

Spring 4-2012

The Effects of Premature Birth on Language Development

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THE EFFECTS OF PREMATURE BIRTH ON LANGUAGE DEVELOPMENT

by

Allison Tanner

B. S., Southern Illinois University, 2010

A Research Paper

Submitted in Partial Fulfillment of the Requirements for the

Master of Science Degree

Department of Rehabilitation

Southern Illinois University Carbondale

May 2012

RESEARCH PAPER APPROVAL

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Masters of Science

in the field of Communication Disorders and Sciences

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April 2012

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A premature infant is a child born before 37 weeks of gestation (Rossetti, 2001). An infant who is born this early is often times small in size and weight. It is important for an infant to stay in utero for at least 37 weeks gestation in order to gain enough weight to support and maintain bodily functions as well as fully develop all physical and neurological structures. When an infant is premature, they can suffer from severe medical complications due to early gestational age and low birth weight (Rossetti, 2001). Currently, infants who are born weighing between 1,000 grams (g) to 1,500g have a 90% survival rate which is increased from past decades (Rossetti, 2001). As weight decreases, survival rates decrease as Infants born between 750g and 1,000g have a 60% chance of survival and those weighing 500g to 750g have a 33% chance of survival (Rossetti, 2001). These percentages are significantly higher than previous decades, but with these lower birth weights, more medical complications may be present themselves (Rossetti, 2001). Even when weight is appropriate for gestational age, premature infants may still suffer from medical complications due to lack of prenatal development (Rossetti, 2001). According to Rossetti (2001), infants who are born prematurely and have a low birth weight are at risk for many medical complications that could impede later development in areas such as communication. The degree of prematurity significantly impacts children born before 32 weeks, defined as extremely premature, and are six times more likely than their full-term peers to be receiving special education services by the time they reach school age (Holm & Crosbie, 2010).

However, there are prevention measures that can be taken in order to aid a child in their language development skills and the process in which caregivers and their infants develop functional interactions. Early intervention services are used for children ages birth to three that are or at risk for significant delays. By implementing an early intervention program, language delays could be minimized at an early age before a child

reaches school. Caregiver-infant interactions could also be improved with the aid of early intervention services in order to positively affect language development. I am reviewing the literature about the language skills of children born prematurely and how they acquire and implement their language skills throughout the first years of life and academic careers. I am studying this topic in order to increase awareness of the language deficits that can be present in children born prematurely and provide prevention methods that can be taken for children born into this population.

Language Development in Children Born Premature

Prelinguistic skills begin to develop immediately after birth. According to Rossetti (2001), the prelinguistic stage of development involves communication through actions and behaviors without using words. Infants born at full gestation typically follow a pattern of language development in which they acquire interactional, gestural, pragmatic, play, and attachment skills needed to build communication skills (Rossetti, 2001). The pre-linguistic and linguistic stages of development can become delayed or altered when an infant is born prematurely. I believe that pre-language and language development skills are negatively affected in children who are born premature and significantly effected in infants and toddlers. Research articles have been included throughout this section in order to determine if this claim is valid.

For the first few months of a newborn's life their auditory discrimination skills are developing in order to discriminate speech sounds in their environment from sounds that are not language based (Jansson-Verkasalo et al., 2010). According to Jansson-Verkaslo et al. (2010), infants begin to enhance their native language discrimination abilities through the ages of six and 12 months. As their native language discrimination abilities improve, infants between six and 12 months decline in unfamiliar phoneme discrimination tasks due to the brain forming optimal phonemic connections

for the child's native language (Jansson-Verkaslo et al., 2010). Jansson-Verkaslo et al. (2010) also stated that studies have shown that an infant's ability to discriminate between native phonemes can predict later language performance. When infants are born prematurely, phoneme discrimination skills can be affected due to the lack of neural development (Jansson-Verkaslo et al., 2010). The lack of neural development can cause the premature infant to inadequately discriminate between speech sounds and non-speech sounds, therefore, delaying the process of language development (Jansson-Verkaslo et al., 2010). Jansson-Verkaslo et al. (2010) conducted a study that focused on the discrimination abilities of phonemes /*ö*/ and /*e*/, from the Finnish native language, in six-month-old premature infants. The participants included infants who were born at or before 32 weeks gestation and infants who were born full term. Jansson-Verkaslo et al. (2010) also investigated the infants' abilities to discriminate between the native phoneme /*e*/ verse the non-native phoneme /*ö*/. Jansson-Verkaslo et al. (2010) continued to investigate these abilities in Finnish infants for a six month period in order to track the development of the infants' phonemic discrimination skills. The data was collected through event-related potentials called mismatch negativity (MMN) in which the latency and amplitude of the auditory signal was compared to behavioral discrimination accuracy (Jansson-Verkaslo et al., 2010). In order to accurately assess the premature infants, their gestational age was corrected.

