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Assessing the Feasibility of Collecting Language Samples from Children who are  
Deaf or Hard of Hearing via Telepractice Technology

by

Cassandra Arias

A thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Science in Speech Language Pathology

Idaho State University

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The members of the committee appointed to examine the thesis of CASSANDRA ARIAS find it satisfactory and recommend that it be accepted.

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RE: regarding study number IRB-FY2019-57: Measuring Language Development of Children who are Deaf and Hard-of-Hearing through Language Samples via Telepractice

Dear Ms. Arias:

Thank you for your responses to a previous expedited review of the new study listed above. This is to confirm that I have approved your application.

Notify the HSC of any adverse events. Serious, unexpected adverse events must be reported in writing within 10 business days.

You may conduct your study as described in your application effective immediately. The study is subject to renewal on or before November 15, 2019, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Tom Bailey (208-282-2179; fax 208-282-4723; email: [humsubj@isu.edu](mailto:humsubj@isu.edu)) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP

Human Subjects Chair

## Dedication

This thesis is dedicated to my husband, Rafael. Thank you for never leaving my side and being a faithful friend in good and difficult times of our lives. I wouldn't have come this far without your love and support.

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## LIST OF ABBREVIATIONS

|                          |   |
|--------------------------|---|
| DHH                      | Deaf or Hard of Hearing                           |
| IESDB                    | Idaho Educational Services for the Deaf and Blind |
| MLU <sub>Words</sub>     | Mean length of utterances in Words                |
| MLU <sub>Morphemes</sub> | Mean length of utterances in Morphemes            |
| SALT                     | Systematic Analysis of Language Transcripts       |
| SLP                      | Speech Language Pathologist                       |

Assessing the Feasibility of Collecting Language Samples from Children who are  
Deaf or Hard of Hearing via Telepractice Technology  
Thesis Abstract – Idaho State University (2019)

Telepractice has been found to be an effective way to provide intervention services to children who are Deaf or Hard of Hearing (DHH) (Blaiser, Behl, Callow-Heusser, & White, 2013; Behl et al., 2017). This is particularly important as children who live in rural and remote areas often lack access to specialized providers (Cason, Behl, & Ringwalt, 2012). Comprehensive assessment of children who are DHH should include a language sample analysis as language samples are the gold standard for measuring language development (Werfel & Douglas, 2017; Blaiser & Shannahan, 2018). Language samples offer in-depth information about the children's functional use of language which norm-referenced assessments alone cannot provide (Ebert & Scott, 2014). The purpose of the study is to understand challenges with assessing children who are DHH in rural areas in Idaho and to explore if telepractice could be used effectively to collect language samples from preschool children who are DHH.

Key Words: Deaf, hard of hearing, telepractice, language samples

## **Chapter 1**

### **Background**

#### **Telepractice**

According to the Idaho Department of Labor (2017), the state of Idaho is composed of 44 counties, of which 37 are classified as rural based on their population density. The Health Resources and Health Administration (2017) describes a rural territory as any territory, with a population density of less than 2,500 to 50,000. Children who live in rural or remote areas, specifically children who are DHH often lack access to experienced providers due to personnel shortage (Cason, Behl, & Ringwalt, 2012). Because hearing loss occurs with less prevalence than other disorders, geographical distance between providers and children who are DHH can be a detrimental limitation to receiving the specialized services they need (Blaiser, Behl, Callow-Heusser, & White, 2013). Telepractice has increasingly been more accepted to meet the requirements of IDEA Part C and to be a positive alternative to mitigate the need for trained personnel in rural areas affected by professional shortage (Behl et al., 2017).

Telepractice is defined as “the application of telecommunication technology to the delivery of speech language pathology and audiology professional services at a distance by linking clinician to client or clinician to clinician for assessment, intervention, and/or consultation” (American Speech-Language-Hearing Association [ASHA], 2015). ASHA supports telepractice as an appropriate service delivery model because children with communication disorders need access to qualified professionals. Telepractice provides families with access to services which may otherwise be hindered by professional shortages in rural areas. Additionally, telepractice fits the requirements of the Individuals with Disabilities Education Act (IDEA, 2004) Part C by providing free and accessible services in a natural environment as the home to support children’s language development (Behl & Kahn, 2015; Behl et al., 2017). The

use of telepractice must comply with the guidelines outlined by the Speech-Language Pathology Code of Ethics (ASHA, 2016a), the Scope of Practice in Speech-Language Pathology (ASHA, 2016b) and state and federal laws, such as the Health Insurance Portability and Accountability Act. The adherence to these requirements ensures client privacy, service accessibility and upholds quality of service to the same standard as in-person service delivery (ASHA, 2015).

### **Telepractice in Intervention**

Telepractice has recently been shown to be an effective alternative service model to provide early intervention (EI) services to children who are DHH (Behl et al., 2017; Blaiser, Behl, Callow-Heusser, & White, 2013). Blaiser, Behl, Callow-Heusser, and White (2013) investigated cost effectiveness, provider and caregiver perceptions, and expressive and receptive language skills associated with telepractice in a randomized controlled study between telepractice and in-person intervention. Data was collected six-months prior to the start of the study and post-data was collected at the end of the 6-month intervention period. The participants included 27 families of infants and toddlers with varying degrees of hearing loss who were enrolled in the Utah Schools for the Deaf and Blind Parent Infant Program (PIP). Nine PIP providers delivered intervention services in both the in-person and telepractice groups. Thirteen children were included in the telepractice group and 14 were in the in-person group. Children in both groups received PIP services according to the services outlined on their Individualized Family Service Plan. Each participant received at least two monthly visits, with the children in the telepractice group receiving one visit through telepractice and the other as an in-home visit as required by state Part C policies.

Receptive and expressive language skills were measured through the Sensory Impaired Home Intervention (SKI-HI) Language Development Scale (LDS; Watkins, 2004). Based on pre- and post-intervention results, the expressive language skills of the children in the telepractice

group were statistically higher than the children in the in-person group ( $p = .03$ ). The Home Visit Rating Scales-Adapted & Extended (HOVRS-A+; Roggman et al., 2012) was used to measure the quality of intervention and the coaching skills of the intervention sessions in both groups. One HOVRS-A+ author independently coded and scored video recordings of four families from the telepractice group and four families in the in-person group with matched providers. Results indicated that the parental engagement was statistically greater in the telepractice group ( $p < .05$ ) than in the comparison group. Caregiver and provider perceptions collected through a researcher-developed survey following the study found the biggest challenge with telepractice to be connectivity and that parent-child engagement during intervention sessions was the most valued benefit for the caregivers.

The costs between telepractice and in-person services were measured using a researcher-developed cost form that analyzed service delivery time, travel time and expenses, technology equipment costs and Internet service costs. Cost forms were completed by the providers every two weeks for four months of the study's duration. Results found the amount of service time and time spent preparing for visits between the groups to be very similar. Each in-person home visit cost was an additional \$77 in provider time and travel cost reimbursement when compared to telepractice. It was calculated that the more telepractice sessions offered a month, the greater the financial advantage over in-person services. Cost-savings over time for telepractice was noted as an important consideration, with an approximate cost saving between \$56,280 to \$86,970 if a provider served 15 families for 24 months with 3-4 monthly sessions.

Behl et al. (2017) replicated the study conducted by Blaiser et al. (2013) with a larger participant sample of 48 children between 19-20 months of age and 15 providers recruited from five EI programs serving children who are DHH throughout the United States. The participating children were matched by chronological age, degree of hearing loss, concomitant disabilities, EI



provider, and recommended EI sessions. Based on the matching criteria, the participants were assigned to either a telepractice ( $n = 23$ ) or in-person ( $n = 25$ ) service delivery. The study's duration was six months and focused on coaching caregivers to strengthen receptive and expressive language skills. The Preschool Language Scale-5<sup>th</sup> Edition (PLS-5; Zimmerman, Steiner, & Pond, 2011), MacArthur-Bates Communication Developmental Inventory Words and Sentences (MBCDI; Fenson et al., 1993), and the Auditory Skills Checklist (ASC; Caleffe-Schenck, 2006) were used to evaluate the children's language and listening skills, respectively. Family outcomes and service delivery were measured through The Family Outcomes Survey (The Early Childhood Outcomes Center, 2014) and HOVRS-A+.

Results were analyzed through analysis of covariance to control the effect of covariates in the small participant sample. Children in both groups demonstrated statistically significant gains in posttest language scores following intervention ( $p = .001$ ). Notably, children in the telepractice group presented statistically better language scores compared to the children in the in-person group on the PLS-5 Receptive Language subscale ( $p = .02$ ) and the Total Language Scores ( $p = .05$ ), however no statistically significant differences were noted on the Expressive Communication subscale ( $p = .21$ ), the vocabulary measure on the MBCDI ( $p = .88$ ) and the ASC scores ( $p = .14$ ). Ratings on the HOVRS-A+ scales found the scores of the families in both groups to be above average performance. There were no statistically significant differences between the scores of the families in both groups on all the other scales except for provider's responsiveness ( $p < .01$ ) and parent engagement ( $p = .04$ ) on which the telepractice group scored statistically significantly better. These findings support previous study findings supporting the effectiveness of telepractice in EI as an effective approach to serve DHH children while still maintaining quality of service delivery.

Behl and Kahn (2015) administered an online questionnaire to early interventionists within a learning community to better understand how telepractice is implemented and to discover current challenges experienced with telepractice service delivery in EI. In this study, 27 participants were surveyed from 11 different EI programs throughout the nation. The areas of challenge mentioned by the providers included internet, software, and hardware variability among clients resulting in technical problems with limited access to technical support. Most practitioners reported using free software including FaceTime and Skype, while those using software requiring paid subscription reported higher satisfaction. The developing field of technology will likely provide better accessibility to higher-speed internet, and higher bandwidth for clients located in more remote areas. Another problem confronted by the providers included lack of professional training in the implementation of telepractice.

### **Telepractice in Language Assessment**

While intervention via telepractice has been studied, less is known about the effectiveness of language assessment through this service delivery model. There are several studies supporting the use of assessment of preschool and school-age children via telepractice. For example, Waite, Theodoros, Russell, and Cahill (2010), examined the fidelity of test results obtained from the administration of the Clinical Evaluation of Language Fundamentals-4<sup>th</sup> Edition, Australian adaptation (CELF-4; Semel, Wiig, & Secord, 2003) through telepractice compared to in-person test administration. Participants included 25 children between five to nine years of age with exclusionary criteria of substantial hearing, cognitive or neurological impairment, uncorrected visual impairment, or English not as the primary language. These participants either had a previous diagnosis of language impairment or were reported to have language deficits by parents or teachers without being formally assessed. Each participant was randomly assigned to either a telepractice or in-person assessment condition. Three qualified

SLPs participated in the study, with one being the Principal Investigator (PI) that participated in all 25 assessments. A total of 13 telepractice assessments and 12 in-person assessments were conducted. The SLPs were randomly assigned to either the telepractice or the in-person assessment administration. Two of the three SLPs took part during the assessment, with one SLP being in-person and other online. The four Core Language subtests (Concepts and Following Directions, Word Structure, Recalling Sentences, and Formulated Sentences) were administered and a total of four possible scoring conditions were possible which included: online scoring for the telepractice test administration, online scoring for the in-person test administration, in-person scoring for the in-person administration and in-person scoring for the telepractice test administration.

Each assessment was conducted in two separate rooms within the same building at the University of Queensland. All of the subtests were administered according to the testing procedures outlined in the examiner manual. The test stimuli were scanned and displayed on a computer monitor during the telepractice assessment condition. During the telepractice assessment administration, the online SLP administered the assessment and scored it, while the in-person SLP simultaneously rated the assessment as an observer.

In either of the two assessment conditions, the in-person SLP obtained an audio recording while the online SLP obtained a video recording of the participant's spoken responses. Although the online and in-person SLPs rated the responses during the assessment, they checked their rating at a later time. The SLPs converted each raw score to a standard score for each of the four subtests to obtain a core language composite score and severity level of language impairment. The paired  $t$  tests found no significant difference ( $p > .006$ ) on the total raw and scaled scores on each of the four subtests on the CELF-4 between the telepractice and in-person conditions. Very good agreement was obtained on intra- and interrater reliability with intraclass correlation

analysis on a sample of online ratings on individual item scores, subtest raw scores, scaled scores, core language score and the severity level. This study supports the assessment of language development through telepractice as an acceptable alternative to in-person test administration.

Similar results were found in a study done by Sutherland, Trembath, Hodge, Drevensek, Silove, and Roberts (2016), with 23 school-age children living in rural areas in Australia who were administered the six subtests of the CELF-4 Australian version in both in-person and telepractice assessment conditions. The four core subtests were administered by the online SLP and the two non-core subtests were administered by the in-person SLP. All of the subtests were completed within a single visit with a break between the telepractice and in-person assessment conditions. The in-person SLP recorded behavior differences between the two conditions through a behavior observation rating scale adapted from the Clinical Evaluation of Language Fundamentals-Preschool, 2<sup>nd</sup> edition, Australian and New Zealand (CELF-P2; Wiig, Secord, & Semel 2004). In contrast to the study performed by Waite, Theodoros, Russell, and Cahill (2010), this study used consumer grade equipment to identify the applicability of telepractice in clinical settings. There was strong interrater reliability between the in-person and telepractice assessment conditions with correlation coefficients ranging from  $r = 0.96-1$  across the subtests. Only one of the 23 sessions were rated with poor audio quality, and no sessions were rated to have poor visual quality. Similar levels of participant distractibility, attention and anxiety were noted between the two assessment conditions. A post assessment questionnaire was used to record participant and parent reactions towards the use of telepractice. Their responses were largely positive and supportive of using telepractice to assess children living in rural areas.

Better understanding of assessment practices via telepractice may be particularly important for evaluating the communication development of children who are DHH. The

development and implementation of newborn hearing screenings in the United States allow children with congenital hearing loss to be identified as early as two months of age (White, Forsman, Eichwald, & Muñoz, 2010). Early identification of hearing loss and advancements in hearing technology have improved results for children who are DHH, however there is a shortage of specialized professionals who are able to address the unique needs of this population. Specialized professionals such as pediatric audiologists and speech-language pathologists are pivotal in supporting improved outcomes for these children (Muñoz, Bradham, & Nelson, 2011). Telepractice can, therefore, be instrumental in ensuring that children are making progress and are evaluated effectively by specialized professionals.

Blaiser (2016) examined the assessment practices used by EI providers who serve children who are DHH and their families through a questionnaire that was sent out to the members of the National Center for Hearing Assessment and Management Tele-Intervention Learning Community. Results obtained from the questionnaire were then discussed during a follow-up Learning Community teleconference one month after the questionnaire distribution to discuss responses, recommendations and challenges associated with assessing children who are DHH via telepractice within EI. Thirteen of the 35 Learning Community members responded, and almost half of these providers reported they did not use telepractice during assessment. One challenge mentioned by the providers was the lack of standardized assessments available for children between birth to three years of age regardless of the assessment condition (telepractice or in-person). Furthermore, providers reported that the spontaneity of a child's responses may be compromised when parents are utilized in the administration of standardized assessments. Despite the limited amount of available standardized assessments for this population, other forms of assessments such as parent interviews, criterion-referenced assessments, and developmental checklists may utilize the parent during telepractice assessments. Language samples may be

valuable to evaluate integration of semantic relationships, phonological development, morphosyntactic and pragmatic skills and to measure progress over time. The use of high-quality bandwidth with a minimum upload/download speed of 1.5 megabits per second, high-quality video cameras, and microphones were the recommendations identified for providers administering language assessments via telepractice. It was also recommended to utilize the parent during the assessments in order to engage the child since young children may be difficult to engage in assessments regardless of assessment condition. If provided with clear instructions and/or scripts, parents may be used as facilitators during language assessments via telepractice.

