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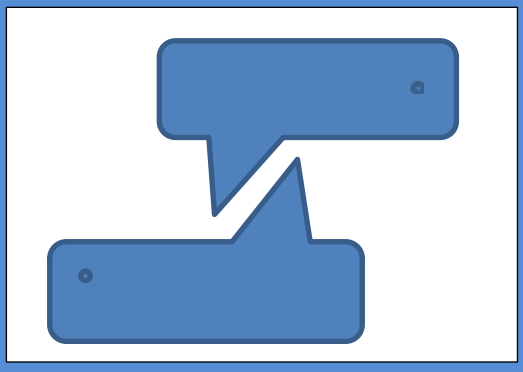

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Mobile device usage and joint engagement in typical and language disordered preschoolers

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Abstract

The purpose of this study was to determine the relationship between rate of mobile digital media use, such as iPads, tablets, and smartphones, and the presence of language disorders in preschoolers. Additionally, this study examined how parents of children with and without language disorders use joint media engagement. Parents of language disordered and typically developing preschoolers were videotaped with their child as they engaged with an iPad application, and specific behaviors were recorded. They then completed a questionnaire regarding mobile media device usage in the home. There was no statistical significance found regarding mobile media device exposure and usage between preschool aged children with and without language disorders. There were statistically significant differences in the behaviors of families of children with language disorders and those with typically developing language as they interacted with the mobile media device. There was discussion regarding possible reasons for the specific findings of this study, including some suggestions for contradictory findings when compared to previous research. There were also implications for speech-language pathologists and implementation of parent training.

Keywords mobile media devices, language disorders, preschoolers, joint media engagement, parent interactions

1. Introduction

With the advent of the iPad in 2010, connection to the media and exposure to the screen has exponentially increased. People of all ages can use applications, or apps, on their iPad, tablet or Smartphone for playing games, learning, or even watching their favorite movies or television shows. What is unique about this new media technology is that it is mobile and can be taken anywhere. Mobile technology is readily available to consumers straight

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from the production line or even more immediately through updated apps at a person's fingertips. Therefore, it has truly permeated every aspect of our lives, including the lives of infants, toddlers and preschoolers. But, is the use of mobile digital media taking the place of valuable parent-child and child-to-child interaction time? With the proliferation of mobile media devices, it is important to determine the impact it has on the lives of our children and their language and cognitive development.

1.1. Perspectives on Media Usage

In 2015 and 2016, the American Speech-Language-Hearing Association (ASHA) began examining technology use and the perspectives of parents and speech-language pathologists as part of their Better Hearing and Speech Month campaigns (American Speech-Language-Hearing Association, 2015; 2016). In Spring of 2015, 1,000 parents of children aged 8 and younger were surveyed on behalf of ASHA to determine technology use and their perception of their children's use of technology (American Speech-Language-Hearing Association, 2015). Results indicated that a majority of children have access to tablets, video game consoles, smartphones, and computers, with most young children under the age of 8 having access to tablets, such as iPads. At the age of 3, 74% of children have had access to tablets and 56% have had access to Smartphones, showing a large amount of preschoolers are accessing mobile media devices. Parents have mixed feelings regarding children's use of technology. Of parents of 3 year olds, 71% feel that technology does more good than harm and 72% of all parents believe that appropriate use of today's technology can enhance communication with children. On the other hand, they do also believe that misuse of today's technology can be harmful to young children, with one-third feeling that misuse of technology may limit speech and language skills. Additionally, when looking at conversation skills, approximately 30% of parents are concerned that the amount and quality of their interactions with their children are negatively impacted (American Speech-Language-Hearing Association, 2015).

Some parents believe that use of digital media is actually beneficial for cognitive development and that children will lag in development if they do not have access to digital media (Vittrup, Snider, Rose, & Rippy, 2016). However, most of the parents in this study showed favorable attitudes toward digital media in general, and agreed that they used it for their child to help them attend to adult tasks. Many parents did report, however, that children under 2 years of age should not have digital screen time.

ASHA polled 307 speech-language pathologists (SLP) regarding their perspective of mobile media technology devices and communication (American Speech-Language-Hearing Association, 2016). Approximately 70% of the SLPs reported observing misuse of personal technology devices by children which caused concern regarding communication. The greatest concern was that excessive technology use by children is replacing conversation and human interaction. When asked about future of technology use, 68% of SLPs replied that continued excessive mobile media use could irreparably damage the communication skills of future generations. In another informal poll, SLPs were also asked their opinion regarding the

impact of technology on communication (Advance Healthcare Network, 2015). Sixty-five percent of SLPs who responded indicated that technology hinders communication development.

1.2. Guidelines for Media Usage

The American Academy of Pediatrics (AAP) (2016) set forth guidelines for that they recommend for parents, schools, pediatricians, and health care policy-makers. They suggested that the total amount of screen time should be limited to no more than 1 hour per day, with no exposure at all for children under the age of 18 months, except for video-chatting. For children aged 18-24 months, parents should take great care in choosing high quality apps. The American Academy of Pediatrics (AAP) (2013) set forth guidelines for that they recommend for parents, schools, and pediatricians, as well as for health care policy-makers. The AAP suggested to parents that the total amount of screen time should be limited to no more than 2 hours per day, with no exposure at all for children under the age of 2. They recommended co-viewing as a way for increasing and modeling communication within the family setting. Focus of the AAP has typically been on television, video games, and computers, but they are beginning to place their attention on guidelines for digital media (American Academy of Pediatrics, 2015; Kamenetz, 2016). However, this technology is relatively young and research regarding the impact of iPad use and communication is limited (Rideout & Hamel, 2006; National Association for the Education of Young Children and the Fred Rogers Early Learning and Children's Media, 2012; Kabali, et al, 2015). Research results regarding handheld media devices and the negative impact on language development is emerging, however. Ma, et al. (2017) found in their study of children aged 6-24 months that the more handheld screen time that a child engaged in, the more likely that the child would have delays in expressive language. It is important to more fully determine whether our concerns are warranted so that we may advise parents regarding appropriate use of mobile media devices for speech and language development. Although there is not much research regarding iPad and other mobile technology devices on communication development, there is a growing body of research regarding the impact of more static technology.

1.3. Impact of Television

Television plays a large part in the lives of most children. Currently, children are watching more television as compared to previous generations and it appears to affect younger toddlers differently than it does older children (Sooryamoorthy, 2014). It has been reported to be the most used media device in the home, with children watching an average of 2.85 hours per day (Vittrup et al., 2016). The primary concerns with infants and toddlers watching television are whether or not it has a detrimental effect on the development of attentional, cognitive language skills (Christakis, 2008).

Infants as young as 9 months are attending to television screens with interest (Linebarger & Walker, 2005), and children develop the ability to select preferred shows after the age of 2 (Kirkorian, Wartella, & Anderson, 2008). As they grow older, into the early preschool years, their ability to

learn from television is debatable and depends on different factors (Kirkorian et al., 2008). Children are capable of learning vocabulary from television programs that used language-learning strategies that are similar to those that are used in live situations. For example, children who watch TV shows such as *Blue's Clues* and *Dora* have higher vocabulary acquisition than those watching *Clifford* and *Arthur*, while there appears to be a negative effect on vocabulary development for children watching programs such as *Teletubbies* and *Barney* (Linebarger & Walker, 2005). There is a body of research suggesting infants and toddlers do not learn effectively from videos and DVDs that are marketed for speech and language development (Anderson & Hanson, 2010; Pempek et al., 2010; Krcmar, Grela, & Lin, 2007). Joint viewing and engagement with parents and adult caretakers has been found to balance the negative impact of television, allowing learning to occur.