The results showed that there was no difference between the preterm group and the control group at six months corrected age when discriminating between the native and non-native phonemes. However, between six and 12 months of age, the full term infants' response to non-native stimuli decreased and their response to the native phoneme /*e*/ increased in rate. These results were not found in the preterm group which continued to respond to the non-native phoneme /*ö*/. The authors also investigated the rate in

which the full term group and the premature group responded to the native phonemes /e/ and /ö/. At the age of six months there was no difference in the response to the amplitude of the phonemes, however the full term group responded more quickly to the native phonemes than the pre-term group. Between the ages of six to 12 months of age, the premature group displayed shortened MMN latency while the full-term group displayed no such behavior. At the age of 12 months it appeared that the two groups did not display any significant differences between their language scores. To further investigate these findings, Jansson-Verkaslo et al. (2010) continued to evaluate the premature and full-term infants' language skills until two years of age using vocabulary development, morphological structures in conversational speech, and the mean length of utterance of the three longest utterances (MSL). The MacArthur Communicative Development Inventories (CDI) test battery was also used to further assess the toddlers' language abilities.

The data concluded that at two years of age the toddlers born premature had less complex expressive language skills in addition to producing significantly less words than the full-term group. Even though the premature and full-term groups performed similarly at the age of 12 months on the recognition of phonemes; there was a delay in language skills when the children reached two years of age. This could be due to the fact the premature group had significant delays in the recognition of phonemes at the age of six months. Jansson-Verkaslo et al. (2010) summarizes that, according to the theory of native-language neural commitment, language development follows a typical pattern of development, while, the brain tunes itself to native phonemes and decreases one's ability to discriminate between non-native phonemes.

According to the summary of these results, the discrimination ability in the infants born premature was delayed and affected the premature group's language development as it became more complex when the children were two

years of age. This evidence supports the claim that premature birth negatively affects the language development of a young child born premature. The delay found in phonological and language abilities in this study could point to a need for young children born prematurely to receive early intervention services. By receiving early intervention services, the phonological and language delays that the children present with can be improved at a young age in order to prevent further delays as they get older.

Briscoe, Gathercole, and Marlow (1998) further investigated the language development of toddlers born at or before 32 weeks gestation and their performance as compared to children of the same age that were born full-term. The authors selected 26 English children born premature and 26 English infants born full-term between the ages of three and four. The children born prematurely did not have any physical impairment impacting their language skills at the time of assessment. In order to fully assess the children's language abilities, receptive and expressive language and phonological short-term memory, were all measured to accurately investigate the subjects' language skills. The children were assessed in their home environment during a 45-minute diagnostic session. The researchers used the British Picture Vocabulary Scales-Long Form (BPVS) to assess receptive vocabulary knowledge, the Oral Vocabulary subtest of the McCarthy Scales of Children's Abilities and the Bus Story Test of Continuous Speech were used to assess expressive vocabulary knowledge, short-term memory tasks to assess the participants phonological memory skills, and a subtest from the Children's Test of Nonword Repetition was used in order to examine the children's phonological abilities (Briscoe et al. 1998).

The results indicated that the children born premature consistently performed at a lower level than the children that were born full-term in receptive and expressive vocabulary, expressive language, and phonological short-term memory for nonwords and digit sequences. After analyzing the

results, the data revealed that there were significant deficits in the preterm groups' raw score on the BPVS (receptive vocabulary knowledge) and the on the Bus Story Information score (expressive language skills). Even though the researchers reported that the premature group performed consistently lower than the full-term group in all areas, did not mean that all of the premature groups' scores were in the range of language delay. In order to accurately analyze the data, the authors divided the two groups into at-risk preterm children, no-risk pre-term children, and full-term children. Perinatal risk factors such as low birth weight, gestational age, Apgar scores, and respiratory factors were analyzed between the three groups in order to determine if these factors would attribute to the data collected. However, no significant differences were found between the groups concerning the perinatal risk factors. The at-risk preterm group performed significantly lower than the no-risk preterm and full-term groups on each skill assessed. When the no-risk group and the full-term groups' language skills were compared, it was found that there was no significant difference between their performances.