The studies previously mentioned (Sutherland et. al., 2016; Waite, Theodoros, Russell, & Cahill, 2010) provide evidence that telepractice can be used to assess children's language skills at a distance with standardized assessments, however not much is known about the effectiveness of using telepractice to assess children's language development through language samples. The effects of using telepractice to assess preschool-children's language skills through story-retell and fast-mapping performance was explored with six typically developing preschool-age children through a within subject design study done by Manzanares and Kan (2014) at the University of Colorado, Boulder. Each participant participated in both telepractice and in-person conditions. Language samples were elicited through a story-retell task, and each participant was presented with two different wordless storybooks by Mercer Mayer, one of which was administered in-person and the other via telepractice in order to control for learning effect. During the language samples within each condition, a presentation phase took place where one examiner told the story. During the elicitation phase, a different examiner served as a naïve listener. This examiner used a narrow script of phrases in order to limit the examiner's influence on the participants' language samples. During the in-person condition, participants were able to look at the story illustrations while the story script was read and during the telepractice

condition, the participants were presented with a PDF slideshow of the wordless storybook. Participants and examiners were connected during the telepractice condition through the Adobe ConnectPro website. Half of the participants started with the telepractice assessment condition first, while the other three participants started with the in-person assessment condition. Order of the conditions was counterbalanced in order to control for order effect. The language samples were transcribed and analyzed through the Systematic Analysis of Language Transcripts (SALT; Miller & Iglesias, 2017) software. The microstructure of the narratives was analyzed through mean length of utterances (MLU) and number of different words. The participants' performance in both the in-person and telepractice conditions were analyzed through multivariate repeated measures analysis of variance. Between the two conditions, no main effects were found for MLU,  $F(1, 4) = .24, p = .67, \eta^2 = .01$  or number of different words,  $F(1, 4) = .04, p = .85, \eta^2 = .02$ . The findings of this study support that telepractice condition is comparable to an in-person condition and that telepractice can be used to measure the language development of preschool-age children. Future research is needed to identify if similar results could be obtained with children who are DHH.

### **Language Samples**

Language samples may be particularly important to obtain with children who are DHH, as they offer an ecologically valid insight on the child's expressive communication across the language domains that standardized assessments are unable to capture. Standardized assessments continue to be the primary method used to evaluate children's language development. The use of language sample analysis during the assessment stage and throughout intervention combined with standardized assessments may provide a clearer picture on how a child functionally uses language. While norm-referenced assessments compare the child's performance to his age-matched peers, these tests measure the child's decontextualized communication skills.

Results from a study done by Spaulding, Plante and Farinella (2006) also support that the use of standardized assessment alone may not be sensitive enough to identify children with language disorders by using a general cutoff score. The study found that children with a language disorder may score within the average range of one standard deviation from the test mean. This finding supports that language samples are necessary to supplement standardized assessments.

While results from a language sample analysis do not provide standardized data, they allow the clinician to better understand the characteristics of the child's natural language use (Heilmann, Nockerts, & Miller, 2010). The use of language samples is a criterion-referenced measure that can provide information about a variety of language skills and they should be an essential component in a comprehensive language evaluation. Language samples are very informative on a child's level of current performance as they are able to provide knowledge on microstructural measures, or performance at the word and sentence level and macrostructural level, which is performance at a more global level across utterances (Ebert & Scott, 2014).

Various microstructural measures may be used during language sample analyses. Sentence length may be measured through mean length of utterance, while lexical diversity can be measured through number of different words. Syntactic complexity may be calculated through subordination index and grammatical error rates through analysis of number of omitted bound morphemes or omitted words (Ebert & Scott, 2014). Detailed measures provided by language sample analysis should be carefully examined in children who are DHH as these children may demonstrated delay in mastery of grammatical morphology. Delay in morphological development of children who are DHH may be due to their limited access to high-frequency fricative sounds (Moeller, Tomblin, Yoshinaga-Itano, Connor, & Jerger, 2007). SLPs working with children who are DHH can gain relevant information on these children's spontaneous use of



morphological and syntactic structures across multiple opportunities which the use of norm-referenced assessments alone could miss (Blaiser & Shannahan, 2018).

Language samples are more sensitive in identifying specific expressive language impairments than standardized tests as they are ecologically valid and can measure how the child performs in real life settings outside of controlled situations like a clinic room. Standardized assessments can only measure what the child knows rather than what the child can do in every day communication within real life situations. Standardized assessments are useful in qualifying children for language services, however they cannot provide the same information on the impact of a language impairment in that child's everyday life as language samples. Language samples are important in intervention planning as they inform SLPs what language structures are emerging or close to mastery by analyzing if a certain syntactic or morphological structure is present and with what frequency it occurs within different contexts (Constanza-Smith, 2010).

Werfel and Douglas (2017) recruited 13 preschool-age children who were DHH and 13 preschool-age children with typical hearing matched within one month of age. Assessment scores obtained from language samples and standardized norm-referenced assessments from the children who were DHH were compared to a typically hearing group. Both groups were administered the Test of Early Language Development-Third Edition (TELD-3; Hresko, Reid, & Hammil, 1999) and the Primary Test of Nonverbal Intelligence (Ehrler & McGhee, 2008). Both groups scored within the normal range and obtained scores within 1.5 standard deviations from the test mean. Fourteen-minute language samples were collected from each participant through the Hadley (1998) protocol. The language samples were twelve minutes long and they were transcribed, coded and analyzed in SALT by their use of Brown's (1973) grammatical morphemes, MLU, and number of different words. Although the groups scored similarly on the

standardized assessment, statistically significant differences were observed between groups on the language sample analyses measures.

The mean MLU for the group of children who were DHH was 4.63, compared to the typically hearing peers who had a mean of 5.66 ( $p = 0.084$ ;  $d = 0.71$ ). The children who were DHH demonstrated less lexical diversity with a mean of 150.38 compared to their typically hearing peers ( $p = 0.040$ ;  $d = 0.85$ ). Lastly, the mean total number of utterances between the two groups did not differ ( $p = 0.975$ ). This result supports that norm-referenced assessments are not as sensitive in identifying children's current language skills as language sample analyses. Furthermore, norm-referenced assessments without the supplementation of language samples may not be sensitive enough to identify morphological deficits of children who are DHH. Performance on standardized norm-referenced assessments may not be representative of how a child uses spoken language in conversation. The unique qualities of both types of assessments call for norm-referenced and language sample analyses to be combined in a comprehensive language assessment when identifying both strengths and weakness in language development of children who are DHH.

Few studies have previously assessed the feasibility of language assessments through telepractice. While Manzanares and Kan (2014) assessed the effects of telepractice in language assessment, the participants in the study only included typically developing monolingual English-speaking children. Due to limited research examining the feasibility of language samples collected via telepractice, this feasibility project explored if telepractice technology could be used effectively to sample language of preschool children who are DHH and sought to examine what challenges/barriers may arise during this process. The current study intended to answer the following research questions:

1. Describe current assessment practices of the Idaho Education Services for the Deaf and Blind

(IESDB) providers in assessing children who are DHH that live in rural/remote areas in Idaho.

2. Are there differences in the number of utterances, MLU in words ( $MLU_{Words}$ ), and MLU in morphemes ( $MLU_{Morphemes}$ ), that can be elicited in different contexts when collecting samples via telepractice?

3. Describe the feasibility of language samples of children who are DHH in Idaho.

It is hypothesized that IESDB providers will use different assessment methods with children who are DHH living in rural/remote areas than with children who are DHH living in urban/suburban areas in Idaho. This assumption is based on barriers such as adverse weather conditions, geographical distance between the child and the provider and costs associated with traveling (Blaiser, Behl, Callow-Heusser, & White, 2013).

It is hypothesized that a greater number of utterances and MLU would be elicited from the play context compared to the narrative retell and conversation contexts. It was assumed that it would be more comfortable for the child to interact with his/her parent which would be more natural for the child. During the play context, the children were expected to play with their parents, rather than interact with the assessor as it was expected in the conversation and narrative retell contexts.  $MLU_{Words}$  and  $MLU_{Morphemes}$  measures were used in the current study to measure the quantity of words and morphemes per utterances as a general measure of morphological and syntactic complexity. A difference between  $MLU_{Words}$  and  $MLU_{Morphemes}$  was expected if the participants mastered age-appropriate morphemes. Based on their chronological age, mastery of Brown's (1973) 14 morphemes is expected from typically hearing preschool-age children (Werfel & Douglas, 2017).

While limited research has focused on collecting language samples via telepractice, it is hypothesized that it may be challenging to recruit families to participate in telepractice sessions when they have little to no experience with this service delivery model. This challenge has been

previously reported in telepractice studies (Blaiser, VanDonsel, & Weitzman, 2016; Blaiser & Weitzman, 2018).

## Chapter 2

### Methods

#### Questionnaire

This study was approved by the Idaho State University Institutional Review Board. The IESDB Director of Outreach program emailed twenty-one IESDB providers from all the seven IESDB regions a letter from the PI. Providers were three preschool teachers, 16 consultants and two preschool consultants that had dual roles as preschool teachers. The letter explained the purpose of the questionnaire, requested their participation and included the link to an electronic questionnaire (see Appendix A). This anonymous questionnaire was created in Qualtrics, a web-based survey management system and included 22 questions. The purpose of the questionnaire was to identify current practices and possible barriers to assessing the language development of preschool children who are DHH in rural/remote areas.

#### Language Samples

**Recruitment.** To recruit families to participate, the PI worked with the IESDB Outreach Director to distribute an informational flyer about the study and a consent form to all the providers mentioned above. The IESDB Outreach Director asked the providers to share these documents with all the families of the preschool children they served. An informational flyer was also shared with families on the Idaho Hands and Voice Facebook page. Families were recruited over a 13-week period. Six families signed the consent form, however only five participated in the study as one family decided they would be unable to participate due to scheduling limitations. Three families were recruited through two different IESDB preschool locations, one family was recruited through an IESDB educational consultant, and another family was recruited by word of mouth from one of the participating families.

**Participants.** The participants included five preschool-age children between 3 years, 4 months and 4 years, 7 months of age. As part of the inclusion criteria, participants needed to have a reliable internet connection, hardware, the ability to download and operate Zoom and a functional web cam. Families from both rural/remote and urban/suburban areas participated. The presence of concomitant impairments was not identified for any of the participants. Participant demographic information is displayed in Table 1. Four participants were female, and one participant was male. The majority of the participants used listening and spoken language. Four children had bilateral hearing loss and the severity of hearing loss varied from moderate to profound. The participants experienced a variety of hearing loss and the hearing technology used included hearing aids, bone anchored hearing aids and cochlear implants. Their access to mobile technology (e.g., cell phones, tablets) varied from daily to two to five times per week.

**Procedures.** After the informed consent was faxed to the PI, the families were emailed the parent protocol (see Appendix B), a Zoom instruction document with links to embedded Zoom videos, and a document with a context order for each session. The contexts included conversation, narrative retell and play.

Two graduate and three undergraduate students with previous experience using SALT from the Communication Sciences and Disorders department at Idaho State University-Meridian participated as assessors in the study. All of the assessors attended a 30-minute in-person mandatory training done by the PI at Idaho State University-Meridian before they started the telepractice sessions. During this training, the assessors were taught how to operate and troubleshoot the application, reviewed the assessor (see Appendix C) and parent protocols and were instructed on their role during the telepractice sessions. The assessors and participants were matched together by the order they signed up to participate in the study.

Prior to the first telepractice session, the assessors contacted the families to schedule a pre-meeting via Zoom. During this meeting, the families had the opportunity to practice using the Zoom application with the assessors and to ask questions related to Zoom and the study. The families learned about the language sample elicitation process, reviewed the parent protocol and completed a demographic questionnaire (see Appendix D).

Each assessor attempted to collect a language sample once per week for three consecutive weeks. However, scheduling varied by each assessor and some experienced difficulties reaching the families to set up a convenient time for the telepractice sessions. To protect the participant's privacy during the telepractice sessions, the assessors were in the HATCH lab at Idaho State University-Meridian and used an iMac desktop computer to connect with the families. Prior to the session, the assessors emailed the families the Zoom link and meeting details. Each telepractice session was recorded in Zoom and saved in Box Cloud Storage. The participants' information was de-identified, and the recordings were accessed only on the password protected computers in the HATCH lab. The telepractice sessions were expected to last approximately 25 minutes. Each telepractice session was expected to elicit approximately 50 utterances which has been suggested by Hadley (1998) to be a sufficient amount of utterances for a language sample analysis.

After the language samples were collected, the assessors transcribed and coded the language samples in SALT. The parent, participant and assessor's utterances were transcribed, but only the participant's utterances were coded. The transcript cut method was applied to the language sample to calculate the  $MLU_{Words}$ ,  $MLU_{Morphemes}$ , and number of utterances in three contexts.

**Contexts.** The elicitation contexts that were included were: 1) a conversation between the participants and the assessors; 2) a narrative retell between the participants and the assessors; 3) a play activity between the participants and their parents. The three language sample contexts were adapted from the Hadley (1998) protocol. All the contexts were allotted seven minutes, but the narrative context was longer as the assessor had to read the narrative first. To control for the role of experience with language sampling over telepractice, the elicitation contexts were counterbalanced between subjects. The order of contexts followed with each participant is outlined in Appendix E.

During the conversation context, the assessors followed a prompt of open-ended questions outlined in the assessor protocol to elicit a conversation with the participants. After the participants' initial response, the assessors used follow-up questions to continue the conversation. Parents were asked to repeat the questions if the participants did not respond. If the participants did not speak for two minutes, the assessors ended the telepractice session if this was the last context or proceeded to the next context.

The narratives 1) *Frog, Where Are You?* (Mercer Mayer, 1969); 2) *Frog Goes to Dinner* (Mercer Mayer, 1974); and 3) *One Frog Too Many* (Mercer Mayer, 1975) were used during the narrative retell context. A different narrative was used in each of the three telepractice sessions in the order listed above. The narratives were scanned, and the pages were displayed on the participants' screen through a power point presentation while the assessors read the narrative script. After the assessors finished reading the narrative, the participants were prompted to retell the narrative by looking at the pages displayed on the screen. Parents were asked to prompt the participants by repeating the assessors' prompts and pointing to the page on the screen. If the participants did not retell the narrative for five consecutive pages, the narrative retell context was



discontinued, and assessors ended the telepractice session if this was the last context or proceeded to the next context.

The play context was intended to be carried out between the parents and the participants. The parents were asked to engage in role-play with the participants' favorite toy/s or game/s. If the participants did not speak for two minutes, the play context was discontinued, and the assessors proceeded to next context or ended the session if play was the last context.

### **Feasibility**

During the language sample collection via Zoom, the assessors completed a data collection sheet to reflect on their experiences (see Appendix F). The feasibility of collecting language samples via telepractice was recorded through a questionnaire (see Appendix G). Assessors used the data collection sheet to complete this questionnaire after each language sample was transcribed and coded. The questionnaire recorded assessor satisfaction with scheduling, language sample contexts and quality of audio-video recording and identified challenges with technology and participant engagement.

## **Chapter 3**

### **Results**

#### **Questionnaire**

Twenty-one IESDB providers were asked to complete an anonymous questionnaire. Fifteen providers started the questionnaire yielding a 71% response rate however, only 13 completed the questionnaire in its entirety, yielding a 62% response rate. Responses from each of the seven IESDB regions are as follows: three respondents from Region 1 (14.29%), one respondent from Region 2 (4.76%), four respondents from Region 3 (19.05%), six respondents from Region 4 (28.57%), two respondents from Region 5 (9.52%), 1 respondent from Region 6 (4.76%), and four respondents from Region 7 (19.05%). Fourteen of the 15 respondents reported to serve only one region. One respondent reported to serve all of the seven regions, but this respondent discontinued the questionnaire after the initial two questions.

One respondent (7.14%) reported to only serve children residing in rural/remote areas, three respondents (21.43%) reported serving children in urban/suburban areas, while 10 respondents (71.43%) reported serving children in both rural/remote and urban/suburban areas. Two respondents (15.38%) reported they did not serve children in rural/remote areas, while seven respondents (53.85%) reported that less than 25% of the children they served lived in rural/remote areas. Three respondents (23.08%) reported that 25% to 50% of the children they served lived in rural/remote areas and one respondent (7.69%) reported that 51% to 75% of the children he/she served lived in rural/remote areas. Based on region number, Region 1 had two respondents report that 25% to 50% of children served live in rural/remote areas. Region 3 had two respondents that reported that less than 25% of the children served are in rural/remote areas, and one respondent that reported 51% to 75%. Region 4 had two respondents report that none of the children who are DHH served lived in rural/remote areas, while two other respondents

reported that less than 25% of the children served are in rural/remote areas. Region 5 had one respondent that reported that less than 25% of the children served are in rural/remote areas. Region 7 had two respondents that reported that less than 25% of the children served are in rural/remote areas and one respondent that reported between 25%-50%. No responses were recorded from Regions 2 and 6 (see Figure 1).

The respondents included teachers of the Deaf ( $n = 11$ ; 55%), early childhood specialists ( $n = 3$ ; 15%), and preschool teachers ( $n = 1$ ; 5%). Some of these respondents had dual professional training ( $n = 5$ ; 25%) as either a consulting teacher, reading specialist, certificated teacher, educational interpreter or counselor. Their professional experience within education ranged from six to 10 years ( $n = 2$ ; 15.38%) and 10 or more years ( $n = 11$ ; 84.62%). Years of experience with children who are DHH ranged from two to five years ( $n = 2$ ; 15.38%), six to 10 years ( $n = 1$ ; 7.69%), and to 10 or more years ( $n = 10$ ; 76.92%).

