Kruskal-Wallis tests indicated similar findings for CTC on each separate day: Day 1: $H(3)=27.053$, $p<.001$; Day 2: $H(3)=24.202$, $p<.001$; Day 3: $H(3)=26.594$, $p<.001$
3 Similar results were found between Canadian and Vietnamese families with typically developing children on each separate day: Day 1: $U=9$, $p<.001$; Day 2: $U=9$, $p<.001$; Day 3: $U=8$, $p<.001$
significant difference in CTC between families of children with hearing loss in the two cultures ($U=27, p=.016$)\(^4\). Regardless of hearing status, Canadian adults verbally engaged with their children significantly more often than did Vietnamese families. However, there was no significant difference in CTC between the two Canadian groups ($U=31, p=.140$)\(^5\) or the two Vietnamese groups ($U=108, p=.218$)\(^6\). The hypotheses supporting these a-priori pairwise comparisons were based on previous literature and therefore no alpha-level correction was required (Kirk 1995; Quinn & Keough 2002; Sokal & Rohlf 1995).

Thus, while culture appears to have an effect on conversational turn count, hearing status does not.

LENA data were also collected on the auditory environment of each home and compared using chi-squared tests. No significant differences were found between the proportions of types of sounds each child was exposed to on an average day. Regardless of hearing status, Canadian and Vietnamese children were exposed to a similar proportion of meaningful speech ($\chi^2(156)=158.529, p=.429$), distant speech ($\chi^2(159)=165, p=.356$), and TV or electronic sounds ($\chi^2(138)=135.4, p=.547$). There was also a similar proportion of silence ($\chi^2(153)=153.801, p=.467$) and noise($\chi^2(150)=158.529, p=.301$) in each cohort. Refer to Table 3.3 for further details regarding types of environmental sounds. According to a Kruskal-Wallis test, there was also no significant difference in the number of conversational turns taken across the three recorded days for each individual participant ($H(2)=.786, p=.675$), indicating that future LENA studies might be able to rely on a single day of recording to obtain representative results.

\(^4\) Canadian and Vietnamese families of children with hearing loss displayed similar results on each of the three recording days: Day 1: $U=28, p=.019$; Day 2: $U=26, p=.013$; Day 3: $U=27, p=.018$

\(^5\) Canadian families, regardless of hearing status, showed similar results on Day 2 ($U=49.5, p=.885$) and Day 3 ($U=26, p=.064$). However, there was a significant difference found on Day 1 ($U=22, p=.03$). This finding may be related to small sample size as well as variation in daily activity, which can affect CTC (Soderstrom & Wittebolle, 2013).

\(^6\) Vietnamese families had similar results on each of the three recording days regardless of hearing status: Day 1: $U=183, p=.191$; Day 2: $U=180, p=.231$; Day 3: $U=174, p=.318$
3.5 Discussion

This study sought to explore variation in conversational turn count obtained using the LENA System as a function of culture and hearing status. Full day audio recordings and automatic analysis results demonstrated both differences and similarities in the amount of talk parents engaged in with their children. The Canadian families, regardless of hearing status, verbally interacted significantly more often than did Vietnamese families. This outcome is in line with previous research that has identified different caregiver-child communication practices in Eurocentric versus Asian cultures (Hwa-Froelich & Westby, 2003; Johnston & Wong, 2002; Simmons & Johnston, 2007; Winskel, Luksaneeyanawin, & Yangklang, 2006; Winskel, Salehuddin, & Standbury, 2013). However, we believe it is the first time differences in amount of caregiver-child talk have been objectively measured and quantified in these two different populations through automated vocal analysis. It is important to emphasize here that differences do not represent any type of deficit but are instead reflective of cultural practices regarding adult-child interaction.

Hearing status, on the other hand, did not significantly affect the number of conversational turns in which Canadian and Vietnamese families participated. This finding supports previous research that hearing status does not affect CTC for children with hearing loss in the US (Caskey & Vohr, 2013; VanDam et al., 2012). Most Canadian families have access to the interventions and tools that are believed to allow children to achieve age appropriate listening and spoken language skills (Canadian Infant Hearing Task Force, 2014). Therefore, it is not surprising that Canadian families of children with hearing loss who communicate orally would participate in similar amounts of conversational turns to their typically developing peers.

Similar to Canadian families, we expected that Vietnamese children with hearing loss would participate in conversational turns as often as typically developing peers. Hearing services in Vietnam are only just becoming available to most families (Lam et al., 2016; Nelson, 2015; Vo et al., 2017). The Vietnamese children with hearing loss who were recruited for this project all received language intervention and audiology services
through a program that is supported by the Global Foundation for Children with Hearing Loss. As such, they have access to hearing technology and early intervention services at a level that may not be available to all Vietnamese families. Based on the IQRs of the two Vietnamese groups, children with hearing loss in Vietnam experienced more variability in CTCs than did typically developing Vietnamese children. These results may therefore be a product of the intervention suggestions provided through training programs originating from Eurocentric countries. However, the families of children with hearing loss who receive services from professionals trained by the GFCHL are, for the most part, communicating in a manner that closely approximates that of their typically developing peers.

Given the clear differences in frequency of conversational turns observed in the two groups as a function of culture, speech-language pathologists and other professionals guiding parents to provide language stimulation to their children should consider how such differences might influence their recommendations. While it may be agreed upon that children require language input to learn to talk, how that input should be provided may differ according to cultural practices. Ignoring the communication practices of the community might make integrating into that community more difficult for children with hearing loss who may have developed communication patterns that differ from those used in their own culture (Crago, 1992). Speech-language pathologists must be aware of differences in parent-child talk to ensure that children are interacting with adults in a way that is similar to their typically developing peers in whichever environment they are living. Such an awareness would also allow clinicians to better understand and interpret parents’ communicative behaviors and participation within intervention and avoid making deficit interpretations about their involvement.

One of the greatest challenges faced in this study was recruitment. The Vietnamese children with hearing loss were recruited through the early intervention program at the Thuan An Centre. Many of the children who were eligible for the study at the time of recruitment were three years old and had hearing loss secondary to maternal rubella related to an outbreak of the disease in 2010-2011 (Lam et al., 2016; Toda et al., 2015). At the time, the measles-rubella vaccine, which limits the spread of rubella in most high-
income countries, was not regularly provided in Vietnam. A major campaign to provide the vaccine was, however, enacted in 2014, so the prevalence of children with hearing loss in Vietnam may change in the coming years (Vynnycky et al., 2016). Although our planned age range had been wider (18-48 months), our decision to age match the four groups limited our ability to recruit participants for the Canadian cohort. While our Canadian sample was small, our results nevertheless yielded significant results. Future studies with larger sample sizes may help to substantiate these findings.

Recruitment of Canadian families, and particularly those with hearing loss, was surprisingly challenging. Although we reached out to clinics, hospitals, school boards, and private practices in six Canadian provinces, identifying eligible participants was difficult. The small sample size for this group was related to a paucity of families that speak primarily English at home and where the parents were born in Canada, both of which were inclusion criteria for this study. Multilingual children whose parents were often immigrants dominated the caseloads of all of the organizations through which we attempted to recruit. The trend of identifying largely international families was also found in our attempts to recruit families with typically developing children. While this shift towards more cultural diversity within Canada may have made our recruitment process more difficult, it also emphasizes the dramatic need for professionals working with families in Canada to improve their sensitivity toward and understanding of variations in language stimulation for families of children with hearing loss from different cultures.

While we did not attempt to control for maternal education, some researchers have found that this correlates with language stimulation in the home (Hart & Risley, 1995; Hoff, 2003; Hoff-Ginsberg, 1994; Rowe, 2008). It has also been found that variability in parent-child talk exists within SES groups in a number of cultures (Hoff, 2003; Huttenlocher et al., 2010; Weisleder, Otero, Marchman, & Fernald, 2015). Most of the Canadian mothers had more than a high school education, while there was a wider range of educational levels in the Vietnamese groups (See Table 3.1). It is therefore possible that maternal education level was confounded with culture in this study. We were able, however, to investigate the effect of maternal education on CTC within the Vietnamese
cohorts. In this study, maternal education did not influence the amount of parent-child talk in which families participated in Vietnam. Future research with greater power is needed to confirm this result. More focused research investigating the impact of maternal education on child development in Vietnam is necessary to better understand this trend. Based on the current findings, however, the communication patterns of Vietnamese families remain relatively similar regardless of the mother’s level of education.

The LENA System now allows researchers to collect information about a child’s natural language environment over an entire day, opening the door to improving our understanding of cross-cultural parent-child talk in the natural environment with minimal observer effect. Using this device, however, does have some limitations. The LENA DLP only collects auditory information. There is no visual data, so no gestural communication is included in this analysis. Additionally, no transcription of the recordings was produced. Therefore, we were unable to investigate questions regarding the quality of the language stimulation provided. Future research might collect data to investigate these variables.

Another potential drawback to using LENA data are the LENA algorithm itself. LENA conversational turns include the key child and an adult. They do not account for potential turns taken with peers, which may represent a significant amount of the language stimulation a child is exposed to in some cultures. (Ochs, 1982; Werner, 1984). Furthermore, as discussed in Ganek and Eriks-Brophy (2017), when the LENA System identifies a sound segment in which two speakers overlap or a speaker is talking in a significant amount of background noise, that segment is found ineligible to serve as part of a conversational turn. In other words, if a turn, or part of a turn, occurs in one of these conditions, it will not be counted in the LENA results. However, a comparison of the proportions of types of environmental sounds children were exposed to in all four cohorts were similar, indicating that the amount of turns lost to overlapping noise segments was comparable across groups (See Table 3.3). While validation studies have shown the Vietnamese recordings to be reasonably reliable for measuring CTC, they have not as yet investigated environmental sounds (Ganek & Eriks-Brophy, 2017). It is unlikely, however, that there would be a difference in the acoustic cues related to general noise and overlapping speech in different cultures. Regardless, these results should be considered
with caution. On the other hand, children with hearing loss often have difficulty hearing and processing speech signals in noise (Leavitt & Flexer, 1991; Wolfe & Schafer, 2008). By not counting potential turns that might occur in noise, the LENA System may be providing a more accurate picture of what the child has actually heard. Although it is necessary to account for these limitations to LENA technology in interpretation of the results, the amount of data provided by the recordings is powerful and can guide future exploration of language acquisition in a wide variety of contexts.

3.6 Conclusion

Through the use of a novel objective technology, the LENA system, this study was able to identify differences in parent-child talk as a function of culture, while hearing status was not shown to contribute to CTC. Data about variations in language stimulation by culture may not necessarily affect long-term developmental outcomes, but they may influence how language delays or disorders are treated in an intervention setting. LENA results, however, do not provide information regarding why a potential difference exists. This question must be answered if speech-language pathologists are to alter their therapeutic recommendations appropriately. The present study is therefore part of a larger mixed methods design that supplements the LENA results with qualitative data to better illustrate why cultural differences might occur in parent-child talk. The results of that analysis can be found in Article 3. The study contributes to the evidence base supporting culture as an important variable in examining the child’s language environment. The combined results of the study serve as an example of how two cultures may engage in parent-child talk differently while still providing an adequate and appropriate amount of stimulation for language learning. Speech-language pathologists working with Vietnamese families, or families from cultures that differ from their own, should consider how cultural communication practices might influence their suggestions for language stimulation. Regardless of the specific culture in question, understanding that variation in language input would be expected across cultures is an important step in providing appropriate services for families of children with hearing loss as well as in understanding the universals of language development.
<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Average Age (months)</th>
<th>Gender</th>
<th>Hearing Status</th>
<th>Causes of Hearing Loss</th>
<th>Hearing Technology</th>
<th>Maternal Education</th>
<th>Avg Recording Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typically Developing Canadian Children</td>
<td>13</td>
<td>36.6 (SD=6.6)</td>
<td>4 Female</td>
<td>Passed DPOAE&lt;sup&gt;1&lt;/sup&gt;</td>
<td>NA</td>
<td>NA</td>
<td>2 high school</td>
<td>14 hrs 10 mins (SD=1 hr 44 mins)</td>
</tr>
<tr>
<td>Canadian Children with Hearing Loss</td>
<td>8</td>
<td>36.5 (SD=9.7)</td>
<td>3 Female</td>
<td>Mild-Moderate to Profound</td>
<td>1 CMV&lt;sup&gt;2&lt;/sup&gt;; 2 craniofacial anomalies; 3 genetic; 1 ototoxic drugs; 1 unknown</td>
<td>3 Bilateral hearing aids; 2 BAHA&lt;sup&gt;3&lt;/sup&gt;; 1 Unilateral cochlear implant; 2 Bilateral cochlear implants</td>
<td>8&gt; high school</td>
<td>14 hrs 2 mins (SD=1 hr 32 mins)</td>
</tr>
<tr>
<td>Typically Developing Vietnamese Children</td>
<td>17</td>
<td>40.2 (SD=6.9)</td>
<td>6 Female</td>
<td>Passed DPOAE</td>
<td>NA</td>
<td>NA</td>
<td>2&lt;high school 7 high school 8&gt; high school</td>
<td>13 hrs 34 mins (SD=1 hr 7 mins)</td>
</tr>
<tr>
<td>Vietnamese Children with Hearing Loss</td>
<td>17</td>
<td>38.6 (SD=6.6)</td>
<td>6 Female</td>
<td>Moderate-Severe to Profound</td>
<td>1 genetic; 1 ototoxic drugs; 1 premature; 6 maternal rubella; 6 unknown</td>
<td>12 bilateral hearing aids; 4 unilateral cochlear implant; 1 bilateral cochlear implants</td>
<td>6&lt; high school 6 high school 5 &gt; high school</td>
<td>13 hrs 43 mins (SD= 1hr 19 mins)</td>
</tr>
</tbody>
</table>

1. Distortion product otoacoustic emissions; 2. Cytomegalovirus; 3. Bone Anchored Hearing Aid
### Table 3.2: Recruitment

<table>
<thead>
<tr>
<th>Group</th>
<th>Typically Developing Canadian Children</th>
<th>Canadian Children with Hearing Loss</th>
<th>Typically Developing Vietnamese Children</th>
<th>Vietnamese Children with Hearing Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>13</td>
<td>8</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>No response</td>
<td>6</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Declined</td>
<td>-</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Did not meet criteria</td>
<td>3</td>
<td>1</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Incomplete recordings</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Total recruited</td>
<td>22</td>
<td>14</td>
<td>34</td>
<td>39</td>
</tr>
</tbody>
</table>
Table 3.3: Average Percentage of Sounds Heard in the Day*

<table>
<thead>
<tr>
<th>Group</th>
<th>Meaningful Speech</th>
<th>Distant Speech</th>
<th>Noise</th>
<th>TV/Electronics</th>
<th>Silence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typically Developing Canadian Children</strong></td>
<td>25.92 (SD=5.12)</td>
<td>25.46 (SD=8.73)</td>
<td>3.85 (SD=4.04)</td>
<td>6.69 (SD=4.37)</td>
<td>38.08 (SD=12.66)</td>
</tr>
<tr>
<td><strong>Canadian Children with Hearing Loss</strong></td>
<td>20.63 (SD=6.21)</td>
<td>27.63 (SD=7.48)</td>
<td>4.75 (SD=3.45)</td>
<td>4.88 (SD=3.18)</td>
<td>41.63 (SD=11.30)</td>
</tr>
<tr>
<td><strong>Typically Developing Vietnamese Children</strong></td>
<td>12.71 (SD=3.18)</td>
<td>38.24 (SD=8.27)</td>
<td>12.82 (SD=5.09)</td>
<td>8.76 (SD=5.43)</td>
<td>27.88 (SD=10.31)</td>
</tr>
<tr>
<td><strong>Vietnamese Children with Hearing Loss</strong></td>
<td>15 (SD=6.06)</td>
<td>40.24 (SD=8.72)</td>
<td>11.41 (SD=4.04)</td>
<td>5.06 (SD=2.77)</td>
<td>28.59 (SD=10.17)</td>
</tr>
</tbody>
</table>

*Numbers may not equal 100 due to rounding
Figure 3.1: Distribution of Conversational Turns by Culture and Hearing Status

Canadian children with hearing loss
Typically developing Canadian children
Vietnamese children with hearing loss
Typically developing Vietnamese children
3.7 References


Quinn, G. & Keough, M. (2002). *Experimental design and data analysis for biologists*. 


van Kleeck, A. (1994). Potential cultural bias in training parents as conversational
partners with their children who have delays in language development. American Journal of Speech Language Pathology, January, 67–78.