Briscoe et al. (1998) used a cut-off value system as defined by Bishop and Edmundson (1987) to determine the children in the preterm group that were at-risk for specific language impairment. The children in the at-risk preterm group displayed scores in language and phonology that were extensively impaired, and according to Briscoe et al. (1998), these children are considerably at risk for specific language impairment. Briscoe et al. (1998) collected further information on these children in the study. The researchers took previously collected data on the participant's language abilities at 12 and 24 months and found there were no significant deficits at the twelve month mark; however, at 24 months there were significant deficits in the language abilities of the at-risk preterm group.

Briscoe et al. (1998) indicated that as a whole, the preterm group scored significantly lower than the full-term group in the areas of receptive and expressive vocabulary, expressive language, and phonological skills. From these scores, the researchers divided the groups into an at-risk and no-risk preterm group and a full-term group. After examining these results, the at-risk preterm group had language scores that were significantly impaired. These results support the claim that premature birth could but does not always have a negative impact on a child's language development. Further analysis of previously collected data on the same participants at 12 and 24 months, coincided with the research of Jansson-Verkaslo et al. (2010) in that there were no delays found in children born premature at 12 months of age, but there were significant delays when the children reached 24 months. This correlation in results suggests that even though a 12-month-old child born premature seems to have adequate language skills, it does not mean these skills will continue to develop normally as the child ages. It is important to monitor the language development of children born premature in order to provide services needed. Early intervention is one such service that these children could benefit from in order to decrease the risk of further developmental delays as the child ages.

Ungerer and Sigman (1983) found similar results in their research concerning the effects of biological maturation on premature infants' development. They hypothesized that if biological maturation was the sole cause in influencing the premature infants' performance, then their test scores would be lower than their full-term peers. Their study involved three areas of development; one of these areas included language development. To begin the experiment, the researchers selected 20 full-term and 20 preterm infants. The authors only included preterm infants whose "general development was within the normal or borderline range at 13 ½ months corrected age" (Ungerer & Sigman, 1983, p.1218). At 22 months corrected age,

the children were given the Receptive and Expressive Emergent Language Scale (REEL) and a receptive language assessment developed by Bzoch and League (1971) to measure receptive and expressive language abilities. The children's language scores were measured again at 36 months using the Reynell Developmental Language Scales which also measure receptive and expressive language skills.

The results from the study indicated that at 22-months corrected age, the preterm groups' receptive and expressive language skills were poorer than the full-term groups on both tests (Ungerer & Sigman, 1983). In order to collect data from the REEL, the researchers collected information from the caregiver and made observations of the child's behavior. The data revealed there was a significant difference between the two groups' receptive and expressive language abilities (Ungerer & Sigman, 1983). The receptive language scale, as developed by Bzoch and League (1971), required the child to touch a picture of a real event or object as described by the examiner (Ungerer & Sigman, 1983). The preterm group demonstrated test scores lower than the full-term group with 18.7 words identified for the preterm children and 24.9 words identified for the full-term children. When the preterm children reached 36-months corrected age, they did not display any differences in scores from the full-term group on the receptive and expressive portions of the Reynell.

After analyzing these results, it can be determined that there is a difference in performance on language tasks at 22 months corrected age between the premature and full-term groups. These results support my claim that premature birth could have a negative effect on a child's language development, because the preterm group's performance was significantly lower at a measurement that was compared to the groups' corrected age. The preterm group's scores were measured again at 36 months corrected age and revealed that there were no significant differences between the two groups on

receptive and expressive language scores. However, this age was corrected as well, therefore it leaves one to question what the scores would indicate if the correction was not made. Rossetti (2001) found in Palisano, Short, and Nelson's (1985) work that, correcting for prematurity should be extended through 12 to 15 months of age, but after that the correction method should not be used. Therefore, it cannot be concluded if these results support or refute the stated claim, due to the late correction placed upon the premature groups' scores. Most professionals interacting with the early intervention population correct the age of premature children to one year, therefore, if these children's language scores fall within the delayed range, it would be important for them to receive such services. By implementing these services at an early age, receptive and expressive vocabulary skills can be addressed in a naturalistic context that will allow for further success when the child reaches school age.

