The Impact Of Baby Sign On The Development Of Pragmatic Skills In Typically Developing Children

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THE IMPACT OF BABY SIGN ON THE DEVELOPMENT OF PRAGMATIC SKILLS IN TYPICALLY DEVELOPING CHILDREN

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Dedication

To Ms. Julie Carson
Your teaching kept me focused through challenging times.
THE IMPACT OF BABY SIGN ON THE DEVELOPMENT OF PRAGMATIC SKILLS IN TYPICALLY DEVELOPING CHILDREN

by

LYNA MARIE SULLIVAN, B.S.

THESIS

Presented to the Faculty of the Graduate School of The University of Texas at El Paso in Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE

Department of Rehabilitation Sciences

THE UNIVERSITY OF TEXAS AT EL PASO

August 2013
Acknowledgements

First I would like to acknowledge all my fellow UTEP student and faculty members. I have learned so much from each one of them and I cherish the opportunity to experience graduate school with such a distinguished group. I would also like to acknowledge my friend and mentor Liza Eriquez. Liza has been a well-respected Sign Language Interpreter for the city of El Paso for over 25 years and was my instructor during my two years in the Interpreter Training Program at El Paso Community College. Lisa also provided me with my first community job as a Sign Language Interpreter as manager of the El Paso Center for the Deaf and Hard of Hearing. The knowledge she instilled in me about American Sign Language and the Deaf Community helped to establish the road to my professional career. This work is also dedicated to my husband Eric and my son Lucas. Seeing my son at nine months of age look and me and sign “all done” from his high chair was one of the greatest moments of my life as a mom. I thank my husband for supporting my passion and being equally proactive in implementing Baby Sign at home with our family. I also would like to thank him for the all the love and support he has offered. He is a blessing
Abstract

The purpose of this study was to determine the impact of Baby Sign on the pragmatic development of typically developing children. The participants for the study were 11 typically developing children. A one group pretest posttest case study design was used to evaluate the impact of baby sign. Prior to parents and caregivers attending a 5 week course on baby sign language, each child was administered the Developmental Assessment of Young Children (DAYC). Although, measurements were taken of the child’s social, cognitive, physical, adaptive, and communication skills, standard scores of only the social subtests from the pretest to the posttest were used to compare pragmatic development in the current study. Results of the case study indicated that Baby Sign did produce a statistically significant difference in the pragmatic development of the participants. Qualitative data suggests that Baby Sign did have a positive effect on the children’s desire to initiate communication.
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Chapter 1: Literature Review

Walk into the baby sections of almost any department store and a parent can find an array of take home resources to implement with their children at home. Shelves are lined with books and DVD’s designed to enhance the development of growing babies. One resource which has become easily accessible to parents and caregivers involves the implementation of sign language as a mode of communication with pre-verbal children.

Baby Sign

Doherty – Sneddon (2003) defines Baby Sign as an augmentative communication approach that teaches babies keyword signing that they can use to communicate before they talk. The use of Baby Sign has become popular among parents of young children as a mode of communication (Doherty – Sneddon, 2003). Pizer, Walters, and Meier (2007) have reported that access to media and social networking sites has allowed for parents to learn more about Baby Sign and has influenced their decision to use it with their children. In addition, Pizer, Walters, and Meier (2007) have reported that the practice of using Baby Sign is being implemented by families who have no previous knowledge of sign language or have no significant ties to the Deaf Community.

In a report written by Pizer, Walters, and Meier (2007) the author explains that the most reported reason for the parents’ decision to implement Baby Sign with their children is to improve communication, but what are the benefits? The growing popularity of Baby Sign has sparked researchers to seek to identify the effects surrounding the use of Baby Sign and its role on childhood development. The overall conclusions determined by researchers reveals that early exposure to Baby Sign does produce supporting evidence that benefits to facilitate child
development do exist, such as increased expressive and receptive skills, a reduction of child frustration and tantrums, as well as an increase in joint visual attention (Doherty-Sneddon, 2008; Pizer, Walters, & Meier, 2007; Brady, 2007; DiCarlo, Stricklin, Banajee, & Reid, 2001; Orlansky & Bonvillian, 1985; Holmes & Holmes, 1980; Goodwyn, Acredolo & Brown, 2000).

In a study conducted by Brady (2007), the researcher examined whether children can learn to use signs to make requests in replace of crying. Sign language modeling was implemented on two experiments using a single-case withdrawal design on four participants. The results of the study not only revealed that all four participants learned to produce signs in order to make requests, but also revealed that a decrease in crying occurred upon making request (Brady, 2007).

Holmes and Holmes (2007) have reported that signs form a distinct representation of gestural communication as well as for individual words. In their study, Holmes and Holmes (2007) evaluated the communicative behavior of hearing child who was exposed to both signs and spoken words for approximately 11 months. Results revealed that out of the first 50 words of the participants’ spoken vocabulary, half of them were produced in conjunction to the signed component, thus suggesting that the combined modality of spoken language and sign may have contributed to the production of the participants’ language development (Holmes & Holmes, 2007).

It has been argued that the exposure to signed language could inhibit the acquisition of speech and language learning (Holmes & Holmes, 2007). However, in a controlled study conducted by Goodwyn, Acredolo and Brown (2000), the researchers concluded that gesture development in pre-verbal children does not delay language development, but actually facilitates early verbal language learning. In this study, a group of parents and children were provided with
training on how to implement the use of symbolic gestures during interaction. The results of this study indicated that the group of participants who received training in symbolic gesturing obtained scores on receptive and language measures which were statistically higher than the group that did not receive training, thus providing evidence to show that parents who used and encouraged the use of symbolic gestures to their children facilitated the early stages of verbal language development (Goodwyn, Acredolo and Brown, 2000).