Child Development, 766–774.


4. Article 3: A mixed methods investigation of language socialization practices in families of children with and without hearing loss in Vietnam and Canada

4.1 Abstract

This embedded mixed methods study explores how cultural differences in language socialization practices influence parent-child talk. The Language ENvironment Analysis (LENA) System was used to audio record an average day of communicative input for families of children with and without hearing loss in Canada and Vietnam. Software automatically calculated an average conversational turn count (CTC), the variable of interest to the study. Canadian families were found to participate in significantly more turns than Vietnamese families irrespective of the child’s hearing status whereas hearing status itself was not found to affect CTC. Interviews with caregivers of each of the children provide insights into how these differences might best be interpreted. Within the Vietnamese families, the language socialization practice “Intelligence” resulted in reduced opportunities for turn-taking, while the Canadian participants’ focus on creating personal “Identity” encouraged them. The findings serve to suggest directions through which language intervention strategies for children with hearing loss in Canada and Vietnam might be better adapted toward a family’s communicative practices. It is the first study to incorporate LENA results into a mixed methods design.
4.2 Introduction

The goal of speech-language pathology service provision is to assist individuals with language disorders and difficulties to reach their greatest communicative potential. In working with young children, speech-language pathologists regularly engage parents as important partners in the language intervention process (ASHA, 2016a; SAC, 2016). Recent research evidence suggests that today’s speech-language pathologists require explicit training in cultural competency to provide services that are appropriate to the needs of families from a large variety of cultural communities (Hyter, Roman, Staley, & McPherson, 2017; Marshall, 2000; Wylie, McAllister, Davidson, & Marshal, 2013). As the need for speech and language intervention continues to grow in low- and middle-income countries, intervention programs, often supported by organizations from high-income countries, are being developed. Unfortunately, these programs rarely adapt intervention strategies and techniques to accommodate local cultural communication practices (Atherton, Nguyen, & Vo, 2013; Jaramillo, 2015; Wickenden, 2013). In order to preserve and support such practices surrounding communication in these communities, speech-language pathologists are encouraged to seek out tools and information that will support evidenced-based practice specific to the needs and experiences of the diverse families they serve. This is a daunting task.

A recent trend in the study of child language acquisition is the use of automated vocal analysis (Ganek & Eriks-Brophy, 2016; Chin, Goodwin, Vosoughi, Roy, & Naigles, 2017). It is also becoming a popular clinical tool (Suskind et al., 2016; Pae et al., 2016; Zhang et al., 2015). The Language ENvironment Analysis (LENA) System is one of the more commonly-used commercially available instruments to automatically analyze daylong recordings. Although the device has only been validated for a few languages at this time, it has the potential to provide extensive objective data regarding parent-child talk in the family’s natural environment, regardless of their cultural background (Canault, Le Normand, Foudil, Loundon, & Thai-Van, 2015; Gilkerson et al., 2015; Pae et al., 2016; Weisleder & Fernald, 2013; Xu, Yapenal, & Gray, 2009). In order to record data related to language input and interaction in the environment, the child wears a digital
language processor that has the capacity to audio record for up to 16 hours. Computer software then automatically calculates how many adult words the child was exposed to, the number of vocalizations the child produced, and the number of conversational turns the child took with an adult, amongst other measures (Gilkerson & Richards, 2009). The LENA System allows language researchers to explore a child’s verbal communication environment outside of a laboratory setting in a way that, in the past, would have been limited by cumbersome recording equipment, potential observer effects, as well as labor intensive coding. For a detailed summary of evidence related to how the LENA System is being used with different populations please see Ganek and Eriks-Brophy (2016).

4.2.1 Language Socialization

Although the LENA System is providing a broader perspective of how parents and children communicate, some researchers believe that too much emphasis is being placed on the amount of talk, to the exclusion of other important variables (Johnson, 2015; Miller & Sperry, 2012). For instance, many of the studies that investigate early child language experience link parent-child talk with socioeconomic status (SES) (Hart, & Risely, 1995; Hoff, 2003; Hoff-Ginsberg, 1994; Rowe, 2008; Rowe, Pan, & Ayoub, 2005). This association can be perceived as being potentially disrespectful to parents of children in lower SES groups, who may be accused of providing their children with inadequate, or in the eyes of some language researchers and clinicians, with ‘deficient’ language input (Pine, 1992). However, many of the parents under investigation and subsequent judgment come from cultures where communication practices may differ from those of the ‘expert’ who is providing services (Johnson, Avineri, & Johnson, 2016).

As part of the process of language acquisition, children learn to appreciate and demonstrate appropriate communicative behaviors that are associated with the social situations and norms to which they are exposed. From infancy, adults use linguistic interactions with children to instill cultural practices that are associated with social hierarchies, systems of ideas, beliefs, and behavioral expectations. Such experiences
allow children to become competent members of their society (Ochs & Schieffelin, 1984). This process of using communication as a tool for acquiring social proficiency is known as *language socialization*. It is concerned not only with the input parents provide to children, but also with how communicative interactions themselves are structured and how this, in turn, affects children’s understandings of their social worlds (Ochs & Schieffelin, 1984). The specifics of language socialization vary according to the social status of the interactants, the value accorded to children’s talk, beliefs about children’s intentionality, and fundamental attitudes about teaching and learning language held by any particular cultural group (Crago, 1990; Ochs, 2000; Ochs & Schieffelin, 2012; 1984; van Kleeck, 1994). For example, Canadian parents use language socialization practices to instill a sense of independence in their children. In line with other Eurocentric cultures, Canadian caregivers value a child-centered learning paradigm over a more didactic approach and treat children as equal conversational partners in adult-child interactions (Johnston & Wong, 2002; Jonk & Enns, 2009; Simmons & Johnston, 2007). Caregivers are also likely to prompt children to produce narratives and will expand on child talk, demonstrating the importance placed on a child’s output and opinions (Johnston & Wong, 2002; Yorke, 2016). As a means to encourage language use, Canadian families also engage in a significant amount of joint book reading and regularly follow the child’s lead in interactions (Johnston & Wong, 2007; Jonk & Enns, 2009; Simmons & Johnston, 2007; Yorke, 2016). Canadian parents are reported to be less involved with extended family and religious or spiritual observances, respecting independent choice over the values of a particular group (Jonk & Enns, 2009; Simmons & Johnston, 2007). Together, these language socialization practices teach Canadian children the importance of their independent role in the community.

In contrast, parents in many non-Eurocentric cultures use language socialization practices that differ from those used in Canadian society. For instance, Crago (1990) found that Inuit children are encouraged to speak more to their peers than to adults and are discouraged from asking questions of adults. Children are, instead, expected to learn through observation and the repetition of routines (Crago, 1990). Nigerian mothers, on the other hand, take a very instructional tone with their children (Burns & Radford,
2008), while Nso mothers in Cameroon tend to respond to their infants with touch rather than speech. In response, Nso babies typically vocalize less that those that receive more verbal feedback (Keller, Otto, Lamm, Yovsi, & Kartner, 2008). Thus, although norms around verbal communication vary from culture to culture, all caregivers use language and interaction to teach their children to talk, while simultaneously integrating them into their role within the community.

This study focuses on Vietnamese families of children with and without hearing loss as an example of how cultural differences may influence parent-child communication. To date, only a limited amount of research has been published on Vietnamese language socialization practices. Ethnographic studies have revealed that Vietnamese parents treat children under five years differently than older children. They adjust their expectations for communication to the abilities of the child by prompting very young children to imitate simple language (Shohet, 2013). Adults frequently speak in a high register and in a friendly tone to younger children as a way of teaching them language (Nguyen, n.d.). Children are expected to attend to adult speech and ask very few questions, as these are perceived as being a challenge to authority (Mestechkina, Son, & Shin, 2014). Parents, therefore, tend to dominate conversations with children. Shohet (2013) reported that adult speech was responsible for approximately 80% of the parent-child interactions she observed as part of her ethnographic study of sacrifice and language socialization in Vietnam. As is the case in many other cultures, education and learning are highly valued in Vietnamese culture (Hunt, 2005). Interviews with Vietnamese families living in the US demonstrate that the participating parents believed that children learn through, “observation, imitation and practice and hard work” (Hwa-Froelich & Westby, 2003, p. 310). Vietnamese parents also believe that both important cultural rituals and small tasks must be explicitly taught (Shohet, 2013). Vietnamese parents’ expectations of their children as communicators are thus likely to have an influence on how often and in what ways they interact with them.
4.2.2 Disability in Canada and Vietnam

Perceptions of disability might also affect parents’ expectations for their child’s communication. Although a diagnosis of a disability such as hearing loss might cause stress within a family, Canadian parents who adopt an oral communication approach are often both optimistic and realistic about their child’s future, and believe that their children can be successful in a mainstream hearing environment (Fitzpatrick, Graham, Durieux-Smith, Angus, & Coyle, 2007; Heiman, 2002). Canadian teachers agree that children with hearing loss benefit academically, socially, emotionally, and linguistically from inclusion within mainstream activities (Eriks-Brophy & Whittingham, 2013). Orally educated children with hearing loss in Canada are, therefore, often expected to integrate into mainstream hearing society as much as possible.

In Vietnam, on the other hand, having a child with a disability or a learning difficulty can be perceived as the fate of the family (Mestechkina et al., 2014). Vietnamese society relies heavily on ancestral worship and, as such, a child with a disability may be seen as the embodiment of ancestral wrong doing and may therefore cause a great deal of shame (Burr, 2015; Hunt, 2005; Shohet, 2013). Children with disabilities may be seen as lazy and deserving of strict, frequently physical, punishment (Burr, 2015; Hwa-Froelich & Westby, 2003). Mothers are regularly blamed if their child is unable to behave in what is considered an appropriate manner, as this is seen as her failure to properly teach her child (Mestechkina et al., 2014). Nevertheless, the quickly changing Vietnamese economy is challenging such traditional views of family, disability, and education (TNS & United Nations Children’s Fund, 2009; World Bank, 2016). The introduction of professions that originate in high-income countries, like speech-language pathology, are beginning to influence Vietnamese society. The concept of including children with disabilities in the community is starting to be embraced, and children with disabilities are beginning to be seen in a more positive light (Mestechkina et al., 2014).
4.2.3 Language Socialization & Speech-Language Pathology

Understanding how language socialization influences variations in parent-child talk can allow speech-language pathologists to identify more effective ways of working with families from other cultures (Crago, 1992; van Kleek, 1994). Speech-language pathology is dominated by professionals trained in or by the Eurocentric system (ASHA, 2016b; Crago, 1992; Marshall, 2000; Rhoades, Price, & Perigoe, 2004). Parents of children with hearing loss who do not share the language socialization practices of their speech-language pathologist may be reluctant to participate in intervention. On the other hand, strictly following suggested practices may lead to the development of inappropriate communication in the child and a potential eventual breakdown in communication at home (Crago, 1992; Delpit, 1988; Rhoades et al., 2004).

Dissonance in language socialization practices can also cause miscommunication and over- or under-identification of communication delays (Hwa-Froelich & Westby, 2003). As an example, American teachers have been found to mislabel African American children as hyperactive because the students’ behavior differs from their own framework for how a child should respond to adults whereby children should sit still and stay quiet (Delpit, 1995). Crago, Eriks-Brophy, Pesco, and DeAlpine (1997) identify culturally based miscommunication in classroom intervention between Inuit students and non-Inuit teachers that stem from differences in expectations regarding competent performance and participation between the two cultural groups.

Therapists and teachers may even go so far as to punish families for behaviors that are appropriate in their home culture but unacceptable from the professionals’ perspective (Lovelace & Wheeler, 2006). For instance, families might be dismissed from therapy because the therapist believes the parents are not following through on recommendations when, in actuality, the parent has a different understanding of their role in developing parent-child communication. In order to better support these families, speech-language pathologists must acquire a better understanding of the language socialization practices used by the clients they serve.
Newly developed tools such as the LENA System are helping to guide both researchers and clinicians to a better understanding of how children communicate in their natural environments, however they cannot provide the necessary cultural context required to explore and fully explain language socialization practices in a way that would allow speech-language pathologists to critique their own cultural biases. This mixed methods study addresses how language socialization practices impact parent-child talk in Canada and Vietnam, which are used as a test case. An embedded design is employed, in which quantitative and qualitative data are embedded within an observational study. The quantitative data, in the form of the LENA conversational turn count, are used to test the theory that culture influences the amount of parent-child talk a family participates in, and qualitative data are collected concurrently to enhance the interpretation of the quantitative results. Research questions for the study are provided in Table 4.1.