Ever-increasing television viewing in infants and toddlers has been found to be a risk factor in language delays. Chonchaiya and Pruksananonda (2008) found that children with language impairments began watching television, on average, around the age of 5 months, while typically developing children began watching television, on average, at around 11 months of age. They also found that, while typically developing children average 1 hour of television viewing, children with delayed language spend an average of 3 hours watching television daily. This greater amount of television viewing leads to decreased parent-child verbal interactions and vocal activity, as there are between 500 to 1000 fewer adult words spoken for each hour that the television is audible (Chonchaiya & Pruksananonda, 2008). Interaction and conversation decreases when television is audible to children, reducing the opportunity for children to access language (Christakis, et al., 2009). Background television noise also has a negative impact on parent-child interactions, reducing the amount of words and utterances per minute, as well as the number of new words produced (Pempek, Kirkorian & Anderson, 2014).

1.4. Joint Attention and Joint Engagement

One of the foundational skills for social interaction and basic communication skills is joint attention. Joint attention refers to "the shared attentional focus of at least two people on an object or third person" (Oberwelland et al., 2016, p. 248), and is also called a "triadic social interaction" (Striano, Reid, & Hoehl, 2006, p. 2819). It is a precursor to the development of perspective taking in children, and is a key component in overall pragmatic language development (Moll & Meltzoff, 2011). Children must develop the capacity to attend to an object and to another person in order to talk and have meaningful conversations. Development of joint attention begins in infancy, as infants younger than 3 months of age look primarily at their caregiver's face, slowly gaining the ability to look at objects. Sensitivity to eye gaze as an early precursor to joint attention can be seen as early as 3 months of age, with eye gaze lasting longer when the adult shows a positive affect and vocalizes along with the eye contact (Striano & Stahl, 2005). At approximately 6 to 9 months of age, infants begin to alternate their gaze between their caregiver and an object. There have been several studies

showing that infants aged 6-9 months of age are capable of following an adult's gaze to a target object or picture and, therefore, responding to joint attention activities (Gredeback, Fikke, & Melinder, 2010; Oberwelland, et al., 2016; Schietecatte, Roeyers, & Warreyn, 2012; Striano et al, 2006). Purposeful eye gaze and pointing are observed to develop at approximately 9 to 12 months of age, when the infant begins to understand that they have the ability to control other people's actions with their own actions (Eilan, 2005).

Following an infant's first birthday, as he develops spoken language, his joint attention skills solidify and then expand. He is able to attend to items with his social partner for longer periods of time and the interactions become more complex. The toddler is not only responding to and initiating joint attention, he is also commenting on the item of interest, requesting, as well is performing in social interactions, and further developing joint engagement. Joint engagement occurs "when the child is actively attending to the same event as his social partner, who may act in ways that enrich the child's experiences with actions and symbols well beyond what might occur during periods of solitary object engagement" (Adamson, Romski, Bakeman, & Sevcik, 2010, p. 1770).

The parents and caretakers are the social partners of toddlers during this development of joint engagement and pragmatic abilities. For some parents, supporting these skills comes naturally and they are able to foster language development by encouraging turn taking, commenting, requesting and other functions of language with their children. For other parents these skills do not come naturally, and they require assistance to successfully help their child through joint engagement and language development in the child's natural environment (Adamson et al, 2010).

1.5. Joint Attention and Literacy

Joint attention is one of many parent and child interaction types that have a significant impact on later literacy development. The quality of parent and child social interactions are related to early literacy skills, including vocabulary, symbolic representation, and phonemic analysis. Joint attention is correlated with acquisition of words, and the greater number of quality interactions a child has, the better he or she scores on vocabulary measures (Dodici, Draper, & Peterson, 2003). The first three years of parent and child interactions can predict later literacy skills, but there are specific factors positively influencing the interactions. These factors include having a mother with a higher education and a warm parenting style, and households with fewer children, as children in these types of homes showed greater vocabulary as compared to those in other households (Farrant & Zubrick, 2011). An additional factor in children's ability to learn vocabulary and to read is the mother's beliefs about interactions and quality shared reading activities (Bojczyk, Davis, & Rana, 2016). Mothers use a variety of strategies with their children. Low-level strategies used by the mothers do not require pointing or verbalizing by the child, and included the mother orienting the child, giving a label or giving feedback. Medium-level strategies used by the mothers encourage the child to point or say single words, and include asking

the child to point to locate an item, having the child label an item in the story, or the mother responds to a child's question about the story. High-level strategies used by the mothers elicit verbal responses of more than single words, and includes asking wh-questions, asking about similarities and differences, having the child define words, or expanding upon the child's utterances.

1.6. Co-Viewing and Joint Media Engagement

Joint attention can be used with young children while they co-view television or co-participate with using a computer, smartphone or tablet. To co-view "refers to occasions when adults and children watch television together, sharing the viewing experience, but not engaging in any discussion about the program" (Valkenburg et al., 1999, p. 54). Parents and children can both focus on each other while sharing the experience of watching a television program, teaching the child about relationships and interactive communication. Joint media engagement is defined as people learning together using media, a spontaneous and designed experience of people using media together to interact (Takeuchi & Stevens, 2011). This engagement can happen anywhere and at any time when there are two or more people interacting with media (Takeuchi & Stevens, 2011).

Joint media engagement has been studied in depth through an initiative by the Joan Ganz Cooney Center at Sesame Workshop and LIFE (Learning in Informal and Formal Environments) Center. The Joan Ganz Cooney Center is based in New York, NY and has a mission to help children learn through digital media, while the LIFE Center is a collaborative effort among the University of Washington in Seattle, WA Stanford University, and SRI International, Inc. in San Francisco, CA, conducting research as a Science of Learning Center. They are interested in determining how this new type of co-viewing with mobile, digital technology impacts young children as it has become increasingly popular. They recommend that joint media engagement should include at least two partners, one type of media with one common point of interest, and at least partial attention to the point of interest, partner, interaction, and some type of engagement communication (Takeuchi & Stevens, 2011). Engagement can come in many forms, including pausing and talking about events seen on television programs and relating them to real life, to creating hands-on activities based on a video seen on a computer, to relating an event seen at a later time back to what was read in a book, both paper and on an e-reader (Lest et al., 2010).

It is also important to understand how parents view media regarding its educational value for their children. Rideout (2014) determined that parents find certain programming, such as *Sesame Street* and *Dora the Explorer* as very educational, whereas *SpongeBob Squarepants* was not. Children are watching this programming at least weekly, and sometimes more, although, after age 4, there is a decrease in the amount of educational programming viewed, despite an increase in TV viewing. Parents believe that their children are learning from educational media, however, they believe that they learn the most from television, and the least from mobile devices. When focusing on joint media engagement, parents and children spend time with each other primarily when watching television, with 55% of families co-viewing, while

29% of families engage together with mobile devices (Rideout, 2014). Siblings are reported as the primary partners in co-viewing with media devices. When parents do use media together with their children, it is primarily to monitor the content. Helping the child benefit more from media was the least frequently reported reason that parents interact with media devices with their child (Rideout, 2014). The primary reason that parents do not always participate in joint media engagement with their children is because they do not have the time or need to do other things (Rideout, 2014).

Lavigne, Hanson, and Anderson (2015) found that, when parents are co-viewing with mobile media devices, the parents' words per minute and sentence length are reduced. Following the viewing, however, the parents show an increase of language quality when speaking with their child. Despite the richer vocabulary use, when the television program was over, parents produced fewer words in general, reducing the amount of language the child was exposed to. Parents may require specific co-viewing strategies to increase their child's language growth. When given an enhanced "Mommy bar," which provides enhanced prompts for specific statements or questions for the parent to use during a co-viewing activity, there is a significantly greater amount and quality of parent and child verbal interaction and greater amount of verbal interaction (Fisch et al., 2008). Not all parents require assistance to participate in successful joint media engagement and their natural interactions may also negate any adverse effects that media viewing at a young age has on overall development (Mendelsohn et al., 2010).