**Baby Sign versus Gestures**

According to Doherty-Sneddon (2003) parents are reading about the benefits of teaching sign to their children, but some empirical research has used symbolic gesturing while others have used sign language. What are the differences between sign language and gestures? Vallotton and Ayoub (2010) define a gesture as an intentional motor act of the body used to express a thought or concept. There are stages in development where the child lacks the fine oral motor control to vocally produce words. Gestures provide an easier symbolic equivalent in the form of simple physical actions used to represent objects and events (Goodwyn, Acredolo, & Brown, 2000). Pointing, for example is a technique children often use to refer to objects prior to having the ability to verbalize specific words for those objects (Iverson & Goldin-Meadow 2005). Other gestures, for example, include the child raising his or her arms in order let caregivers know that they want to be picked up or hand flapping to express that they want more of something.

Baby Sign, in contrast, is the act of using signs taken from American Sign Language (ASL), a language that uses the hands, face and body to convey meaning, and pairing those signs along with verbally expressing the word to communicate with children. American Sign Language in itself is a complex and abstract language that follows a strict grammatical structure. The use of
ASL signs, much like with spoken language, is made from repetitive motions in various combinations (Liddell, 2003). Sign language is a system with a governed set of rules that help to maintain a linguistic component. Liddell (2003) reports that every sign consists of one location, one hand shape, and one or more movements produced in order to convey meaning. Baby Sign is a systematic form of communication, which requires the parent or caregiver to know how to accurately produce the sign and pair them with the keywords that are most often used in a child’s everyday routine.

**Research On Gesture Development in Relation to Language**

Bernstein and Tiegerman-Farber (1997) state that early language development is characterized by children’s representation of the environment through gesture, vocalization, and later by their single word use, but that their ability to make themselves understood is often limited by their difficulty in combining sounds and sound sequences to form words. Children who are pre-verbal use gestures as their primary way of communicating with parents and other caregivers. Over the past 20 years research has been conducted to study the impact that gestures can have on child development, primarily in the area of language (Goldin-Meadow, Goodrich, Saur & Iverson, 2007; Capirici, Iverson, Montanari, & Volterra, 2002; Iverson & Goldin-Meadow, 2005).

With relation to gestures and language, in a longitudinal study completed by Goldin-Medow, Goodrich, Saur & Iverson (2007), the researchers examined the maternal responses to gestures and speech of the 10 children beginning at 10 months of age and ending at 24 months. The researchers evaluated the one to two words responses produced upon their child’s gesturing. The results of the study found that all 10 mothers “translated” the gestures of their children into...
words, thus allowing for gestures to serve as a tool for children to express their thoughts (Goldin-Medow, Goodrich, Saur & Iverson, 2007).

In a similar study conducted by Capirci, Iverson, Montanari, & Volterra (2002), the researchers examined the effects of the exposure to sign language on the use of communicative gestures on a hearing child of deaf parents. The researchers collected data on the combinations of words, signs, and gestures produced by the child for a period of two years and then compared them to the 12 hearing children who had no exposure to sign. The results of the study concluded that the use of gestures was identified as a key component in the facilitation of early communicative development (Capirci, Iverson, Montanari, & Volterra, 2002).

The intent of language is to convey an assortment of communication functions. However, for a child who has not learned how to speak, gesturing is the primary way for children to communicate to their parents and caregivers. Children begin to produce gestures between the ages of 9 to 12 months and produce their first words between 1 and 1 1/2 years (Bernstein & Tiegerman-Farber 1997). The gestures made by children who do not yet have the ability to verbalize their thoughts serve as a way to communicate with their caregivers and give meaning into the movements that their bodies and hands are producing.

Despite the popularity and growth of the practice of Baby Sign, there is limited research on the impact of Baby Sign on childhood development. Within recent years, some research has been conducted to assess the impact that gesturing and Baby Sign can have on children and language which has revealed positive effects to the argument that exposure to Baby Sign can help to facilitate early language learning (Goldin-Medow, Goodrich, Saur & Iverson, 2007; Capirci, Iverson, Montanari, & Volterra, 2002). It is evident that language and the ability to communicate wants and needs is a critical element to human growth and development. However language is
not the only portion of human growth that needs maturing. Carta, Greenwood, Luze, Cline, & Kuntz (2004) have reported that proficiency in social interaction with adults and peers is an important outcome of early childhood. Despite the popularity in the practice of Baby Sign on childhood development, there is a lack of research that investigates the impact that gestures can have on childhood pragmatics.

**Relation of Gesture Development to Pragmatic Skills**

Bernstein & Tiegerman-Farber (1997) define pragmatics simply as the rules that govern the use of language in social contexts. Pragmatics in typically developing children can be assessed at birth. In infancy children interact by smiling, responding to verbal and physical exposure and by maintaining eye gaze. As the child begins to reach his/her first year of life, the expression of social skills and communicative intent begins to become more challenging for the toddler. Ninio and Snow (1996) state that the utterances produced by 10 - to - 12 month - olds are used for two main interactive goals. The first goal involves the children participating in social interactions the second involves the child establishing a mutual and joint attention with the primary caregiver.

Children at the early stages of development lack the verbal ability to communicate their needs, wants and ideas. James (1990) states that in early childhood, children use language to communicate three main functions: regulating others behavior, establishing joint attention, and social interaction. As a child’s language matures, so does the need for the child to engage in more social interactions. It is at this stage of child development that children use gestures to initiate a variety of communicative intents, such as requesting and commenting, due to the inability to apply verbal speech in conversation.
Researchers have shown that the relationship between gestures and language development is critical in that it helps to facilitate verbal language (Capirci, Iverson, Montanari & Volterra, 2002; Goldon-Meadow, Goodrich, Sauer & Iverson, 2007, Pizer, Walters, & Meier, 2007; Goodwyn, Acredolo, & Brown 2000; Iverson, Goldin-Meadow, 2005). However, little is known about the relationship between gesture development and pragmatics skills of young children. Pragmatic skills of young children are crucial for child development in that it helps to create a foundation for the child’s ability to make connections to social interactions to caregivers, peers, and others who are in their environment (Voress & Maddox 1998). However, in order for children to participate in social interactions, they must have the communication skills (verbal and non-verbal) necessary in order to develop social relationships with others (Odam, McConnel, & McEvoy, 1992).