Respondents reported rural/remote settings ( $n = 6$ ; 37.5%), school setting ( $n = 1$ ; 6.25%), settings outside of child's natural environment ( $n = 5$ ; 31.25%), and the presence of multiple agencies during a testing visit ( $n = 1$ ; 6.25%) as challenging settings to test children who are DHH in Idaho. Three respondents (18.75%) did not consider any setting hard to test (see Figure 2).

Respondents were asked how many children in rural/remote areas currently receive the services they need. The responses indicated varied from all of the children (15.38%; Region 3 and 7), most of the children (46.15%; Region 1, 3, and 7), half of the children (7.69%; Region 5) and only few of the children (7.69%; Region 4). Three respondents (23%; Region 4) reported that none of the children in their region lived in rural/remote areas and therefore could not respond to the question (see Figure 3). Three respondents (23.08%) reported that IESDB uses telepractice to assess young children in rural/remote areas, five respondents (38.46%) reported

that IESDB does not use telepractice and five respondents (38.46%) were unsure. Approximately two-thirds of the respondents ( $n = 9$ ; 69.23%) indicated they would be willing to use telepractice for language assessments, while a third ( $n = 4$ ; 30.77%) indicated they were unwilling.

Five respondents (38.46%) agreed that children in rural/remote areas have the same assessment opportunities as children in urban/suburban areas while eight respondents (61.54%) disagreed. As shown in Figure 4, the respondents ( $n = 2$ ) from the most rural region, Region 1, felt that children in rural/remote areas had the same assessment opportunities as those in urban/suburban areas. Respondents that served families in both rural and suburban areas (Regions 3, 4, and 7) were mixed in terms of their impressions of assessment access, however the respondent from Region 5 felt these children do not have the same opportunities.

The differences in opportunities between children in rural/remote areas and those in urban/suburban included: lack of access to assessment and intervention services ( $n = 2$ ; 15.38%), fewer provider visits ( $n = 3$ ; 23.08%), and shorter assessments and visits ( $n = 1$ ; 7.69%). The rest of the respondents ( $n = 7$ ; 54%) reported lack of SLP and audiology services, less frequent provider visits, and the need to travel farther distances to access specialized services. Furthermore, respondents reported shorter assessments and visits, limited support systems for the families, and limited access to assessment and intervention services. One respondent indicated that if parents are interested to receive services, children in rural/remote areas are provided with the same opportunities as children in urban/suburban areas. Another respondent mentioned that parents in rural/remote areas may sometimes be unwilling to have providers visit their homes and may perceive assessments as less useful.

Five respondents (38.46%) agreed that children in rural/remote areas are assessed as frequently as they should be while eight respondents (61.54%) disagreed. As shown in Figure 5, the respondents serving the most rural region and the ones serving families in both rural and

suburban areas (Regions 1, 3, 4 and 7) had mixed responses. The respondent from Region 5 felt that children in rural/remote areas are not assessed as frequently as they should be.

More than half of the respondents ( $n = 9$ ; 69.23%) reported that arranging assessments for children in rural/remote areas may be costly while the rest ( $n = 4$ ; 30.77%) disagreed. Expenses associated with assessing children in rural/remote areas included: provider time ( $n = 10$ ), travel expenses ( $n = 11$ ), and meals ( $n = 6$ ). Four open-ended responses (12.9%) indicated that contracting providers to carry out services, training the providers prior to administering an assessment, and the wear on the state vehicles are also expenses associated with assessing children in rural/remote areas. One respondent indicated that expenses depend on who provides the services (see Figure 6).

Respondents reported that children who were DHH were assessed with norm-referenced assessments ( $n = 13$ ; 38.24%), criterion-referenced assessments ( $n = 8$ ; 23.53%), and language sample analyses ( $n = 10$ ; 29.41%). Three providers (8.82%) reported to also use parent report surveys/inventories, observations and assess in American Sign Language. Similarly, children who are DHH in rural/remote areas were assessed with norm-referenced assessments ( $n = 12$ ; 36.36%), criterion-referenced assessments ( $n = 7$ ; 21.21%), and language sample analyses ( $n = 9$ ; 27.27%). In addition, five respondents (15.15%) reported to use parent report surveys/inventories and observations and to assess in American Sign Language. One respondent reported to be unsure how the assessment process for this population would be.

Three respondents reported that language samples are always used to measure language development with children in urban/suburban areas, four respondents reported they are often used and five respondents reported they are sometimes used. In contrast, one respondent indicated that language samples are always used with children in rural/remote areas, three reported they are often used and seven reported they are sometimes used with this population

(see Figure 7). For children in urban/suburban areas, four respondents (30.77%) indicated language samples are collected once a year. Three respondents (23.08%) indicated they are collected twice a year, three respondents (23.08%) indicated they are collected every three to four months and other three respondents (23.08%) indicated they are collected on a monthly basis.

For children in rural/remote areas, one respondent (7.5%) indicated language samples may be collected less than once a year because only a special staff member collects language samples upon request. Three respondents (22.5%) indicated language samples are collected once a year with this population. The rest of the responses ranged from twice a year (30.77%), every three to four months (30.77%), and on a monthly basis (7.69%). Barriers in collecting language samples included the extensive amount of time to: collect language samples (5.56%), transcribe (11.11%), and analyze them (22.22%). Other barriers included difficulty eliciting the child to talk (5.5%), limited amount of time for assessment (27.78%), lack of training on how to take language samples (16.67%) and finding a place to capture a language sample in its entirety (5.5%). One respondent (5.5%) mentioned that all of the barriers mentioned were applicable (see Figure 8).

### **Language Sample Measures**

Forty-five observations were recorded for MLU in words ( $MLU_{Words}$ ), MLU in morphemes ( $MLU_{Morphemes}$ ) and number of utterances from the 15 language samples obtained. The unadjusted means of the  $MLU_{Words}$ ,  $MLU_{Morphemes}$  and number of utterances by context, order of context and session number are reported.

**Context.** When analyzing by language sample elicitation context, the mean value of  $MLU_{Words}$  in the conversation context was 2.2 (range: 1.0 to 3.6) and the mean value of  $MLU_{Morphemes}$  was 2.4 (range: 1.0 to 3.9). The mean value of number of utterances in the

conversation context was 51.9 (range: 5.0 to 82.0). When controlling for the number of seconds by context, the mean number of utterances in the conversation context was 61.03.

The mean value of  $MLU_{Words}$  in the narrative retell context was 2.4 (range: 1.0 to 4.8) and the mean value of  $MLU_{Morphemes}$  was 2.5 (range: 1.0 to 5.0). The mean value of number of utterances in the narrative retell context was 50.6 (range: 3.0 to 74.0). When controlling for the number of seconds by context, the mean number of utterances in the narrative retell context was 37.38.

The mean value of  $MLU_{Words}$  in the play context was 2.3 (range: 1.1 to 4.0) for the play context and the mean value of  $MLU_{Morphemes}$  was 2.4 (range: 1.1 to 4.4). The mean value of number of utterances in the play context was 56.9 (range: 6.0 to 85.0). When controlling for the number of seconds by context, the mean number of utterances in the play context, the mean number of utterances was 64.06. Figure 9 displays the mean  $MLU_{Words}$  and Figure 10 displays the mean  $MLU_{Morphemes}$  by context across participants.

The measures obtained for all participants across the three sessions were coded in an Excel file. SAS 9.4 Software was used to perform the statistical analysis. A 3 x 3 repeated measures analysis of covariance with context nested within order of context presentation was used to identify differences between  $MLU_{Words}$ ,  $MLU_{Morphemes}$ , and number of utterances. The same analysis was performed with context nested within number of sessions. Since some assessors spent more than seven minutes on the contexts, the total time in seconds for each context was used as the covariate.

Based on adjusted means, statistical analysis for  $MLU_{Words}$  identified no statistically significant difference by language sample elicitation context,  $F(2, 40.2) = 0.07, p = 0.94$ . Statistical analysis for  $MLU_{Morphemes}$  identified no statistically significant difference by context,  $F(2, 40.2) = 0.06, p = 0.93$ . Statistical analysis for the number of utterances identified a

statistically significant difference by context,  $F(2, 40.5) = 6.8, p = 0.002$ . Between the three contexts, a statistically significant difference was identified in the number of utterances between the conversation and narrative retell,  $t(40.7) = 3.1, p = 0.003$ , with the conversation context having a greater number of utterances than the narrative retell context. There was also a statistically significant difference between play and narrative retell,  $t(40.7) = 3.6, p = 0.0007$ , with greater number of utterances noted in the play context compare to the narrative retell context. No statistically significant difference was identified between play and conversation,  $t(40.3) = 0.61, p = 0.547$ .

**Order of context.**  $MLU_{Words}$ ,  $MLU_{Morphemes}$  and number of utterances were analyzed by order of context within a session regardless of context type. Based on adjusted means, statistical analysis for  $MLU_{Words}$  found no statistically significant difference by order of context  $F(2,40)=0.16, p=0.85$ . Statistical analysis for  $MLU_{Morphemes}$  identified no statistically significant difference by order of context,  $F(2, 40) = 0.06, p = 0.93$ . Likewise, no statistically significant difference was identified for the number of utterances by order of context,  $F(2, 40.2) = 0.01, p = 0.99$ .

**Session number.** A language sample was collected from each participant during three telepractice sessions. When analyzing by session number, the mean value of  $MLU_{Words}$  in session 1 was 2.1 (range: 1.0 to 3.7) and the mean value of  $MLU_{Morphemes}$  was 2.3 (range: 1.0 to 4.1). The mean value of number of utterances for session 1 was 49.5 (range: 3.0 to 82.0). When controlling for the number of seconds, the mean number of utterances for session 1 was 50.29.

The mean value of  $MLU_{Words}$  in session 2 was 2.5 (range: 1.0 to 4.8) and the mean value of  $MLU_{Morphemes}$  was 2.7 (range: 1.0 to 5.0). The mean value of number of utterances in session 2 was 51.6 (range: 6.0 to 76.0). When controlling for the number of seconds, the mean number of utterances for session 2 was 51.15.



The mean value of  $MLU_{Words}$  in session 3 was 2.3 (range: 1.0 to 4.4) and the mean value of  $MLU_{Morphemes}$  was 2.4 (range: 1.0 to 4.6). The mean value of number of utterances in session 3 was 58.3 (range: 27.0 to 85.0). When controlling for the number of seconds, the mean number of utterances for session 3 was 62.11.

Based on adjusted means, statistical analysis for  $MLU_{Words}$  found no statistically significant difference by session,  $F(2, 40.3) = 2.33, p = 0.110$ . Statistical analysis for  $MLU_{Morphemes}$  found no statistically significant difference by session,  $F(2, 40.3) = 2.14, p = 0.130$ . Statistical analysis for the number of utterances identified a statistically significant difference by session,  $F(2, 40.7) = 3.91, p = 0.028$ . Between the three sessions, a statistically significant difference was identified in the number of utterances between the sessions 1 and 3,  $t(40.9) = 2.5, p = 0.01$  with a greater number of utterances in session 3 than in session 1. A statistically difference was also identified between sessions 2 and 3,  $t(40.9) = 2.3, p = 0.023$ , with a greater number of utterances in session 3 than in session 2. No statistically significant difference was identified for the number of utterances between sessions 1 and 2,  $t(40.2) = 0.1, p = 0.84$ .

### **Reliability**

An undergraduate student who was not an assessor was trained as a rater who transcribed and coded one language sample from each participant ( $n = 5$ ). The PI selected which language samples to be rated based on the following context order: 1) conversation; 2) narrative retell; 3) play. The rater had access to the five language sample audio-video recordings in Box Cloud Storage. Pre- and post- interrater reliability was obtained for the  $MLU_{Words}$ ,  $MLU_{Morphemes}$  and number of utterances measures for all the three contexts in each language sample. The mean inter-judge reliability for all the three measures was 86%. The rater and the assessors discussed

the differences and reviewed the language sample recordings. After discussing the differences, the mean interrater agreement was 100% for all of the three measures.

After the assessors implemented their post-rating edits, the PI noted consistent errors on the coding of the language samples and systematic changes were made to all the language samples ( $n = 15$ ) to ensure consistent coding. Furthermore, the rater implemented these systematic changes in the post-rating transcripts. The systematic changes included: marking the beginning of nonverbal utterances with = instead of *C* to prevent nonverbal utterances to count in the number of utterances measure, coding all mazes with *()* and writing out the entire phrase *I don't know* instead of the *IDK* code. The assessors' post rating measures along with the measures obtained from the other two language samples were used for the statistical analyses. It is assumed that the low interrater agreement may be due to the limited amount of experience with SALT transcription and coding and that these procedures require clinical judgement and interpretation.

### **Feasibility**

A questionnaire was completed by the assessors after they had transcribed and coded the language samples obtained. Out of 15 responses from the five assessors, it was indicated that mothers alone accompanied the child for 10 sessions, mothers and fathers together accompanied the child for two sessions, and mothers with a younger sibling accompanied the child for three sessions. Three assessors (60%) were able to collect a language sample once a week for three consecutive weeks. Two assessors (40%) were not able to follow the time guideline due to assessor and participant illness and because one parent did not respond to the email in time to schedule weekly sessions before the assessor had to leave for vacation. There was an average of nine days between the language samples, with a range between two to 35 days. Across participants, the first and second telepractice sessions were scheduled two days ( $n = 1$ ; 20%), six

days ( $n = 1$ ; 20%) and seven days apart ( $n = 3$ ; 60%). The second and third telepractice sessions were scheduled six days ( $n = 1$ ; 20%), seven days ( $n = 1$ ; 20%), eight days ( $n = 2$ ; 40%), and 35 days apart ( $n = 1$ ; 20%).

Assessors' satisfaction ratings with scheduling ranged from very satisfied to dissatisfied. Twelve responses (80%) indicated that the assessors were satisfied and three responses (20%) indicated the assessors were dissatisfied with scheduling. The effectiveness of communication between the assessors and the families prior to the telepractice session was rated by the assessors as either effective ( $n = 12$ ; 80%) or ineffective ( $n = 3$ ; 20%). Challenges associated with scheduling a telepractice session included reaching the family ( $n = 3$ ; 16.6%) or finding a time convenient for both assessors and the families ( $n = 4$ ; 22.2%). One open-ended response (5.5%) indicated that one parent opened a new email account which caused the parent to miss the assessor's email regarding the scheduled date. Most responses (55.56%) indicated no challenges with scheduling. If the assessors reported they had difficulty reaching the family, they were then asked the number of attempts which included the number of emails and phone calls done to reach the family. The assessors that experienced difficulty reaching the family each reported eight attempts.

Difficulties with technology were recorded for assessors and participants when attempting to connect in Zoom and during the telepractice session. None of the assessors experienced technical difficulties when connecting in Zoom. During the telepractice sessions, most of the assessors' responses ( $n = 14$ ; 93.3%) indicated they experienced no technical difficulties, while one response (6.7%) indicated technical difficulties. In general, the participants did not experience technology difficulties when attempting to connect in Zoom ( $n = 11$ ; 73.34%). Most responses ( $n = 12$ ; 80%) indicated that the participants did not experience technical difficulties during the telepractice sessions.

When technical difficulties existed, the most common difficulties were audio break-up ( $n = 3$ ; 16.6%), inaudible volume ( $n = 3$ ; 16.6%), and both audio and video difficulties ( $n = 2$ ; 11.1%). Four open-ended responses indicated technical difficulties as muffled sound quality on the participant's iPhone, inability to view the narrative pages on the screen during the narrative retell context, slow internet connection causing the participant to cut out, and difficulty sharing the screen during the narrative retell context. Five responses (27.78%) indicated no technical difficulties.

Other challenges with collecting language samples that were not technology related, included participants' unintelligibility ( $n = 7$ ), shyness ( $n = 2$ ) and distractibility ( $n = 9$ ). Other reported challenges included the participant getting up and not wanting to sit back down, the participant not wanting to play during the play context, the attending parent not playing with the participant during the play context, participant not wanting to play but rather talk during the play context, and the participant crying during the session which did not allow for the last language sample context in that session to be completed (see Figure 11). The level of support needed ranged from all the time to minimal. The children who participated required support to stay engaged all the time ( $n = 3$ ; 20%), most of the time ( $n = 7$ ; 46.7%), some of the time ( $n = 2$ ; 13.3%) and minimal support ( $n = 3$ ; 20%).

The majority of the responses ( $n = 10$ ; 66.7%) indicated difficulty with maintaining the child's attention during the session, however two responses (33.3%) indicated it was easy. When participants needed redirection, assessors reengaged the participants with additional stimuli on the screen ( $n = 7$ ; 31.8%) or required additional assistance from the attending parent ( $n = 11$ ; 50%). Three responses indicated that the participants did not need to be redirected (13.6%) and one response indicated it was not possible to redirect the participant to the targeted task (4.5%).