1.7. Purpose of this Research

Electronic media is widely used by modern day families, and there are mixed views regarding the potential benefits or detriments involved in the use of electronic media with young children. Some professionals recommend limited screen time for children, including no screen time for children under the age of 2. Despite these recommendations, young children are still exposed to TV and digital media. We have research evidence concerning the impact of television watching and language development, however, not much is known about the effects of mobile electronic media devices on language development. When parents and children co-view television or participate in joint media engagement using these devices, learning can occur; however, not all parents understand the potential effectiveness of this interaction.

The purpose of this study is to examine the relationship between mobile media technology use and language disorders in preschoolers, as well as to determine if there is a difference in how parents are interacting with their children and mobile media devices when a language disorder is present or if language development is typical. Research questions to be examined include:

1. Is there a quantitative difference in mobile media device exposure and usage between preschoolers with a language disorder and typically developing preschoolers?

2. Are there differences between the ways parents of preschoolers with language disorders and parents of preschoolers with typically developing language participate in joint media engagement?

2. Methodology

1.1. Participants

This study was approved by the Institutional Review Board (IRB) at Loma Linda University, in Loma Linda, CA. Participants were recruited through flyers that were distributed. Once parents received the flyer, they telephoned the researchers and an interview was conducted to determine if the family was eligible to participate in the study. The interview was conducted primarily to determine if the participants met inclusion and exclusion criteria. All participants met the inclusion criteria which included all preschool children between the ages of 3 and 5 years. The typically developing children had no reported history of language delays. The children identified as language disordered/delayed all had Individualized Education Plans (IEPs) under the eligibility of Language or Speech Disorder, with primary goals in the area of expressive and/or receptive language. English was the dominant language of all participating children and their parents. Additionally, all participating adults were the child's custodial parent and provided their child's everyday care. There was one exclusion criterion; children with existing concomitant disorders, such as autism, developmental delays, hearing loss, etc.

The participants included 20 parent child dyads. Ten of the dyads included children with language disorders and 10 included children who were typically developing. Children identified as having language disorders were recruited from language therapy programs within the Whittier Area Cooperative Special Education Program (WACSEP) Special Education Local Plan Area (SELPA) in the Whittier, CA area. Children identified as typically developing were recruited from public Head Starts and private preschools in the Whittier, CA area. Children in both groups were from middle and low socioeconomic populations.

1.2. Data collection and processing

Parents were asked to complete a paper-and-pencil questionnaire (Appendix A). They provided basic demographic information, including child's birthdate, primary language in the home, sex, information regarding previous speech and language services, and history of language delay or disorder. They completed a 4-item survey regarding their child's mobile media device usage. Some questions were modified from interviews used in research by Chonchaiya and Pruksananonda (2008, p. 979). Questions addressed age of exposure, amount of time exposed daily, parent participation, and types of activities children engage in. Response choices to each survey item varied. In some cases, there were up to seven responses for the parents to choose from. One specific item included a 5-point Likert scale with response selections ranging from Never to Always (Appendix A).

A collection sheet was used to code data based on observed parent and child interactions (Appendix B). Observed behaviors were divided into three categories: low level engagement (e.g. directing attention, giving a label,

providing feedback, other), medium level engagement (e.g. asking child to locate items, asking child to label items, responding to child's questions, other), and high level engagement (e.g. wh- questions, comparing/contrasting questions, asking the child to define a word, expanding on the child's utterances, other) (Bojczyk, Davis & Rana, 2016).

Parent and child dyads used the *My PlayHome* application by PlayHome Software Ltd., which is an interactive doll house application where characters and objects can be manipulated. It includes sound effects and realistic activities. Application was accessed on a 2nd generation iPad by Apple, Inc., which was protected by an Otterbox Defender case for iPad. Guided Access was enabled to ensure the parent and child were not able to navigate away from the application. Dyads were recorded using a TomTom Bandit video camera, which was placed approximately 6 feet away from the parent and child.

Parent and child were invited to the assessment room and became acclimated to the environment where they were videotaped, and to the iPad. Children who had been identified by their parent as typically developing were administered the *Preschool Language Scale-5 Language Screening Test* (2012), which is a norm-referenced criterion referenced language tool that can be used to screen language skills in children from birth to age 7. It takes approximately 5-10 minutes to complete. Any child not receiving a passing score would be referred for additional speech and language assessment and not be part of this study.

Parent and child were seated side by side at a table in a clinical assessment room which was depleted of any other furniture, toys or other objects that could potentially distract the child from the activity at hand. Parent was given a brief introduction on how to operate the iPad and the application. This familiarized them to the device and application if they had not previously used them. The parent was instructed to interact with their child and the iPad as if they were at home in the manner that they typically would. The video recorder, which was placed approximately 6 feet from the parent and child dyad, was started and the examiner left the room for 15-20 minutes as the participants interacted with the iPad application. This provided the option of some portion of the video being discarded (e.g. warm-up time where there was low interaction or distraction). Following the interaction, the examiner returned and stopped the video recording. The parent was asked to complete the questionnaire (Appendix A). When the questionnaire was completed in full, the child received a book as compensation.

The examiner viewed the recordings and determined the types of joint media engagement behaviors used by the parents. Behaviors were coded based on 15 minutes of interaction and recorded on a tally sheet. A second examiner also watched the recordings and the examiners discussed any disagreements on behaviors, establishing high inter-rater reliability.

1.3. Data analysis

Differences in mobile media device exposure and usage between groups were measured using a chi square analysis. The Mann-Whitney U test was used

to analyze the differences in joint media engagement behaviors between the groups.

3. Findings

3.1. Comparison of mobile media device exposure and usage between preschool groups

No statistically significant differences were observed between parent-child groups when comparing age exposed to media devices (X^2=6.13, *df* =4, *p*=.29). We also found no significant differences between parent-child groups based number of hours per day that the child was exposed to media devices (X^2=7.14, *df* =4, *p*=.13). The third variable observed was level of parent participation, which was measured by reporting how much time the parent spent interacting with their child on the media device. We found no significant differences across groups for this variable (X^2=5.28, *df* =4, *p*=.25).

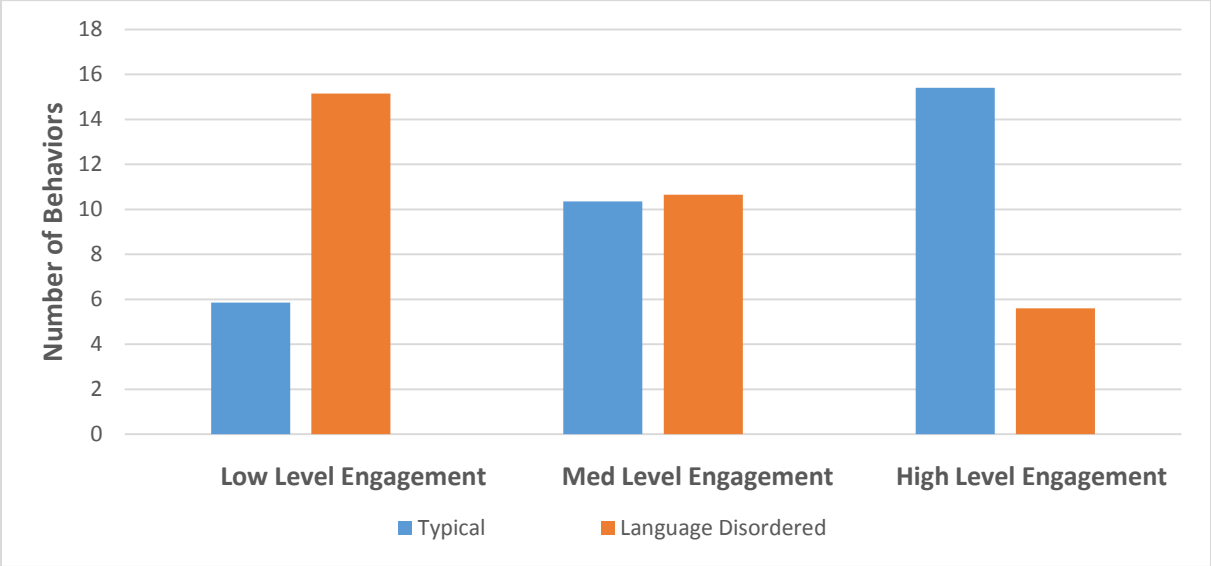

Figure 1. A comparison of total low, medium, and high engagement behaviors across typical and language disordered children