4.3 Methods

The overarching goal of this study is to identify potential differences in language socialization practices to explain variation in conversational turn count, a variable that speech-language pathologists might take into consideration when adapting their therapeutic suggestions and practices to create more culturally-appropriate intervention techniques. In order to achieve this objective, the study takes on a pragmatic worldview (Tashakkori & Teddlie, 2010). Pragmatism is problem-centered and oriented towards ‘what works’ (Creswell & Plano-Clark, 2011). Ontologically, pragmatists believe a singular ‘truth’ exists, however, we as humans, can only understand that ‘truth’ through our own capacities and experiences, creating multiple perspectives. Humans, therefore, will never attain or comprehend the ‘truth’ fully because it will always be filtered through human interpretations. Consequently, rather than allowing the paradigm to govern methodological choice, the pragmatist researcher selects a methodology that she believes will best address the research question by coming as close to the ‘truth’ as possible (Creswell & Plano-Clark, 2011). In the case of this study, an embedded mixed methods design has been selected to accomplish this.
Mixed methods research combines quantitative and qualitative data for the purpose of enhancing the depth and breadth of understanding of an observed phenomenon (Johnson, Onwuegbuzie, & Turner, 2007). An embedded design such as that used here allows for qualitative data to be used to expand on quantitative results. Quantitative and qualitative data are collected and analyzed within a traditional cross-comparison design to enhance the overall study at various stages of the research (Caracelli & Greene, 1997; Greene, 2007; Creswell & Plano-Clark, 2011). Engaging in mixed methods research to investigate parent-child talk using LENA data and qualitative analysis in this case provides an opportunity to better illustrate why the number of conversational turns parents take with their children might vary as a function of culture.

Although quantitative data reporting the amount of parent-child talk a child is exposed to can provide some information about differences in communication across cultures, it cannot provide a sufficient understanding of why such differences might occur. Language socialization research, which is typically studied via qualitative measures, provides opportunities for enhanced insights and interpretations (Miller, Koven, & Lin, 2012; Goodwin & Kyritzis, 2012; He, 2012; Nonaka, 2012). LENA results have been combined with numerous other data collection measures including traditional language assessments, parent reported daily activity logs, quantitative questionnaires, video recordings, transcriptions, look-while-listening tasks (Fernald, Zangl, Portillo, & Marchman, 2008), acoustic measures, indoor positioning systems, and accelerometer results (Abney, Warlaumont, Haussman, Ross, & Wallot, 2014; Charron et al., 2016; Ko, Seidl, Cristia, Reimchen, & Soderstrom, 2015; Marchman, Martinez, Hurado, Gruter, & Fernald, 2016; Sangwan, Hansen, Irvin, Crutchfield, & Greenwood, 2015; Suskind et al., 2015; Warren et al., 2010; Wood, Diehm, & Callender, 2016). To date, however, no existing studies have merged LENA results with qualitative analysis. In fact, very few studies in the fields of speech-language pathology or audiology have adhered to a mixed methods approach (Suleman & Hopper, 2014).

In the present study, quantitative and qualitative data were collected at the same time. Analysis occurred separately but concurrently. Once results were calculated, the two
strands were merged together in a narrative format, with the qualitative arm supplementing the quantitative results. See Appendix 1 for a diagram of the embedded mixed methods design.

4.3.1 Participants

Families of children with and without hearing loss in Canada and Vietnam were recruited to participate in this project. The children were between 18 and 48 months old. All the families were primarily monolingual English or Vietnamese speakers and parents were born in either Canada or Vietnam respectively. Spoken language was the primary mode of communication for all families and all the children with hearing loss wore hearing technology, either hearing aids or cochlear implants. The children participated in the quantitative arm of this study and the caregivers of these same children participated in the qualitative arm reported here. Refer to Article 2 for more demographic details related to the children. See Table 4.2 for details regarding the demographics of the participating caregivers.

Families of typically developing Canadian children were recruited from drop-in centres, early learning centres, and libraries in the greater Toronto area. Canadian families of children with hearing loss were recruited from hospitals, schools, and the private practices of speech-language pathologists in Toronto and Windsor, Ontario and Vancouver, British Columbia. Families in Vietnam were recruited with the help of the Global Foundation for Children with Hearing Loss (GFCHL), an American organization training professionals in Vietnam with whom the first author had volunteered. Vietnamese families of children with hearing loss were recruited from the Thuan An Centre for Disabled Children, a government run school for the deaf with an early intervention program that uses language stimulation techniques taught by the GFCHL. The families of typically developing Vietnamese children were recruited from the Hoa Lan Private Kindergarten, a Catholic preschool across the street from the Thuan An Centre. Both schools are located in the Binh Duong Province outside of Ho Chi Minh City.
The first author is a white upper-middle class American speech-language pathologist and certified auditory-verbal therapist with extensive training and experience in working with families of children with hearing loss in Australia, the United States, and Vietnam. She volunteered with the GFCHL for six years prior to the time of the present research study. Her experiences and perceptions of working with Vietnamese therapists and families over the course of her volunteerism have inevitably and expectedly had a direct influence on the objectives, research questions, and analyses associated with this research. She and the co-authors had no direct contact with any of the participating families until the time that the present research study was conducted.

4.3.2 Quantitative data collection and analysis

Quantitative data were collected using the LENA System. The child wore a LENA digital language processor for three days while it audio recorded the child’s natural language environment. Upon completion, the recordings were uploaded for automatic analysis of the number of conversational turns taken between the child and an adult over the three days, the variable of interest in the quantitative arm of the study. The LENA software defines a conversational turn as a child vocalization that occurs within five seconds of an adult utterance uninterrupted by another child speaker (Oller et al., 2010). Conversational turn count (CTC) was chosen as the primary measure for this study because, of the LENA variables, it most closely represents instances when parents and children are verbally interacting and explicitly attending to one another. The LENA CTC has been validated for use with both English and Vietnamese speakers (Ganek & Eriks-Brophy, 2017; Xu, Yapanel, & Gray, 2009). Results of the conversational turn counts obtained from the four groups of families who participated in the study (Canadian and Vietnamese families of children with and without hearing loss) were compared using a Kruskal-Wallis test and a set of a priori paired comparisons. Further details regarding the quantitative arm of this project can be found in Article 2.
4.3.3 Qualitative data collection

A semi-structured interview guide (DiCicco-Bloom & Crabtree, 2006) was designed based on publications by Johnston and Wong (2002) along with ongoing work being conducted in the Childhood Hearing Loss Lab at the University of Toronto. Questions addressed topics including activities of daily living, support networks, perceptions of disability, cultural activities, and practices and expectations regarding adult-child communication. The interview guide was translated into Vietnamese prior to data collection.

One-on-one interviews were conducted with a caregiver of each of the children participating in the quantitative arm of this study. It has been shown that collecting data from the same participant families improves the validity of a mixed methods design (Creswell & Plano-Clark, 2011). Wording and order of the questions varied slightly according to participant responses. Participants were prompted to provide more information or clarify a comment as needed. Interviews conducted in Toronto took place at a location convenient for the participant, most often in the participant’s home. Interviews with families located in Windsor and Vancouver occurred over the phone. Vietnamese interviews took place primarily in an office space at the Thuan An Centre. All of the interviews were digitally audio recorded. The first author also took field notes during and immediately following each interview. The recordings were transcribed or translated verbatim in English by research assistants or translators and uploaded to NVivo-10 software (QSR International, 2012) for analysis.

4.3.4 Vietnamese-English Translation

Vietnamese interviews were conducted with the help of seven translators, as none of the authors speak Vietnamese. Four assisted in interpreting interviews in person. Two of these interpreters chose to also translate written transcripts of the interviews. Three additional translators joined them. Four of the translators held bachelor degrees in English translation from Ho Chi Minh City University of Education while others had
received formal instruction in English translation from the Trinh Foundation, an
Australian organization training Vietnamese healthcare professionals in speech-language
pathology. The first author met with each translator prior to conducting the interviews to
discuss the project as a whole along with interview techniques. Topics covered included
pragmatism, mixed methods research, hearing loss, language socialization, and the LENA
System. The translators were provided with the interview guide in both English and
Vietnamese at this time. During the interviews, the translator sat next to the participant
and provided consecutively translated summaries of what was said so that the first author
could probe further if necessary, thus minimally disrupting the flow of the discussion
(Esposito, 2001). The interpreter was also permitted to probe if s/he felt the need for
clarification or expansion of an idea. After the interview, the first author and the
interpreter had a short debriefing session to discuss the participants’ overall responses.
This protocol was created include the interpreters in the research team and ensure they
understood the epistemology of the project (Brämberg & Dahlberg, 2013; Richardson et
al., 2017; Wong & Poon, 2010).

Once the interviews were complete, the audio recordings were sent electronically to
translators for verbatim orthographic transcription in English. Although the authors
would have preferred the interpreters to translate the transcribed interviews they were
present for, it was not feasible due to the number of available translators. Upon
completion, the transcript and audio recording were sent to a second translator for a
review of conceptual clarity, grammar, and comprehension (Gesink, Rink, Montgomery-
Andersen, Mulvad, & Koch, 2010). Disagreements between translators were primarily
related to grammatical issues. Having multiple translators working on the same
transcription can improve the quality and trustworthiness of the translation (Esposito,
2001; Swaine-Verdier, Doward, Hagell, Thorsen, & McKenna, 2004).

4.3.5 Qualitative Analysis

A Thematic Analysis in the style of Braun and Clarke (2006) was conducted to identify,
analyze, and report patterns in the interview data. A separate analysis was conducted with
each cohort (Canadian and Vietnamese/with and without hearing loss) so that differences and similarities between the four data sets could be easily identified. A brief description of how the first author executed Braun and Clarke’s (2006) six phases of analysis is reported below.

4.3.5.1 Phase 1: Developing familiarity with the data

The first author read and re-read interview transcripts multiple times while making hardcopy notes highlighting her initial thoughts and impressions of the data. She referred back to notes taken during the interviews and past readings at this time. These notes helped to establish the initial codes generated in Phase 2 of the analysis.

4.3.5.2 Phase 2: Generating initial codes

A set of initial codes was created based on the interview guide and the notes generated in Phase 1. The coding of data from each of the four cohorts began with these same codes to ensure that specific characteristics related to previous research in language socialization were considered in the analysis. The data were then coded at the semantic level, allowing the participants’ responses to be organized by their explicit surface meaning rather than examining underlying meanings (Boyatzis, 1998; Braun & Clarke, 2006). New codes were added and initial codes were deleted if no data were found to fit them. Code definitions were kept electronically in NVivo-10. Coding and code definitions were refined through an iterative process in which the first author reviewed transcripts and individual codes multiple times.

4.3.5.3 Phase 3: Searching for themes

Patterns were identified in an inductive, bottom-up manner (Braun & Clarke, 2006). The first author organized hardcopy representations of each code into ‘thematic piles.’ Once the candidate themes had been arranged, an initial thematic map was created to identify potential relationships between them.
4.3.5.4 Phase 4: Review themes

Each code was reviewed and revised to ensure it formed a coherent pattern. All of the transcripts were then reexamined to confirm that the themes reflected the data set in its entirety and to code any additional data. This process helped to create both internal and external homogeneity, meaning that the codes within each theme adhered together while remaining distinct from other themes (Braun & Clarke, 2006).

4.3.5.5 Phase 5: Defining and naming themes

In this phase the initial thematic map was refined to reflect the relationships between themes. Brief definitions of each theme were developed to describe their scope and content. Theme names were also clarified through discussion between the authors.

4.3.5.6 Phase 6: Producing a report

The first author produced two-page reports on each theme to ‘tell the story of the data’ (Braun & Clarke, 2006). In the report, each theme was supported by numerous data extracts illustrating how it corresponded to the over-riding qualitative research question. These reports can be found in Appendix 4.2.

4.4 Results

4.4.1 Quantitative Results

LENA conversational turn counts averaged over three days were collected from Vietnamese families of children with hearing loss (CTC $Mdn=336$, $IQR=414$), Vietnamese families of children without hearing loss (CTC $Mdn=268$, $IQR=135$), Canadian families of typically developing children (CTC $Mdn=968$, $IQR=564$), and Canadian families of children with hearing loss (CTC $Mdn=763$, $IQR=227$). A Kruskal-Wallis test indicated that there was a significant difference in the number of
conversational turns taken between the four cohorts \((H(3)=27.707, p<.001)\) (See Figure 4.1). A priori paired comparisons were conducted to further explore this difference. Mann-Whitney U-tests showed a significant difference between the two typically developing groups \((U=217, p<.001)\) and the two groups with hearing loss \((U=27, p=.016)\). However, there was no significant difference between the two Canadian groups \((U=31, p=.140)\) or the two Vietnamese groups \((U=108, p=.218)\). These pairwise comparisons were planned based on previous literature, therefore, no alpha-level correction was made to control for potential Type I error (Kirk, 1995; Quinn & Keough, 2002; Sokal & Rohlf, 1995). While culture affected differences in CTC between the groups, hearing status did not. Canadian families participated in more turns than Vietnamese families. Further details regarding the quantitative results of this study can be found in Article 2.

4.4.2 Qualitative Results

Although the analyses of all four cohorts were completed separately, it became apparent that the themes from the two Vietnamese groups aligned with each other, as did the two Canadian groups. Therefore, the results of the Thematic Analyses were pooled by culture to include: Vietnamese families and Canadian families. One overarching theme, *Intelligence*, containing three elements and one sub-theme, was identified for the Vietnamese cohort. Similarly, one overarching theme, *Identity*, consisting of two components, was found for the Canadian cohort.

4.4.2.1 Overarching Vietnamese Theme: Intelligence

‘Intelligence,’ as the Vietnamese participants explained it, encompasses the child’s ability to express his wants and needs while understanding those of others, and demonstrating a desire to learn as well as executing new skills. Achieving these abilities was of the highest importance to the family members interviewed. In order to attain the goal of ‘Intelligence,’ every person in the child’s life has a role that the participants expected them to play: ‘Children Learn,’ ‘Parents Teach,’ and the ‘Community Supports.’ These
three roles together form the theme, ‘Intelligence.’ Additionally, this theme has a subtheme specifically related to children with disabilities, ‘Children with Hearing Loss Need More.’ See Figure 4.2 for a depiction of the theme ‘Intelligence’ and it’s sub-theme.

4.4.2.1.1 Children Learn

Participants believed that a young child’s responsibility is to learn. The Vietnamese parents interviewed understood that children needed to learn because they do not inherently know anything about the world around them. Vietnamese participants expected their children to demonstrate their desire to learn by attending during instruction, expressing curiosity, displaying good memory skills, and developing advanced linguistic abilities. Ngoc\textsuperscript{1}, a mother of a child with hearing loss, described how she uses her child’s language ability as a measure of his intelligence:

“Yes, I compare two children of the same age. They are two normal children and this child is the same age as the other child. Now, this child can talk a lot, make lots of progress, and use various forms of body language, therefore, I think this child is more intelligent than the other one because they are the same age but this child makes more progress than the other. The child walks more and talks more.”

The participants believed children learn these linguistic and academic skills through observation and imitation as they grow into successful adults. At the same time, children are also expected to integrate into the community. The parents interviewed thought that children should be obedient and respectful to people around them, and particularly to adults. According to the participants, they should care for others and follow the customs of the family.