Schirmer, Portuguese, and Nunes (2006) also investigated the language development of three-year-old children born premature. The focus of their research was to measure the impact of gestational age and birth weight on the language development and neurodevelopment (Schirmer et al., 2006). The researchers investigated this subject area because they believed that gestational age and low birth weight, both factors of premature birth, have a negative effect on language acquisition. Often times, children born premature can be born at a very young gestational age and/or have a dangerously low birth weight. All of these factors that coincide with premature birth can have extreme negative effects on the development of language skills. In order to begin their research, Schirmer et al. (2006) included 69 children, both male and female, who were born in the Neonatal Intensive Care Unit of Hospital São Lucas and who received further care at the Neonatal Follow up Outpatient Clinic. To participate in this study, the subjects had to be born before 37 weeks and weigh under 2500g at birth.

Language development of the participants was evaluated by using the observation technique of language behavior based on the Nicolosi Sequence of Language Development (Schirmer et al., 2006). The researchers assessed the participants' receptive and expressive language abilities by using a qualitative system that determined if language skills were adequate or altered (Schirmer et al., 2006).

After analyzing the data, it was found that 34 children presented with normal language development skills while 35 children presented with altered language development. Schirmer et al. (2006) also discovered that children with prematurity who fell within the altered language range, displayed low birth weight and smaller gestational age. Expressive language skills were also deemed to be developmentally delayed in premature children who had very low birth weight. From these results, it can be concluded that this study supports the claim that language development can be negatively affected by premature birth. Even though this study investigated the affects of gestational age and low birth weight on language development, these factors are two main characteristics of children born premature. These risk factors are important to recognize because children who have a young gestational age along with a low birth weight can be identified early for early intervention services. Since more children are surviving very early premature birth, it is important for early intervention services to be implemented as soon as the child is able in order to aide in development.

Caregiver Interactions with Premature Infants

One major aspect that can affect premature infant development is the quality of caregiver-infant interaction. I believe that if a premature child and caregiver participate in quality interactions, than child development will be enhanced. Studies that have provided further investigation involving the effects of caregiver-preterm infant interactions on language development have been included to support the stated claim.

Parent-child interactions can become altered when a child is born premature. As stated by Chesney and Champion (2008), "Parent competencies, such as formation of attachment relationships, serve an important function as an emotional and physiological regulator for all human species (pg. 145)." Marotta (2002) also adds that when examining development at an ecological level, parents have a great influence on how a child develops due to the quality of interactions provided to the child within their surroundings. Therefore, it is of utmost importance for caregivers to form a positive bond with their children in order to develop adequate linguistic skills. Meijssen, Wolf, van Bakel, Koldewijn, Kok, and van Baar (2010) investigated the importance of maternal attachment after very preterm birth due to the negative effects that preterm birth may have on the quality of attachment acquired. Meijssen et al. (2010) conducted this study by including infants born before 33 weeks gestational age as well as infants born under 1500g. The researchers divided the infants into a control group and an intervention group. For the intervention group, the researchers included mothers and preterm infants that were already participating in the Infant Behavioral Assessment and Intervention Program that addressed methods to increase the quality of social and environmental interactions (Meijssen et al., 2010)

The researchers collected data through maternal interviews and discovered that 70% of the mothers in both groups had balanced attachment representations and 30% of the mothers had unbalanced attachment representations. Even though the majority of the mothers had balanced attachments, over 50% of the mothers felt negative emotions the first time they saw their child and 65% of mothers had negative feelings the first few weeks at home with their child. It was reported that these negative feelings often came from fears about how small the infant was and additional medical conditions of the infant. Meijssen et al. (2010) also discovered that the mothers who were found to have non-balanced attachments with their infants

possessed negative emotions concerning the birth of their child. Even though these findings suggest that the majority of these mothers had balanced attachments with their child, it is important to realize that not all mothers and infants have balanced attachments after a child is born premature. That is why Meijssen et al. (2010) feels that it is important to provide immediate support for mothers of preterm infants so that more positive interactions can occur immediately after the baby is born. The idea of this prevention method is to increase the likelihood of a balanced attachment in order for the child to experience positive interactions needed to build the communication skills needed for development (Meijssen et al. (2010).