3.2. Ways parents engage with typical vs. children with language disorders

The second research question examined the differences between the two groups in the way that the parents interact with their children while engaging with the mobile media device. The examiners observed low, medium, and high level engagement in order to address this question (Appendix B). Low Level Engagement behaviors performed by the parent included directing attention (Attention) (e.g. “look at this”), parent giving an item a label (Give Label) (e.g. “that’s a faucet”), parent modeling for the child (Modeling) (e.g. “say ‘apple’”), and/or parent providing feedback (Feedback) (e.g. “that’s right”).

Medium Engagement Behaviors included the parent asking the child to locate an item (Locate) (e.g. “where’s the shoe?”), or asking the child to label an item (Ask Label) (e.g. “what is this?”), answer a question asked by the child (Answer), asking a yes/no question of the child (Yes/No) (e.g. “do you

think he's gonna get dizzy?"), parent commenting on what they see (Comment) (e.g. "he looks like a pirate"), and/or directing the child to do something (Direct) (e.g. "turn on the shower").

High Level Engagement behaviors performed by the parents included asking Wh- Questions (e.g. "what do we do in the bathroom?"), discussing Similarities and Differences (e.g. "did you see there's a yellow one upstairs and a blue one downstairs?"), Ask Definitions (e.g. "what do we do with a swing?"), Expand on the child's statements (e.g. child: "grandma," adult: "that looks like grandma"), provide Positive Feedback (e.g. "that was very smart of you to think about the light switch"), and to Connect what they were doing to real life experiences (e.g. "is that like you when you swing?").

Differences in overall Low Level behaviors were statistically significant. As seen in Figure 1, families with children with language delays used Low Level behaviors more often than families with typically developing language. Table 1 indicates that the behaviors that were greater for families with language delays included Give Label (Mdn=15.5), p=.00, Model (Mdn=14.5), p=.002, and the Total Low Engagement behaviors (Mdn=15.15), p=.00.

Table 1
Comparison of low engagement behaviors of parents with typical children vs. children with language disorders

Low Level Engagement Behavior	**Typical (Mean Rank)**	**Language Disordered (Mean Rank)**	**Sig. Level (*p*)**
Attention	10.1	10.9	.79
Give Label	5.5	15.5	.00
Model	6.5	14.5	.00
Feedback	9.8	11.2	.63
Other Low	11.35	9.65	.52
Total Low	5.85	15.15	.00

As seen in Table 1, Medium Level Engagement behaviors were used at approximately the same frequency between the two groups and there was no statistically significant difference overall. The only statistically significant differences found within the Medium Level Engagement behaviors were that the use of Ask Label was greater for families with children with language delays (Mdn=13.65) than for typically developing children (Mdn=7.35), p=.015, and the use of Answer was greater for families with children with typical language (Mdn=13.3) than for families with children with language delays (Mdn=7.7), p=.035 (Table 2).

Table 2
Comparison of medium engagement behaviors of parents with typical children vs. children with language disorders

Medium Level Engagement Behavior	**Typical (Mean Rank)**	**Language Disordered (Mean Rank)**	**Sig. Level (*p*)**
Locate	8.25	12.75	.89
Ask Label	7.35	13.65	.02
Answer	13.3	7.7	.04
Yes/No	11.85	9.15	.31
Comment	12.9	8.1	.07
Direct	8.95	12.05	.24
Other Medium	10.7	10.3	.91
Total Medium	10.35	10.65	*.91*

When examining High Engagement behaviors, we found that, overall, families with typically developing children use High Level behaviors more often than families with language delays (Figure 1). We found three specific High Level behaviors that these families used, which were the use of Wh-Questions (Mdn=14.9), p=.00, the use of Expand (Mdn=13.75), p=.01, and the use of Positive Feedback (Mdn=13.95), p=.007, as seen in Table 3.

Table 3
A comparison of high engagement of parents typical vs. children with language disorders

High Level Engagement Behavior	**Typical (Mean Rank)**	**Language Disordered (Mean Rank)**	**Sig. Level (*p*)**
Wh- Questions	14.9	6.10	.00
Similar/Different	13.0	8.0	.06
Ask Definition	10.10	10.9	.79
Expand	13.75	7.25	.01
Positive Feedback	13.95	7.05	.01
Connect	11.5	9.5	.48
Other High	11.0	10.0	.73
Total High	15.4	5.6	.00

Table 3 also shows that the Total use of High Engagement behaviors was greater for families with typically developing children (Mdn=15.4) than for those with children with language delays (Mdn=5.6), *p*=.00.

4. Conclusions and Discussion

Present research indicated no statistically significant difference regarding mobile media device exposure and usage between preschool aged children with and without language disorders. These results are not consistent with results of Ma, et al. (2017), who found that young children with increased media exposure are at risk of having expressive language delays. Results are also not consistent with expectations of speech-language pathologists, who reported to the American Speech Language Hearing Association (2016) that they believed the increased use of mobile media devices can be harmful to young children. Differences in results may be due to the methods used in the current research. Parents completed the questionnaire in the presence of the researcher and may not have felt as though their responses were confidential. Even though they were assured that there was no judgement regarding their responses, they may not have felt comfortable sharing honest information. Additionally, because they did not have much time to complete the questionnaire, as they completed it immediately following the videotaping session, they may not have had time to think about their responses.

We did find statistically significant differences in the behaviors of families of children with language disorders and those with typically developing language as they interacted with mobile media devices. Parents of children with typically developing language used higher level engagement behaviors, while those with language delays tended to use lower level engagement behaviors. The different quality of behaviors used with children were similar to those seen by Bojczyk, Davis, and Rana (2016), as parents using high level engagement behaviors had children with typically developing language, while children with language disorders had parents who primarily used low level engagement behaviors. Because high level engagement behaviors lead to stronger language, it is not surprising that children exposed to these behaviors have typically developing language, while those exposed to low level behaviors do not have as much opportunity to develop and expand their language skills. It should be noted, however, that it is a possibility that the parents who do use low level engagement behaviors may do so because they understand that their child has difficulty with language and cannot comprehend or utilize more complex language.

There has been a rapid growth of mobile media device usage, including within the preschool population. This novel study addresses this important and timely topic to help professionals and parents understand the impact of mobile media devices on language development, as well as how they can best interact with children. Additionally, videotaping parents and their children together while interacting allowed the researchers to observe behaviors naturally.

The present pilot study included 20 parent and child dyads with ten in each group resulting in a statistically small sample. This made it difficult to generalize the results. Another limitation of the study involved the

administration of the questionnaire. With the examiner in the room and limited time for the parents to recall information, responses may not have been completely accurate. Parents may have felt pressured to complete the form quickly without careful thought, or, with limited anonymity, that their responses would be judged.

Use of iPads and other mobile media devices are a growing trend and are common in homes. Speech-language pathologists can guide families in the most appropriate ways for parents to use these devices with their preschool-aged children through parent training. Trainings should focus on using devices together to increase communication. Additionally, speech-language pathologists should teach when to use low level engagement behaviors and how to expand to using high level engagement behaviors.