\textsuperscript{1} All names have been changed to protect the anonymity of the participants.
4.4.2.1.2 Parents Teach

While Vietnamese children are expected to learn, a parent’s role is that of teacher. Participants expressed the idea that intelligent children are of the utmost importance and parents are meant to help them attain the skills necessary for adulthood. Participants felt it was their job to provide everything from a moral compass to instruction for self-care through conversation both formally, by providing explicit lessons in both academics and language as well as answering questions, and informally, by modeling appropriate language and behavior. These interactions were viewed as essential for helping the child develop appropriately. The mother of a typically developing Vietnamese child, Phoung, explains her role as her child’s teacher:

“Children of [my child’s] age are simple minded. I can shape him and teach him what’s right and what’s wrong so that he can have the foundation for the future.”

4.4.2.1.3 Community Supports

The Vietnamese participants highlighted the importance of family, friends, and professionals in raising a child. The parents interviewed believed socializing teaches children how to confidently integrate into society and provides opportunities to learn and practice using language. According to the Vietnamese participants’ family, friends, and especially grandparents, provide parenting advice and often interact with the child as part of daily routines. A grandfather of a typically developing Vietnamese child discussed the important role those outside the family play in ensuring his grandchild is learning,

“In order to provide a good education for your children, there must be a combination of lessons from the family, the school, and the community. If there is only input from the family, she will not be educated properly. Family alone is not enough the school has to play a role here because she obeys her teacher...because at her age she is not able to learn words yet. She is only three years old. At the kindergarten, aside from teaching children daily living skills, teachers also teach them how to sing.”
4.4.2.1.4 Subtheme: Children with Hearing Loss Need More

Although the Vietnamese participants agreed that the roles described above applied to children with disabilities, they also stated that children with hearing loss required “more.” According to them, children with disabilities will have more to learn so their parents will be required to teach them more and in a more specific manner. Families of children with disabilities will also require more support from community members. Most parents interviewed felt ‘pity’ for people with disabilities but argued that they should receive specialized professional services, like speech-language pathology, as well as charity in an effort to fully integrate them into society. Linh, a mother of a typically developing child, put it this way,

“I feel real pity for [children with disabilities] because everyone wants their child to be born healthy…I think that in my family when there is a child like that at first, I think we will be really sad but then we still need to find a way to bring him to school for the disabled. The teachers there can teach him to talk to connect with the society.”

Vietnamese children with hearing loss were expected to communicate like their typically developing peers by receiving increased support from family and the community.

4.4.2.2 Overarching Canadian Theme: Identity

Canadian participants, on the other hand, referred to different language socialization practices. The theme ‘Identity’ explores the cycle of how ‘Exposure’ to experiences, people, and language leads children to ‘Honor’ the individuality of others and to create their own identity, which then leads to new experiences, people, and language. Participants stated that this theme applied to children with and without disabilities, therefore, there is no subtheme associated with it. Figure 4.3 depicts the theme, ‘Identity.’
4.4.2.2.1 Exposure

‘Exposure’ captures the Canadian participants’ ideas about how children learn. Young children must be exposed to a significant amount and wide variety of stimulation in order to create their own identity including daily routines, family, and community. Parents interviewed saw intervention for children with disabilities such as hearing loss as another opportunity to expose their child to language learning. The role of professionals is to recommend specific ways to improve language input or expose the child to multiple modalities for communication. Kate, the mother of a typically developing child, explains how children learn language through exposure:

“I noticed with him it’s almost like the reinforcement through different types of mediums where, you know, it’s in the book, um, imitating us and, you know, in song, uh, sing, you know, from his blocks and, you know, bath time, play with letters or whatever, uhm, and even, you know, I hate to say it, TV. We don’t have an ipad so he doesn’t do that stuff but, um, you know there’s certain programs that, uh, I think we’re sort of selective in what we do let him watch, um, and they are educational and, you know, and he does, we do see him pointing out letters and things like that.”

Kate, and the other participants, felt that children must be exposed to language by adults and other children as well as through toys, books, and activities in order to learn to talk.

4.4.2.2.2 Honor

“Honor” captures how children’s interests and behaviors, created by exposure to their environment, results in honor from caregivers. Canadian parents valued their child’s preferences, followed the child’s lead to determine whether parental intervention was necessary, and actively involved children in disciplinary decisions. Participants encouraged curiosity and self-advocacy while honoring individuality. This was extended to caring for hearing technology by encouraging personal responsibility with device care and advocacy and communicating with others to practice skills for independence. The participants’ openness and support of their child’s interests created more opportunities for exposure to various forms of stimulation. Helen, the mother of a child with hearing loss, said,
“Children have a very unique perspective on things and they pick up on things that are different than adults would and they’re exploring the world in a different, in a, you know, they’re exploring the world as they go and it gives you a unique perspective on things but I think it gives you unique clues on on how your kids are developing and it’s extremely important to listen to your kids.”

4.5 Discussion

This study investigated the language socialization practices parents in two different cultures use and how they influence language input for children with and without hearing loss. Analysis of LENA data were able to identify a significant difference in the amount of conversational turns families in Canada and Vietnam participated in on a daily basis, regardless of hearing status. Qualitative results highlighted two themes that synthesize and exemplify the language socialization practices used in the different cultural groups represented. By integrating the qualitative results with the quantitative analysis, we can better illustrate how language socialization directly impacts parent-child talk.

4.5.1 Canadian families have higher CTCs than Vietnamese families

Both the themes ‘Intelligence,’ which was developed from the interviews with Vietnamese families, and ‘Identity,’ which was created from the Canadian interviews, play a role in understanding the difference between Canadian and Vietnamese CTCs that were identified in the LENA data. While ‘Identity’ may increase the number of turns families participate in, ‘Intelligence’ might reduce turns as the LENA System calculates them. For instance, within the theme ‘Identity’ is the idea of ‘exposure.’ The Canadian parents interviewed expected their children to learn language through ‘osmosis’ and therefore specifically exposed them to toys and activities they believed would increase the amount and quality of language they heard throughout the day, in a conscious effort to increase their linguistic abilities. At the same time, Canadian participants demonstrated their ‘honor’ for their child’s personal opinions and desires by listening to them talk and valuing their thoughts. The loop created within the theme ‘Identity’ encourages LENA conversational turns between parents and children by ensuring that parents regularly
expose children to linguistic stimulation while at the same time encouraging them to voice their observations and feelings. By following the child’s lead, parents have more opportunities to provide language that is of interest to the child, which allows more occasions for conversation. The theme ‘Identity’ aligns with previous research into Canadian language socialization practices in that the parents interviewed as part of this study talked about the importance of honoring independence by following the child’s lead and encouraging child talk through exposure to daily routines like joint book reading. The expectations for communication placed on Canadian parents and children create an environment in which adults and children regularly participate in the type of verbal exchanges that the LENA System would count as a conversational turn.

The Vietnamese participants, on the other hand, had different expectations for how children should communicate with adults. The theme ‘Intelligence’ requires less back and forth verbal exchanges between adults and children than does ‘Identity.’ Vietnamese children were expected by participants to learn. Learning, as described by the Vietnamese parents, involves observing and memorizing information and behavior modeled for them. Unlike ‘Identity,’ Vietnamese children are expected to passively learn rather than verbally respond. Vietnamese participants stated that because children do not have much knowledge, they should defer to adults in conversation or stay silent around adults in an effort to prevent saying something inappropriate that might embarrass the family. This is in line with previous research that found parent-child talk in Vietnam is adult dominated (Shohet, 2013). When participants expect their children to observe quietly as a means of learning, children do not have the opportunity to engage in a large number of conversational turns as counted by the LENA System.

The parents’ role in developing ‘Intelligence,’ according to the Vietnamese participants, is to teach. These results confirm past findings related to ideas about formal education and learning through imitation in Vietnam. Some researchers have found, however, that Vietnamese parents have different expectations for younger children, which are pertinent to the current cohort (Shohet, 2013; Nguyen, n.d.). Formal ‘study time’ was a popular activity amongst Vietnamese participants but was usually discussed in reference to older
siblings. Periods of ‘study time’ with a parent throughout the day could increase CTC by providing an explicit time for extended one-on-one conversation, but may be less common with young children. However, ‘study time’ was more common in families of children with hearing loss. Adapting this routine, typical for slightly older children, may be a successful strategy for increasing CTC for children with hearing loss. Verbal interactions during formal lessons may continue to be dominated by adult speech, with limited opportunity for the child to respond. However, while participants often stipulated that there were occasions when it would be considered inappropriate for children to ask questions, they were often encouraged to do so as a display of curiosity. This is counter to previous literature that described questioning as a threat to authority (Metechkina et al., 2014), and may be a reflection of a difference in the expectations of children at different ages. On the whole, however, the Vietnamese participants’ didactic approach to instruction may reduce the number of LENA conversational turns a child is able to participate in throughout the day.

Community support is the final element of the theme ‘Intelligence.’ Vietnamese participants regularly ensured that their children were interacting with extended family, neighbors, and friends. One might suspect, then, that Vietnamese children engage in many conversational turns on a daily basis. Although the LENA System has been shown to be valid for use with Vietnamese speakers (Ganek & Eriks-Brophy, 2017), due to the limitations of the software, which are described below, some of these turns may not have been counted. Future studies relying on LENA data should investigate this phenomenon and consider how to account for potential turns that are not included in the conversational turn count.

In combination, the Canadian parents’ expectations for communication to develop their child’s ‘Identity’ and the Vietnamese participants’ goal of developing their child’s ‘Intelligence’ affects LENA conversational turn counts in opposite directions. The communication preferences the Canadian families discussed are reflected in a higher CTC than those of the Vietnamese families. It should be noted, however, that the language socialization practices of one culture are in no way better than the others in that
all typically developing children are capable of learning to talk (Chomsky, 2002; Skinner, 2015). Professionals working with families that adhere to practices similar to ‘Identity,’ ‘Intelligence,’ or other language socialization practices might incorporate these notions into their therapeutic recommendations. When working with families who promote ‘Identity,’ encouraging exposure to a wide variety of language stimulation opportunities and following the child’s lead to maximize their interests might generate more conversational turn taking. On the other hand, in families focused on ‘Intelligence,’ maximizing the different roles a child and parent embody within verbal interactions may create the most optimal language learning experience. While individual families may vary in their adherence to the practices promoting ‘Identity’ or ‘Intelligence’, understanding the role that language socialization practices such as those identified here play in parent-child talk may positively influence the recommendations a speech-language pathologist might make in individualized family-centered practice.

4.5.2 Hearing status did not affect CTC

Regardless of culture, hearing status did not have an effect on LENA generated conversational turn count. This finding supports previous LENA studies in which hearing status did not impact CTC in the US (Caskey & Vohr, 2013; VanDam, Ambrose, & Moeller, 2012). The similarities between families of children with and without hearing loss are likely related to improvements in access to newborn hearing screenings, hearing technology, and early intervention in both countries (Geers & Nicholas, 2013; Stringer, 2017; Vo et al., 2017; Yoshinaga-Itano, 2003). In Vietnam, access to these services has been supported by training programs from Eurocentric countries that were likely promoting their own language socialization practices. Within both the Canadian and Vietnamese cohorts participants agreed that children with hearing loss or other disabilities are expected to adhere to the same language socialization practices as typically developing peers. Therefore, it is not surprising that the amount of parent-child talk taking place between families and children with and without hearing loss is similar.
Participants in the Vietnamese cohort believed ‘Intelligence’ was an important goal for children regardless of their hearing status. The sub-theme ‘Children with Hearing Loss Need More’ demonstrates that the participants believed children with hearing loss must work harder and receive more formal instruction from their parents and others along with more guidance from professionals. Formal ‘study time’ may provide a quiet one-on-one time with a caregiver in which turn taking is optimized. Children with hearing loss often have difficulty hearing in noise or from a distance (Leavitt & Flexer, 1991; Wolfe & Schafer, 2008). Therefore they may miss opportunities to participate in conversational turns. These focused sessions might enhance opportunities for turns that may have been missed during the day. Further investigation into specific sessions of ‘study time’ may be of interest. The roles that make up ‘Intelligence’ remain the same although they are augmented for children with hearing loss. As such, we would not expect the communication patterns between Vietnamese families to deviate significantly from each other based on hearing status.

Similarly, Canadian participants felt that children with hearing loss should be expected to follow the same language socialization practices as their typically developing peers. Although Canadian families of children with hearing loss may have had earlier access to the services and technology needed to learn spoken language, children with hearing loss in Canada also struggle to hear in noise and at a distance. Therefore, parents in this study relied on speech-language pathologists to learn strategies for increasing conversational turns throughout the day. The therapy helps to ensure the children are receiving the same amount of language input as their typically developing peers. The LENA results demonstrate the success of these strategies by showing that families participate in the same amount of talk regardless of hearing status. Again, because there is no difference in the language socialization practices of the Canadian families based on hearing status, we expected the LENA result showing no difference in CTCs.

Once again these results related to hearing status are in line with the previous literature. The Vietnamese participants are an example of the changing view of how children with disabilities should be treated. Although many described feeling pity for children with
hearing loss, they also believed that they should receive community support and be integrated into society rather than being shunned as a sign of shame. In the same way, Canadian participants expected children with hearing loss to be integrated into the community by behaving similarly to their typically developing peers. Professionals should therefore encourage the families they work with to engage in the same language socialization practices they would use with typically developing children within their own culture. According to the participants, it is not necessary to alter one’s expectations for a child’s communication based on hearing status.

4.5.3 Limitations

There were a number of limitations related to the implementation of this project. The results of both the quantitative and qualitative arm of the study were likely affected by challenges related to recruitment. Quantitative results may have been affected by small sample size although statistical significance was achieved as expected. Unfortunately, it was not feasible to match our samples for maternal education, socioeconomic status, age of diagnosis, hearing age, or type of technology due to differences in the education and healthcare systems in the two countries. All of these variables have been shown to impact parent-child talk (Dettman et al., 2016; Hart & Risley, 1995; Montes et al., 2017; Yoshinaga-Itano, 2003). Additionally, Canadian families represented a homogeneous high socioeconomic status as represented by maternal education while the Vietnamese families were more diverse, potentially affecting their views on language socialization practices.

Canadian recruitment proved to be especially difficult. While all the Canadian parents were born in Canada, many of them were first generation Canadians, which again might have influenced their responses in the interview. Recruiting Canadian families in which the parents were born in Canada was difficult and limited our sample size. Recruiting parents who were at least second generation Canadians was not feasible. While the Vietnamese families all lived in a central location, outside of Ho Chi Minh City, in order to achieve a reasonable sample size, our Canadian recruitment was extended across
Canada. Should there be a difference in language socialization practices by geographic location, the variations in recruitment areas might affect results. Finally, the children in this study were primarily three years old. It is possible, according to past literature (Shohet, 2013; Nguyen, n.d.) that the language socialization practices discussed here might vary by age. Consult Article 2 for a detailed discussion of limitations related to the quantitative arm of this project. Future studies investigating language socialization in these two cultures should consider the effect of these variables.