Vallotton and Ayoub (2010) argue that the period of the first three years of life is when children show the most rapid growth in the use of gesture and words to make connections to the concepts of social awareness and interaction skills. However, despite the argument that pragmatic skills are a crucial part of childhood development, there is currently limited research that looks into the impact that gesture development can have on the pragmatic skills of children. From what is gathered from the limited research, it is argued that the use of gestures does help to facilitate social skills of children (Vallotton & Ayoub, 2009).

Theories regarding the overall development of speech and language are vast. However, despite the enormous differences of opinions, Oller, Oller & Badon (2006) state that all theoreticians agree that the development of speech and language in particular is a dynamic constructive process. One of the most important contributions to the study of child development came from psychologist Lev Vygotsky (1896-1934), who emphasized the theory that people are...
products of their social worlds and that scaffolding is crucial in advancing child skills. Vygotsky’s theory argues that children acquire speech in the context of social communication. These theories help to support the acknowledgment of caregiver as “teachers” who provide better understanding to particular concepts.

In a longitudinal study done by Valotton & Ayoub (2009), they concluded that the use of gestures served as a communication and mental tool, which assisted in forming an understanding of the social-emotional world. Much like the other researchers that looked into the impact that gestures can have on language development, Vallotton and Ayoub (2009) agreed that gestures works as intentional motor acts that serve the purpose with communicating with other people. However the authors concluded that the use of gestures also helped to predict the development of children’s social skills and argued that future studies should review the impact that gestures can have on childhood pragmatic skills.

Baby Sign and Pragmatics

Researchers over the past 20 years who have studied the impact that Baby Sign can have on child development have primarily focused on language (Capirci, Iverson, Montanari & Volterra, 2002; Goldon-Meadow, Goodrich, Sauer & Iverson, 2007, Pizer, Walters, & Meier, 2007; Goodwyn, Acredolo, & Brown 2000; Iverson, Goldin-Meadow, 2005). Language, though a crucial part to typical human development, is only one of several critical domains surrounding human growth and development. According to Prutting and Kirchner (1987) the need for a pragmatic perspective for clinical purposes has been widely asserted. Ninio and Snow (1996) report that pragmatics is a critical element to typical human development and argue that children must acquire the knowledge necessary to initiate communication in interpersonal situations.
Ninio and Snow (1996) provide a more elaborate definition of pragmatics as the “acquisition of knowledge necessary for the appropriate, effective, rule-governed employment of speech in interpersonal situations.” In other words, on top of being taught how to speak a language, children need to learn how to use language with caregivers and others as new social experiences present themselves. Children are taught by their caregivers how to carry out various speech tasks such as asking questions, making requests, greeting new and familiar people, making statements, as well as other speech tasks that help the child learn how to appropriately initiate, maintain, and end a conversation with a speech partner. The use of gestures for the pre-verbal child begins to play a role in pragmatic development in that children use gestures for a variety of communicative intent and meaning.

Pragmatics is the use of language in social context. The use of Baby Sign in preverbal children allows for the ability to intentionally initiate meaning and thought content to their caregivers. The research conducted by Prutting and Kircher (2007) argues that intentionality and meaning are at the heart of language use. Understanding the impact that Baby Sign can have on the pragmatic skills of young children can help to foster the growth of interaction skills, and the ability to develop relationships.

The Current Study

The limited research on the impact that Baby sign can have on language has produced evidence that the use of systematic gestures helps to facilitate language development in preverbal children (Capirci, Iverson, Montanari & Volterra, 2002; Goldon-Meadow, Goodrich, Sauer & Iverson, 2007; Pizer, Walters, & Meier, 2007; Goodwyn, Acredolo, & Brown 2000; Iverson, Goldin-Meadow, 2005). But what is the rationale for studying the impact that Baby Sign
can have on the pragmatic skills of children? It is agreed upon by researchers that speech, language and the ability to apply it to social situations is a constructive process that is taught by parents. Using a variety of communication intents not only facilitates the development of a child’s language, but also allows the child to more easily initiate and interact with the parents, caregivers, and the other people that exist the child’s environment. The use of Baby Sign to convey meaning can help to decrease the frustration that exists between a baby who cannot verbalize his or her needs and the parent who cannot understand what the child is requesting. Pizer, Walters, and Meier (2007) write that parent’s decision to implement Baby Sign is due to the perception that the signs improve the clarity of parent-child communication, which therefore may reduce the child’s frustration of not being able to convey their wants and needs. Decreasing the frustrations between parents and children can lead to an increase in more social interactions. The increase in language modeling can lead to more opportunities for scaffolding the child’s new experiences, thus enhancing the growth and development of a child’s world knowledge.

It is my hypothesis that repeated exposure to the use of baby signs as a mode of communication by family members and, the other “teachers” consistently present in baby’s routine, can enhance the development and quality of a child’s pragmatic skills. This study aims to support the notion that that the use of Baby Sign to convey needs and wants will foster pragmatic development in preverbal children, thus enhancing the ability to develop strong relationships and initiate meaningful social interactions. The research question asked in this study is, what is the impact of parent education on Baby Sign on the pragmatic development of typically developing children?
Chapter 2: Methods

Participants

The participants of the study were 11 children between the ages of six and twenty-seven months whose parents/caregivers enrolled in the Baby Sign class. Participants 9 and 10 were diagnosed with a language delay and were receiving therapy at the UTEP speech and hearing clinic. However, at pre-testing both participants tested as typically developing according the test battery used in the study. During therapy at the UTEP clinic, both participants were exposed to a total of 10 signs. The remaining participants had no previous exposure to any sign training. The participants were accompanied by at least one parent and/or caregiver or sibling who attended the baby sign class. For the duration of the paper the adults will be referred to as caregivers and the children will be referred to as participants. Table 1.1 is a list of the participants and their chronological ages at pre- and post-testing.

Recruitment Methods

A flyer was distributed throughout the community in order to recruit parents to participate in the Baby Sign class. Parents were also informed about the Baby Sign course through word of mouth by students of the UTEP graduate school.