Ten responses (66.7%) indicated that the assessors were able to obtain a good audio-video quality recording, while five responses (33.3%) indicated they were not able to.

Eleven sessions (73.3%) lasted between 21 to 30 minutes and four sessions (26.7%) lasted over 30 minutes. Fourteen of the language samples (93.3%) yielded 50 or more total number of utterances, while one language sample (6.7%) yielded between 25 to 50 total number of utterances. Seven responses (46.7%) indicated the assessors spent between 40 to 60 minutes to transcribe the language samples and eight responses (53.3%) indicated they spent over 60 minutes. Assessors spent either less than 10 minutes ( $n = 5$ ; 33.3%), 10 to 20 minutes ( $n = 7$ ; 46.7%), 20 to 40 minutes ( $n = 2$ ; 13.3%) or more than 60 minutes ( $n = 1$ ; 6.7%) to code the language samples. Two optional open-ended questions allowed the assessors to mention any challenges experienced during the session that were not previously addressed and what could improve their experience (see Appendix H). Most of the assessors indicated that they were not satisfied with parent participation in the play context and the amount of closed-ended questions asked by the parents during the session. Responses proposed that more parent training could improve the quality of the telepractice session.

The overall satisfaction with the language elicitation process ranged from satisfied ( $n = 14$ ; 93.3%) to dissatisfied ( $n = 1$ ; 6.7%). Table 2 displays the  $MLU_{Words}$ ,  $MLU_{Morphemes}$ , number of utterances, time of elicitation, and assessor satisfaction ratings for each of the three contexts. Responses indicated that the conversation ( $n = 13$ ; 31.7%), narrative retell ( $n = 14$ ; 34.1%) and play ( $n = 14$ ; 34.1%) contexts were successfully used. Each of the three language sample elicitation contexts were individually rated by level of success for each session and responses ranged from very successful to very unsuccessful. Thirteen responses rated the conversation context successful (86.6%). The average time for the conversation context was 6.80 minutes with a range between less than one minute to nine minutes. Eleven responses rated the narrative retell

context successful (86.6%). The average time for the narrative retell context was 11.3 with a range between eight to 15 minutes.

Twelve responses rated the play context successful (80%). The average time for the play context was 7.2 minutes with a range between six to nine minutes. The following toys were used by the participants during the play context: My Little Pony car, Mickey Mouse doll, toy vanity, car and bag, balloons and parachute, trucks, cars, motorcycles and books, toy excavator, Paw Patrol, Paw Patrol puzzles, and books, Paw Patrol and puzzles, Play-Doh, Lincoln logs and coloring book, blocks and toy fishing game, Barbie doll with clothes and shoes, Barbie and Ken dolls, car, swim/diving ring, toy hair brush.

## **Chapter 4**

### **Discussion**

This study sought to identify telepractice as a potential opportunity to better assess the language of children who are DHH in rural/remote areas and those in urban/suburban areas. A questionnaire was completed by current providers in the state of Idaho who work for the Idaho Educational Services for the Deaf and Blind (IESDB) and fifteen language samples were collected from five families via telepractice. Differences in regard to  $MLU_{Words}$ ,  $MLU_{Morphemes}$ , and number of utterances were analyzed between three different language sample elicitation contexts via telepractice to determine if a certain context may be more appropriate for clinical use. Assessors were given opportunities to reflect on the feasibility of using telepractice for collecting language samples.

### **Questionnaire**

IESDB providers from across the state of Idaho participated in a questionnaire looking at potential discrepancies in language assessments processes between children who live in rural/remote areas and those who live in more densely populated areas. With a 62% response rate, it is felt that this was a representative sample of the providers who serve young children who are DHH. Most respondents served children in both rural and urban areas which allowed them to make comparisons in assessment practices in the two different settings. Nearly half of the respondents identified rural areas as a challenging setting to test children who are DHH. The challenges identified with assessing children in rural/remote areas were consistent with previous studies which identified geographical distance between providers and children to be a considerable barrier (Blaiser, Behl, Callow-Heusser, & White, 2013). Less frequent language samples are collected from children who are DHH in rural/remote areas than from children who are DHH in urban/suburban areas. Respondents reported to use language samples for language

assessments, however none of these respondents were SLPs. Due to their diverse professional background, respondents' methods in collecting, analyzing, and interpreting language samples may differ from SLPs (Blaiser & Shannahan, 2018).

While telepractice has been shown to be a successful way to respond to these challenges and connect children with providers (Behl et al., 2017; Blaiser et al., 2013; Waite et al., 2010), a third of the respondents were uninterested in using telepractice as a way to assess children in rural/remote areas. It is unknown how familiar these respondents are with telepractice, however, their hesitancy to use it may be due to lack of knowledge and training. Future research should examine providers' perceptions on assessment opportunities in relation to the types of settings they serve. There appeared to be a trend in the responses obtained from the IESDB providers and the settings (rural/remote versus urban/suburban) they served. The providers who served children who are DHH in rural/remote areas alone reported less challenges with assessing children who are DHH than providers who served children who are DHH in both rural/remote and urban/suburban areas. Furthermore, future research should investigate what barriers may be seen with assessing older, school-age children who are DHH in comparison to preschool-age children who are DHH.

### **Language Sample Measures**

Language samples may be collected with a variety of communication partners and in different contexts and environments. The contexts used in the study were ecologically valid as they were elicited in the natural environment of the home and were typical preschool-age activities. Similarities between  $MLU_{Words}$  and  $MLU_{Morphemes}$  values across the three different contexts indicates that the participants have not yet mastered morphological development, as a difference between these measures would be expected if children use inflectional morphemes.



MLU<sub>Words</sub> and MLU<sub>Morphemes</sub> can be used appropriately to measure and track the language samples of preschool-age children who are DHH.

The play context yielded the greatest number of utterances, followed by conversation, while the narrative retell context yielded the least number of utterances. Based on these results, it may be suggested that the play and conversation contexts may be more facilitative of speaking than the narrative retell context.

While all context may be used during a language sample, it may not be attainable for SLPs to use three different contexts within a telepractice session. Among the three contexts, play was found to promote the greatest number of utterances with the second satisfaction rating, regardless of challenges such as parents' lack of participation in play and use of closed-ended questions that were not facilitative of longer utterances. If using the play context, SLPs may need to be familiar with the toys and know how they could be used to be conducive of expressive language. Training will be necessary to prepare the parents to be language facilitators and know how to support their child during the play context.

Potentially, the conversation context may be more appropriate to use with preschool children when collecting language samples as this context yielded the second greatest number of utterances among the three contexts, received one of the highest satisfaction ratings and posed the least amount of challenges. Even though these challenges were not observed in the conversation context, it will still be necessary to train the parent. Parent training in this context could still influence the success of the session as they will need to support the child, ask the appropriate questions and provide sufficient wait time. During the study, it was observed that one child required parent support during the conversation context, as the parent restated the assessor's questions and comments to help the child hear better.

Based on these findings, it is recommended that SLPs who serve preschool-age children who are DHH via telepractice, use both the play and conversation contexts when obtaining language samples via telepractice. Although narratives may be valuable for school-age children, they may not be as relevant for preschool-age children. Considering the fewer number of utterances obtained in the narrative retell context, this context may be more appropriate to use with school-age children because narratives may be more linguistically complex and relevant to the academic curriculum.

The number of utterances was recorded to increase by session number. While a statistically significant difference was not observed between sessions 1 and 2, a significant difference was observed between sessions 1 and 3 and 2 and 3. These results may indicate that as children become more comfortable with the telepractice service delivery model, they may speak more. Since no differences were measured across  $MLU_{Words}$  and  $MLU_{Morphemes}$  across contexts and session number, it may be that these measures may not be as sensitive to track progress over time.

It is interesting to note that Participant 4 had a greater  $MLU_{Words}$  and  $MLU_{Morphemes}$  in the narrative retell context in comparison to the conversation and play contexts. It is unknown what exact factors might have contributed to the greater  $MLU_{Words}$  and  $MLU_{Morphemes}$ , however SLPs who use language samples to assess the language development of children who are DHH need to be sensitive and select the language sample context that may elicit the best language for a given child regardless of the type of service delivery model used.

When adjusted for time, there was a statistically significant difference in the number of utterances between narrative retell in comparison to conversation and play contexts. This difference could be inherent to the nature of the conversation and play contexts where there was more give and take between the assessor and the child compared to the narrative retell. During

the conversation and play contexts, children are prompted more than in the narrative retell where the child may have had more of a monologue.

It is recommended that if SLPs obtain language samples via telepractice they consider that the measures obtained in the initial session may not be the most representative of the child's language. Language samples via telepractice service delivery model may be used as a tool for ongoing progress. Infrequent language sample analysis may not be as sensitive to children's language development. More frequent language samples can provide more representative language. While it may not be practical for practitioners to do three language samples in a week, monthly language sample analysis may provide more representative measures of the child's real language abilities.

Syntactic, morphological, semantic and pragmatic language development of preschool and school-age children can be successfully analyzed in SALT, but SALT may have not been the best way to assess communication outcomes for all the participants in this study based on level of expressive language. It should be noted that there was a small sample size and the expressive language abilities of the participants varied, and one of the child's limited output may have negatively skewed the mean results.

Measures such as type-token ratio, total number of different words, and number of different words may be used to measure semantic development and might be particularly useful for children who have less complex language. Measures of story grammar, communicative intentions, turn-taking, and topic maintenance may be used to measure pragmatic development with language samples (Blaiser & Shannahan, 2018). Furthermore, the language samples obtained via telepractice can serve as speech samples to measure intelligibility and to identify speech errors in connected speech.

**Feasibility**

Although studies have analyzed the effectiveness of telepractice with standardized assessments, the feasibility of collecting language samples via telepractice from preschool-age children who are DHH has not previously been studied. Using language samples via telepractice to measure the language development of children who are DHH offers multiple benefits. Language samples are more sensitive to language development across the language domains in comparison to norm-referenced assessments (Blaiser & Shannahan, 2018). Additionally, using language samples via telepractice eliminates the possibility of compromising the standardized procedures of norm-referenced assessments.

The results of this study support previous studies sharing the feasibility of telepractice, however, there is still a considerable challenge in helping providers and families understand the benefits (and overcoming the barriers- perceived or real) to utilizing and participating in telepractice. Lack of provider interest was noted as a third of the IESDB providers who completed the questionnaire mentioned they were not interested in implementing telepractice as a service delivery model. Recruiting families to participate in the current study was a notable challenge as multiple attempts were made over a 13-week period. This challenge has been noted in previous research (Blaiser, Van Donsel, & Weitzman, 2016; Weitzman & Blaiser, 2018) and the success/feasibility of using telepractice is currently impacted by the willingness of providers and the level of parent interest and engagement.

Adequate parent training will be pivotal to the success of telepractice sessions as parents will support the SLP and carry out the instructions provided. Parent training will aim to help support parents as facilitators in language sample elicitation to ensure that the language elicited is most representative of the child's language rather than answering direct questions and may

know how to support and respond to facilitate language during their interactions with their children.

The non-technical challenges reported were recorded from the different assessors without noticing a trend specific to a particular assessor. Upon further analysis, it was noted that one assessor that worked with a family that did not have a reliable Internet connection and used an iPhone reported more dissatisfaction with the scheduling and technology which may have skewed the overall results obtained on the satisfaction ratings. It is important to note that high-quality bandwidth is essential when using telepractice to connect with families and that it would be valuable to check in with assessors and note any technology changes when conducting assessments via telepractice.

While satisfaction ratings were recorded from the assessors based on scheduling, technology, language sample elicitation process in general, however these did not influence the satisfaction rating with the individual language sample contexts (i.e., the assessor that worked with the family with poor Internet connection still rated the play context successful).

Scheduling telepractice sessions convenient for both assessors and families was not a significant challenge for the assessors. It is possible that families may be more flexible with scheduling telepractice sessions if telepractice was the only service delivery model available. It is noteworthy that the assessors were able to collect, transcribe and code the language samples recorded even with the participants' consumer-grade hardware. Despite the reported challenges, positive satisfaction ratings with conversation, narrative retell, and play contexts suggest that all contexts may be feasible to be collected via telepractice.

### **Limitations and Future Directions**

During the telepractice sessions, participants were in different settings within their home, including parents' bedroom, participant's bedroom, living room and kitchen. While this is an

excellent way to gauge language in a young child's natural environment, it is possible that distractions specific to that setting may have influenced the level of engagement and participation. The toys used by the participants during the telepractice sessions were selected based on personal preference and varied by participant and session number. It would have been valuable to screen the toys prior to their use to ensure their facilitation for language.

The parent-child play dynamic during the play context varied by participant. Some parents role-played and asked open-ended questions, while others asked mostly closed-ended questions. Some parents did not play with the participants, which then led the participants to play independently and talk to the assessor about their play. During the narrative retell context, parents asked questions in addition to the ones used by the assessors, which may have overwhelmed the participants. The change in communication partners between the narrative retell and the play and conversation context may create a confound as the assessor was the communication partner during the conversation and narrative retell contexts while the parent was the communication partner during the play context.

Future research is needed to identify how the outcomes of this study compare to language samples obtained in-person and if there are differences between these two types of service delivery models. Furthermore, research should investigate parent satisfaction and responsiveness toward the process of collecting language samples via telepractice as their perception may influence their level of engagement.

### **Conclusion**

The current study supports that children who are DHH in rural/remote areas may not have the same opportunities for assessment and intervention as children who are DHH in urban/suburban areas. In response to this disparity, telepractice can be used to bridge the gap between children in need of services and specialized professionals. It was found that the overall

feasibility of collecting language samples via telepractice from children who are DHH was positive. The success of collecting language samples via telepractice may be affected by parent support and parent training will be a necessary. Although the current study had a small participant size, the sample was representative of preschool-age children who are DHH. It was noted that there are advantages and disadvantages to every language sample elicitation context, and that the conversation and play contexts may be most sensitive to use with this population.

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Table 1

*Participant Demographic Information*

| Participant | Age       | Gender | Access to mobile technology | Communication modality        | Type of hearing loss    | Degree of hearing loss | Age at hearing loss identification | Age at first fit | Hearing technology        | Age EI enrollment |
|-------------|-----------|--------|-----------------------------|-------------------------------|-------------------------|------------------------|------------------------------------|------------------|---------------------------|-------------------|
| 1           | 55 months | Female | Daily                       | Total communication           | Mixed bilateral         | Severe to profound     | 40 months                          | 41 months        | Hearing aids              | 24 months         |
| 2           | 47 months | Female | 2-5 times per week          | Listening and spoken language | Conductive bilateral    | Moderate to severe     | Birth                              | 1.5 months       | Bone anchored hearing aid | 6 weeks           |
| 3           | 40 months | Female | 2-5 times per week          | Listening and spoken language | Conductive bilateral    | Moderate               | 12 months                          | 30 months        | Hearing aids              | 30 months         |
| 4           | 53 months | Female | Daily                       | Listening and spoken language | Conductive unilateral   | Severe                 | Birth                              | 12 months        | Hearing aid               | Birth             |
| 5           | 51 months | Male   | Daily                       | Listening and spoken language | Sensorineural bilateral | Profound               | Birth                              | 2 months         | Cochlear implants         | 4 months          |

Table 2

*Measures Comparison by Context*

| Context             | <i>M</i> (Range)<br>MLU <sub>Words</sub> | <i>M</i> (Range)<br>MLU <sub>Morphemes</sub> | <i>M</i> (Range)<br>Number of Utterances | <i>M</i> (Range)<br>Minutes | Satisfaction<br>Rating                         |
|---------------------|--|--|--|-----------------------------|--|
| Conversation        | 2.2 (1-3.6)                              | 2.4 (1-3.9)                                  | 51.9 (5-82)                              | 6.8 (0-9)                   | Successful<br>86.66%<br>Unsuccessful<br>13.34% |
| Narrative<br>Retell | 2.4 (1-4.8)                              | 2.5 (1-5)                                    | 50.6 (3-74)                              | 11.33 (8-15)                | Successful<br>86.66%<br>Unsuccessful<br>13.34% |
| Play                | 2.3 (1.1-4)                              | 2.4 (1.1-4.4)                                | 56.9 (6-85)                              | 7.26 (6-9)                  | Successful 80%<br>Unsuccessful<br>20%          |