Although a translation protocol was put in place to prevent pertinent information from getting lost in translation, it is possible that some questions and responses may have been oversimplified. It is also possible that some participants may have felt uncomfortable speaking with the researcher or through an interpreter and therefore modified their opinions and thoughts. Future research might engage members of the community fluent in the language to conduct the interviews rather than working through translators. Additionally, while most of the Canadian interviews took place in the participants’ homes or over the phone, the Vietnamese interviews primarily occurred in an office setting. The environment may have influenced how the participants chose to respond to specific questions.

The LENA System software has some of its own limitations. Sound segments in which two or more people are talking at the same time or in which a speaker is talking in a significant amount of background noise are not counted as part of a conversational turn (Gilkerson, Coulter, & Richards, 2008). Additionally, any turns that the child may have engaged in with other children would not be classified as a turn by the LENA System. LENA conversational turns only include the key child and an adult speaker. While the child may have been verbally engaging many times a day with another child, the LENA results would not reflect that. Due to the limitations of the LENA software, some of the turns the child may have participated in as a function of the parental expectation that the child engage regularly with the larger community may not be reflected in the results, potentially reducing the presented turn count.
Mixed methods studies come with their own limitations as well. Conducting an embedded design study allowed us to collect both quantitative and qualitative data from the same families, while the children were at the same developmental stage, improving the validity of our results (Creswell & Plano-Clark, 2011). However, conducting this project as an exploratory design, in which the quantitative data are analyzed prior to qualitative data collection might have informed the interview guide in a way that may have allowed us to further focus our results (Creswell & Plano-Clark, 2011). Future mixed methods researchers using the LENA System might consider this approach.

4.6 Conclusion

This project adds to the literature on Vietnamese and Canadian language socialization practices as well as LENA use. Speech-language pathologists working with families who adhere to the idea of ‘Identity’ can capitalize on their language socialization practices by increasing exposure to and honoring people and activities in the child’s life. Professionals working with families who uphold the theme ‘Intelligence’ can maximize language stimulation by relying on the roles different members of the child’s community are expected to play. Therapists training or working with families from other cultures can view this study as an example of how language socialization might influence conversational turn taking.

The language socialization practices of one culture are in no way better than any others in that all typically developing children are capable of learning to talk (Chomsky, 2002; Skinner, 2015). Individual families within all cultures will vary in the language socialization practices they choose to apply with their children. When working with some families, encouraging exposure to a wide variety of language stimulation opportunities and following the child’s lead to maximize their interests might generate more conversational turn taking. In other families, maximizing the different roles a child and parent embody within verbal interactions may create the most optimal language learning experience. Still other families may follow completely different language socialization practices. Speech-language pathologists can create effective family-centered intervention
by learning about and incorporating the language socialization practices each individual family chooses to use and promote.

The LENA System is an exciting new tool that can provide an unprecedented amount of information about child language use in his natural environment. However, without an understanding of language socialization, there may not be a clear explanation of why conversational turn taking occurs in a particular manner especially in an unfamiliar culture. Engaging in a mixed methods design allowed us to expand on the LENA CTC results through qualitative analysis. Future LENA studies should consider a mixed methods approach, particularly those studies interested in examining cultural differences.

The next step in providing more culturally appropriate intervention in Vietnam is to create recommendations for parent-child talk as they apply to individual families. Vietnamese professionals and the families they work with will be critical in executing this stage of the research. The future of speech-language pathology in our diverse and global community must incorporate detailed investigations of parent-child communication in different cultures to develop a better understanding of how language and socialization intersect so that families can be provided with the most effective, appropriate, and family-centered supports available.
Table 4.1: Research Questions

<table>
<thead>
<tr>
<th>Quantitative Questions</th>
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<tbody>
<tr>
<td>1. Do differences exist in the amount of conversational turns between English-speaking Canadian families living in Canada and Vietnamese-speaking families living in Vietnam when the child is typically developing?</td>
<td></td>
</tr>
<tr>
<td>2. Do differences exist in the amount of conversational turns between English-speaking Canadian families living in Canada and Vietnamese-speaking families living in Vietnam when the child has a hearing loss?</td>
<td></td>
</tr>
<tr>
<td>3. Do differences exist in the amount of conversational turn taking between Canadian families of typically developing children and families of children with hearing loss?</td>
<td></td>
</tr>
<tr>
<td>4. Do differences exist in the amount of conversational turn taking between Vietnamese families of typically developing children and families of children with hearing loss?</td>
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<table>
<thead>
<tr>
<th>Qualitative Question</th>
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<tbody>
<tr>
<td>1. From the perspective of Canadian and Vietnamese parents of children with and without hearing loss, what are the perceptions of the language socialization practices they use with their children?</td>
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<table>
<thead>
<tr>
<th>Mixed Methods Question</th>
<th></th>
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<tbody>
<tr>
<td>1. How does interview data about language socialization from parents of children with and without hearing loss in two different cultures help to illustrate potential conversational turn count differences as calculated by the LENA System?</td>
<td></td>
</tr>
</tbody>
</table>
### Table 4.2: Demographics of Caregivers

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Caregiver Interviewed</th>
<th>Caregiver age (years)</th>
<th># of adults in the home</th>
<th># of children in the home&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Maternal education&lt;sup&gt;2&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vietnamese children with hearing loss</td>
<td>17</td>
<td>12 mothers; 3 fathers; 1 grandfather; 1 both parents</td>
<td>M=32.3 (SD=9.4)</td>
<td>M=3.3 (SD=1.9)</td>
<td>M=1.6 (SD=.9)</td>
<td>6&lt;high school; 6 high school; 5&gt;high school</td>
</tr>
<tr>
<td>Typically developing Vietnamese children</td>
<td>17</td>
<td>13 mothers; 2 grandfathers; 1 mother &amp; brother; 1 mother &amp; grandmother</td>
<td>M=38.6 (SD=12.0)</td>
<td>M=3.2 (SD=1.6)</td>
<td>M=2.2 (SD=1.1)</td>
<td>2&lt;high school; 7 high school; 8&gt;high school</td>
</tr>
<tr>
<td>Canadian children with hearing loss</td>
<td>8</td>
<td>8 mothers</td>
<td>M=34.8 (SD=3.5)</td>
<td>M=2.0 (SD=0)</td>
<td>M=1.8 (SD=.5)</td>
<td>8&gt;high school</td>
</tr>
<tr>
<td>Typically developing Canadian children</td>
<td>13</td>
<td>11 mothers; 2 both parents</td>
<td>M=37.8 (SD=5.4)</td>
<td>M=2.1 (SD=.5)</td>
<td>M=2.1 (SD=1.0)</td>
<td>2 high school; 11&gt;high school</td>
</tr>
</tbody>
</table>

1. Including the key child; 2. Maternal education of the key child’s mother
Figure 4.1: Distribution of Conversational Turns by Culture and Hearing Status

Canadian children with hearing loss
Typically developing Canadian children
Vietnamese children with hearing loss
Typically developing Vietnamese children
Three roles (child, parent, community) that make up the theme of Intelligence from Vietnamese caregivers.

Parents of children with and without hearing loss agree that these roles are even more important for people with disabilities including hearing loss so we ‘add’ a ring to highlight the additional efforts that must be made.
The parent models respect for identity so that the child will honor the individuality of others.
Appendix 4.1: Embedded Mixed Methods Design Model

Data Collection

1st Meeting
- Family records
- Conduct interview

2nd Meeting
- Family records

Analysis

QUANT
- Statistical analysis of LENA results

qual
- Thematic analysis

MMR\textsuperscript{3} Analysis

Integration
- Supplement QUANT with qual in a narrative discussion

1. Dominant quantitative arm; 2. Supplementary qualitative arm; 3. Mixed Methods Research
Appendix 4.2: Thematic Essays

Appendix 4.2.1 Children Learn

Vietnamese participants discussed behaviors they expected to observe in an ‘ideal’ child and agreed that the child’s role is to learn Intelligence. From the parents’ perspective, language becomes a tool to measure, grow, and display the child’s intelligence. Without it, parents would not have the ability to gauge their child’s cognitive development. Ngoc, mother of a child with hearing loss, explains, “Yes, I compare two children of the same age. They are two normal children and this child is the same age as the other child. Now, this child can talk a lot, make lots of progress, and use various forms of body language, therefore, I think this child is more intelligent than the other one because they are the same age but this child makes more progress than the other. The child walks more and talks more.” Parents are able to use linguistic abilities to monitor intellectual development. Children who talk more are seen as being smarter.

Conversely, abstaining from conversation will harm a child’s intellectual development according to Vietnamese participants. Some participants used the word, “sick,” to describe the repercussions of preventing a child from talking, illustrating the importance of language in understanding children as ‘smart.’ Vu, the father of a child with hearing loss, explains, “I like active children. I want the child to be talkative and energetic. If the child only plays and remains silent all day his/her brain will not develop well.” Language can be used to monitor a child’s development both in comparison to other children and independently.

Children are also expected to learn through engaging in conversations themselves according to Vietnamese participants. These conversations not only provide a learning opportunity but they also serve as a signal to adults that the child is intelligent. Chau, a mother of a typically developing child, states, “When the child is thinking, he will have a lot of questions, which proves that the child is intelligent. He asks what he is wondering and how he can solve the problem. If we don’t allow them to ask, they can’t fully develop
their brain.” Stifling this type of verbal behavior not only diminishes the child’s ability to show his intelligence, it may have more serious ramifications, such as preventing natural development.

After language is acquired, participants expected children to use it to learn. Participants expected children to demonstrate their intelligence by asking questions and repeating what they were told. Children who ask questions are viewed by Vietnamese participants as curious. Dat, the parent of a child with hearing loss, describes his inquisitive daughter this way, “My daughter asks a lot [of questions]. Asking a lot is a way for her to wonder why. Why something is that way. Why it is not normal. Why it can possibly be like that or why not. There must be questions to help her improve her critical thinking.”

Participants described children as knowing very little about the world and adults as experts who are meant to teach them by answering their questions. Although children are not seen as knowledgeable, verbal question asking demonstrates a desire to learn that most participants valued.

Equally, a child who does not demonstrate a desire to learn, one who refuses to attend to what she is being taught, is considered naughty. One parent of a child with hearing loss went so far as to remark that, “He doesn’t want to sit still to let me teach him. He keeps running out on the street and being naughty… After school, at night, we feed him then let him play with toys and teach him a little but he always runs around and doesn’t let us teach. We see that he can speak some but not clearly.” ‘Naughty’ behavior related to the lack of attention paid to lessons is considered unacceptable and may negatively impact a child’s language development. In this way, once again, the ‘ideal’ child is expected to ‘want to learn’, and that desire is closely tied to expected language skills.

According to Vietnamese participants, children are expected to observe and imitate those around them. Bich, mother of a typically hearing preschooler, explains, “Of course, they learn from adults. They listen to us talk and, a little later, they will apply and talk. They listen to adults talking and imitate. Children imitate a lot. Yea! In fact, whatever we say, we discuss, children imitate. At this age they update information very fast and they can
remember well.” Children achieve intelligence through the language provided to them by adults. They are expected, by the Vietnamese participants, to attend to conversation around them and internalize the important information. Here, Bich also shows how parents describe memory as a vital characteristic needed to demonstrate intelligence.

In addition to participating in family functions and caring for those around them, children are also expected to be obedient and respectful in their interactions by Vietnamese participants. Hang, the mother of a typically hearing child, discusses teaching her child a chore, “When I hang the clothes, I ask him to hold the hangers for me one by one. I even count the hangers with him, like, for instance, ‘one, two,’ it’s, like, we play. I let him do things. He actually follows me in everything and I ask him a lot to help me, which is quite okay. He is obedient.” Here Hang expresses her pride that her son is responsible when it comes to helping his mother and that he is learning through observation and imitation, as expected. She also shares that he is obedient and helps his mother without argument or discussion.

Children are also expected to remember lessons and events over time according to Vietnamese participants. The ability to recall what happened in the day or retell a poem is symbolic of a ‘smart’ child. Hien, another mother of a child with hearing loss, says, “He remembers, therefore, he is smart. A day in school, he remembers things that happened and tells what he learned, which proves he is smart. That’s what I think…Those who don’t understand will never tell.” Children are expected to demonstrate their intelligence by verbally reciting things they have learned or experienced. In order for a child to demonstrate that they are, in fact, intelligent, they require a certain level of linguistic ability according to Vietnamese participants.

There is, however, a down side to learning through imitation. A number of parents interviewed reported that they feared their children would learn inappropriate behaviors or language by imitating peers. Chau, understood that her child was learning language not only from her but also from her friends, “When playing with children, [my daughter] can be happy and carefree but whenever there is a friend that said bad words, she will learn
them immediately.” Most parents agreed that their children were learning language from many different sources. A few referenced a traditional saying, “When you are near ink, you are dark and when you are near lights, you are bright.” One translator described the underlying meaning by stating, “evil communications corrupt good manners.” Children are expected to learn from everyone around them.

Parents of children with hearing loss described children as being ‘unaware’ of the world around them. A grandfather of a child with hearing loss, stated “[My grandson] is still too young. There are so many simple things that he doesn’t understand. He isn’t aware of anything yet.” This view of a child’s ability to function within society was reported repeatedly regarding self-care skills like feeding and toileting as well as language development. It also appears in the context of parent-child talk. Ngoc said, “if children only play with adults, they can’t understand. They can’t perceive things. It means adults are too mature. Their minds think differently than adults.” Vietnamese participants made a firm distinction between adults and children, where children were seen as knowing less because of their age.

As a result of these perceived differences, participants expected adults and children to fulfill very specific roles when interacting with one another. Children, due to their lack of understanding about the world, were expected to defer to adults in conversation. Although Vietnamese participants appeared to agree that interactions with a variety of community members, regardless of age, was important for development, when children are confronted with adults in conversation most agreed with Huyen’s impression of a child’s role, “Well, [my child] doesn’t know anything. He just likes to play…Well, normally when adults are having a conversation, children rarely interrupt…Because he doesn’t understand adult things.” Her child also has a hearing loss. The impression that adults and children think differently, therefore, influences when communication between the two can take place.