More research is needed in the area of mobile media device usage and preschoolers. It is necessary to perform these studies with a larger sample size. Additionally, allowing the parents to take the questionnaire home to complete for less time pressure and anonymity would be beneficial. Future research should also include videotaping families over time to help them acclimate to the testing situation to make their interaction as natural and comfortable as possible. Studying the differences between communication interactions with mobile media devices and static toys to determine the impact on technology would also be beneficial in this digital age.

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Appendices

Appendix A

Please complete the following questions regarding the child you brought in today:

Child's birthdate: _____ (day,month,year) Primary Language in the Home: _____

Child's sex Male Female

Has your child ever been identified as having a language disorder/language delayed? Yes No

Does your child receive or has your child ever received speech and language services? Yes No

Please circle the appropriate response.
Your honest responses are valued and will be kept confidential:

At what age was your child first exposed to mobile media devices (iPad, tablet, e-reader, smartphone)?

A. Never
B. Less than 6 months of age
C. 7-9 months of age
D. 10-12 months of age
E. 13-18 months of age
F. 19-24 months of age
G. More than 25 months of age

How many total hours per day does your child use these devices?

A. Never
B. Less than 30 minutes
C. More than 30 minutes but less than 1 hour
D. More than 1 hour but less than 2 hours
E. More than 2 hours but less than 3 hours
F. More than 3 hours but less than 4 hours
G. More than 4 hours

How often do you participate with your child when they are using the devices?

A. Never
B. Rarely
C. Sometimes
D. Often
E. Always
F. N/A

What types of activities does your child engage in while using the devices?

A. Games
B. Educational apps
C. Videos (YouTube, etc.)
D. Books
E. Websites
F. Other apps
G. N/A

Appendix B

Observing for*:
Low level engagement
1. Directing attention (orienting to the iPad— "look at that")
2. Giving a label (provides a specific label— "that's a rope")
3. Feedback (Provides a neutral or negative response to child utterance or behavior- asking child to listen)
4. Other low level engagement (Not related to the activity- "let me tie your shoe")

Medium level engagement
5. Locate (Locating an object or character; asking "where" question—can you find the brick?")
6. Asks label (Asks general name or label- "what animal is that?")
7. Answer (Responding to a child's question about the story)
8. Other medium level engagement

High level engagement
9. Wh-? Interrogative (Interrogative with what, why, where, or when- "what is his grandma making?")
10. Asks about similarities/differences (Asks child to compare/contrast objects- "why do you think this dog is bigger than that one?")
11. Asks definitions (Asks child meaning of a word- "do you know what a pilot does?")
12. Expands (Adds to or builds on child's previous utterance- "it's heavy because it's full")
13. Other high level engagement

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Co-occurrence of Cleft Palate in Pierre Robin Syndrome and Associated Challenges

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Abstract

Pierre Robin Sequence (PRS) is a condition characterized by malformation of the lower jaw (retrognathia), abnormal positioning of the tongue (glossoptosis) and cleft palate. Children with PRS may exhibit speech and language difficulties and hypernasality among others, based on the type and severity of cleft palate and the age at which surgery was done. The present study is an attempt to describe speech and language characteristics in toddlers with PRS before and after speech language therapy. Two toddlers, who were diagnosed to have Expressive Language Delay secondary to repaired cleft of palate with PRS, were considered for the Early Intervention Program using Focused Stimulation approach. The children selected were matched for language, vocabulary size and the IQ level. The baseline was established and various measures such as type and pattern of the vowels, consonants, true and proto words were analyzed. Speech and language therapy was given for 20 sessions. Post-therapy measurement was done after 20 sessions. Pretest-Posttest design was used to compare the differences in speech and language measures for the pre-therapy and post-therapy conditions. The results revealed that the type and number of vowels, consonants and words were variable in the toddlers, which could be attributed to individualistic variations and the way in which the mothers implemented the approach at home. The speech and language behaviors of each child have been discussed in detail in the full length paper. The present study is one of the first attempts to emphasize the speech and language characteristics of children with PRS and also highlights the clinical implications of early intervention.

Keywords Pierre Robin Sequence, cleft palate, Early Intervention Program, Focused Stimulation, Language measures

1. Introduction

Pierre Robin Sequence (PRS) is a condition characterized by severe malformation of the lower jaw (retrognathia) or an abnormally small jaw (micrognathia), abnormal positioning of the tongue (glossoptosis) and associated cleft palate and feeding related issues (Breugem & Van der Molen,

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2009). Initially this condition had been considered as a syndrome, but in the present time it is believed to represent a specific outcome of an anomalous developmental process. The major cause for the condition to develop as illustrated by various studies is the inability of the lower jaw to develop adequately during prenatal condition. Inadequate development of the lower jaw results in lack of downward movement of the tongue which in turn leads to the formation of cleft palate.

One of the earliest descriptions of Pierre Robin syndrome was provided by two authors named Lannelongue and Menard in 1891, which included features such as glossoptosis, micrognathia and cleft palate (Tewfik & Trinh, 2015). In the year 1923, after a French dental surgeon named Pierre Robin published a case study detailing the various features, the syndrome came to be named after him. Till the 1970s, the condition was commonly known as Pierre Robin syndrome. Later, the term 'sequence' was coined in order to include a set of anomalies caused by a series of events set off by a particular malformation. Now the condition is commonly known as Pierre Robin Sequence (PRS). Previously the term Robin Anomalad was also used by a few authors (Bush & Williams, 1983).

Besides the physical characteristics discussed above, children with PRS may also exhibit various problems such as feeding issues, respiratory problems, ear infections, reduced hearing and delays in speech and language among others (Filip et. al., 2015). Some of these issues may resolve as the child grows and others may require surgical, non-surgical or prosthetic intervention. Studies have shown that PRS may also manifest conditions affecting cognitive function, and overall psychological adjustment (Drescher et. al., 2008).

Over the last two decades many studies have been conducted in order to assess the effect of micrognathia and retrognathia on airway obstruction. But very few studies have focused on the speech and language difficulties in children with PRS. The smaller size of the lower jaw is one of the major deterrents for speech and associated oromotor problems in children with PRS. In conditions wherein the mandible is set significantly behind the maxilla there may be chances of the tongue getting displaced posteriorly, closer to the throat. This backward displacement of the tongue may cause respiratory difficulties for the baby. Also the small size of the mandible and oral cavity may lead to limited movements of the tongue (Gangopadhyay, Mendonca & Woo, 2012).

Cleft palate has been reported to occur in 1 for every 700 children born with PRS (Cleft Palate Foundation, 2007). Due to the presence of cleft palate, children with PRS may exhibit speech and language difficulties and hypernasality due to velopharyngeal dysfunction (VPD). It is also influenced by the type and severity of cleft palate and the age at which surgery was done. There have also been contradictory findings which suggest that children with PRS do not have a greater frequency of velopharyngeal dysfunction after the repair of cleft lip and palate (CLP) and may not need supplementary surgical procedures for correction (Goudy, Ingraham & Canady, 2011).

One of the earliest studies to assess speech and language characteristics in children with PRS was conducted by Williams, Williams, Walker and Bush

(1981). This study aimed to investigate the speech, language, hearing and educational abilities of thirty children with PRS. A total number of 55 children were considered for the study out of which 14 (26%) had CLP. The children were seen to have variable linguistic patterns and a disparity was observed in comprehension and expressive language. This disparity could range from normal language skills to a delay in either or both receptive and expressive language skills. Some children also demonstrated atypical linguistic patterns, deviant articulatory patterns and severe nasal air emissions. Thus it would appear that children with PRS may also benefit from early language intervention programs. By involving the mothers in the intervention programs, strategies learnt in the clinical setup could be generalized to communication throughout the day.