Experimental Design

A one group, pretest-posttest case study design was conducted in order to evaluate the effects of Baby Sign on the pragmatic behaviors of children. Each child was twice administered the *Developmental Assessment of Young Children (DAYC)* language battery. Pre-testing was
administered prior to the introduction of the Baby Sign class. Post-testing occurred within 5-7 weeks of the end of the 5 week Baby Sign course.

Table 1.1
*Participants Chronological Ages at Pre- and Post-Testing*

<table>
<thead>
<tr>
<th>Participant</th>
<th>CA Pre-Test (months)</th>
<th>CA Post-Test (months)</th>
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<tr>
<td>P1</td>
<td>6</td>
<td>9</td>
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<td>27</td>
</tr>
<tr>
<td>P11</td>
<td>29</td>
<td>31</td>
</tr>
</tbody>
</table>

**Dependent Measures**

The dependent variable is the individual standard scores collected from each participant during the pre and post testing administration of the DAYC. The DAYC is a standardized test which evaluates children from 0 to 48 months in five domains of child development. The five domains that measure different but interrelated developmental abilities are in the areas of social-emotional, cognition, physical, adaptive, and communication. Measurements were taken in all
areas of child development and were recorded. However for the purpose of this study, standard scores of the social-emotional domain were evaluated to assess pragmatic development.

According to the examiners manual of the DAYC (Voress & Maddox, 1998), social skills permit the establishment of a relationship between two or more people through which they mutually influence each other’s behavior. The social development subtest consists of 58 items that measure the child’s social awareness, social relationships, and social competence. Voress and Maddox (1998) state that observing the child in natural settings can provide for the most accurate estimations of the child’s skills. Therefore, interviewing the parent during the assessment is crucial in determining DAYC scores. Measurements were not taken of when or how often Baby Signs were used in the home.

The DAYC protocol administered to assess the child’s area of development has a high degree of reliability. The three types of test errors observed were content, time, and scorer. The data retrieved from these observations suggests that the DAYC possesses little test error and that users can have confidence in its results. The DAYC was normed on a sample of 1,269 children residing in 27 states.

**Independent Variable**

The independent variable for the current study was the training provided to the caregivers on how to produce and implement Baby Sign at home with their children. By the end of the class the caregivers were taught how to produce close to 200 signs. Several materials were used during the training of the course in order to facilitate with the instruction of Baby Signs. Each family was presented with binders which contained a picture illustration of how the sign is produced as well as a written explanation of where and how to position hand and finger placement. Each of
the sign illustrations also contained a descriptive example of how and when the sign can be implemented by caregivers. The caregivers were presented with handouts of each sign that was taught for the specific thematic unit. Power Point slides displaying a picture illustration of how to produce the signs were used during instruction of each Baby Sign class and were offered as a visual aid for the caregivers. A DVD was provided to each of the families at the end of the baby Sign class as resource to refer to if the caregiver needed assistance related to the production of the sign. The DVD was separated into five chapters which contained the instructors of the Baby Sign class producing the signs that were taught as well as the label for the sign being produced. In addition, food, toys, and books were presented during the second part of the class in which instructors and caregivers used these items to aid in examples of how the Baby Signs can be implemented during various daily routines.

Procedure

The administration of the DAYC test at pre-test was conducted at either the child’s home or at the UTEP Speech and Language Clinic and ranged from 45 minutes to one hour. Scoring was based on clinician observation, requested actions directed to the child, and by caregiver report. Pre-testing was administered within 2 weeks of the start of the Baby Sign class and post-testing was administered between 5 to 7 weeks after the conclusion of the Baby Sign course. Each participant was randomly assigned a nominal participant number used to individually assess and evaluate the participant’s progress.

At pre-testing, the parents were asked to complete a questionnaire (See Appendix A) designed in order to obtain information regarding who the child interacts with most on a daily basis and for how long. This information is crucial in that it is the intent of the study for the child to be
exposed to sign language as much as possible. This information was later used at the start of the Baby Sign course to explain to the parents that the more the child is exposed to the signs by their caregivers, the higher the probability that the child would begin to implement the signs.

The baby sign class was offered over a five week period. The sign language lessons assigned for each week were divided into 5 themes which were selected by examiners and a total of 20 signs were assigned for each lesson. Words and thematic units were obtained based on the MacArthur Communicative Development Inventory for American Sign Language, a report written which identifies the first signs used in deaf children of deaf parents (Anderson & Reilly, 2002). The five themes included were Family Members and Greetings, Food, Toys and Animals, Emotions and Routines, and Miscellaneous (See Appendix B). During the entire 5 week course, caregivers continuously asked questions of how to produce words in Baby sign that were not assigned to the unit. These words were added to the Week 5 miscellaneous list of signs.

The Baby Sign class was divided into two parts, instruction and implementation. The adults were instructed on the Baby Signs while their children were being cared for by student volunteers in a separate room. The caregivers were first taught how to express the signs. They were taught hand placement, finger placement and palm orientation. The parents and caregivers during this time had the opportunity to ask questions about the signs and practice producing them with each other. The caregivers also were given the opportunity to practice receptively identifying the signs produced by the instructors.

The second hour consisted of having all the children and parents in the same room. There, the parents were instructed on how to implement sign use with their babies during communication at home. Parents were first modeled ideas and strategies on how to modify daily routines in order to
implement the use of Baby Sign during interaction. During the caregiver and child interaction, feedback was provided as they implemented the use of Baby Sign with the materials provided.

Prior to starting Week 1, parents were asked to bring family photos with them to class. The parents sat at tables in a typical classroom setting with their children. In weeks 2 through 5 the second part of the Baby Sign class was modified by removing all the classroom tables and having parents sit on a rug in the middle of the room with their children. Materials were provided to the children and caregivers according to the thematic unit assigned for the week. The change in classroom setting allowed for better interaction for families to practice the use of Baby Sign with their children. Parents and caregivers were instructed to pair the sign along with the spoken word in order to guarantee exposure to both the visual and audio representation of the words being used within the routine.