Although children will eventually become adults, there is a period where they are seen as dependent on adults to care for them. This appeared in references related to both
language development and self-care. Anh, whose child has a hearing loss, said, “When [my son] can understand everything I say, he’ll be assigned something to do,” when discussing her son’s ability to help with chores around the house. In order for children to be welcomed into adult conversation and given responsibilities around the house, Vietnamese participants expect children to have a certain level of language. Without it, children are seen as ‘incompetent’ and unable to care for themselves or engage with adults.
Appendix 4.2.2 Parents Teach

The Vietnamese participants view parents as the ‘teacher.’ It is their role to help a young child who is incapable of helping herself. Vietnamese participants supported children in everything from self-care skills to moral judgments. A major learning focus for children within the child participant age group in the study are activities related to hygiene and general cleanliness around the house. Parents interviewed discussed teaching dressing, feeding, and toileting skills among others. Children at this age are also often given simple chores around the house like picking up toys or carrying dishes to the sink after a meal. Linh, mother of a typically developing child says, “They can learn from adults things like how to sweep the floor. For example my child usually takes the broom from me to sweep the floor or help me with the cooking. My eight-year-old child also asked me to teach him how to cook.” Linh is teaching her child to care for the home while at the same time encouraging expected traits such as caring for others, and responding to direct requests to learn a new skill. Nga, the mother of a child with hearing loss, elaborates, “I know cases like when he wants to eat…if I understand, then I can feed him and if I don’t understand, when we don’t understand, we just get angry at him or just ignore him.” Here, language abilities impact the parent-child dynamic. Adults often struggle to help children if they cannot understand them. Children require expressive language to obtain help from adults when they cannot perform a skill on their own according to the Vietnamese participants.

A parent’s role is not limited to helping with self-care skills. They must also act as a moral compass for children who are unfamiliar with the world. “Children of [my child’s] age are simple minded. I can shape him and teach him what’s right and what’s wrong so that he can have the foundation for the future,” reports Phuong, the mother of a typically developing child. Vy, another mother of a child with hearing loss, explains, “Since the child is too young to draw distinction between evil and good influences. Therefore, it’s very crucial to pay attention to children’s thoughts and acts so that we could give instructions to guide them to the right way.” Because children are ‘unaware’ of the world, it falls on parents to ensure that children are making ‘good’ choices throughout the day. Some participants reported using folktales, books, and TV shows while others taught
through spontaneous conversations. According to the Vietnamese participants, children are less capable than adults and it is therefore necessary that adults guide and teach them so that they learn to make the correct choices in life.

Parents are responsible for ensuring that their children are gaining the knowledge necessary to fully integrate into the community. The parents interviewed described a number of ways in which they instruct children. The methods span a variety of different types of lessons. Most of the parents of children with hearing loss described providing extensive language stimulation to children learning to talk. Trang, whose child has a hearing loss, explains, “We should have needed to talk to them every day since early age, since they were born. Even though they can’t talk, we have to talk to them a lot so that…when they hear a lot they will talk.” Although this example relates to language learning, providing a model for children to imitate was a commonly used teaching method for many different skills. Sang, the mother of a typically developing child, describes the many types of knowledge she imparts to her child daily and how she incorporates this into their day, “Normally [my child] learns singing, reciting poems, or I tell him stories. Playing with toys, learning the letters, looking at pictures and numbers. I also let him get familiar with the trees, flowers, and everything…because he’s now like a sheet of blank paper. I have to create an environment so that he’ll learn things and learn how to think…Playing with adults so that children can learn the language, learn to have a rich vocabulary or through the adult talking in different contexts I can draw lessons from these stories and conversations.” Sang believes it is her job to teach her child about the world and she can do this by exposing him to language and experiences throughout the day. This parent incorporates learning into everyday activities to help her child reach his intellectual potential. Additionally, while parents frequently provided the stimulation, other members of the community did so as well, as described in ‘Community Supports.’

Other parents have different ideas about how children should be taught. In the case of school-age children, Vietnamese parents were expected to be more formal in the education process. Many parents of typically developing children interviewed referred to set ‘study time’ for their older children. These sessions often reinforced information the
child was learning in the classroom. Younger siblings imitate their older brothers and sisters by sitting and coloring or looking at a book during ‘study time’ at home. Many of the parents of typically developing children interviewed agreed, however, that their two or three year old children were too young to read or truly study. However, some parents did discuss creating more formal learning environments for their preschool aged children. For instance, Trinh was asked what she would do if her daughter struggled to learn a song. Singing is a common academic goal for young children in Vietnam. She responded, “I will give [my daughter] more practice, since she still can’t sing smoothly. I need to practice many times.” For this mother, spending focused time teaching her child a task is necessary even though the child is young. Most participants who had children with hearing loss also discussed taking a more formal approach to teaching their children. ‘Study time’ was mentioned as part of the daily routine in almost every family of a child with hearing loss.

Vietnamese participants hoped their children would be inquisitive, demonstrating a desire to learn, as described in ‘Children Learn.’ One mother, Han, who has a typically developing child, explains the role of the parent in such situations, “[Children] ask [questions] because their knowledge is not whole. They are curious to know the answer…If [my child] asks [a question], I need to explain to help her gain a deeper understanding.” When a child reaches out to learn more about the world, particularly through conversation, parents are obligated to answer.

Parents who participated in this project also felt that they are responsible for teaching their children to talk. While most instruction occurs through language, the parents often claimed to first have to didactically teach their children to speak. Language learning occurs when the parents specifically teach words one-by-one. Trinh claims, “It starts at 14 or 15 months old. The parents start to teach the children to say ‘father,’ ‘mother,’ or ‘grandmother,’…I pointed at the animals and said, ‘bird’ or ‘ant,’…They start to repeat. At first, it was not correct…whenever I see the object I will point at it and tell her to repeat.” According to the Vietnamese participants, children learn through imitation. It is
the parents’ job, however, to ensure that the child is being exposed to the appropriate information.

Although parent-child interaction is framed as work in which parents are required to constantly be teaching and children are expected to be continuously learning, the parents of typically developing children interviewed did report that they received pleasure from interacting with their children. For example, Thi says, “Talking and explaining for [my daughter] to understand what she is not sure of, or mom and daughter share with each other. Since she is still little I always love talking and sharing. I like talking with her…I like her to be as a friend and join us to let her sit like that, I feel…first of all, sitting together not talking is sad. I prefer for her to join us. And, there are some more important matters that she has to sit still for. This [interview] is another matter that she has to sit still for and let mom talk. Only when I ask her to talk, then she can talk.” Here we see a clash between what parents want and how they choose to socialize their children. Thi, mother of a typically developing child, would like to chat with her daughter because she enjoys the interactions. However, she is quick to point out that there are situations where those types of interactions are inappropriate. She feels the need to regularly reinforce these behavioral rules so that her child can integrate into the community.

Interacting with the community also requires that the child be respectful in their language use. Parents teach their children greeting rituals and appropriate titles when they are very young. “If guests are coming I only tell [my daughter] to greet and sit around and play. And she can only answer when adults ask…I think sometimes children don’t really know what they are talking about. Sometimes they will repeat something that they heard from somewhere, which might bother guests” states Mai, the mother of a typically developing child. Depending on the context that the child is in, s/he may be expected to be quiet and defer to adults. The Vietnamese parents interviewed seemed to feel the need to control when their child spoke to prevent them from expressing something inappropriate they may have learned from an unknown source. While a child might be gaining intelligence through observation, parents felt they were too young to monitor their own thoughts for others or participate in topics of conversation that may be too advanced.
Appendix 4.2.3 Community Supports

‘Community Support,’ captures the idea that that socializing with a variety of people, including friends, extended family, and professionals is an important part of everyday life that helps children develop intelligence according to Vietnamese participants. At the same time, supporting caregivers by providing parenting advice is also a significant role played by the community.

When asked to describe a typical day, all of the Vietnamese participants casually mentioned time throughout the day when children were expected to play with other children or older relatives. Play activities reportedly occurred at all times of the day. Parents rarely provided specifics about the exact nature of the play. The important piece was always that, at these times, children were interacting with people from outside their immediate families and that this type of activity occurred regularly. By ensuring that these opportunities for interaction are seamlessly assimilated into the child’s daily routine, parents are effectively integrating them into their community.

The inclusion of so many opportunities for social engagement illustrates the importance Vietnamese participants placed on socializing. One father of a child with hearing loss described it in this way, “Because as the Vietnamese proverb has it, ‘study goes with practice,’ if she just sees and doesn’t come in contact or react, she’s just a scarecrow.” Here, an interpreter clarified that a ‘scarecrow’ symbolizes a person who is ‘hollow,’ inside, without a brain. In order to achieve intelligence, children must socialize with those around them.

Socializing thus provides children with the opportunity to learn. Ngoc, the mother of a child with hearing loss explains, “Playing with children, they are still very young so they can understand each other and they learn different things from one another…Like, when this one sings, the other one also sings. When the other one dances, this one also dances. And the activity like feeding themselves they learn from one another.” Engaging with
other people including children provides opportunities for children to learn a variety of skills.

Children are expected to be different from adults. Therefore, they will have a better understanding of each other than an adult might. One parent of a typically developing child put it this way, “I think that for example, when he plays with his older brother and sister at home, there are things which his brother and sister understand so he learns more from them.” Because children are seen as thinking in a similar manner to each other that is inherently different from the way adults think according to Vietnamese participants, they are seen as appropriate teachers for each other. Children are then encouraged to interact with other children so that they may learn new skills.

Through interacting with family, Vietnamese participants reported that children learn specific traits they are expected to demonstrate when talking with other people. One trait is responsibility. “She must be responsible,” says Yen, the mother of a typically developing child, “Responsibility with herself and people around her. Just that. She just needs to show responsibility and she can be capable of other things as well.” Children are expected to care not just for themselves but for those around them too. Without this empathy for others, the child will not be accepted into the community.

Socializing with the community can also improve a child’s confidence. “I want my child to be sociable and can fit in any kinds of social situations,” Nguyen, another mother of a child with hearing loss, explains, “I want him to be confident. I don’t want him to be shy…I think people need to blend in, fit into the community. Shyness can lead to isolation and, in turn, autism.” Encouraging a child to engage with others increases their desire and ability to do so. Children who cannot socialize are seen as being vulnerable for autism. The participants believed that avoiding isolation will improve a child’s overall well-being.

Children can also learn ‘naughty’ behaviors through interactions, however. Parents therefore serve to teach their children right from wrong. Although children can learn a
great deal through interactions, they must also rely on their parents and community to
guide them. Many Vietnamese parents acknowledged that it was imperative that extended
family members step in to help teach children. Chau, the mother of a typically developing
child, put it this way, “First of all, [my son] can learn the moral values of the family. If
the child is still young, he can learn how to talk or how to do things. For example, if
adults do something wrong and he repeats the same thing, you can’t tell him that he has
done something wrong because he just follows what you did. Only when the adults are
correct can they tell the children to do the right things… There are things that he can
learn [from adults outside the family] but learning from the family is the most important.”
Chau felt that it is valuable for her family to reinforce the values she is instilling in her
child. She is keenly aware that children learn through imitation and observation, and so
wants to only expose her children to family. Learning through experience with extended
family helps children generalize the lesson taught to them by their parents.

Parenting can be challenging regardless of cultural background. The Vietnamese parents
interviewed often reported reaching out to those with experience with childrearing when
they came across an issue they did not know how to handle. Commonly, mothers like
Yen reached out to their own mothers or mothers-in-law, “If there is any problem [with
my son] I talk to paternal grandma…It’s like being a daughter-in-law, first of all, I ask
permissions, or, when I have something I don’t understand, and grandma, who raised her
children, has experience.” Ngoc also relies on family, “I mean, I am still young and I
don’t have enough experience in parenting. I will ask my mother, grandmother, or adults
around me, those who have experience parenting.” Most Vietnamese wives move in with
their husband’s family upon marriage. They are then expected to be respectful and
deferential to their mothers-in-law, who may play a large role in the way the child is
raised. In Yen’s situation, and in the case of many of the mothers I spoke with, the help is
appreciated because the knowledge that comes from experience is respected. This is done
in a similar manner to the ways in which parents instruct their children to respect elder
speakers, which is discussed in ‘Adults Teach.’
Vietnamese parents reported relying regularly on people who were professionally trained in child development, primarily medical professionals and teachers. Most of the parents of typically developing children who were interviewed for this project sent their children to preschool at least a few days a week. Although they admitted that their children were too young for most academic pursuits like reading or writing, most conceded that it was the teachers’ job, in the case of young children, to teach self-care skills that would otherwise fall to the parent and are discussed in ‘Adults Teach.’ One grandfather of a typically developing child put it this way, “in order to provide a good education for your children, there must be a combination of lessons from the family, the school, and the community. If there is only input from the family, she will not be educated properly. Family alone is not enough, the school has to play a role here because she obeys her teacher…because at her age she is not able to learn words yet. She is only three years old. At the kindergarten, aside from teaching children daily living skills, teachers also teach them how to sing.” Parents and friends are not enough to teach children everything they need to know. Teachers also play a role in helping children improve their abilities in developing age appropriate skills. Other participants who have children with hearing loss, like Anh, preferred to ask the school, “I will ask the Sisters (nuns) who teach me or I’ll ask the teachers who come [to my home].” Participants relied on a similar support network to the one that they are helping their children create. Nhu, whose child is also typically developing, often turned to her customers, “There are lots of people with experiences at the shop and I ask them, then I draw a conclusion myself.” Nhu was willing to accept advice from all members of her community who have experience raising a child. Vietnamese parents regularly seek support from those around them according to the participants.

Many participants stated that religion helped them to feel supported in raising their children. For the most part, parents reported following either Catholicism or Buddhism. In both cases, children routinely attended religious ceremonies, and some parents mentioned the importance of carrying on family traditions for future generations as a main impetus for introducing children to religion. Those family bonds are seen as fundamental to the child’s future development. For instance, Phuong, a mother with a
child who is typically developing, described holidays like this: “We cook food and gather our brothers, sisters, and relatives. On my side we have his grandmother, uncles, and aunts while on my husband’s side there are many many of them… I think it is to strengthen the tie in the family between brothers and sisters… so that we may teach the children who are in the family so later on when his grandparents pass away, they can still rely on their aunts and uncles. Like, if we have some problem, they will help us.” Holidays are seen as a time when a child is expected to learn to become part of their family by engaging with family members they may not see regularly.

Another mother of a child with hearing loss, Thuy, claims, “In comparison with the Catholics who often go to church every Sunday or more, for me, in Buddhism, I just expect him to simply follow traditional worship at home like what his family has done so far…After all, I wish my son can learn to speak and integrate into the community when he grows up.” Participating in a religious community is a way for children to socialize and become a part of their society according to the Vietnamese participants. Religious groups can also provide support for the family. Vu, the father of a child with hearing loss, describes his religious community in this way, “We have got a lot of support from the Catholic group that I participate [in]. Everyone cares deeply about my child. We usually socialize and hang out with the people in the Union (church congregation)... it was also Father who helped me get in touch with Sister Sang in order to send my child to study at the center.” Religion helped this participant identify a way to educate his daughter with a hearing loss. Socializing in these formal communities has benefits for both parents and their children.
Appendix 4.2.4 Subtheme: Children with Hearing Loss Need More

Within the idea that children who talk a lot are more intelligent is the implication that children who do not or cannot talk are not intelligent. Children with disabilities like hearing loss who struggle with language may be at an immediate disadvantage in terms of how their intelligence was viewed by the Vietnamese participants. Although they may be cognitively intact and perform skills appropriate to their age, a delay in their language abilities may lower the participants’ expectations for them.