Figure 1

*Percentage of Children Served in Rural/Remote Areas by Region Number*

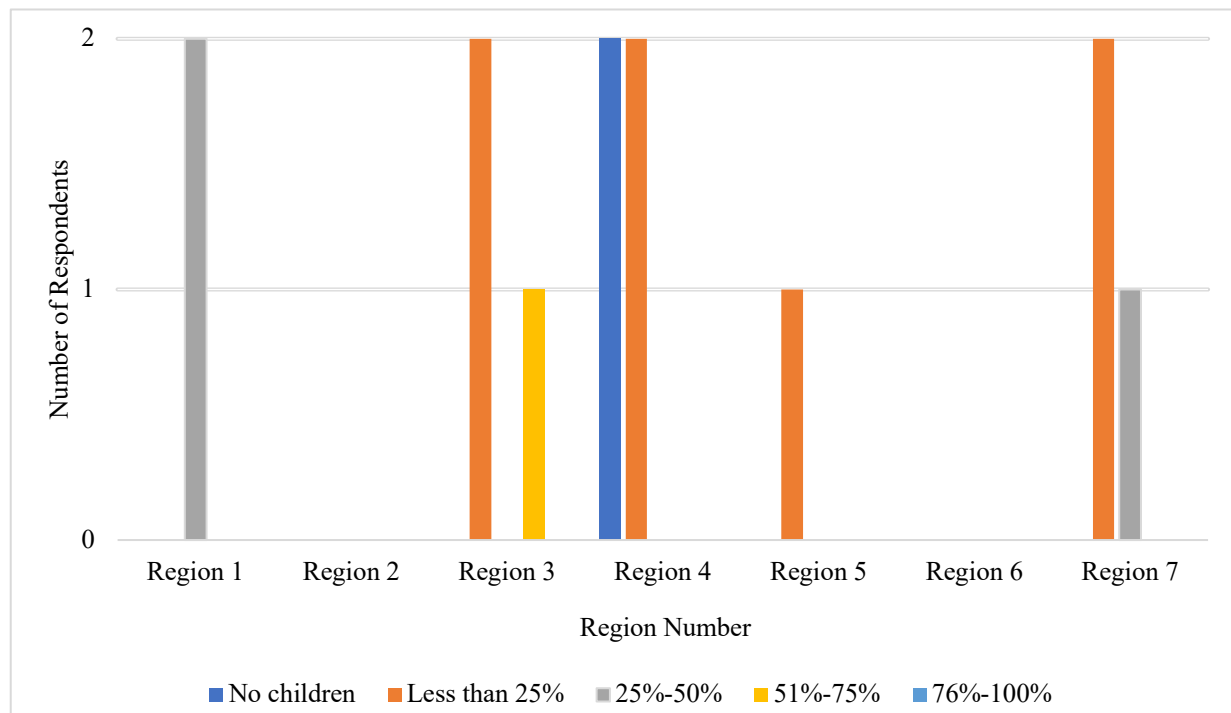


Figure 2

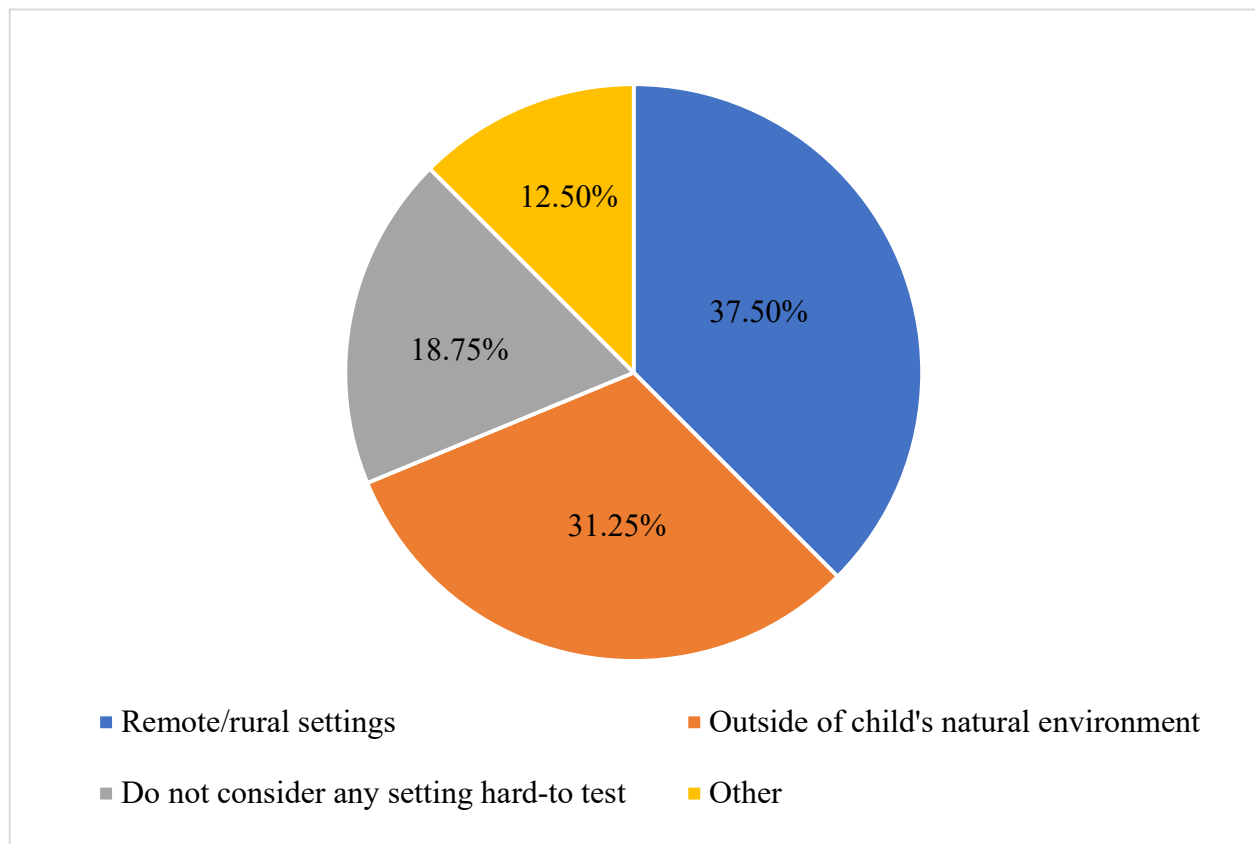
*Settings Considered Hard to Test in Idaho*



Figure 3

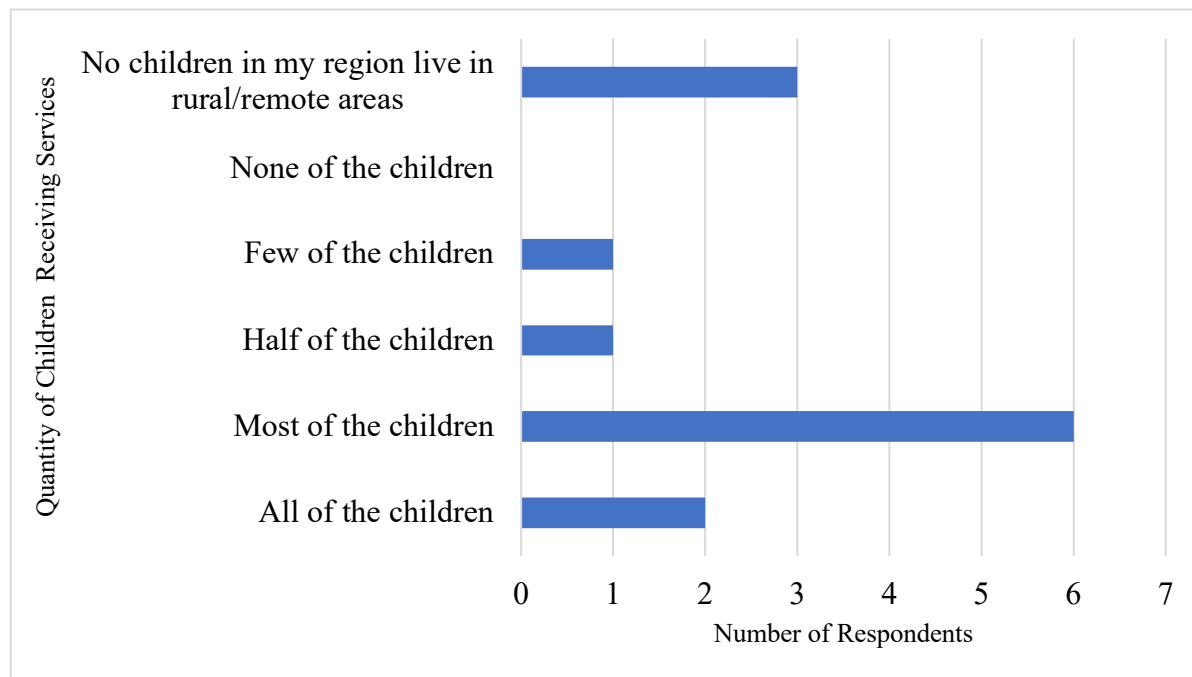
*Children in Rural Areas Receiving Services*

Figure 4

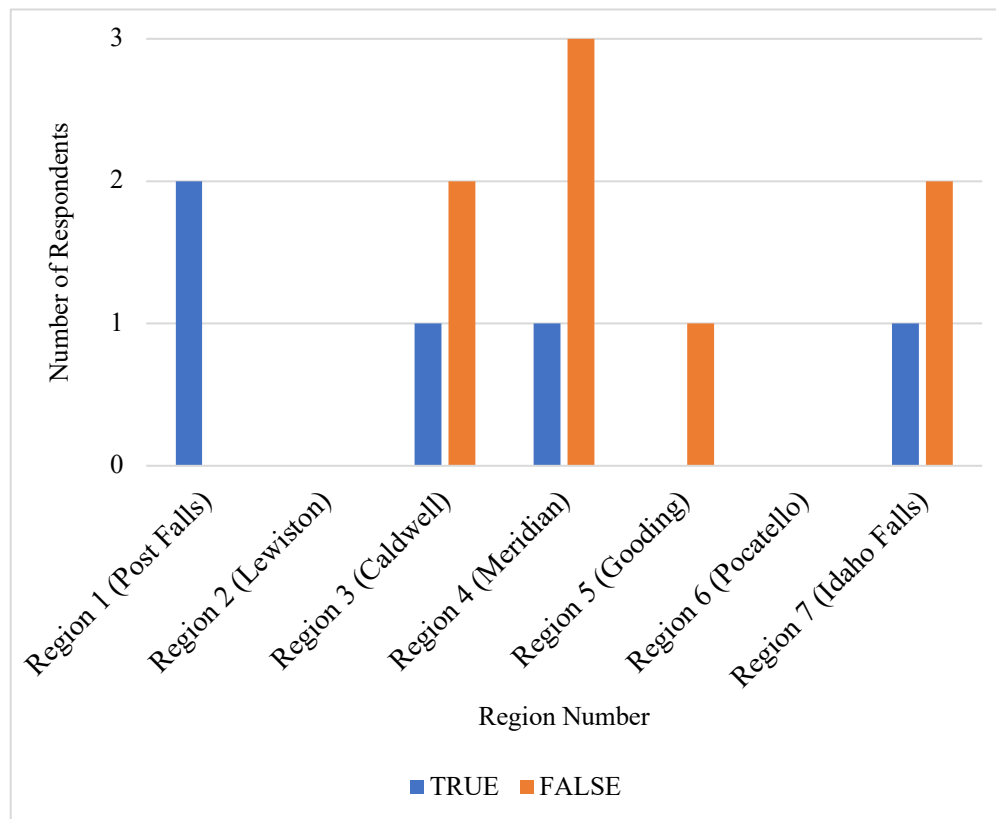
*Assessment Opportunities Between Rural/Remote and Urban/Suburban*

Figure 5

*Differences in Frequency of Assessment Between Rural/Remote and Urban/Suburban*

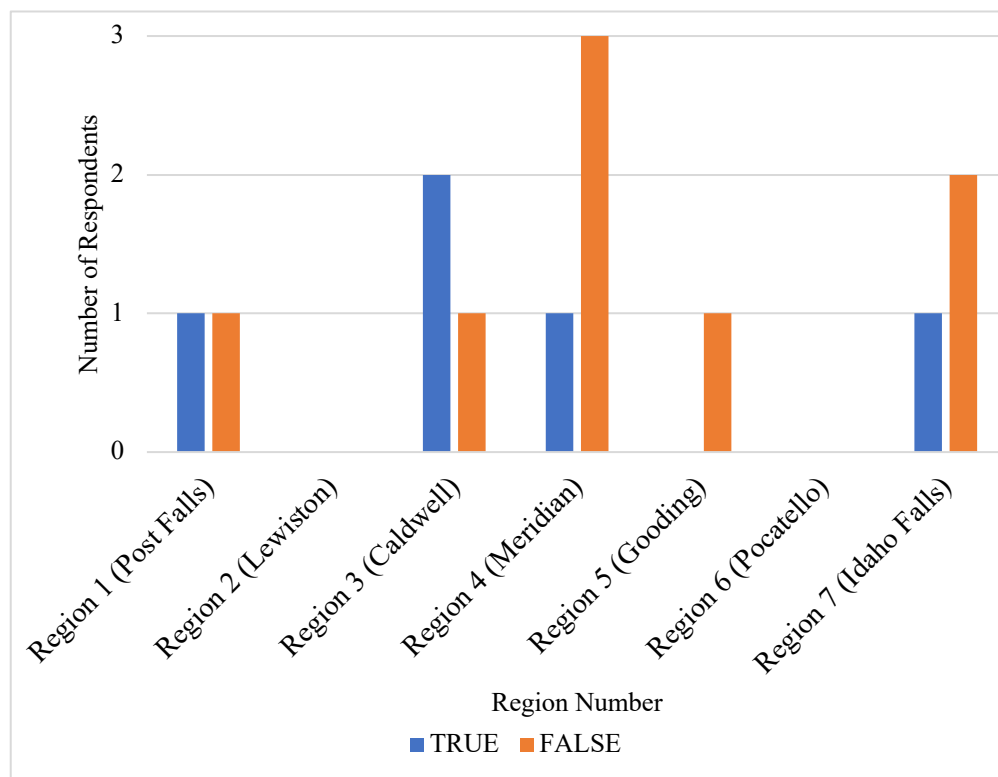


Figure 6

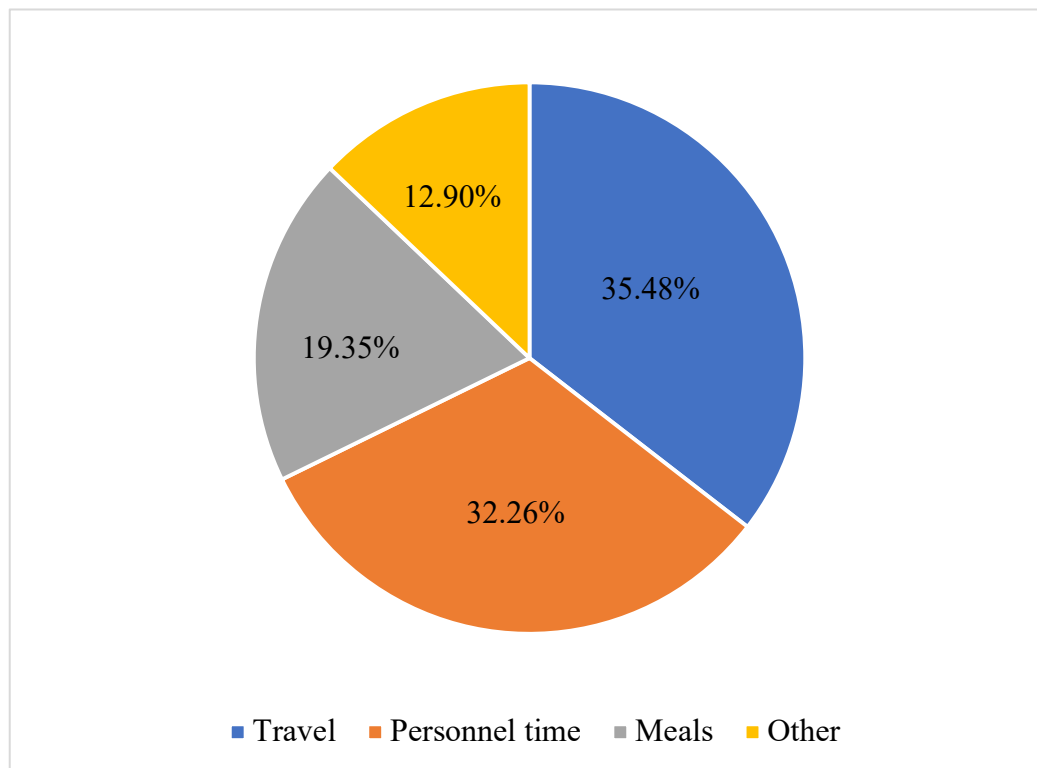
*Professional Expenses Associated with Assessment in Rural Areas*