Questionnaires were complied in order to measure the social validity and treatment accessibility of Baby Sign training. The families completed a second questionnaire at the end of the Baby Sign course (See Appendix C) to evaluate their perspectives regarding any impact the workshop had on their daily routine and overall child’s development. The questionnaire completed at the end of the Baby Sign class was developed to collect and evaluate qualitative data regarding the parent’s perspective on the class itself, their level of apprehension about using Baby Sign with their children, and how they feel the class has benefited their family.

A third questionnaire (See Appendix D) was also completed by the families at the time of post-testing. The form was designed to collect and evaluate qualitative data regarding parent’s perspectives on their child’s progress in the use of Baby Sign, how much exposure their baby is receiving to sign, and again the impact that the use of Baby Sign has had on their child.
Chapter 3: Results

The purpose of this study was to evaluate the effects of baby sign on the area of pragmatics. The subtests standard scores of the pretest and posttest (Figure 1.2) compare and evaluate the impact baby sign had on the participants.

Overall Scores

The data collected from the DAYC obtains a total of five types of scores which consist of subtest raw scores, subtest age equivalents, subtest standard scores, a quotient standard score, and percentiles. After recording the raw score, age equivalent, percentile, and standard score for each subtest, a General Development Quotient (GDQ) is obtained (Figure 1.1) and an overall GDQ standard score and percentile is determined. The quotient has a mean of 100 and a standard deviation of 15.

The examiners manual of the DAYC standardized test provides a guideline which displays an interpretation of the standard scores. The table places the standard scores of each participant in a descriptive category beginning from very poor to very superior. The pre-test scores of the overall GDQ’s of each participant revealed that each participant scored at, or above the average range.

The GDQ from the post-test standard scores revealed that not all participants’ scores increased when compared to their pre-test scores. The GDQ of participants 2 and 5 revealed a decrease. The remaining participants GDQ increased. However, despite the increase of the overall GDQ scores, no individual participant increased in standard deviation.
Subtest Scores

Standard scores provide the most accurate indications of the child’s performance of the DAYC subtest. Standard scores are converted from raw scores and have a mean of 100 and a standard deviation of 15. The standard score allows for the examiner to evaluate the comparisons across subtests. Table 1.2 displays the pre and post-test standard scores of each participant. A comparison of the scores reveals that not all of the participants had an increase in their standard scores.

The post-test standard scores of participants 2, 8, and 11 showed a slight decrease. The scores of the remaining eight participants increased. However, only the post-test scores of participants 6, 9, and 10 moved a standard deviation. Participant 6 displayed the highest increase in their standard score, moving two standard deviations.

According to the guideline provided in the examiners manual of the DAYC, five of the 11 participants scored into a higher descriptive category based on their post-test standard score.
Participants 9 and 10’s score placed them from the average category to above average.

Participant 6 displayed the highest increase in change of categories, placing from average to the superior range.

**Statistical Analysis**

The Wilcoxon Signed Rank Test was used in order to analyze the participant’s pre and post-test GDQ scores and subtest scores of the social emotional domain on the DAYC. The test revealed a Z score of -0.869 and a p-value of .06 for the GDQ and a Z score of -2.006 and a p-value of .04 for the standard scores. The results of the Wilcoxon Signed Rank test revealed that the p-value for the standard scores is significant at the less than .05 level and the p-value of .06 for the GDQ approaches significance.

**Survey Results**

The results of the baby sign workshop survey included responses regarding caregiver’s confidence levels in their ability to use Baby Sign with their children, their stress level regarding the implementation of the Baby Sign, and their overall perception of the impact that Baby Sign had on their family. A total of 8 surveys were completed at the end of the baby sign course. A total of two sets of participants were siblings and only one survey was filled out for each pair the caregiver. One caregiver did not complete the survey.

**Confidence Level.** A Likert scale was used to determine the level of confidence the parents felt in his/her ability to produce the signs. According to the surveys, 78% of the caregivers reported
feeling very confident in their ability to use Baby Sign with their children. The remaining 22% of the caregivers reported feeling somewhat confident.

**Stress Level.** When asked of the caregivers to rate the stress level of the Baby Sign workshop, 100% of them reported no stress level. Regarding their stress level of implementing Baby Sign with their children, 89% of them reported no stress at all, and 11% of them reported slightly stressful. The caregivers were asked to comment on what about the workshop or the implementation of Baby Sign was stressful. The two comments which were provided involved their concern that their child would not be attentive to the caregiver’s production of the sign. However one comment stated that implementing Baby Sign “became easier” when reassured by instructors that children do pay attention.

More feedback was provided by the caregivers when asked to comment on what they did not find stressful about the workshop of the implantation of Baby Sign. All the comments provided contained positive responses regarding the use of Baby Sign with their children. One caregiver commented that the implementation of Baby Sign “actually reduced the stress in our family by increasing our communication.” Another comment stated that the signing became less stressful as he/she was communicating as more “wants and needs were met with signing.”

**The Impact of Baby Sign on Communication.** Parents were asked to report and comment on any changes they have seen regarding their child’s language or communication. Out of the total of 9 comments provided, each one stated in one form or another, a visible change seen by the parent in their child’s behaviors, vocal productions, or productions of signs. In regards to behavior, some caregivers reported their children showing more eye contact, as well as, the child being
more attentive to their caregivers hand movements. Other comments included, on top of their child’s increase of sign production, more babbling and increase in spoken vocabulary. One comment stated that his/her child “shows off” by producing the signs for family members.

**Overall Impact of Baby Sign.** The remainder of the survey involved questions regarding the caregivers overall perspective of what they enjoyed most about the workshop, what they enjoyed least, and their thoughts concerning whether or not they would continue to implement Baby Sign with their children at home. When asked what they enjoyed most about the workshop, the most common answers were the interactions that occurred between the children, parents, and other children. Other comments indicated that the caregivers enjoyed the overall experience of bonding and learning Baby Sign as a family. Additional comments involved the caregivers enjoying witnessing their child’s new form of communication. For example, one caregiver stated that he/she enjoyed “interacting with my child,” as well as the, “enhancement of communication between parent and child.” According to the surveys, six of them reported that their child was using Baby Sign as a form of communication. The total number of signs used reported by the surveys was 39. No comments were posted by the caregivers regarding what they liked least about the workshop.