Meijssen et al. (2010) confirmed the finding that in order for the brain to develop, interaction must occur within an individual's surroundings. When preterm infants are first born, their behavior is unlike full-term infants; preterm infants are often times non-attentive, overly aroused, show more negative affect, and avoid eye contact (Meijssen et al., 2010). In order for a very premature infant to have the ability to interact with the world, they must first possess self-regulatory competence when they are infants (Meijssen et al., 2010). As defined by Bronson (2000) (as cited in Meijssen et al., 2010), self-regulatory competence is important for the infant's social interactive and exploratory opportunities, which are necessary for learning processes.

Therefore, Meijssen et al. (2010) investigated the effects of the Infant Behavioral Assessment (IBA) and Intervention Program on mother-infant interactions and how those interactions affect the infant's development. The researchers selected the IBA and Intervention Program because this program provides parents with skills that allow them to guide their infants' self-regulatory competence (Meijssen et al., 2010). Meijssen et al. (2010) included 176 preterm infants born under 32 weeks gestation and weighed less than 1500 grams. To analyze data, 53 participants were placed in the

intervention group and 56 participants were placed in the control group. The participants in the intervention group received therapy in their home environment six to eight times over the course of the experiment. After each session, the parents were provided with a report that included the infant's neurobehavioral and developmental progress. With this report, they were also provided with information on how to continue guiding their infant's self-regulatory competence development. The infants in the intervention group also attended regular visits to an outpatient pediatric clinic and were provided with standard care. However, infants in the control group just received standard care from the same clinic. The researchers hypothesized that the infants in the intervention group would display more positive interactions, therefore positively affecting their development. When the infants were six months corrected age, the researchers conducted a battery of tests, which included the IBA, the Bayley Scales of Infant Development, a physical examination, and the Still-Face procedure. The Still-Face procedure protocol instructed the caregiver to provide face-to-face social interaction, than an episode in which the infant experienced minor stress due to the unresponsiveness of the caregiver during still-face, and the final step, the reunion episode, reinstated caregiver interaction.

The results concluded that the infants in the intervention group showed less positive behavior when interacting with their mothers and were more focused on the environmental surroundings instead of the interaction with their mothers when participating in the intervention program at home. However, when the intervention group was administered the battery of tests at the local hospital, they focused more on the environment; unlike the control group which focused more on their mothers. Throughout the Still-face procedure both groups displayed less positive engagement with an environmental focus, as well as displaying negative behaviors during the reunion phase. When observing the intervention and control groups self-

regulatory competence, no differences were found throughout the procedure. However, the intervention group performed significantly better on the Bayley Scales of Infant Development.

The results of Meijssen et al. (2010) supports the claim that quality caregiver-infant interactions will increase a premature infant's communication development. The data concluded that the intervention and control groups maintained the similar social interaction behaviors for most of the areas measured. However, the intervention group displayed less positive behaviors than the control group in the first play episode that was conducted at the hospital. These behaviors included less smiling and more of a focus on environmental surroundings. The researchers suggest that the reason the intervention group demonstrated more interest in the environmental surroundings was because it is developmentally appropriate and more abstract to move focus from faces to objects; therefore the intervention group would be considered to have a greater developmental gain than the control group. The intervention group and the control group's cognitive development was also assessed at six months of age by using the Bayley Scales of Infant Development and it was found that the intervention group performed significantly better than the control group. These results could suggest that because the intervention group was participating in activities that focused on increasing the quality of interactions, the child in the intervention group was able to develop better communication abilities better than the control group. The increased communication abilities for the intervention group also correlated with the fact that the intervention group displayed higher cognitive scores than the control group when assessed at six months of age. Therefore, this article supports my claim that quality interactions, which are a result of appropriate attachment, positively affect the development of children.

Poehlmann et al. (2011) further investigated the interactions of mothers and their premature infants; however, the researchers' observations were made over a longer span of time at four, nine, 16, and 24 months. The researchers investigated mother-infant interactions and how these interactions were affected by premature birth. The objective of this research was to examine the individual differences in dyadic interaction trajectories between infants born premature and their mothers. Beckwith and Cohen (1980), DiVitto and Goldberg (1979), and Harrison and Magill-Evans (1996) (as cited in Poehlmann et al., 2011) suggested that research has shown that mothers of preterm infants tend to not actively engage with their premature infants and also display more negative dyadic interactions than do parents of full-term infants. Considering this information, the researchers hypothesized that the trajectory between the mother and child born premature would vary depending on each participant. The researchers also hypothesized that there would be some improvement in interactional behavior over a period of time between the mothers and their children.