This brings us to the subtheme: “Children with Hearing Loss Need More.” In addition to the expectation that children learn, parents of children with hearing loss reported that they also hoped their child would be as ‘normal’ as possible. Parents of children with hearing loss repeatedly said that they wanted their children to communicate and behave in a manner similar to other children in their community. With access to technology and appropriate speech-language therapy, most parents of children with hearing loss expressed feeling hopeful that their children would be able to achieve this goal. For example, Thuy, the mother of a child with hearing loss, stated, “At first, when I saw him like that [with a hearing loss], I was very sad, me and my husband both. Both of his sisters were born normal. Why did it happen to him? My husband’s family and both sides grandparents were very sad as well but with early detection and intervention and the hearing aids, I hope he will be able to speak soon. We’re a bit relieved about that. When he’ll be able to speak, we won’t be sad anymore. At first we were all depressed wondering how his life would be considering he wouldn’t be able to fall in line with the society if he could not speak. I bleed for him.” Parents of children with hearing loss expressed hope that their children would eventually be able to use language in a way that would allow them to integrate into the community. Parents feel that it is important for children to be able to socialize with their peers and community. Most of the parents interviewed stated that, although their child had a hearing loss, access to advances in intervention gave them hope that their child would be able to communicate in a way that would allow them to learn and demonstrate their intelligence in a similar manner to their typically developing peers.
Although parents appear to agree that all children benefit from socializing and being a part of a larger community, the participants indicated that children with hearing loss required extra support. Furthermore, according to the Vietnamese participants, children with hearing loss are different and therefore may need additional support in order to integrate into the community. One grandfather, a primary caregiver to a child with hearing loss, explained, “As far as I am concerned, if a child is normal, [learning to speak] will be easy. But if the child is with some disability like my grandson, there has to be a specialist. We can’t teach them on our own.” Children with hearing loss must be integrated into a special community of experts with specific knowledge regarding education. The general community is simply not enough even though the principles of integration remain.

Parents of children with hearing loss reported incorporating play into their lessons. This strategy was dictated by teachers at the child’s school, highlighting the importance of experts in educating children with hearing loss. Hoa, the mother of a child with hearing loss, describes it this way, “After we started school here, before, he was too young to learn anything. He started school here when he was two. The nuns will assign the tasks and I will teach him accordingly. For example, if the nuns assign colors or numbers, I will teach him colors or numbers. We have a different topic every week and we will play and learn about the topic during the week. Before that I didn’t know so we just merely played together without learning anything.” By adopting the advice of the teachers, parents learn to teach children with hearing loss the same types of information they would to a typically developing child. In this way, they keep their identity as teacher and children remain the learners.

Just like parents of children with hearing loss, parents of typically developing children see the importance of trained professionals, such as teachers, in the raising of children with disabilities. Linh, whose child has typical hearing, describes it this way, “I feel real pity for [children with disabilities] because everyone wants their child to be born healthy… I think that in my family when there is a child like that at first, I think we will be really sad but then we still need to find a way to bring him to school for the disabled.
The teachers there can teach him to talk to connect with the society.” While teachers instruct young typically developing children on self-care skills and singing their job increases when it comes to children with disabilities. They are expected to also teach communication. The Vietnamese participants indicated that parents are not capable of raising their children alone. They need others with different skill sets to help.

Vietnamese parents of typically hearing children repeatedly described feelings of pity for people with disabilities. The appropriate reaction to the feeling was to provide charity and kindness. Rather than hiding people with disabilities, most parents agreed they should be integrated into the community as much as possible. Bich, the mother of a typically developing child, states, “I have a perfect child who is complete so I am happy. Those who have children like that [disabled], it’s unfortunate that nobody wants. Disability is also the problem in the society. It happens because a disease nobody wants it. If it happens to someone, we need to give them chances to live a normal life. Give them chance to have a normal life. It depends on the understanding and development.” Although people with disabilities are seen as ‘incomplete’ and ‘unwanted,’ Bich, like many of the parents, agreed that the community should help them live as normal a life as possible.
Appendix 4.2.5 Exposure

“Exposure” captures how the Canadian participants expressed their understanding of their child’s learning processes. They stated that, in order for children to learn, they must be exposed to a great variety of different types of stimulation. The most important thing children were expected to learn in this manner was identity. Daily routines often provided children with multiple opportunities to be exposed to play, books, and TV. Participants saw these activities as opportunities for children to learn language. Daily errands, including traveling from activity to activity, and formal ‘classes’ were viewed as opportunities for interactions with the community that helped children learn who they are.

Many of the parents interviewed described language learning as a process that occurs through ‘osmosis.’ Parents help to expose children to different types of stimulation like other people, toys, and media. Eventually, the child absorbs the input, learning to talk. Kate, a mother of a typically developing child, said in her interview, “I noticed with him it’s almost like the reinforcement through different types of mediums where, you know, it’s in the book, um, imitating us and, you know, in song, uh, sing, you know, from his blocks and , you know, bath time, play with letters or whatever, uhm, and even, you know, I hate to say it, TV. We don’t have an iPad so he doesn’t do that stuff but, um, you know there’s certain programs that, uh, I think we’re sort of selective in what we do let him watch, um, and they are educational and, you know, and he does, we do see him pointing out letters and things like that.” According to Kate, exposing her son to different forms of language stimulation throughout the day is helping him become a spoken language user.

The Canadian participants described a number of different people and experiences that they felt influenced the developing identity of the child, including interactions with both adults and children. Adults can model ideas for children who may not have their own experiences to draw from. Michelle, whose child has a hearing loss, explains, “Different experiences, different play types, uhm, really comes down to, uhm, being young children,
being exposed to everything that, like as much as they can, as possible, uhm, but again, yeah, because adults operate in a different way. It’s great for them to see and learn…because of, an adult’s experience, I guess, maybe…It can bring, sort of, examples like a model of things because of what they know of that a child has not yet learned…So uhm, in that sense, so, like, being able to learn new things based on the adults.” Adults can demonstrate certain ideas that might be new to the child. These types of exchanges help the child learn new information about their world.

Children also learn through exposure to other children. They learn social skills and pragmatics through peer encounters similar to the ones they have with adults. Another mother of a child with hearing loss, Jana, said, “We really like that our kids have gone to daycare, preschool, like, at a really young age. Um, we find it really helps, with their, um uhh, their social skills with other kids. Um, being comfortable with your peers and, um, learning to share and, yeah, thinking about other people besides yourself and that sort of thing.” Spending time with other children allows a child to learn the norms of interacting with others. The participants stated that children need to engage with people of all ages in order to develop their identity.

Children were exposed to other children during organized classes, visits to the park or library, and through family functions. Interacting with children, it was agreed, taught children a different way of communicating that could not be learned from adults. Josie, another mother of a typically developing child, explains, “I think that playing with kids is good because it will, I mean, I think it’s really, really, really, important. Um, helps you develop your ability to interact with your peers, I think it’s really good because they aren’t, like, they’re more challenging, they’re less compliant, you have to learn how to navigate the situations where the person isn’t, where the, like, in an adult situation, the adult is going to kind of shape the situation so that the child is more successful in it, whereas, with a kid, like, nobody’s really gonna make sure that your child doesn’t freak out, or, so they have to kind of, practice more self-regulation.” Exposing children to other children allows them to develop as individual communicators who can engage with others independently.
Many Canadian participants discussed activities they include their children in that may help them learn, such as visiting museums, and arts and crafts projects. Exposure to activities such as these ensure that the child is learning about their world and their place within it. Parents also believed that children learn by participating in classes like swimming or library time as well as more structured school programs. Jana continues, “We really like that [the school] really try to – it’s not just free play all the time. Like, there’s structure to it. They do a lot of circle time and singing – they sing everything. Um, they, uh, they, uh, they really try to – they made me – the focus on some academics even at this age. Um, and we kinda like that. Um, and, uh yeah. And both [our sons] have done really well in it. They - I think they like the structure, they have a set time for everything.” The repetition of the structured environment allows for exposure to many new ideas and behaviors that the child can take advantage of.

All of the Canadian participants were happy to share pieces of their religious heritage with their children. However, these experiences tended to focus on more cultural aspects such as eating or gift giving traditions, rather than the more spiritual. Morgan, a mother of two typically developing children, stated, “They go to a Catholic school, or, oh sorry, [my daughter] does. Um, he will. Um, and we’re kind of, what, our decision is to do that until they’re finished high school and then introduce them to other religions as they go along and once they’re old enough to make their own decision about what they want to do they can do that. I won’t force church on them like it was forced on me. Um, but once she shows an interest, I’ll definitely take her.” All of the Canadian participants agreed, regardless of their own religious backgrounds, that it was vital for children to be exposed to people of different faiths who might see the world differently. Engaging with a wide variety of people from different backgrounds was seen as a way to help children communicate and develop a better understanding of their world. One mother of a typically developing child, Joy, explained why she chose to expose her son to people from different backgrounds, “Oh, like a different perspective and a different possibly cultural view of things and different sense of humor. Like, my family has a very specific sense of humor so yeah…because we live in a world with many cultures and different people and he’s not going to live in a bubble when he’s older, I hope.” Exposing children
to people with differing ideas and opinions was seen as a way to help them become better, more accepting, community members who honored the identity of others. The importance of learning this trait is emphasized further in the theme ‘Honor.’

Children also learn language through exposure. The idea that language exists in many different places and can be used in different ways extended to the participants’ views on how children with disabilities such as hearing loss might communicate. One father of a typically developing child, Chris, explained how children with disabilities might talk, “Maybe they would use speech if they had one particular disability. Maybe they would use an augmentative communication system. Maybe they would use gestures and signs. Maybe they would not be intentional, in which case messages would be derived from the communication partner as opposed to being sent intentionally by the child.” Chris has training as a speech-language pathologist and, therefore, has specific knowledge around communication disorders. However, many of the participants echoed his views, especially regarding the involvement of the child’s parent. Participants who were unsure how to talk to a child with a disability assumed they would rely on the child’s parent to guide. For parents of children with disabilities, exposing their child to language becomes more challenging. Regardless of a child’s linguistic abilities, participants agreed that there are many ways to expose child to language and many ways for a child to communicate.

Parents model extensive amounts of language for their children. Gaby, mother of a child with hearing loss, talked about how children learn to talk, “Hearing and modeling. So hearing it till they hear the sound and then, um….modeling, meaning, uh, kinda like repeating or mimicking…right? In the beginning it’s repeating and mimicking and then later on it becomes like modeling. Language and, uh, sentence structures, grammar, um…I know I used to have like the family home visitor come and you know she’s like, ‘just repeat everything and be like a sports commentator,’ and ‘just say, ‘oh I’m walking over to the fridge,’ ‘I’m opening the fridge door,’ ‘I’m pouring the milk into the glass and giving you the glass so you can drink the milk.’ Like just verbalize to death everything.” The participants believed that all children learn language through exposure but, as Gaby
mentioned, when the child has a hearing loss, professionals can give advice regarding how that exposure can best be presented to the child. Leah, another mother of a child with hearing loss, builds on Gaby’s description, “So it’s things like talking – making sure that I’m aware that babies can’t differentiate background noise to language. It’s all the same volume to them and their brain hasn’t figured out how to separate the two. So making sure that when you talk to babies you wanna use that sing-songy voice so they can capture that information differently from background information…to make sure that when you are talking to children with hearing loss, the background noise is as little as possible to make sure that your house is set up so there are lots of carpets around and fabric items so that it captures the echoing sound. To make sure that when you’re talking to a child, you’re talking - like I’m talking to you quite fast so I slow down take pauses give them the opportunity to process that information a little bit longer than you would expect.” Advice like this from the speech-language pathologists allows mothers like Leah to provide an appropriate level of exposure to language for a child with hearing loss.

In addition to intervention specialists, parents with children with hearing loss who were interviewed also sought help from other sources in the community. While most Canadian participants felt their parents (the child’s grandparents) were ‘out of touch’ with modern parenting styles, they did turn frequently to friends. This exposure to suggestions from community members was especially important for parents of children with hearing loss who have special parenting considerations. Leah continues, “One of our questions and issues are beyond the scope of what my friends and family have experienced, um, you know, like [my daughter] has to have an, uh, EEG for seizure, test…and you know there was not – nobody really I know who can talk about that so, um, I do have a couple of friends at her hearing school, other moms, so I can talk to them about things like that.” In order to ensure that they are providing their children with everything they need parents reach out to their communities to find the best advice available.

The parents of Canadian children who participated in these interviews believed that by ensuring that their children were exposed to a variety of people, places, and things they
would learn to become better communicators, with individual identities that would allow them to become better citizens within their community.
Appendix 4.2.6 Honor

The theme ‘Honor’ explores how Canadian participants value a child’s interests and behaviors, created through exposure to their environment. In addition to learning language through exposure to linguistic stimulation, as discussed in the theme ‘Exposure,’ children also develop their own set of likes and dislikes. Participants expressed a great love of learning about their child’s preferences. Samara, mother of a typically developing child, talked about her son’s love of reading, “[He] love, loves books. He’s, he’s loved, ever since he was a baby, he’s loved books. So he’ll go off and he’ll flip through books on his own. Uhm, but we always, we read bedtime stories. We’ll read. We’ll pretty much, anytime during the day, if he brings us a book, we’ll read.”

Samara’s son enjoys reading and Samara is more than willing to indulge that preference whenever he likes. Similarly, Laura’s typically developing son has food preferences that she is happy to cater to, “He doesn’t have as much protein as I’d like him to have but…he does, I mean, the fact that he’s eating so many fruits and veggies and we can give him a piece of broccoli and he’s happy and excited and that’s good. Yes.” Participants were eager to share their child’s interests. These likes and dislikes were seen as the emergence of the child as a person and the caregivers treasured them.

Introducing new ideas and experiences through exposure contributes to the creation of the child’s identity. Michelle, the mother of a child with hearing loss, put it this way, “[Kids] don’t know anything, in like, they don’t necessarily, because they don’t have all of the experience, uhm, and knowledge of, like, what we have, and the influence yet, perhaps, uhm, I think it might be, it is good to see their perspective. Uhm, because it’s very innocent, like, very naïve. So, and, uhm, yeah, so, in that sense I think it’s good because they may see things they’re, they are going to see things that are different than someone who has lived longer who has experienced and who may have seen the same situations. Their view will be different than someone who has been in the same view before.”