In addition to being asked what they enjoyed most about the workshop, the caregivers were also asked to comment on what they found most helpful. What was found to be most helpful for the caregivers were the resources provided to the families at the end of each class. One caregiver reported that “the visuals (slides and handouts), then immediately using the signs as the children played made it easier to remember.” The caregivers also commented on the openness of the workshop in the ability to ask questions.
The final portion of the survey involved the caregiver’s opinions on their willingness to continue implementing Baby Sign at home with their children upon termination of the workshop. Every survey completed by the caregivers indicated that they would continue the use of Baby Sign with their children. The top reason stated for wanting to continue Baby Sign was to increase communication with the children. One caregiver believed that the implementation of Baby Sign “will help my baby communicate better, not only with me, but with everyone who is around him.” Another reason stated for willingness to continue the use of Baby Sign was to reduce frustration. One comment stated that Baby Sign will help to “alleviate the frustration of not knowing what your child wants and needs.” Every survey answered yes when asked about interest in participating in a refresher Baby Sign course as well as their willingness to participate in a one year follow up to monitor their child’s progress.

Post – Test Survey Results

The caregivers of participants 1, 5, and 6 completed a survey at post-testing to evaluate any impact that Baby Sign had on the families since the termination of the class. Results of the three surveys revealed three different perspectives on the impact that Baby Sign had on each family.

Participant 1 caregivers commented that it “was too soon to tell” whether or not learning Baby Sign expanded their child’s vocabulary. They reported that participant 1, the youngest of the participants, was not yet verbally communicating nor signing. However, the caregivers commented that they would recommend using Baby Sign because, “Any way to be able to communicate and understand your baby is helpful.”

The caregiver of participant 5 revealed that their child was producing Baby Sign over verbal communication. The caregiver stated that their child was producing a total of five signs, imitates
approximately 25% signs, and is attempting to imitate more signs. In addition, the caregiver reported that the child began producing more variations on babbles. The caregiver recommended the use of Baby Sign because he/she reported that it has, “reduced the frustration when he is unable to say what he wants.”

The caregiver of participant 6 reported that their child was producing four new signs since the termination of the workshop. In addition, the caregivers wrote that the use of Baby Sign expanded their infant’s vocabulary and that signs helped to distinguish the sounds that the child was producing. The caregiver recommended Baby Sign, stating that it “makes it much easier” for caregivers to communicate with their children.

Table 1.2
*Participant Pre- and Post-Test Standard Scores*

<table>
<thead>
<tr>
<th>Participant</th>
<th>CA Pre-Test</th>
<th>Pre-Test Standard Score</th>
<th>CA Post-Test</th>
<th>Post-Test Standard Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>6</td>
<td>98</td>
<td>9</td>
<td>108</td>
</tr>
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<td>P2</td>
<td>7</td>
<td>104</td>
<td>11</td>
<td>94</td>
</tr>
<tr>
<td>P3</td>
<td>10</td>
<td>108</td>
<td>14</td>
<td>121</td>
</tr>
<tr>
<td>P4</td>
<td>10</td>
<td>104</td>
<td>12</td>
<td>107</td>
</tr>
<tr>
<td>P5</td>
<td>15</td>
<td>118</td>
<td>17</td>
<td>121</td>
</tr>
<tr>
<td>P6</td>
<td>15</td>
<td>91</td>
<td>18</td>
<td>123</td>
</tr>
<tr>
<td>P7</td>
<td>18</td>
<td>113</td>
<td>21</td>
<td>120</td>
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<td>P8</td>
<td>19</td>
<td>122</td>
<td>22</td>
<td>121</td>
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<tr>
<td>P9</td>
<td>24</td>
<td>98</td>
<td>27</td>
<td>115</td>
</tr>
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<td>P10</td>
<td>24</td>
<td>98</td>
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<td>115</td>
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<td>P11</td>
<td>29</td>
<td>103</td>
<td>32</td>
<td>100</td>
</tr>
</tbody>
</table>
Figure 1.2
*Participant Social Emotional Subtest Standard Scores*
Chapter 4: Discussion

The purpose of the study was to evaluate the impact of Baby Sign on the pragmatic development of children. Results of the Wilcoxon Signed Rank Test revealed a statistically significant difference between the pre-test and post-test standard scores of the social emotional subtest domain within the $p$–value. Survey results completed by the caregivers do provide qualitative data that supports the need for further studies. However, the methodological limitations of the current study does not allow for a true cause and effect statement to be made regarding the impact that Baby Sign has on the pragmatic development of children.

The surveys completed by the caregivers at the end of the workshop, plus the additional surveys completed at during post-testing, reveal that the implementation of Baby Sign had a positive effect on each family that participated in the workshop. According to parent report, every child who participated in the workshop learned how to produce at least two or more signs and appropriately used them as a source of communication with their caregivers. Some of the strongest responses reported by the caregivers involved the increase of parent and child interaction, as well as a decrease of frustration when attending to their child’s needs and wants. Some of the comments made by caregivers stated that Baby Sign decreased the amount of stress in the household because the child’s “wants and needs were met with signs.” Another comment by a caregiver stated that their child was using their new knowledge of Baby Sign as a way to “show off” to family members.

These comments suggest that the children used their new found knowledge of Baby Sign as a way to initiate and maintain social interactions with parents and caregivers. Although the frequency of exposure to Baby Sign varied by family, each child would not have had the
awareness to implement Baby Sign in their interactions with their caregivers had it not been for the caregiver’s language modeling of pairing the spoken word with the correct sign. These reports support the hypothesis that repeated exposure to Baby Sign by caregivers may enhance the development and the quality of the pragmatic skills of children.