In order to begin the experiment, 181 participants were selected on the basis that the infants were born at or before 35 weeks gestation, weighed less than 2500g, and presented with no congenital problems or neurological findings. Home visits were made when the infants were four and nine months old. During the visit, the mothers completed self-administered questionnaires along with the researchers recording 15 minutes of the mother and child interacting during play. The mothers were instructed to play with their child as they normally would while using toys in the child's environment. When the children reached 16 months and 24 months of age, the families were asked to continue the study in a laboratory playroom using developmentally appropriate toys provided by the experimenters. To assess the mother-infant play interactions, the Parent Child Early Relational Assessment (PCERA) was used. The PCERA includes three parent subscales: 1. Positive Affect,

Involvement, and Verbalizations, 2. Negative Affect and Behavior, and 3. Intrusiveness, Intensity, and Inconsistency and three child subscales: 1. Positive Affect and Social and Communicative Competence, 2. Quality of Play, Interest, and Attention, and 3. Dysregulation and Irritability.

The results of Poehlmann et al.'s (2011) study concluded that on average, the preterm infants' quality of play, interest, and attention improved over the span of the study. Data was also recorded to observe the mother's interactional abilities. It was noted that at four months, mothers of premature infants who experienced more neonatal health risks interacted displayed more positive affect, involvement, and verbalizations with their children than did mothers of infants with fewer neonatal health risks; this behavior continued over the span of the experiment. It was also noted that infants who were born closer to term displayed more complex interaction skills than infants younger in gestational age. Since play facilitates language, it can be assumed that the more complex a child's play is, the more their language skills will be adequately developed. Infants who were born closer to full gestational age possessed more complex play skills in this study. This evidence supports my claim that when infants are provided with quality interactions their language skills become more complex. Because of the results of this article, my claim is valid.

Rocissano and Yatchmink (1983) stated in their study, "Research has shown that a potent factor in predicting outcome is some quality of the interactions between infants and caregivers (p. 1229)." Rocissano and Yatchmink (1983) further investigated caregiver interactions with toddlers born premature. The researchers believed that for a child to maintain a social interaction, they are required to use the majority of their cognitive ability. Therefore, if an adult wants to maintain an interaction with a child developing language skills, they must attend to the topic the child chooses. If a caregiver adequately responds to a toddler's interaction, then

the toddler has the ability to use more of their cognitive resources for skills such as language development (Rocissano & Yatchmink, 1983). In this study, the researchers investigated the behaviors that mothers and toddlers use to maintain joint attention, as well as behaviors that lead to breaks in joint attention (Rocissano & Yatchmink, 1983).

To start their research, Rocissano and Yatchmink (1983) selected 20, 24 month old children that were born before 36 weeks gestation and weighed less than 2500g at birth. The interactions between the mother and the child were videotaped in a laboratory playroom during half hour sessions. During the sessions, each mother was asked to interact with their child as they normally would on a daily basis. In order to initiate interaction between mother and child, the experimenters provided a child-sized table, a shelf containing toys, three large pillows, juice, and cookies. The interactions between mother and child were recorded and transcribed each session; in turn, providing the researchers with information regarding the quality of interaction along with the child's Mean Length of Utterance (MLU).

According to the results, children that were allowed to lead the topic of discussion were found to have more success in generating language skills as opposed to the interactions that were more directed by the mother. It was also observed that the more attentive the mother was to the child lead interaction, the more complex the child's language became. The mean MLU was 1.51, meaning, most of the children were able to provide at least two-word sentences; which according to Bloom, Lightbown, and Hood (1975) (as cited in Rocissano & Yatchmink, 1983), these skills are often evidence of emerging grammatical skills. The mean scores of the children's language abilities also suggested that most of the children's language became more complex. Even though the mean average of the scores displayed emerging complex language skills, many of the children did not achieve this success when scores were assessed individually. This means that when each of the

participant's scores were examined, the majority of the participants did not achieve adequate language scores, but appeared to have adequate language abilities when the scores were averaged with participants who had achieved above average language scores. Due to the discrepancy between individual scores, the researchers divided the children into High and Low language groups. After dividing the groups, the authors then analyzed the quality of interaction between mother and child as compared to the child's MLU. The data revealed that the child's developing linguistic skill was correlated with the amount of time the mother and child maintained topic. The High group was more synchronous in their interactions as compared to the Low group. The High group also shared a joint topic more frequently than the Low group.