It has been established that toddlers with repaired cleft lip and palate (RCLP) exhibit expressive language delay in addition to multiple associated problems which needs to be dealt by a team of experts (Scherer, 1999). Toddlers with RCLP have been seen to demonstrate features such as reduced mean length of utterance (MLU), reduced lexical diversity, smaller phonetic inventory and various deviant phonological processes during the development of speech and language (Morris & Ozanne, 2003). Early language intervention is warranted for such children and in their study, it was clearly illustrated that early language intervention programs have been successful in facilitating both language and speech in children with CLP (Scherer & Kaiser, 2007). Various studies have also emphasized the constructive changes seen in the language skills of children by involving parents/mothers in a structured parent-implemented program (Scherer, 1999; Pamplona et. al., 1999, 2004).

Focused Stimulation approach (Girolametto, 1988; Girolametto et. al., 1996, 1997) is one such method which has been widely used for enhancing language and for building vocabulary in children with CLP (Scherer, D'Antonio & McGahey, 2008). There have been limited studies focusing on the importance of early intervention in children with PRS and the changes seen in their linguistic abilities when provided with a structured parent-implemented program. Thus a series of studies have been carried out in our institute to highlight the favourable effects of the early intervention program. The results of these studies indicate that the toddlers with RCLP demonstrated significant changes in their speech and language abilities. There were notable improvements in the toddlers articulatory repertoire, vocabulary and mean length of utterance (Pushpavathi, Kavya & Akshatha, 2017 a,b). These findings stress upon the importance of providing intensive language stimulation in the early years which is the critical period for speech and language development.

Hence, the present study is aimed to describe the speech and language characteristics and non-verbal behaviors in toddlers with PRS before and after speech-language intervention. The objectives of the present study are as follows:

(1) To study the impact of early language intervention program on the speech related parameters such as frequency of occurrence of vowels and consonants in children with PRS.

(2) To investigate the effect of early language intervention program on the development of linguistic skills such as prototype words, true words and jargon utterances.

2. Methodology

2.1 Participants

Two toddlers aged between 2 and 2.6 years who were diagnosed to have Expressive Language Delay secondary to repaired cleft palate with PRS served as the subjects for the study. The participants were enrolled for the Early Language Intervention Programme (ELIP) at Unit for Structural and Oro-facial Anomalies, All India Institute of Speech and Hearing (AIISH). An informed consent (approved by AIISH Ethical Committee) was obtained from the parents prior to their participation in the study. Psychological evaluation for both the participants revealed age-adequate developmental and mental age. The detailed description of the subjects is shown in Table 1.

Table 1
Detailed description of participants

	Participant A	Participant B
Age/Gender	2.6 years/Female	2 years/Male
Age of primary surgery	1.6 years	1 year
REELS*	RLA: 27-30 months	RLA: 22-24 months
	ELA: 16-18 months	ELA: 9-10 months
Hearing evaluation	Hearing sensitivity within normal limits	Bilateral minimal hearing loss due to middle ear pathology
Other findings	• Facial dysmorphism • Nasal-bridge depression • Visual problems • Receding mandible	• Micrognathia • Glossoptosis • Palatal fistula present

**Note: REELS- Receptive Expressive Emergent Language Scale (Bzoch & League, 1971)*
RLA- Receptive language age
ELA- Expressive language age

2.2 Data collection and processing

A detailed pre-therapeutic evaluation was conducted to establish the baseline related to speech and language features of the children. The audio video recordings were carried out in a quiet room during unstructured play sessions between the Speech Language Pathologist and the child, with the mother also being involved in the sessions. Recordings were done using a Handycam recorder (Sony DCR-SR88). The recorder was placed on a tripod stand at a distance of approximately 8-10 feet from the child. The spontaneous interaction between mother and child were recorded in the baseline audio-video recording and a post therapy audio-video recording was done after the 20th session. Thus in total, 2 video recordings and analyses for each participant were carried out by a qualified Speech Language Pathlogist. The parameters assessed in each child's inventory were frequency of occurrence of vowels, consonants, proto words and true words.

2.3 Speech and Language therapy

Speech-language therapy was conducted in the clinical setup for sessions lasting forty-five minutes each. Speech therapy sessions were carried out by a qualified Speech Language Pathologist. This was done by preparing a master lesson plan by taking up the specific goals and activities. Play way method was used to improve vowel and consonant inventory, functional communication skill and to increase the frequency of meaningful utterances. Focused stimulation approach was demonstrated to the mother during therapeutic sessions using low-cost materials and commonly available toys. A multisensory approach was used to increase the oromotor movements. Visual feedback using mirror work and tactile cues with interesting oromotor activities was provided appropriately wherever required. A corpus of vocabulary was prepared which contained the most commonly used functional words by toddlers. This was done with the aim of increasing the child's functional vocabulary. The positive behaviors, and behaviors which were attempted correctly by the child were reinforced with token and tangible reinforcements to improve their cooperation and confidence in doing the activity. The mothers were also told to carry out a similar training program at home in the absence of direct supervision of the SLP. A total number of 20 therapy sessions were conducted.

2.4 Data analysis

Each of the video and audio-taped session of mother-child interaction during unstructured play was transcribed using International Phonetic Alphabet (IPA) symbols. The frequency of occurrence of vowels and consonants were calculated. Vowels were classified as high (/i/), mid (/e/, /æ/) and low (/a/) based on the tongue height and their frequencies were calculated. The frequency of occurrence of different consonants were calculated based on place of articulation (bilabials, glottals, labiodentals and semi-vowels). Also the total number of true words and proto words were obtained and tabulated. In addition, any positive changes in the child's vocabulary and the overall improvement in the expressive language were investigated. The tabulated data was entered in a Microsoft excel sheet and the difference in the frequency of occurrence of vowels, consonants, true words and proto words were calculated and analyzed from baseline to 20th session using descriptive statistics.

3. Findings

The present study is an attempt to explore the impact of focused language stimulation program in two children with PRS, by throwing light on the changes in the phonemic inventory of the children. The findings obtained have been highlighted below.

3.1. Effect of intervention on speech related measures.

The effect of early intervention on speech related measures were analyzed by calculating the frequency of occurrence of vowels and consonants. Vowels were classified based on their tongue height and consonants were classified based on the place of articulation.

3.1.1. Frequency of occurrence of vowels

The frequency of occurrence of vowels across participants and sessions were obtained and analyzed. These vowels were classified as high (/i/), mid (/e/, /æ/) and low (/a/) based on the tongue height.

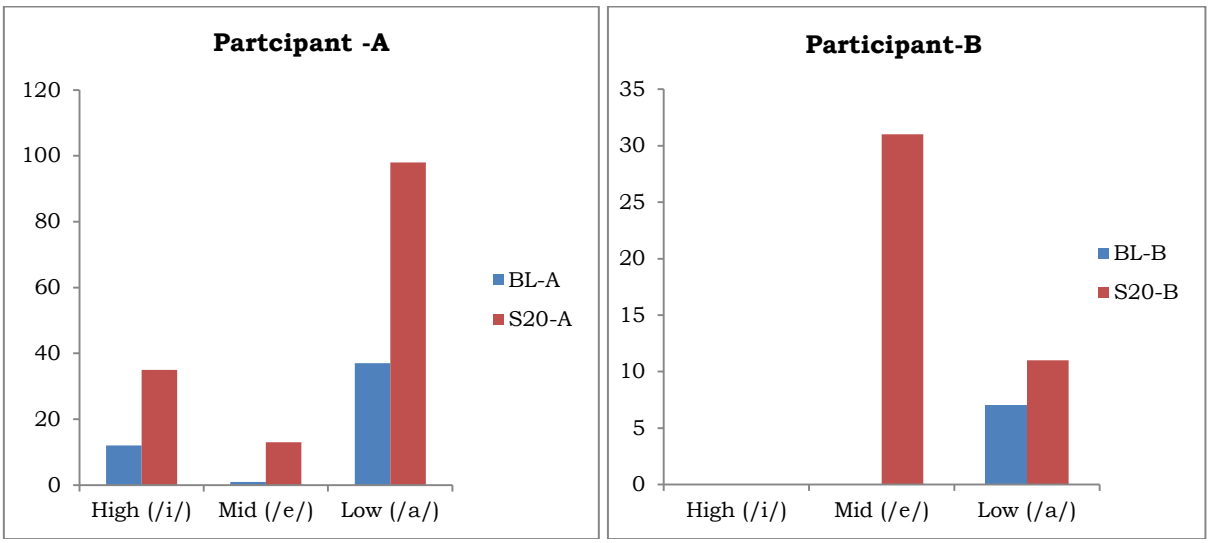

Figure 1. Frequency of occurrence of vowels w.r.t. tongue height in the two participants in pre- and post-therapy conditions. (BL – Baseline; S20 – 20th session).