Figure 7

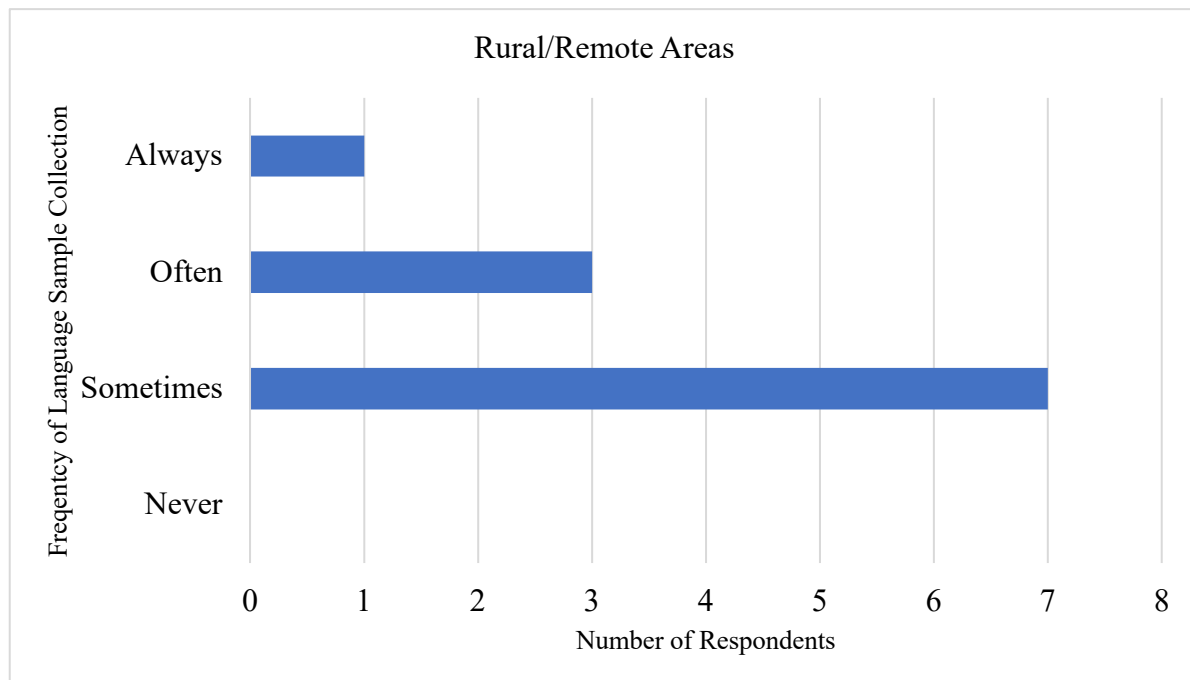
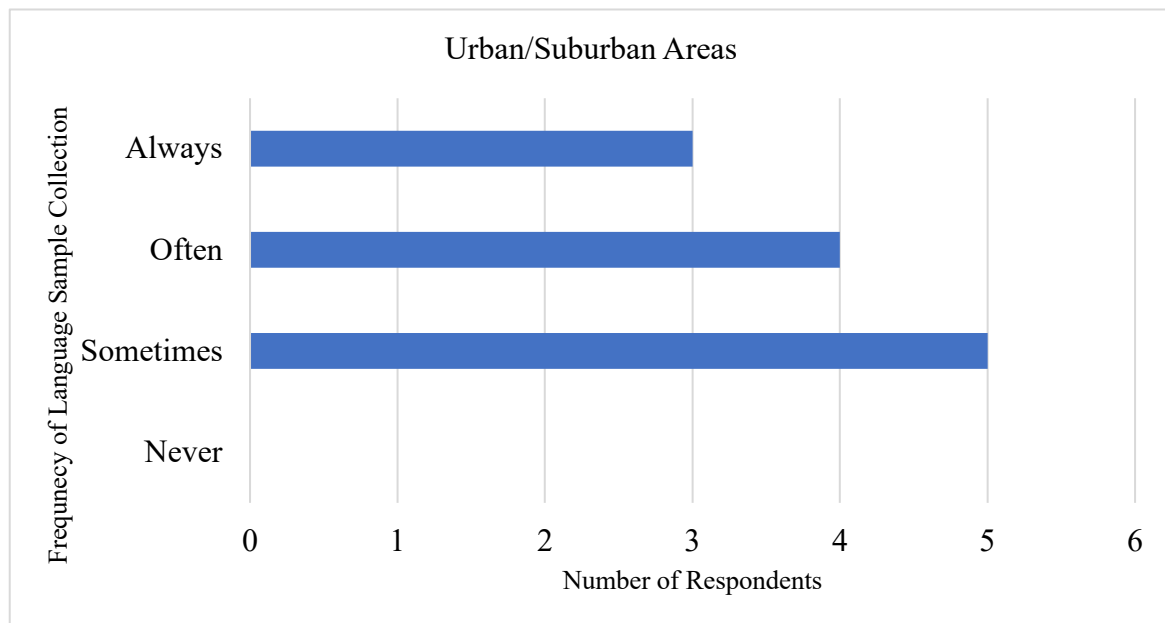
*Language Sample Differences Between Children in Rural versus Urban Areas*

Figure 8

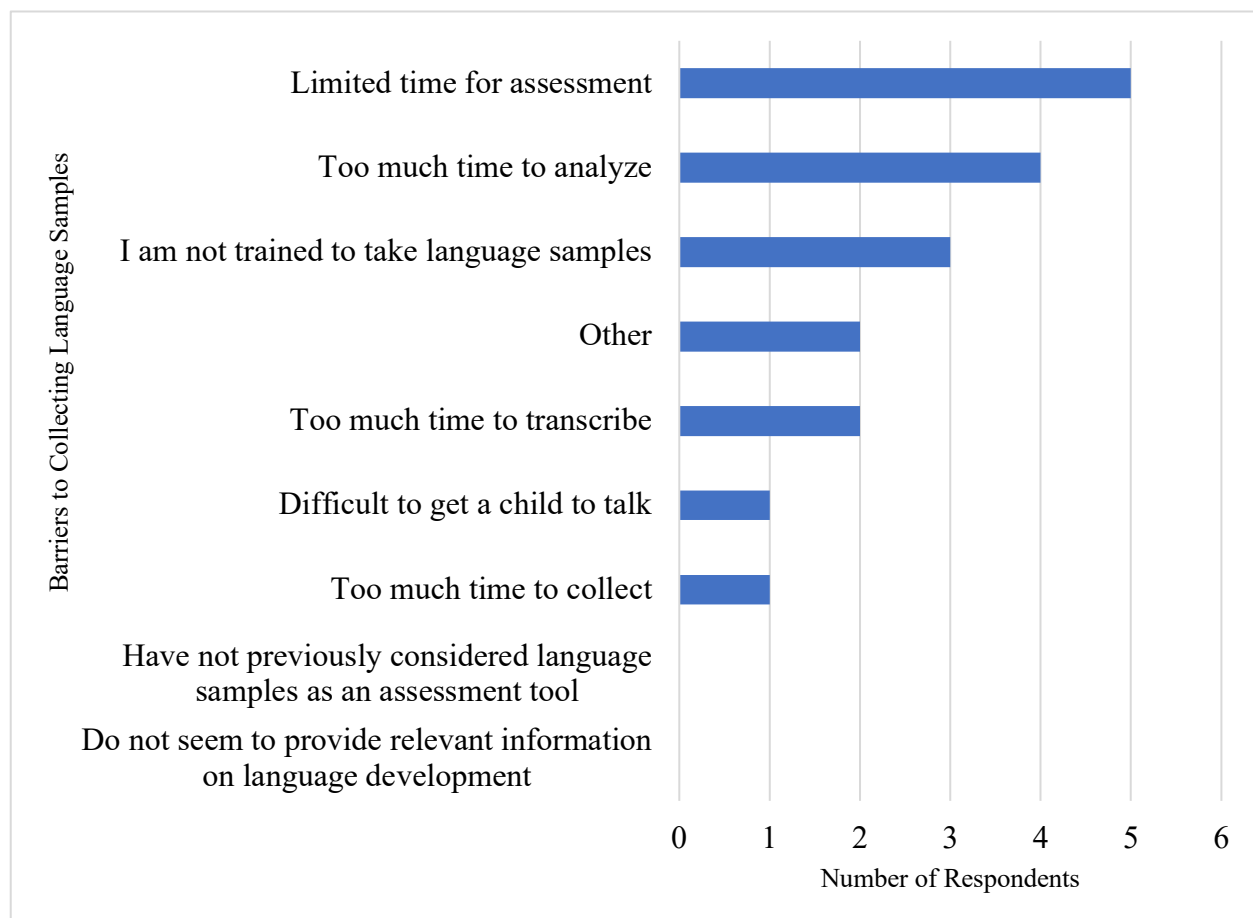
*Barriers to Collecting Language Samples*

Figure 9

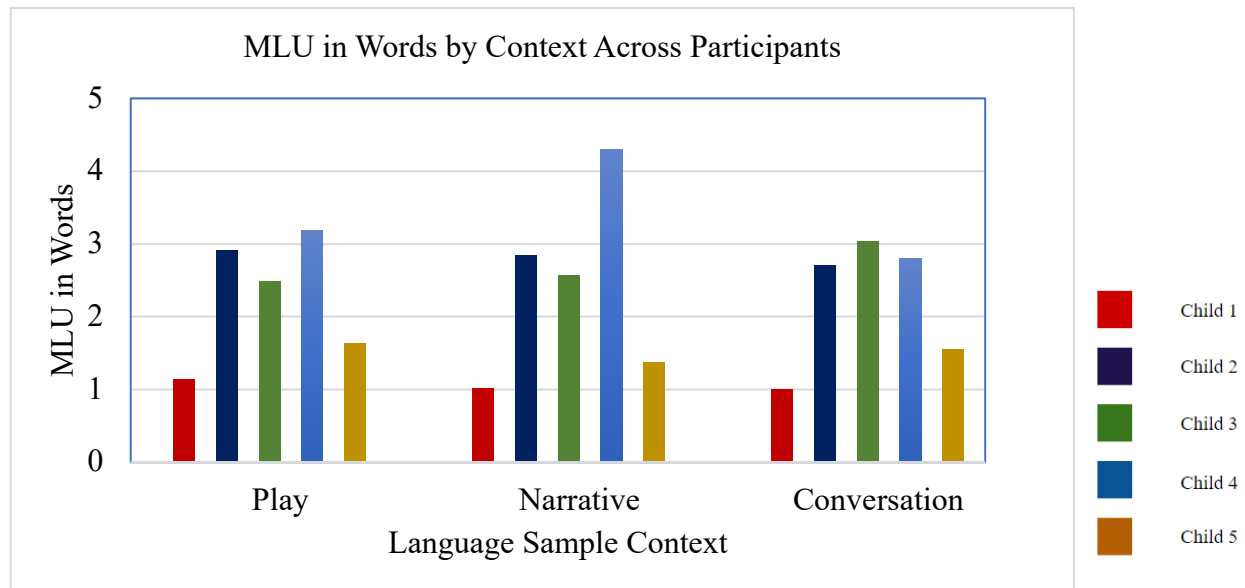
*MLU in Words by Context Across Participants*

Figure 10

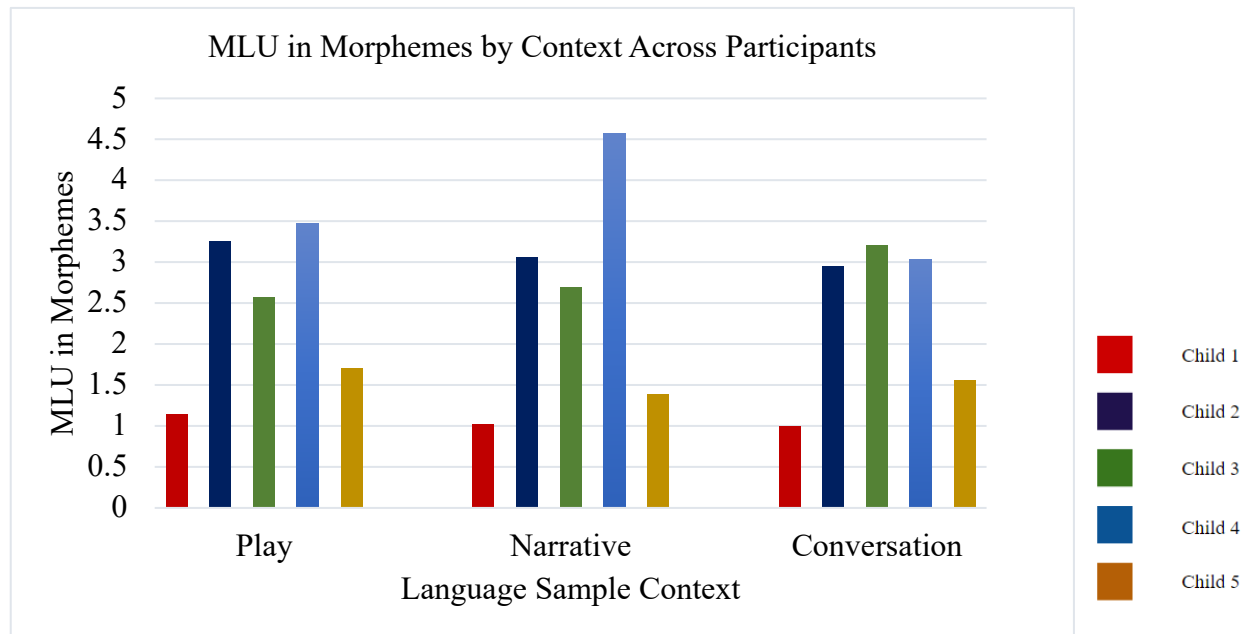
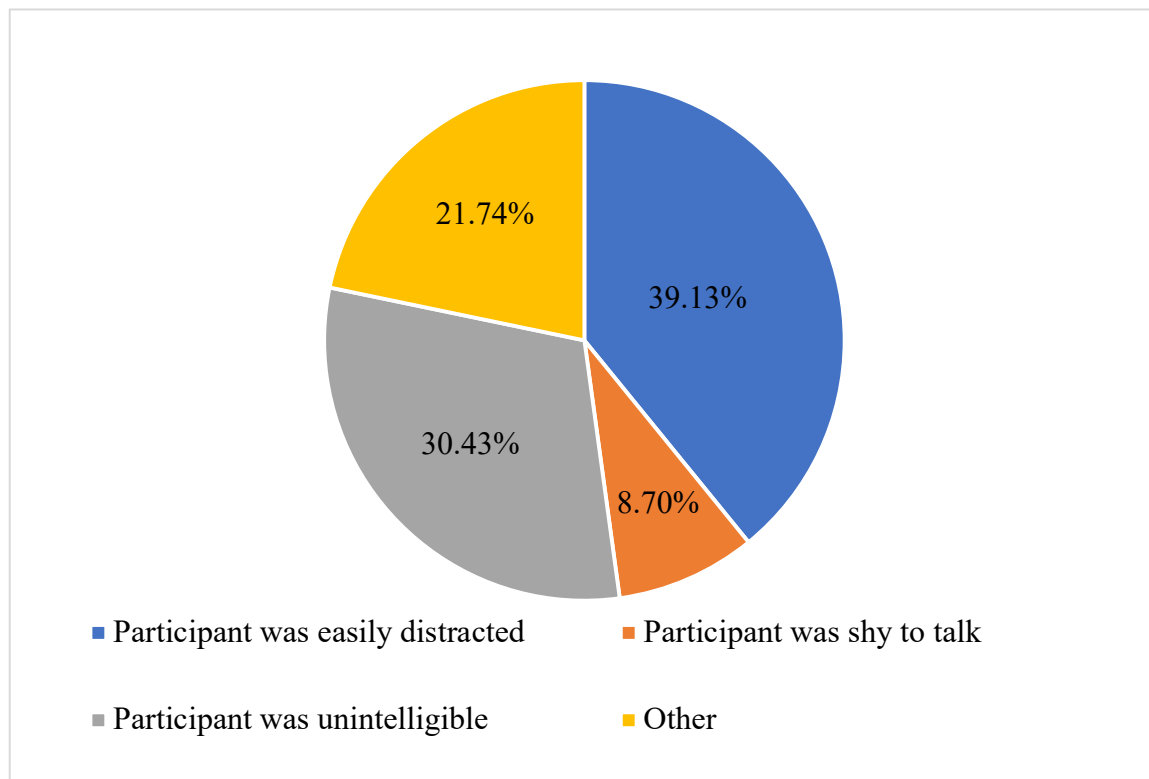
*MLU in Morphemes by Context Across Participants*



Figure 11

*Challenges with Child Engagement*

## Appendix A IESDB Provider Questionnaire

Please select the provider region you are associated with. Please check all that apply.