Rocissano and Yatchmink (1983) state, "the preterm child's linguistic skill is associated with the maintenance of joint attention in dyadic interaction (pg. 1238)." Therefore it can be concluded that when a mother or caregiver provides a quality interaction, such as staying attentive to a child's topic, it can facilitate complex language skills. This supports the claim that when a premature child is provided with a quality interaction by their caregiver, they are given an opportunity to develop more adequate language skills.

Young and Hauser-Cram (2006) also conducted research similar to Rocissano and Yatchmink's (1983) in that the investigators looked at the effects of mother-child interactions on a born premature child's mastery motivation ability. Thirty-four three-year-old children born premature with biological disabilities were included in this study along with their mothers. The researchers collected data in the child's home environment which the child's cognitive skills, mastery motivation skills (problem solving skills, and mother-child interactions were assessed.

The results indicated similar findings as Rocissano and Yatchmink (1983) investigation. Young and Hauser-Cram (2006) found that the children's ability to use high complex problem solving skills correlated with the child's cognitive abilities and quality of interactions received from the mother. The more the mother reacted to the child in a positive manner that provided cognitive stimulation the better the child was able to problem solve. This article does support my claim that the more quality interactions a child receives from their caregiver, the more they are better able to develop adequate skills required for cognitive development. Due to the evidence found, it would be valuable for a toddler born premature to receive early intervention services in order for the caregivers to develop their ability to promote linguistic development through holistic social interactions (Marotta, 2002).

Conclusion

According to the articles pertaining to the effects of premature birth on language development, the claim that language development is negatively affected before children reach school age is valid. All of the articles pertaining to this claim fully support the idea that premature birth negatively effects a child's language development during the first years that are crucial to the development of adequate language skills. The information acquired from this research, can be used to advocate for early intervention language therapy for children born premature. Children born premature do not always exhibit signs of a language delay. Therefore, it is imperative for parents and caregivers to monitor their child's progress in order to seek appropriate services for language delays that can be detrimental to complex processing tasks.

The claim regarding the negative of effects on language development in school-age- children born premature is valid. The articles that have been included fully support the thought that children born premature will have

difficulty in school due to the complex processing required to complete difficult language tasks. It is also imperative for children in this age group to receive services that aide in the deficits of complex language processing tasks. Children at this age level could receive services in school or could early intervention services. Early intervention services could facilitate the development of imperative language skills that are required of children as they enter school. Parents and caregivers need to be aware of the risk factors that are present for their premature child in order to seek adequate services.

Regarding the claim the effects of caregiver -infant interaction a premature infant's language development, it was found that one out of the three articles supported the stated claim. The research conducted by Rocissano and Yatchmink (1983) fully supported the idea that the quality of caregive-infant interaction effects the language of children born premature. The research conducted by Meijssen et al. (2010) and Poehlmann et al. (2011) do not fully support the claim of the positive of effects of caregiver-infant attachment on a premature infants language development. Meijssen et al. (2010) suggests that the subjects maintained the same amount of social interaction with their mothers throughout the research and showed no differences in social interaction abilities. However, the premature infants of the premature group had higher scores on the Bailey Scales of Infant Development, but this is the only information that suggests there is a positive correlation between language development and caregiver -infant interaction. Therefore the claim cannot be fully supported due to the lack of evidence. Poehlmann et al. (2011) conducted similar research and discovered that caregiver-infant interaction did not correlate with linguistic abilities due to the finding that the children who had less complex play skills had parents that interacted with them frequently. Even though these results suggest there is no impact on caregiver-infant

interaction on language development, there are multiple research studies that suggest the opposite. The quality of the caregiver-infant interaction is important for language development. Early interventionists are experts in the area of caregiver-infant interaction and can facilitate those interactions in order to positively affect language development. Caregivers need to be aware of these services in order to provide a language thriving environment for their premature child.

Future research should be focused on specific abilities of premature infants. Syntax, semantics, morphology, phonology, and pragmatics are all areas that should be further studied. If data was available in these areas, then children born premature could receive appropriate services in order to aide in their development. Further research should also be conducted on the effects of medical complications on language development. By conducting this research, professionals could identify infants to be at risk for significant delays in all areas of language development. Research could also be conducted on the effects of early intervention on a premature infant's language development; which would include the five areas of language. Early interventionists could apply this data to therapy in order to implement effective therapeutic procedures for the language development of children born premature.

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Research Paper Title:

The Effects of Premature Birth on Language Development

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