Figure 1 clearly depicts the frequency of vowels from baseline to the 20th session for both the cases. With reference to participant A, at the time of baseline recording, vowels present in the child's inventory included /i/, /u/, /æ/ and /a/. The post-therapy recording showed the presence of vowel /ə/ in addition to the others. The trend clearly indicates that the low vowels showed the greatest improvement followed by high and mid vowels. Low vowel /a/ showed the greatest increase with respect to frequency from 40 to approximately 100. The high vowel /i/ also showed a fairly good improvement, with the frequency increasing from 12 to 35. In terms of frequency, mid vowels also showed an increase from 1 to 13 at the time of post-therapy recording. With respect to participant B, only low vowels (/a/) were present at the time of baseline recording. However post-therapy recording showed the occurrence of mid vowels such as /æ/ and /ʌ/ adding up with low vowels.

3.1.2. Frequency of occurrence of consonants

The frequency of occurrence of different types of consonants across participants and sessions were calculated based on place of articulation (bilabials, glottals, labiodentals and semi-vowels).

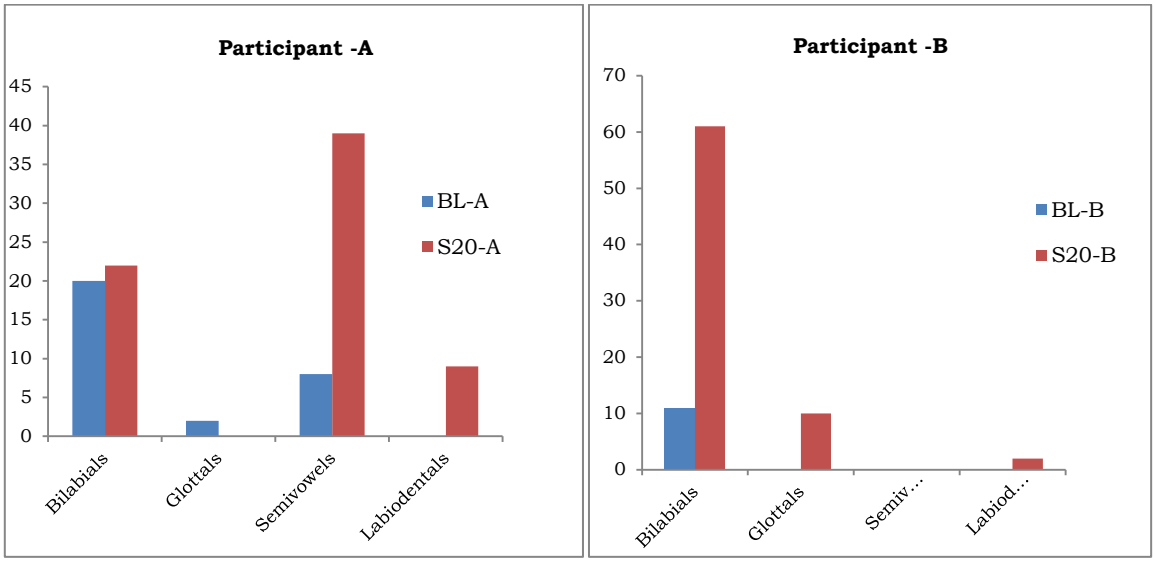

Figure 2. Frequency of occurrence of various consonants in the two participants in pre- and post-therapy conditions. (BL – Baseline; S20 – 20th session).

Figure 2 illustrates the changes in the frequency of consonants in the children's inventory between the baseline and post-therapy conditions. At the time of baseline recording, with respect to place of articulation, consonants such as bilabial /m/, glottal /h/ and semivowel /j/ were present in the inventory of participant A. During the post-therapy recording, additional consonants such as voiced bilabial /b/, labiodental /v/, and lateral /l/ were acquired by the child. In terms of frequency, semivowels showed the greatest improvement. There was a small increase in bilabials. Labiodentals which were absent during the baseline showed an emergence by the 20th session. It is also interesting to note that glottal fricative which was present during the baseline session was not seen at the post-therapy recording. With reference to Participant B, only bilabials nasals (/m/) were present in the child's inventory. While at the end of 20th session child showed a marked increase in the number of bilabials. The post therapy recording also showed the emergence of glottals (/h/) and labiodentals (/v/). The voiceless labiodental was not attempted as /f/ is not present in the phonetic corpus of Kannada language.

3.2. Effect of intervention on language related measures.

The effect of early intervention on language related measures were analyzed by depicting the number of true words, proto words and non-meaningful utterances. The frequency of all the language related parameters measures the positive changes in the child's vocabulary and subsequently their language.

3.2.1. Frequency of occurrence of true-words and proto-words.

The frequency of occurrence of true and proto words were analyzed. True words were considered based on their meaningfulness and articulatory

accuracy. Proto words were words which resembled true words and are not meaningful.

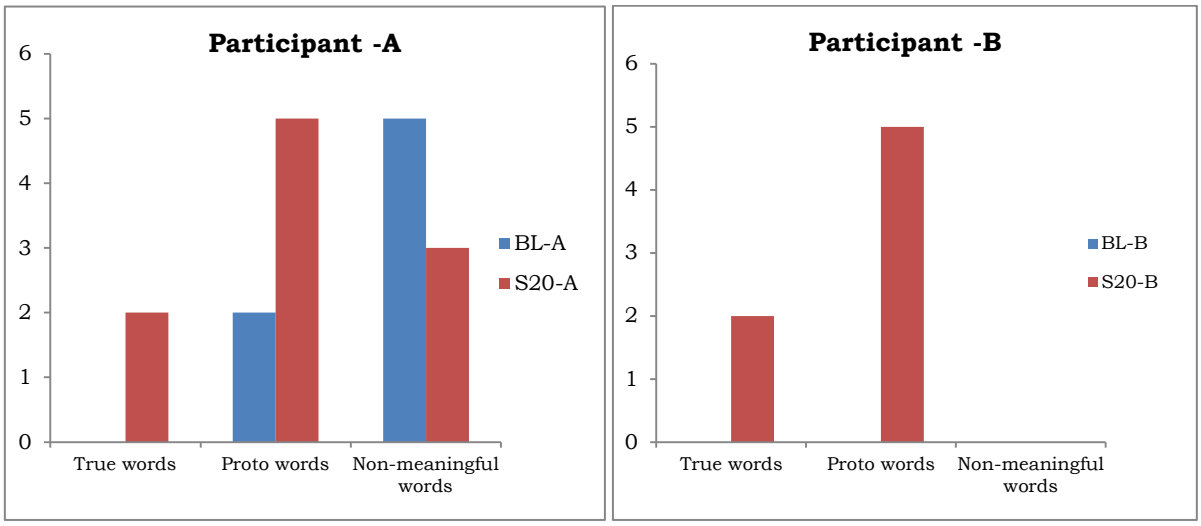

Figure 3. Frequency of occurrence of true words, proto words and non-meaningful words across participants and sessions. (BL – Baseline; S20 – 20th session)

Figure 3 illustrates the number of true words, proto words and non-meaningful words for the two toddlers between baseline and the 20th session. The graph clearly depicts a notable increase in the frequency of true and proto words and a reduction in the non-meaningful words. At the time of baseline recording, the repertoire of participant A did not consist of any true words. It is encouraging to note that by the 20th session the child had acquired 2 true words that is /ba/ and /ba:l/. Similarly the frequency of proto words increased from 2 to 5. At the time of post-therapy recording the child was consistently using proto words such as /a:ji/ for /ba:ji/, /alu/ for /hallu/, /ija:/ for 'meow', /ija:u/ for 'bow' and /ijal/ for 'twinkle' . Another noteworthy result is the decrease in the number of non-meaningful words from 5 to 3. The child frequently used semivowel and vowel combinations such as /a:ji/, /ija:/ and /jaja/ among others.