- ☐ Region 1 (Post Falls)
  - ☐ Region 2 (Lewiston)
  - ☐ Region 3 (Caldwell)
  - ☐ Region 4 (Meridian)
  - ☐ Region 5 (Gooding)
  - ☐ Region 6 (Pocatello)
  - ☐ Region 7 (Idaho Falls)
- 

Please select the type of areas you work in.

- ☐ Rural/remote areas
  - ☐ Urban/suburban areas
  - ☐ Both rural/remote and urban/suburban areas
-

What percent of the children you serve reside in rural/remote areas?

- ☐ No children
  - ☐ Less than 25%
  - ☐ 25%-50%
  - ☐ 51%-75%
  - ☐ 76%-100%
- 

What is your professional training? Please check all that apply.

- ☐ Speech-language pathologist
  - ☐ Audiologist
  - ☐ Teacher of the Deaf
  - ☐ Each Childhood Specialist
  - ☐ Preschool Teacher
  - ☐ Other (please specify) \_\_\_\_\_
- 

How many years have you worked in education?

- ☐ 0-2 years
  - ☐ 2-5 years
  - ☐ 6-10 years
  - ☐ 10+ years
- 

How many years have you worked specifically with children who are DHH?

- ☐ 0-2 years
  - ☐ 2-5 years
  - ☐ 6-10 years
  - ☐ 10+ years
- 

What settings do you consider hard to test in the state of Idaho? Please check all that apply.

- ☐ Remote/rural settings
  - ☐ Outside of child's natural environment
  - ☐ Do not consider any setting hard-to test
  - ☐ Other (please specify) \_\_\_\_\_
- 

About how many children (including early intervention and school-age children) who need services and live in rural/remote areas in your region currently receive services through IESDB?

- ☐ All of the children
  - ☐ Most of the children
  - ☐ Half of the children
  - ☐ Few of the children
  - ☐ None of the children
  - ☐ No children in my region live in rural/remote areas
- 

Does IESDB currently uses telepractice to assess the language development of young children in rural/remote areas?

- ☐ Yes
  - ☐ No
  - ☐ Not sure
- 

If you would be able to do a language assessment via telepractice, would you do it?

- ☐ Yes
  - ☐ No
- 

Children in rural/remote areas have equal assessment opportunities as children in urban areas

- ☐ True
- ☐ False

*Skip to next question: If children in rural/remote areas have equal assessment opportunities as children in urban areas = False*

---

How are their opportunities different?

- ☐ These children do not have access to assessment and intervention services
  - ☐ These children are visited less often by a provider
  - ☐ Assessment sessions/visits are shorter in duration
  - ☐ Other (please specify) \_\_\_\_\_
- 

Children living in rural/remote areas are assessed as frequently as should be.

- ☐ True
  - ☐ False
- 

It is costly to arrange assessments for children in rural/remote areas.

- ☐ True
  - ☐ False
- 

What professional expenses are typically involved with assessing children in rural/remote areas?

Please select all that apply.

- ☐ Travel
  - ☐ Personnel time
  - ☐ Meals
  - ☐ Other (please specify) \_\_\_\_\_
  - ☐ Not applicable
- 

What type of assessments are typically used to assess the language development of children who are DHH? Please check all that apply.

- ☐ Norm-referenced assessments (compare the child to his/her age-matched peers)
  - ☐ Criterion-referenced assessments (compare the child to performance standards rather than peers)
  - ☐ Language Sample Analysis
  - ☐ Other (please specify) \_\_\_\_\_
  - ☐ Not Applicable
-

What type of assessments are typically used to assess the language development of children who live in rural/remote areas and are DHH? Please check all that apply.

- ☐ Norm-referenced assessments (compare the child to his/her age-matched peers)
  - ☐ Criterion-referenced assessments (compare the child to performance standards rather than peers)
  - ☐ Language Sample Analysis
  - ☐ Other (please specify) \_\_\_\_\_
  - ☐ Not Applicable
- 

Are language samples typically used to assess language development (e.g., initial assessment or progress monitoring) of children who live in urban/suburban areas?

- ☐ Always
  - ☐ Often
  - ☐ Sometimes
  - ☐ Never
  - ☐ Not applicable
- 

Are language samples typically used to assess language development (e.g., initial assessment or progress monitoring) of children who live in rural/remote areas?



- ☐ Always
  - ☐ Often
  - ☐ Sometimes
  - ☐ Never
  - ☐ Not applicable
- 

For children who live in urban/suburban areas, how often are language samples collected per child?

- ☐ Once a year
  - ☐ Twice a year
  - ☐ Every 3-4 months
  - ☐ Monthly
- 

For children who live in rural/remote areas, how often are language samples collected per child?

- ☐ Once a year
  - ☐ Twice a year
  - ☐ Every 3-4 months
  - ☐ Monthly
-

What are some of the barriers with collecting language samples with children on your caseload?

Please select all that apply.

- ☐ Language samples take too much time to collect
- ☐ Language sample take too much time to transcribe
- ☐ Language samples take too much time to analyze
- ☐ It is difficult to get a child to talk
- ☐ Limited time for assessment
- ☐ Language samples do not seem to provide important information about a child's language development
- ☐ Have not previously considered language samples as an assessment tool
- ☐ I am not trained to take language samples
- ☐ Other (please specify) \_\_\_\_\_
- ☐ Not applicable

## Appendix B Parent Protocol

We will have three different sessions. Within each session, there will be three different ways we will encourage your child to talk: a conversation between your child and the provider (the person on the screen), play between you and your child, and a narrative retell activity that will be led by the provider. We will do these in different order every time we meet, and your provider will help you know which order to follow for each session. Below you can find more information about each of the different activities, and what you can do throughout the session. You can help your child prepare for these sessions by telling him/her you will do a video call with a “friend” that wants to meet him/her. Please make sure your child wears his/her hearing technology during every session.

### **1. Conversation**

After you have connected with the provider, you can introduce to your child the “friend” you told him/her about. The provider will start by introducing himself/herself and engage in a conversation with your child. Your role is to make sure the technology is working and to encourage your child to engage.

Tips:

- Make sure to pause and give your child a chance to answer the questions, even if it takes a little more time for them to talk. It is okay if your child is not talking during this part because that is part of what we are trying to investigate.
- If your child does not respond, repeat the question the provider asked to see if your child feels more comfortable answering you than the provider.

### **2. Play Activity**

Adapted from “Guide to Analysis of Language Transcripts” by K. Retherford, 2000, p. 11-12.

Before the session, you will talk to the provider about the toys and activities your child likes.

Please select a few of your child's favorite toys to play with during this part of your session.

Here some things to keep in mind when playing with your child.

- Start playing by describing what your child does or sees (e.g., You are playing with the big truck!). Also talk about what you do or see (e.g., I will change the wheels on my car). Start playing next to your child and wait for him/her to join you. If your child uses one word to talk, imitate what he/she says and add animal sounds or vehicle noises. If your child talks using more than one word, assign play roles and take turns speaking.
- Attempt to have an “interactive” conversation with your child. This means after your child verbalizes then you label the object or make a facial expression meanwhile taking communication turns. Invite your child to play. For example, you could say “The baby is hungry”. While playing with a doll you could say, “Show me your baby’s food.” Encourage your child to pick the toys and make plans for the play activity.
- Limit the amount of questions you ask to approximately one question every four speaking turns. Questions are important but asking too many could shorten your child’s answers. Try to limit saying “Tell me about this” as it can make your child describe rather than communicate and instead have a conversation with your child at his/her level.
- Speak in sentences that are slightly longer than your child’s sentences. During the conversation, avoid talking more than your child and try to respond with the same number of sentences per speaking turn as your child uses.

### **3. Narrative Retell**

- During this part, the provider will tell your child a narrative and the books’ pages will appear on your screen.
- Point to the pages displayed on the screen to engage the child.

- After the provider will tell the narrative, your child will retell the narrative by looking at the pages displayed on the screen.
- You can repeat the question the provider might say (e.g., “What happened next?”) but do not cue him/her. You could encourage your child to speak by telling him/her “You can do it! Keep going!”.
- If your child won’t speak for five consecutive pages, we will finish this part earlier.

### Appendix C Assessor Protocol

#### **Pre-Meeting with Participant's Family**

- After you attended the training, you can call the family you were assigned to at the phone number provided on the family's consent form to schedule a Zoom meeting. Please find a time that is convenient to you and the family. Ask the family if it is possible to have the child attend this meeting (at least the first part) in order to meet and introduce yourself to him/her.
- Go to Zoom and create a meeting (please refer to the Zoom instruction document in Box Cloud Storage under the "Zoom Overview" folder).
- Copy and paste the scheduled meeting details in an email to the family. You will do this for the pre-meeting and all three telepractice sessions. Please try to send this email at least 24 hours before your scheduled session.
- Introduce yourself to the family and child. This will be a great time to meet the child and tell him who you are. During this meeting, ask the family if they have questions about Zoom.
- Ask the questions in the Demographic Information form.
  - Save the completed Demographic Information form in the research binder in the HATCH lab.
- Review the parent protocol with the family.

#### **Scheduling a Telepractice Session**

- Call the family using the HATCH lab phone. Write down your scheduled session/s on the calendar next to the phone.

#### **Starting the Language Sample Elicitation**

- Test your Zoom connection prior to your scheduled session by joining the meeting test.
- If you are experiencing challenges with Zoom (e.g., audio challenges), please make sure to contact the family and inform them before they set up to join Zoom.

- Before starting the session, hang the “Do Not Enter” sign on the HATCH lab door. This sign is in the thesis binder in the HATCH lab.
- Video-record each session through the Zoom recording option by selecting the record button when the session starts.
- Each session will be approximately 30 minutes. Each of the three language elicitation contexts (conversation, play and narrative retell) should not exceed 10 minutes.
- Prior to starting your Zoom session make sure you have the following items prepared:
  - Data Collection sheet
  - Protocol Sheet (this form)
  - Power point presentation with book’s pictures on the MacBook computer in the HATCH lab that you will use for every session. You can find the power points by logging in Box Cloud Storage and looking in the “Narrative Retell” folder.
  - Printed copy of the narrative power point to refer to the script.
- Follow the order of language sample elicitation context that you were assigned. Please refer to the “Order of Language Sample Elicitation Context” document uploaded under the “Protocols” folder in Box Cloud Storage.
- As you are connecting with the family, start by saying: “Hello \_\_ (child’s name) \_\_! How are you doing today? It’s so good to see you. Today you will play a little with mom/dad, and then we will look at a book together.”
- Follow the order of language sample elicitation context you have been assigned.
- Make sure you do not go over seven minutes. Use a timer to keep track of time.

**Conversation Context (7 minutes)**

- Try to use two-three questions per session. There are eight questions provided for you to use. Use the following questions:

1. My favorite thing to do in the winter is play in the snow because I love being outside. What is your favorite thing to do?
  2. My favorite thing to do in the summer is to go swimming because I love water. What is your favorite thing to do in the summer?
  3. Elephants are my favorite animals because they are very big and strong. What kind of animals do you like? What animal would you like to see?
  4. I like to play with my friends outside. Where do you like to play with your friends?
  5. I like to play dolls at my friend's house. What do you like to play with your friends?
  6. Yesterday was my birthday party. My brother brought me balloons, I had 10 friends at my party and the food was delicious. What do you want to do for your birthday?
  7. Yesterday I had cookies and cake at my birthday party. I wonder if you like cake? If so, what kind of cake?
  8. I cut my finger a few days ago and it hurt so much! Did you ever have an owie? How did you get it?
- As your conversation continues, use statements and/or open-ended questions to elaborate on the topic discussed. Avoid using closed ended questions.
  - If the child does not respond to your question, try asking it one more time in a slightly different way or make a statement. You can then try to elaborate on your response to that question or statement and see if he/she might join the conversation. If the child does not respond, move on to the next question.
  - If the child does not produce any utterances for two minutes, then move on to the next language sample elicitation context.

**Play** (7 minutes)

Adapted from "Guide to Analysis of Language Transcripts" by K. Retherford, 2000, p. 11-12.



- The participant's caregiver will be the main facilitator in this context. You may transition to the play context by saying to the child "Your mother (or responsible caregiver) was telling me about your (toy of interest). Show me how you play with it!"
- During this part, you will be mostly watching the caregiver interact with the child. You may have to jump in the conversation in case the turn-taking and playing has stopped and encourage the parents to parallel talk or play. If the child will not engage in play for two minutes, you will skip to the next language sample elicitation context.
- Finish this context by saying to the participant "I am so glad I got to see how you play with\_(toy)\_."

The following guidelines should be followed by the participant's caregiver during the play context.

- a) Start playing by describing what your child does or sees (e.g., You are playing with the big truck!). Also talk about what you do or see (e.g., I will change the wheels on my car). Start playing next to your child and wait for him/her to join you. If your child uses one word to talk, imitate what he/she says and add animal sounds or vehicle noises. If your child talks using more than one word, assign play roles and take turns speaking.
- b) Attempt to have an "interactive" conversation with your child. This means after your child verbalizes then you label the object or make a facial expression meanwhile taking communication turns. Invite your child to play. For example, you could say "The baby is hungry". While playing with a doll you could say, "Show me your baby's food." Encourage your child to pick the toys and make plans for the play activity.
- c) Limit the amount of questions you ask to approximately one question every four speaking turns. Questions are important but asking too many could shorten your child's answers. Try

to limit saying “Tell me about this” as it can make your child describe rather than communicate and instead have a conversation with your child at his/her level.

- d) Speak in sentences that are slightly longer than your child’s sentences. During the conversation, avoid talking more than your child and try to respond with the same number of sentences per speaking turn as your child uses.
- If the child does not produce any utterances for two minutes, then move on to the next language sample elicitation context.

#### **Narrative Retell Context (7 minutes)**

- Transition to the next context by saying “I want to show you one of my favorite books now? I am excited to read it to you!”
- Continue by saying “Listen carefully while I tell you the story. After I am done I would like you to tell me the story”.
- Select the narrative corresponding to your language sample number.
  - Language Sample 1: *Frog, where are you?*
  - Language Sample 2: *Frog Goes to Dinner*
  - Language Sample 3: *One Frog Too Many*
- Read the entire narrative by following the book reading protocol.
- Tell the attending parent to point to the pages displayed on screen to keep the child engaged.
- After you finished reading, tell the child “Now it’s your turn to tell me the story!”. Start playing the power point slides from the beginning of the book.
- When it is the child’s turn to talk, encourage him/her to say more, but avoid asking specific questions. Use the following cues in order to help the child retell the story:
  1. What happened here?
  2. Tell me more.

3. Then what happened? (use this prompt if the child starts speaking but does not finish)
- Remember that wait time is essential. Give the child at least 5 seconds before you repeat your question or use another prompt.
  - You may use each prompt twice per slide/book page. If child does not respond after you asked those prompts, move on to the next slide/book page.
  - Continue prompting the child to talk. If the child does not speak for five consecutive book pages, discontinue the narrative retell task and move on to the next language elicitation context.

### **Conclusion**

- Before ending the session, ask the parents what type of hardware they used to connect (e.g., laptop, tablet, etc.) and note that in your data collection sheet.
- After completing the final language elicitation context, thank the parents and the child for meeting with you. For example, you could say “Thank you so much for talking to me. It was so fun meeting you! I will see you soon.”

### **Language Sample Audio-Video Recording**

- After your session has ended, Zoom will automatically convert the recording to a file that will pop up in the finder window.
- Log into Box Cloud Storage.
- Open the “Language Sample Recordings” folder. Select the appropriate subfolder based on language sample number (e.g., Language Sample 1).
- Drag and drop the Zoom recording. Save under the following name coding guidelines:
  - Your assessor code (your assessor code given to you at the training)
  - Session number (# 1-3 based on which language sample number it is)

- Write the language sample context initials in the order elicited (C-conversation; P-play; and NR-narrative retell).
- After the file has been successfully uploaded, log out of Box Cloud Storage.
- Erase the audio-video recording from the computer and empty the computer's trash folder.

### **Language Sample Transcription and Coding**

- Transcribe the entire language sample.
- When transcribing, open up two windows: 1) video recording and 2) SALT 16.
- Open SALT 16. Select the Getting Started Window: Select "New" to create a new transcript.
- Fill in the new transcript's header information:
  - Target speaker select: child
  - Other speakers select: examiner and parent
  - Target speaker information
  - Participant's ID: Child's assigned de-identification number (e.g., P1)
  - Select appropriate gender for the child
  - Date of sample: mm/dd/yyyy
  - Current age: yy:mm (e.g., 04:00)
  - Grade: "P" (Preschool)
  - Examiner's name: your assessor code (e.g., A1)
  - Location: Child's home
  - Sampling Context: Select "Other" and type in the language samples you were able to elicit (e.g., Conversation, Narrative Retell, Play).
  - Target Language: Select English
  - After the header information is complete, click the "OK" icon.