Michelle believes that her child’s innocence allows him to see the world in a unique way.
Many of the Canadian mothers interviewed for this project agreed with Michelle. Most stated that they loved listening to their child talk because it allowed them to learn more about their child’s personality. Helen, another mother of a child with hearing loss, said, “Children have a very unique perspective on things and they pick up on things that are different than adults would and they’re exploring the world in a different, in a, you know, they’re exploring the world as they go and it gives you a unique perspective on things but I think it gives you unique clues on how your kids are developing and it’s extremely important to listen to your kids.” Participants identified their children as individuals and expressed the value of that to them as parents by allowing the children to voice their own opinions about the world and their preferences for toys, books, and activities. The Canadian parents interviewed happily encouraged children to talk while they listened.

By listening to children, adults can honor their child’s individuality. They can help them meet their needs, address their questions, and provide activities and other items that they enjoy. These actions on the part of the parent serve to show children their place of importance within the family and larger society. One mother, Leah, whose child has a hearing loss, highlighted why listening to children is important, “Well, often if you know what they’re thinking, you can calm them down from having a temper tantrum. Sometimes they can be thinking a totally different thing than what’s going on. The other thing is important to know is what they’re thinking is because…I have been in situations where I have like for example, [my daughter]. [My daughter] is quite physically small and so its easy to just pick her up and move her places, doing what you want to do, and she just tells me, ‘I don’t like when you pick me up.’ Yeah, of course you don’t. I wouldn’t like that either. Why am I doing this to you all the time? But only because she would tell me that, I was able to stop doing it. And, it’s a fair thing. It’s not like she’s saying like, ‘no, don’t ever touch me again, Mommy’” Listening to her daughter’s feelings allowed Leah to understand her wants and needs and by following the child’s request she was able to honor her daughter’s wishes.
The participants also saw themselves as guides for their children. As described in ‘exposure,’ they would provide their children with information and experiences, but it was the child’s responsibility to make final decisions. For instance, participants were happy to expose children to many different religions and allow them to choose what they wanted to believe. Participants spoke about supporting any interests expressed by their child. When parents like Leah honor their child’s individuality, the child not only learns their own value as an individual but also the importance of respecting others in the community. Canada is a diverse nation. The population hails from many different religious and cultural backgrounds. Children are expected to honor the beliefs of others by observing how adults treat others. Bari, whose child has a hearing loss, puts it this way, “I want [my children] to be respectful. I want them to, uhm uhm, look at, look at the good in people. You know, not judge people. I think it takes, it sometimes, if you’re a parent. Yeah, so, just, just to be, uh, not judge people. Uhm, do your best. Know that everyone’s different and, uhm, everyone tries their best, not to have hate.”

The parents interviewed for this project continued to support the individuality of each child by honoring their opinions and modeling respect for people from different backgrounds. This was equally true of children with disabilities. Participants felt they should be treated just as any other child would be, “One of my cousins is disabled,” Morgan, mother of a typically developing child, shared, “so, you know, he’s just paralyzed from the waist down, so, um, we never really saw him like that as a kid, right? He was just my cousin.” All kids should be respected for who they are regardless of their abilities.

In addition to supporting individuality, Canadian participants wanted their children to be confident in who they are and how they interact with others. This was especially important for children with hearing loss. The parents interviewed were interested in teaching their children self-advocacy skills. Nora, mother of a child with hearing loss, described her concerns this way, “I just don’t want her to be so like – she, but she gets – she tends to be, like, even a pushover, too. And it worries me when she goes to like school that because she’s a disability I know she – and she has red hair, that I know she’s
gonna be made fun of for being – for both of those things and I don’t want her to be so self-conscious. So I want her to be strong-willed.” Nora’s solution is to expose her daughter to many other young children at an early age.

Other parents interviewed felt their children were too young to advocate for themselves. As such, the parents took over and advocated for them. They also took control of other activities related to self-care and hearing technology when they believed the child was too young to do this alone. Their actions were taken not to prohibit the child from completing tasks but as a way to model behavior for the child to learn. Gaby, whose child also has a hearing loss, chose to model self-advocacy in the classroom for her children, both of whom have conductive hearing losses, “She’s going to a brand new school, brand new teacher, all new friends. Nobody knows about her and her condition. I didn’t know if I needed to, like, talk to the teacher, like, really ahead of time or not or…I didn’t know if I should have gone to the front of the classroom with the rest of the kids and say, ‘you know I just like to introduce you to [my daughter] she has a bigger [ear] and a little ear like Nemo.” Demonstrating self-advocacy skills like these builds the confidence of the child.

Parents honored their child’s identity by following the child’s lead throughout most interactions, including those in which the parent was guiding the child to behave appropriately. The concept of following the child’s lead also holds true within behavioral management contexts. Most of the parents believed in the use of ‘natural consequences’ to help regulate their child’s behavior. This form of discipline allows for children to make their own choices while permitting them to experience any and all related consequences. Susanna, whose child is typically hearing, describes it this way, “I also feel like he’s old enough for some understanding and contemplation about things. So, like – or I’m trying to encourage a sense of, like, empathy. Or, you know, like I’m trying to encourage these more complicated things? Like, ‘if you do this, this might happen,’ ‘what is your sister trying to tell you when she’s crying?’ Um, it’s, um, y’know, ‘If you hit people at the park, we go home,’ Like, you know? Like it’s like there’s – it’s just like in everything, there needs to be, like, ‘if you don’t eat your dinner you’re going to be hungry later and
you gotta feel that a little bit. It’s time to feel things.” By teaching children natural consequences, parents are honoring their child’s preferences and choices.

Parents also honor their children by following their lead related to self-care skills such as dressing, feeding, and toileting. Children were given the space to try all those activities on their own. Parents were prepared to intervene only if needed. This also held true when children were dealing with more emotional needs. Parents were keen to talk with children not only to learn their preferences but also to ensure their safety and well-being. Participants wanted their children to feel comfortable about coming to them for guidance on problems so they could learn more about their children, support them, and keep them safe. Michelle, whose child is typically developing, said, “Well if they’re asking something because they’re worrying about it then I’d like to know that, that they’re worried about it because then that helps me be able to, to ease that concern or to be able to talk them through the problem or understand what a bigger picture might be.” In this way the participants in this study were eager to honor their child’s emotional identity as well as their physical and self-care abilities.

Because children were seen as having their own individual identities, the participants expressed that it was especially important for them to honor children while having conversations with them. Trisha, mother of a typically developing child, talked about listening to her daughter during conversations, “I think they have to learn to speak and it’s important to have your voice…but yeah, no, I have, I don’t think they should always be quiet. Unless you’ve asked them to be, because let’s say I’ve taken them to the movies or something [laughter] but, yeah, no, I think they have to learn talk and express their feelings and such.” Trisha wants her daughter to have the ability to express her needs and desires to her. As a parent, she respects that her child has independent thoughts and should be able to share them.

Conversely, when an adult speaks to a child, participants stated that they should continue to honor their children by being truthful and fair. Josie, another mother with a typically developing child, put it this way, “As a way of showing respect, and my own values
would be, like, that you don’t lie to kids and that you, you know, things, they are going to learn things as they get older and I think that, you don’t really think that they understand or that things will stick with them, but they will and I think being honest and accurate, I think that’s something that they need to trust you too, right?” Adults, the participants thought, should respect that children do understand the world around them and should be spoken to as such. Honoring what the child says and understands was of the utmost importance to the participants.

Honoring the child’s identity not only demonstrates respect for the child, it also serves as a model for how children should treat others. As discussed in the theme ‘exposure,’ children learn through community models. The parent honored identity so that the child will respect the individuality of others. Additionally, following the child’s lead allows the parent to learn the child’s interests and provide more specific stimulation, contributing to the cycle of exposure and honor.
4.7 References


1. Conclusion

The three articles presented here serve as an illustration of how cultural values surrounding communication influence interactions between parents and their children. The findings contribute to a more in-depth understanding of how language socialization influences parent-child talk in two different cultures, using the Language ENvironment Analysis (LENA) conversational turn count (CTC) as the primary variable under investigation. This set of studies builds on multiple bodies of literature, including automated vocal analysis, mixed methods research, and language socialization practices in the context of language intervention. The results of this project are meant to govern adjustments to the speech-language pathology services being provided to Vietnamese families in Vietnam and other parts of the world, particularly those for children with hearing loss.

The first article demonstrates that the LENA CTC is valid for use with Vietnamese speaking families. The concise validation protocol laid out in the manuscript can be used by future researchers and clinicians to ensure that the LENA System is valid for use with previously uninvestigated populations without significant time and labor costs. Validating the tool in other languages and with children who have additional needs will create a more universal picture of how children communicate, while at the same time helping to identify differences related to culture.

Once validity was established, the CTC generated by the LENA System was used to identify a significant difference between the number of conversational turns taken in Canadian families compared to Vietnamese families. At the same time, there was no difference between the numbers of turns taken by families of children with hearing loss versus those of children with typical hearing, regardless of culture. These results are presented in the second paper. Taken together, these first two studies exemplify the growing utility of the LENA System in child language research. This is the first known study to use the LENA System to look specifically at language socialization as an important variable contributing to the organization of parent-child talk.
In order to fully understand the LENA results, however, additional information was required. As part of the project, a qualitative analysis investigating parents’ perceptions of the language socialization practices they use with their children was conducted. Themes identified through qualitative interviews were used to expand on the conversational turn counts using a mixed methods approach as outlined in the third paper. The mixed methods approach provided a more holistic and integrated view of how the LENA results intersected with participant’s perspectives on language learning, thus improving both the quality of the research and the implications for clinical practice.

In their interviews, Canadian participants stated that they encouraged verbal interactions between children and adults, while Vietnamese caregivers described how they expected conversations with children to be adult dominated, regardless of hearing status. Language socialization practices thus served to emphasize and promote an individualized identity in Canadian families while, according to the Vietnamese participants, these interactions served to build intelligence in Vietnamese children. These differing perspectives help to explain why automated vocal analysis showed a significant difference in conversational turn count between families in these two cultures regardless of the child’s hearing status.

Although the results from both the Canadian cohorts were combined, as were the Vietnamese groups, four separate Thematic Analyses were initially conducted. The results are presented in the form of short definitions within Article 3. However, as part of Braun and Clark’s (2006) protocol, more in depth analyses were produced and are included here in Appendix 4.2. These essays clearly depict the differences in parental communicative expectations as a function of culture versus the similarities as a function of hearing status. The results also highlight certain topics affected by language socialization practice that may be of interest in future studies including literacy practices, discipline, and the role of the extended family in raising children with and without disabilities. Speech-language pathologist who understand how language socialization impacts the daily activities parents and children engage in will be able to create the most culturally respectful intervention strategies for them, leading to the development of appropriate goals and expectations for both families and clinicians.
The Canadian parents who were interviewed described the importance of listening and responding to their child as a way of helping them create their own identity. Instructing Canadian participants interviewed for this project to talk more with their children is therefore likely to result in improved language stimulation. Vietnamese families, on the other hand, talked about encouraging their children to learn through observation to build intelligence. For clinical purposes, language stimulation may best be capitalized on in the homes of the Vietnamese participants through modeling and formal teaching rather than conversation. Neither of these approaches to language stimulation is inherently better than the other. Instead, customizing intervention to the language socialization practices being used by the family may lead to more successful outcomes.

The mixed methods approach taken in this project is relatively uncommon in the fields of speech-language pathology and audiology (Suleman & Hopper, 2014). It is also rare in the LENA literature (Ganek & Eriks-Brophy, 2016). Furthermore, while the literature discussing cultural competency is growing rapidly in speech-language pathology, very few papers focus on language socialization practices as a primary variable. These studies demonstrate how a mixed methods approach can be used to integrate quantitative and qualitative data to better understand why LENA CTC results may be different across different cultures and how to interpret such differences. Although there was a difference in the number of turns in which families in the two cultures participated, and caregivers had different views on language socialization practices, the adoption of a mixed methods approach to the interpretation of the data leads us to the realization that these distinctions represent a difference and not a deficit. By accounting for cultural variation in parent-child talk, clinicians can design more culturally appropriate intervention strategies for families of children with hearing loss.

Future studies can use the results from this project to design speech-language pathology programs for Vietnamese families. Although this investigation recruited participants in Vietnam with children with hearing loss, the language socialization practices identified here along with their clinical implications might apply to children who have language delays and disorders unrelated to hearing loss. Repeating this protocol with families from
other cultures or children with other communication disorders will also increase our understanding of child language use. Specific information about language socialization and how it might affect speech-language pathology should be integrated into training curriculums for professionals working in communication disorders regardless of where they are training.

The next steps to achieving more culturally appropriate intervention in Vietnam is to design therapeutic techniques that align with the language socialization practices used by each individual family. Vietnamese professionals and the families of children with hearing loss they work with should be involved in this arm of the study to confirm that the language socialization practices are being applied appropriately. The outcomes of such new intervention strategies should be closely tracked to document whether or not incorporating appropriate language socialization practices into speech-language pathology actually improves outcomes. The results of this type of treatment program, as well as this project itself should be repeated regularly. Vietnam is a quickly charging nation with rapidly expanding industrialization and increasing contact with other cultural communities (World Bank, 2016). As a result of these changes and influences, language socialization practices may shift, creating a need for new therapy strategies.

There were some limitations in the execution of this project, of which recruitment was the most challenging. The 2010-2011 maternal rubella epidemic in Vietnam reduced our child participant age range to primarily three year olds (Toda et al., 2015). The limited age range made it more difficult to find matching children in Canada who spoke primarily English at home. Additionally, inclusion criteria required that Canadian parents were born in Canada. Families who fit these requirements were difficult to find, particularly in the population of children with hearing loss. Difficulty identifying eligible Canadian families highlights the immense diversity of the Canadian population and the importance of understanding the influence of language socialization in a North American therapy setting. Although the hypotheses posed in this study were supported, the results may have been more robust given a larger sample size.
Additionally, the LENA algorithm itself may have some limitations. When a speaker is talking in a noisy environment, the software will often label that segment as overlapping noise and exclude it from any analysis of conversational turns. The first paper presented here, however, found the LENA conversational turn count valid for use in Vietnamese. Furthermore, there was no significant difference between the proportions of overlapping noise occurring between the different cohorts, indicating that they are comparable. Future improvements to the automatic analysis or the addition of human coders may provide more information about this important variable.

Taken as a whole, these three studies demonstrate the utility of the LENA system as well as how a mixed methods approach to interpreting LENA data can help both researchers and clinicians better understand how cultural differences in language socialization practices directly influence parent-child talk. Rather than being viewed from a deficit perspective, however, such information can contribute to the creation of intervention practices that are better adapted to the communication patterns adopted by a given family. The results broaden our understanding of what might be considered ‘normal’ in child language production as a function of cultural background. By continuing to examine and understand culturally-specific language use in the context of speech-language pathology, intervention can be made more accessible and familiar to families from different cultural backgrounds who seek it out, allowing more children to learn to listen, talk, and become fully integrated, competent members of their societies and communities.
5.1 References