According to the results of the pragmatic domain post-test scores of the DAYC, not all of the participants showed an increase in pragmatic development. However, several factors should be taken into consideration when evaluating the scores of each individual participant’s, such as age, the amount of time each child spent on a daily basis with the caregiver who took the workshop, and the frequency of exposure each child had to Baby Sign. For example, the information from the caregiver of participant 6 may have influenced the increase in standard score. Upon post-testing, the caregiver informed the examiner that she had quit her job shortly after the end of the workshop. The child was no longer under the care of his grandparents, who did not expose the child to Baby Sign, but was now spending a full day with the caregiver who reported to have implemented Baby Sign throughout the child’s daily routine. The post-test scores of participant 6 increased two standard deviations. The post-test scores of participants 9 and 10 also increased to one standard deviation. Frequency of exposure to sign should be taking under consideration here given that the participants were exposed to signs in the UTEP clinic during therapy prior to the start of the Baby Sign workshop. In addition, upon completion of the post-test survey, the caregiver of participant 1 reported that the signs which were implemented with the child were used effectively but not frequently. Participant 1 attended daycare and was the youngest of the participants. However, approximately 2 to 3 months after post-testing was completed, the caregiver delivered a video of the child appropriately producing the signs for the “milk” and “more” during snack time. The participant was approximately 12 months at the time the video
was taken. These factors should be taken into consideration when accounting for the increase, as well as the decrease, of the post-test scores.

**Limitations**

The current case study served as preliminary work to evaluate the impact of Baby Sign on the pragmatic development of children. Limitations of the study exist primarily from the use of the experimental design. The experimental design used was a one-group pre-test post-test design. Therefore, the lack of a control group could not account for the behavioral changes that occurred in the children over the time period between pre and post-testing. One factor to consider was the age range of the participants. The original plan of the study was to test children from 6 to 18 months. However, due to lack of participants the ages ranged from 6 to 27 months. The wide gap in range made it difficult to interpret the scores. Maturation was an additional factor to consider as a limitation of the study. The testing completed for this study was another limitation to consider. Much of the data recorded for the study involves reactive measures, which could not account for the changes in post-test scores.

The overall results of the study did not allow for a direct cause and effect statement to be produced regarding the impact of Baby Sign on the pragmatic development of children. Future considerations into the study should include more systematic approaches to obtain a more accurate definition of the impact that Baby Sign can have on the pragmatic development of children. A longitudinal study of the participants could be considered in order to further evaluate the impact. Conducting a single subject design could also help in producing a true cause and effect statement on the impact of Baby Sign on the pragmatic development of children.
Conclusion

Current research shows that the use of Baby Sign is a growing trend among parents and caregivers. Despite the growing popularity, limited research has been conducted to evaluate the effects of Baby Sign on typically developing children. This study may provide evidence related to parental perception that exposure to Baby Sign to preverbal children can foster the ability to develop the pragmatic skills necessary to initiate and maintain meaningful social interactions. Further examination is necessary to identify a cause and effect relationship between Baby Sign and pragmatic abilities in normally hearing children.


communicative verbalizations by toddlers with and without disabilities in inclusive classrooms. *Journal of the Association for Persons with Severe Handicaps, 26*(2), 120-126.


Appendix

Appendix A

Infant Interaction Survey

Infant’s Date of Birth: ________________________  Infant’s Participant #: ___________

1.  Do parent(s) work?
    □ full time   □ part time   □ self-employed   □ not applicable

2.  Who spends the most time communicating with the infant?
    □ parent(s)   □ relative   □ nanny   □ other_________________

3.  How much interaction time is spent with the infant and their primary caregiver on a daily basis?
    ___________________________________________________________________

4.  Does the infant attend daycare? If yes, how many hours daily?
    ___________________________________________________________________

5.  Does the child have siblings? If so, how many and what ages?
    ___________________________________________________________________
Appendix B

BABY SIGNS

Week 1
Family Members and Greetings

<table>
<thead>
<tr>
<th></th>
<th>Mom/Dad</th>
<th>Grandmother</th>
<th>Baby</th>
<th>Please</th>
<th>Mine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brother</td>
<td>Aunt / Uncle</td>
<td>Hello</td>
<td>Good</td>
<td></td>
<td>Yours</td>
</tr>
<tr>
<td>Sister</td>
<td>Cousin</td>
<td>I Love You</td>
<td>Morning,</td>
<td>Goodbye</td>
<td></td>
</tr>
<tr>
<td>Grandfather</td>
<td>Boy/Girl</td>
<td>Thank You</td>
<td></td>
<td>Good Night</td>
<td></td>
</tr>
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</table>

Week 2
Food

<table>
<thead>
<tr>
<th></th>
<th>Hungry</th>
<th>More</th>
<th>No</th>
<th>Banana</th>
<th>Cheese</th>
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</thead>
<tbody>
<tr>
<td>Thirst</td>
<td>All Done</td>
<td>Water</td>
<td>Orange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat/Food</td>
<td>Hot</td>
<td>Milk</td>
<td>Cereal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drink</td>
<td>Cold</td>
<td>Juice</td>
<td>Cookie</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Want</td>
<td>Yes</td>
<td>Apple</td>
<td>Cracker</td>
<td></td>
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</table>

Week 3
Toys and Animals

<table>
<thead>
<tr>
<th></th>
<th>Airplane</th>
<th>Book</th>
<th>Cat</th>
<th>Elephant</th>
<th>Monkey</th>
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<tbody>
<tr>
<td>Ball</td>
<td>Bubbles</td>
<td>Cow</td>
<td>Horse</td>
<td></td>
<td>Outside</td>
</tr>
<tr>
<td>Bear</td>
<td>Car</td>
<td>Dog</td>
<td>Bird</td>
<td></td>
<td>Play</td>
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### Week 4

**Emotions and Routines**

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Action</th>
<th>Item</th>
<th>Item</th>
<th>Action</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy</td>
<td>Sorry</td>
<td>Toothbrush</td>
<td>Shoes</td>
<td>Stop</td>
<td></td>
</tr>
<tr>
<td>Sad</td>
<td>Sleep</td>
<td>Bath</td>
<td>Clothes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angry</td>
<td>Up</td>
<td>Dirty</td>
<td>Where</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afraid</td>
<td>Hurt</td>
<td>Clean</td>
<td>Potty/Toilet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cry</td>
<td>Diaper</td>
<td>Help</td>
<td>Sit</td>
<td></td>
<td></td>
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</tbody>
</table>