- Transcribe and code the selected utterances in SALT 16. Transcribe what the assessor, attending parent and the child say, but only code the child's utterances.
- Use subtitles to separate the language sample by language sample elicitation contexts: play, narrative retell and conversation. Add "+" on the subtitle line (e.g., + Conversation).
- Add the time when you start a context below the subtitle line (e.g., +3:30) and below the last utterance of that context. This will help you calculate how much time you spent within each context and will be reported in the post-session questionnaire. The time you spent within the narrative retell context will be longer than the other two contexts because it will also include the time you spent reading the narrative.
- Transcribe the sample following the rules of analysis and protocol. A SALT protocol with guidelines will be in the HATCH Lab.
- You will not compare the language sample to the SALT database. You only need to obtain the MLU and number of utterances for each language sample elicitation context. You will do this using the Transcript Cut feature.
- How to use the transcript cut feature:
  - Write START in brackets →+ [START]
  - Write END in brackets → + [END] in the language sample context you will transcribe. Each time you analyze a new context, erase the START and END subheadings from the previous context.
  - Select the "T-Cut" icon.
  - Select the code option and enter the [START] for the start point and [END] for the end point.
- Use the Standard Measures report in the Analyze menu to obtain the three measures.

- Write the MLU in words and morphemes and the number of utterances under each transcribed language sample elicitation context (e.g., + MLU in words, + MLU in morphemes, + Total utterances).
- Click “Save document” icon in SALT 16 and select file name to save under. Please save it under “Desktop” option. Click “Save”.
- Name your language sample transcription with the same title as the video recording that is saved in Box Cloud Storage. Follow these coding guidelines:
  - Assessor code
  - Session number (# 1-3 based on which language sample number it is)
  - Write the language sample context initials in the order elicited (C-conversation; P-play; and NR-narrative retell).
- Log into Box Cloud Storage.
- Open the “Language Sample Transcriptions” folder.
- Drag and drop the transcribed language sample from the computer’s desktop.
- After the file has been successfully uploaded, log out of Box Cloud Storage.
- Erase the language sample transcription from the computer’s desktop and empty the computer’s trash folder.

### **SALT Protocol**

- What to count:
  - If a child uses a repetitive phrase (e.g., “I don’t know”) DO count that for MLU.
  - If a child uses a rote phrase (counting, singing), mark it that as ONE word with the underscore (e.g., “The\_end”).
- Intelligibility:

- Use X for an unintelligible word, XX for an unintelligible segment of unspecified length, and XXX for an unintelligible utterance.
- If half or more of the utterance is intelligible, count that utterance as intelligible.
- If less than half of the utterance is intelligible, count it as unintelligible.
- Example: “X big cars” X = 1 word, there are 3 words total in the utterance, 2 that are intelligible,  $\frac{2}{3}$  of the words are intelligible, so this is counted as an intelligible utterance.

**Data Collection**

- After you completed the data collection sheet please save it to the research binder in the HATCH lab.
- Log into Box Cloud Storage. Click on the “Post-Language Sample Questionnaire” folder and open the document link.
- Complete the questionnaire with the information from the data collection sheet. Please respond to the questions based on your experience with the session.

## Appendix D Participant Demographic Questionnaire

1. Your Assessor Code: \_\_\_\_\_
2. Child's Date of Birth (mm/dd/yyyy): \_\_\_\_\_
3. Child's Gender: \_\_\_\_\_
4. As per parent report, how often is the child exposed to mobile technology (e.g., use FaceTime, play with the phone, etc.)?
  - a. Daily
  - b. 2-5 times a week
  - c. Once a week
  - d. Twice a month
  - e. Once a month
  - f. Once in awhile
  - g. Never
5. What communication modality does the child use (e.g., ASL, total communication, cued speech, listening and spoken language)? \_\_\_\_\_
6. What communication modality do the parents (immediate family) use with the child?  
\_\_\_\_\_
7. What is the child's type of hearing loss (sensorineural, conductive, mixed, unilateral, bilateral)? \_\_\_\_\_
8. What is the child's degree of hearing loss (e.g., mild, moderate, severe, profound)?  
\_\_\_\_\_
9. At what age was the child identified with hearing loss? (e.g., present at birth)?  
\_\_\_\_\_
10. At what age did the child first receive hearing amplification? \_\_\_\_\_



11. Does the child currently use hearing amplification? \_\_\_\_\_
12. What type of hearing technology does the child use (e.g., hearing aids, BAHA, cochlear implant)? \_\_\_\_\_
13. When was the child first enrolled in early intervention? \_\_\_\_\_
14. What type of hardware (e.g., laptop, tablet) will the parents use when connecting via Zoom for the language samples?
- \_\_\_\_\_

Question for assessor only:

15. Were you able to meet with the child during the introductory session in Zoom?
- \_\_\_\_\_

## Appendix E Order of Language Sample Elicitation Contexts

| Child | Session 1           | Session 2           | Session 3           |
|-------|---------------------|---------------------|---------------------|
| 1     | 1. Narrative Retell | 1. Play             | 1. Conversation     |
|       | 2. Play             | 2. Conversation     | 2. Narrative Retell |
|       | 3. Conversation     | 3. Narrative Retell | 3. Play             |
| 2     | 1. Conversation     | 1. Conversation     | 1. Narrative Retell |
|       | 2. Play             | 2. Narrative Retell | 2. Play             |
|       | 3. Narrative Retell | 3. Play             | 3. Conversation     |
| 3     | 1. Conversation     | 1. Narrative Retell | 1. Play             |
|       | 2. Narrative Retell | 2. Play             | 2. Conversation     |
|       | 3. Play             | 3. Conversation     | 3. Narrative Retell |
| 4     | 1. Play             | 1. Conversation     | 1. Narrative Retell |
|       | 2. Conversation     | 2. Narrative Retell | 2. Play             |
|       | 3. Narrative Retell | 3. Play             | 3. Conversation     |
| 5     | 1. Conversation     | 1. Narrative Retell | 1. Play             |
|       | 2. Narrative Retell | 2. Play             | 2. Conversation     |
|       | 3. Play             | 3. Conversation     | 3. Narrative Retell |

## Appendix F Data Collection Sheet

Participant Code: \_\_\_\_\_

Assessor Code: \_\_\_\_\_

Date of Language Sample Collection (mm/dd/yyyy): \_\_\_\_\_

|  |   |
|--|---|
| Did the participant use hearing technology during the telepractice session?    |   |
| Time (in minutes) it took to collect the language sample.                      | Start Time:<br>End Time:<br>Total Time: |
| What type of hardware did the participant use?                                 |   |
| List the challenges with connecting with the participant.                      |   |
| Who experienced technical problems?  |   |
| List the type of technical problems you or the participant experienced.        |   |
| List challenges with participant's engagement/attention.                       |   |
| Was the participant engaged? If no, what did you do to redirect him?           |   |
| How much support was required from the attending parent/caregiver?             |   |
| List the language sample contexts used (conversation, play, narrative retell). |   |

|  |   |
|--|---|
| Number the language sample contexts in the order they were assigned. | <input type="checkbox"/> Conversation<br><input type="checkbox"/> Play<br><input type="checkbox"/> Narrative Retell |
| Time it took to transcribe the language sample.                      | Start Time:<br><br>End Time:<br><br>Total Time:   |
| Time it took to code the language sample.                            | Start Time:<br><br>End Time:<br><br>Total Time:   |

## Appendix G Assessor Questionnaire

Select your assessor code:

- ☐ A1
  - ☐ A2
  - ☐ A3
  - ☐ A4
  - ☐ A5
  - ☐ A6
- 

Who accompanied the participant during this language sample? Check all that apply.

- ☐ Mother
  - ☐ Father
  - ☐ Other (please specify):
- 

What language sample number is this?

- ☐ First
  - ☐ Second
  - ☐ Third
-

In which order were the different contexts presented? Please enter the appropriate number.

\_\_\_\_\_ Conversation

\_\_\_\_\_ Play

\_\_\_\_\_ Narrative Retell

---

Were you able to collect a language sample once a week for three consecutive weeks?

- ☐ Yes
- ☐ No
- ☐ I already answered this question
- 

*Display This Question:*

*If Were you able to collect a language sample once a week for three consecutive weeks? = No*

Why were you not able to collect a language sample once a week for three consecutive weeks?

Please select the correct option and elaborate.

- ☐ I already answered this question in a previous questionnaire
- ☐ Reason/s due to assessor (Please explain)

\_\_\_\_\_

- ☐ Reason/s due to participant (Please explain)

\_\_\_\_\_

- ☐ Other (please explain): \_\_\_\_\_
-

How satisfied were you with scheduling a telepractice session with the participant's family?

- ☐ Very satisfied
  - ☐ Satisfied
  - ☐ Dissatisfied
  - ☐ Very dissatisfied
- 

How effective was the communication between you and the participant's family prior to the telepractice session?

- ☐ Very effective
  - ☐ Effective
  - ☐ Ineffective
  - ☐ Very ineffective
- 

What were some of the challenges associated with scheduling a telepractice session? Check all that apply.

- ☐ Difficulty reaching family
  - ☐ Difficulty setting a time convenient for both parties (participant's family and assessor)
  - ☐ Other (please specify): \_\_\_\_\_
  - ☐ No challenges experienced
-

*Display This Question:*

*If What were some of the challenges associated with scheduling a telepractice session? Check all that apply = Difficulty reaching family*

How many total attempts were necessary to schedule this appointment (including emails and phone calls, etc.)? Please slide the slider.

1 2 3 4 5 6 6 7 8 9 10

|                    |  |
|--------------------|--|
| Number of attempts |  |
|--------------------|--|

Assessor experienced difficulty connecting via Zoom.

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree



Participant's family experienced difficulty connecting via Zoom.

- ☐ Strongly agree
  - ☐ Agree
  - ☐ Disagree
  - ☐ Strongly disagree
- 

Assessor experienced technical challenges during the telepractice session.

- ☐ Strongly agree
  - ☐ Agree
  - ☐ Disagree
  - ☐ Strongly disagree
- 

Participant experienced technical challenges during the telepractice session.

- ☐ Strongly agree
  - ☐ Agree
  - ☐ Disagree
  - ☐ Strongly disagree
- 

What kind of technical difficulties were experienced during the telepractice session? Select all that apply.

- ☐ Audio delay
  - ☐ Audio break-up
  - ☐ Echo
  - ☐ Inaudible volume
  - ☐ Video image crash
  - ☐ Camera did not turn on
  - ☐ Both audio and video difficulties
  - ☐ No technical difficulties were experienced
  - ☐ Other (please specify): \_\_\_\_\_
- 

Type of hardware used by the participant

- ☐ Computer (laptop or desktop)
  - ☐ Tablet or iPad
  - ☐ Smart Phone
  - ☐ Other (please specify) \_\_\_\_\_
- 

What type of language sample contexts were successfully used during the language sample elicitation? Select all that apply.

- ☐ Conversation
  - ☐ Play
  - ☐ Story Retell
  - ☐ None
- 

How was the conversation context?

- ☐ Very successful
  - ☐ Successful
  - ☐ Unsuccessful
  - ☐ Very unsuccessful
- 

How was the play context?

- ☐ Very successful
  - ☐ Successful
  - ☐ Unsuccessful
  - ☐ Very unsuccessful
- 

What toy/s and/or game/s were used during the play context?


---

How was the narrative retell context?

- ☐ Very successful
  - ☐ Successful
  - ☐ Unsuccessful
  - ☐ Very unsuccessful
- 

How many minutes were spent during the conversation context? Please slide the slider.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

|         |  |
|---------|--|
| Minutes |  |
|---------|--|

---

How many minutes were spent during the play context? Please slide the slider.


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

|         |  |
|---------|--|
| Minutes |  |
|---------|--|

---

How many minutes were spent during the narrative retell context (including the time you spent reading the narrative and the child retelling the story)? Please slide the slider.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

|         |  |
|---------|--|
| Minutes |  |
|---------|--|

---

Satisfaction with the overall language elicitation process.

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Dissatisfied
- ☐ Very dissatisfied

---

Please mention any dissatisfaction or challenge you experienced that was not addressed in the questionnaire (e.g., parent asked too many questions, or you felt that the protocol was not clear enough, etc.).

- ☐ Dissatisfaction/challenges \_\_\_\_\_
  - ☐ Not applicable
-

What were some challenges experienced with the participant when conducting the telepractice session? Select all that apply.

- ☐ Participant was easily distracted
  - ☐ Participant was shy to talk
  - ☐ Participant was unintelligible
  - ☐ Other (please specify): \_\_\_\_\_
- 

What was the level of support the participant required from the parent/caregiver during the telepractice session?

- ☐ All the time
  - ☐ Most of the time
  - ☐ Some of the time
  - ☐ Minimal
  - ☐ No support needed
- 

Maintaining the participant's attention during the telepractice session was

- ☐ Very easy
  - ☐ Easy
  - ☐ Difficult
  - ☐ Very difficult/unattainable
-

What did you do to redirect the participant's attention? Select all that apply.

- ☐ Reengaged the participant with additional stimulus via screen/telepractice
  - ☐ Required additional assistance from the attending parent/caregiver
  - ☐ Unable to redirect participant's attention to the targeted task
  - ☐ Participant did not need to be redirected
  - ☐ Other (please specify): \_\_\_\_\_
- 

You as the assessor were able to obtain a good quality audio-video recording for the language sample transcription process

- ☐ Strongly agree
  - ☐ Agree
  - ☐ Disagree
  - ☐ Strongly disagree
- 

How long did it take to collect the language sample?

- ☐ Less than 10 minutes
  - ☐ 10-20 minutes
  - ☐ 21-30 minutes
  - ☐ 30+ minutes
-

How many utterances (C-units) were you able to collect during the entire language sample elicitation? You can obtain the total number of utterances by adding up the number of utterances from each of the contexts elicited in this language sample.

- ☐ Less than 25 utterances
  - ☐ 25-50 utterances
  - ☐ 50+ utterances
- 

How long did it take to transcribe the language sample?

- ☐ Less than 10 minutes
  - ☐ 10-20 minutes
  - ☐ 20-40 minutes
  - ☐ 40-60 minutes
  - ☐ 60+ minutes
-



How long did it take to code the language sample?

- ☐ Less than 10 minutes
  - ☐ 10-20 minutes
  - ☐ 20-40 minutes
  - ☐ 40-60 minutes
  - ☐ 60+ minutes
- 

What do you think could improve the experience of collecting language samples via telepractice?

Note: You only have to answer this question once.

- ☐ \_\_\_\_\_
- ☐ I already answered this question, or I don't have anything to say

## Appendix H Assessor Responses

**Question**

Please mention any dissatisfaction or challenge you experienced that was not addressed in the questionnaire.

**Responses**

“The mom would not actively play with her child.”

“The mom was talking and asking too many questions especially yes/no questions.”

“After explaining to the mother what is expected of her and what questions to ask/not ask, she still asked closed ended questions and talked a lot for her daughter. I think that potentially sending the parents a more detailed description of how they should interact with their child would be more efficient. I think that would results in less time wasted and we would get a better understanding of how the child actually interacts in day to day life.”

“The mom sat on her phone during play.”

“Younger sibling would chime in and the iPhone quality was poor at times.”

“The mother asked the participant an overwhelming amount of questions and did not provide enough time for the participant to answer. I felt awkward to tell her to stop asking so many questions since we had already covered this in the pre-meeting. The mother also focused on labeling colors and asked closed-ended questions. Since the participant did not respond to the questions I asked during conversation, mother asked her own questions, which were mostly labeling question.”

“Parent asked a lot of questions and the participant was distracted with other things (e.g., drinking a drink) and did not engage in the conversation. I wish mom would have removed these extraneous distractions prior to the session.”

**Question**

What do you think could improve the experience of collecting language samples via telepractice?

### **Responses**

“Participant was distracted by different objects she had in her hands during the narrative retell and conversation contexts. During the play context, the child kept running around the house and did not engage to play with the mom too much. Throughout the three sessions, the child had minimal to no direct interaction with me.”

“Providing more parent training to coach/teach parents what types of questions to ask and to wait for the child to answer.”

“I think that giving the parents a training on what they should do would be more helpful. I explained what was in the protocol for the parents, but the mom still didn’t follow it. I also think that only being able to use the HATCH lab phone to contact them really didn’t help communication and scheduling.”

“Better camera quality.”

“I think that it would be beneficial if the parents were given more information beforehand about what a successful language sample looks like, what types of elicitation strategies are often used, and to use as natural of conversation as possible with their child. I also think that if they understood that we’re trying to see what types of language they use in general and not see how they answer specific questions necessarily about something. Sometimes the child will get distracted and start talking about something unrelated and the parent would stop them and redirect them. I feel as though this is fine once they’re finished talking but a lot of the time the mom would interrupt the child or talk over them if they were talking about something else.”