During the baseline recording of Participant B, the child's repertoire did not consist of any true words. By the 20th session child had acquired 2 to 3 true words. The first word acquired by the child was /amma/ and this word showed the maximum frequency of occurrence post-therapy. Also there were no proto words in the child's repertoire during baseline. However post-therapy there were almost 4-5 proto words present in the child's repertoire. The proto words in the child's vocabulary included /amam/ for food, /aha/ for /akka/, /na/ for /aɳɳa/ and /ma/ for /amba/. Non-meaningful gestures were not reported, however vocalization with varying intonation patterns was present.

4. Conclusions

In conclusion, the results of the present study illustrate that there was a noteworthy expansion in the repertoire of phonemes and vocabulary in both of the participants. This improvement can be attributed to the continuous

parent-implemented intervention program in addition to intensive home training. The findings of the present study highlight the fact that early intervention in children with PRS could prevent active deviances from being established and also confirms that intensive early intervention programs are necessary in order to change already established deviant behaviors.

5. Discussion

Research over the last two to three decades has led to the findings that children with CLP in general, usually exhibit a delay in the production of their first word and also early vocabulary (Scherer 1999). Children with PRS on the other hand, have been seen to demonstrate variable language patterns with no consensus between the receptive and expressive language skills (Williams et.al., 1981). This could be attributed to the presence of structural anomalies such as cleft palate, microganthia and cognitive deficits. Children with PRS also have many medical issues which require long-term medical treatment.

Issues such as airway obstruction and feeding problems were encountered by Participant A as a neonate. The surgical correction of the palate was done at the age of 1.6 years and no intervention was sought for in terms of speech and language till the age of 2.6 years. Thus there was a delay in the acquisition of expressive vocabulary and the phonemes present in the child's repertoire was also limited. This could probably be attributed to the lack of stimulation at home and to the delay in initiating the intervention program. In case of Participant B, surgical correction of the palate was done at the age of 1 year and speech and language intervention was begun from the age of 2 years. The speech and language characteristics of the children have been discussed below.

The aim of the present study was to investigate the frequency of occurrence of vowels among the two toddlers with RCLP associated with PRS. Studies have shown that children with CLP demonstrate a better proficiency for vowels compared to consonants since these sounds do not require velopharyngeal competency (Williams et. al.,1981; Van Demark et. al., 1979). The findings of the present study indicate that children with PRS also follow a similar trend, wherein low and high vowels displayed a 100% accuracy compared to mid vowels, although Participant B acquired some mid vowels post-therapy. The frequency of vowels in the repertoire of both the participants greatly increased after the intervention program which support the findings of previous studies carried out in children with RCLP recently (Pushpavathi, Kavya & Akshatha, 2017 a,b). There was a disparity in the type of vowels acquired in both the participants which supports the findings of Williams et. al. (1981) who reported that children with PRS demonstrate atypical articulatory patterns.

The presence of a repaired cleft palate and also the small size of the mandible and oral cavity might have led to the child presenting with limited oromotor movements which could explain the limited vowel inventory. This finding supports the results of previous studies which report that the spatial constraints of the lower jaw as one of the major setbacks for speech which

may lead to oromotor problems in children with PRS (Gangopadhyay, Mendonca & Woo 2012).

The other aim was to analyze the frequency of occurrence of consonants among the two toddlers. There were significant changes seen in the consonant inventory between the baseline and post-therapy conditions of both the participants. There was a disparity in the trend followed by both the participants in terms of the type of consonants acquired, with respect to place of articulation. Participant A showed a noteworthy increase in semivowels and labiodentals whereas Participant B displayed a significant increase in bilabials and glottal consonants. These findings are in consonance with the findings of Williams et. al. (1981) who stated that children with PRS exhibit atypical articulatory patterns and atypical phoneme substitutions.

The limitation in children's consonant inventory can also be attributed to the presence of palatal fistula which limits the oral cavity to build up sufficient intra-oral pressure and release it. This is in consonance with the findings of a previous study which reported that the reduced variety of sounds in children with CLP could also be attributed to their inability to build intraoral pressure required for the production of pressure consonants (Willadsen & Enemark, 2000). Thus it can also be concluded that children with PRS also exhibit deviant articulatory patterns similar to that of children with CLP, which was also depicted in a previous study (Williams 1981). The findings obtained in the present study are in agreement with the study of Sreedhanya et. al., (2015) that suggest that the limitations in the oral structures of children with CLP may lead to a small consonant inventory. In addition to the limitations seen in the oral structures the small size of the mandible might have contributed to limited tongue and oromotor movements resulting in a restricted consonant inventory.

The frequency of occurrence of true words and proto words were also investigated. Both children in the present study had age-adequate receptive language skills, whereas a delay was observed in the expressive language abilities. Participant B exhibited a relatively slower rate of improvement compared to Participant A in terms of expressive language abilities and sound inventory. This is in consonance with the findings of a previous study which reported that the linguistic patterns of children with the Robin Anomalad are variable and there may exist a disparity between the comprehension and expressive language skills (Williams et. al., 1981).

With reference to the vocabulary of Participant A, a spurt was seen for both true words and proto words whereas non-meaningful words showed a decline. This could be attributed to the fact that, as the child began acquiring and using meaningful words, the non-meaningful words in the repertoire became redundant. The child had been habituated to using non-verbal gestures such as pointing, nodding, hand waving and different facial expressions among others and post-therapy it was seen that there was a decrease in the non-verbal behaviors. This could be attributed to the emerging vocabulary of the child. The role of Focused Stimulation approach as an effective means to remediate speech and language problems in children with CLP has been established previously (Scherer, D' Antonio & McGahey, 2008; Pushpavathi, Kavya & Akshatha, 2017 a,b). The findings of

the present study highlight the importance of this approach as an efficient method to improve the linguistic abilities of children with PRS too.

For Participant B, the delay in expressive language could be attributed to the presence of middle ear pathology that could have influenced the effectiveness of early intervention program. The child had also developed non-verbal means of communication such as gestures, pointing, nodding and non-verbal actions that could have contributed to the decreased rate of improvement. The accelerated rate of development seen in Participant A can be attributed to the continuity in the number of sessions attended whereas Participant B received therapy only thrice a week. This lack of continuous stimulation by the Speech Language Pathologist could be the explanation for slower rate of development.

In essence, the results of the present study highlights the associated speech and language manifestations seen in children with PRS as a result of their structural and orofacial limitations. The study also stresses on the need for early intervention in this population with respect to speech-language therapy involving trained professionals by means of establishing its beneficial effects. The present study also highlights the importance of intensive home training and speech and language stimulation by parents in order to obtain a positive outcome.

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