### Week 5

**Miscellaneous**

<table>
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<tr>
<th>Color</th>
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<th>Item</th>
<th>Item</th>
<th>Item</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Mood</td>
<td>Pizza</td>
<td>Hippo</td>
<td>Pants</td>
<td>Calm</td>
</tr>
<tr>
<td>Blue</td>
<td>Stars</td>
<td>Pancake</td>
<td>Zebra</td>
<td>Glasses</td>
<td>down</td>
</tr>
<tr>
<td>Yellow</td>
<td>Sun</td>
<td>Beans</td>
<td>Alligator</td>
<td>Socks</td>
<td>Sick</td>
</tr>
<tr>
<td>Green</td>
<td>Home</td>
<td>Potatoes</td>
<td>Frog</td>
<td>Soap</td>
<td>Fall down</td>
</tr>
<tr>
<td>Black</td>
<td>Keys</td>
<td>Egg</td>
<td>Lion</td>
<td>Shh/Be</td>
<td>Tired</td>
</tr>
<tr>
<td>White</td>
<td>Phone</td>
<td>Hot Dog</td>
<td>Snake</td>
<td>Quiet</td>
<td>Lie Down</td>
</tr>
<tr>
<td>Pink</td>
<td>Show</td>
<td>Fruit</td>
<td>Rabbit</td>
<td>Wait</td>
<td>Dance</td>
</tr>
<tr>
<td>Purple</td>
<td>Look</td>
<td>Flower</td>
<td>Rattle</td>
<td>Disappoint</td>
<td>Be careful</td>
</tr>
<tr>
<td>Brown</td>
<td>Work</td>
<td>Excuse me</td>
<td>Piano</td>
<td>ed</td>
<td>A–Z</td>
</tr>
<tr>
<td>Grey</td>
<td>Ice cream</td>
<td>Berry</td>
<td>Donkey</td>
<td>Frustrated</td>
<td>Alphabet</td>
</tr>
<tr>
<td>Color</td>
<td>Music</td>
<td>Pig</td>
<td>Inside</td>
<td>Stand up</td>
<td></td>
</tr>
<tr>
<td>Noodles</td>
<td>Good job</td>
<td>Chicken</td>
<td>Crab</td>
<td>Kiss</td>
<td></td>
</tr>
<tr>
<td>Jump</td>
<td>Good</td>
<td>Mouse</td>
<td>Spider</td>
<td>Wake up</td>
<td></td>
</tr>
<tr>
<td>Slide</td>
<td>Snack</td>
<td>Giraffe</td>
<td>Shirt</td>
<td></td>
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</tr>
</tbody>
</table>
Appendix C

Baby Sign Workshop Survey

As our workshop ends, please take a few minutes to reflect on the experience. Your honest and thoughtful answers will help us improve this course in the future.

1. How confident are you in your ability to use sign with your child?
   1 – very confident; 2 – somewhat confident; 3 – slightly confident; 4 – not at all confident

2. How stressful was the workshop?
   1 – very stressful; 2 – somewhat stressful; 3 – slightly stressful; 4 – not at all stressful

3. How stressful is using sign with your child?
   1 – very stressful; 2 – somewhat stressful; 3 – slightly stressful; 4 – not at all stressful

4. If you found the workshop or using sign with your child to be stressful, please comment on what made either of these experiences stressful.

5. If you did NOT find the workshop or using sign with your child to be stressful, please comment.

6. Have you seen any change in your child’s language or communication? (Example, more/less frustration, more/less sign or speech use, more/less eye contact)

7. What did you enjoy most about the workshop?

8. What did you not enjoy about the workshop?
9. What did you find the most helpful during this workshop?

10. What did you find the least helpful during this workshop?

11. Do you think you will continue using baby sign with your children? If so, why? If not, why not?

12. Would you be interested in a refresher course in 6 months – 1 year?
   Yes  No

13. Would you be interested in monitoring your child’s development in 1 year?
   Yes  No

14. Please list the signs and words or any sign-word combinations your child is using.

We have enjoyed our time together and hope you have too. We hope you continue using sign with your children as long as you wish. Please let us know if we can help you in any way in the future.
Appendix D

Infants Communication Preferences and Development

1. Do you feel the baby signs that were taught in the course were used frequently and effectively with your infant? Explain briefly why you feel that way.
   □ Yes □ No □ Frequently but not effectively □ Effectively but not frequently
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________

2. What form of communication does your infant use most frequently?
   □ Verbal communication □ Baby sign □ Both evenly □ None
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________

3. What kinds of verbalizations is your baby producing? Were they producing these before they were taught baby sign?
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________

4. What kinds of signs is your baby making? Do they continue to use singing as a mean of communication?
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________

5. In your opinion, did learning baby sign expand your infant’s vocabulary or inhibit it?
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________
   ___________________________________________________________________________________
6. Would you recommend to baby sign to others with infants? Why or why not?
Vita

Lyna Sullivan was born and raised in El Paso, TX and graduated from Bel Air High School in 1998. Lyna then completed the Interpreter Training Program from El Paso Community College and upon graduation moved to Austin, TX to work as a Sign Language Interpreter. Lyna then attended the University of Texas at Austin and obtained a Bachelor of Science Degree from the University of Texas at Austin in Communication Science and Disorders. She then returned to El Paso and worked as a Sign Language Interpreter for the city of El Paso and as an Early Intervention Specialist for the Eleanor-Zind Early Childhood Intervention program.

In 2009 Lyna became a Video Relay Interpreter for Purple Communications and began work interpreting for the nation’s deaf and hard of hearing community. Lyna then pursued a Master’s of Science in Speech Language Pathology at the University of Texas at El Paso and continued to work as an interpreter while obtaining her education. During her time in the Speech Language Pathology Program she presented a poster, *The Impact of Baby Sign on Motor, Cognitive, & Pragmatic Development*, at the Texas Speech Language Hearing Association (March 2013) in Dallas, TX.

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This thesis/dissertation was typed by Lyna Marie Sullivan