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# An Examination of the Effects of a Summer Book-Reading Program on the Language and Early Literacy Outcomes of Toddlers from High Risk Environments

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

AN EXAMINATION OF THE EFFECTS OF A SUMMER BOOK-READING  
PROGRAM ON THE LANGUAGE AND EARLY LITERACY OUTCOMES OF  
TODDLERS FROM HIGH RISK ENVIRONMENTS

A dissertation submitted in partial fulfillment of

the requirements for the degree of

DOCTOR OF EDUCATION

in

CURRICULUM AND INSTRUCTION

by

Mary Anne Ullery

2012

To: Dean Delia C. Garcia  
College of Education

This dissertation, written by Mary Anne Ullery, and entitled An Examination of the Effects of a Summer Book-Reading Program on the Language and Early Literacy Outcomes of Toddlers from High Risk Environments, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Laura Dinehart, Major Professor

Date of Defense: March 28, 2012

The dissertation of Mary Anne Ullery is approved.

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Florida International University, 2012

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## DEDICATION

This is dedicated with love to my husband, Federico, my children Isabel, Graciela and Benjamin, and to my parents, Thomas and Mary Sue Ullery. Your patience and support kept me moving forward.

## ACKNOWLEDGMENTS

Thank you to the wonderful children who participated in the Linda Ray Program.

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Finally, I must acknowledge a debt of gratitude to my committee chair, Dr. Laura Dinehart, whose incredible knowledge of research with high risk families and writing has helped guide me through this process. I would have never made it this far without her help, intuitive guidance and most of all, her friendship.

ABSTRACT OF THE DISSERTATION

AN EXAMINATION OF THE EFFECTS OF A SUMMER BOOK-READING  
PROGRAM ON THE LANGUAGE AND EARLY LITERACY OUTCOMES OF  
TODDLERS FROM HIGH RISK ENVIRONMENTS

by

Mary Anne Ullery

Florida International University, 2012

Miami, Florida

Professor Laura Dinehart, Major Professor

The current study examined the impact of an early summer literacy program and the mediating effects of the home literacy environment on the language and literacy outcomes of a group of children at-risk for long-term developmental and academic delays. Participating children (n=54) were exposed to an intensive book-reading intervention each summer (June through mid August) over a 3-year period.

The current study implemented an ex post facto, quasi-experimental design. This nonequivalent group design involved a pretest and posttest over three time points for a non-randomized treatment group and a matched non-treatment comparison group.

Results indicated that literacy scores did improve for the children over the 3-year period; however, language scores did not experience the same rate of change over time. Receptive language was significantly impacted by attendance, and race/ethnicity. Expressive language was impacted significantly by gestational age and attendance. Results also indicated that language outcomes for young children who are exposed to a literacy program were higher than those who did not participate; however, only receptive

language yielded significance at the  $p < .05$  level. These study results also found that activities in the home that support literacy and learning do indeed impact language and literacy outcomes for these children, specifically, the age at which a child is read to, the number of books in the home, a child's enjoyment of reading, and whether a child looks at books on his or her own impact language scores.

This study concluded that at-risk young children do benefit from center-based literacy intervention. This literacy experience, however, is also driven by the children's home environment, their attendance to the program, whether they were premature or not and the type of caregiver.



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## CHAPTER I

### INTRODUCTION

Literacy is currently viewed as a process which begins long before a child enters school. Young children's participation in early book-reading and other such literacy practices are generally thought to be paramount for the development of both language and literacy skills. Research has found that children who are exposed to book reading in the home are stronger readers in second grade than those who are exposed less frequently (Scarborough, Dobrich, & Hager, 1991). Following an ex post facto research design, merging two data sets, this dissertation study examined the impact of an early summer literacy program and the mediating effects of the home literacy environment on the language and literacy outcomes of a group of children at-risk for long-term developmental and academic delays. Participating children were exposed to an intensive book-reading intervention each summer (June through mid August) over a three-year period. Children were administered a teacher-reported, researcher-designed literacy pretest at the beginning of each summer and posttest at the end of each summer. Children were also administered the Reynell Developmental Language Scale (Reynell, 1990) at 18- and 24- and 36-months. At 36 months, children were tested using the Bracken School Readiness Assessment (Bracken, 2007). Families completed two surveys: The Stony Brook Family Reading Survey (Whitehurst et al., 1999) and Activities for Parents and Children.

## **Purpose**

Research indicates that the early language and literacy experiences of young children have significant effects on their long-term academic success (DeBaryshe, 1993; Payne, Whitehurst, & Angell, 1994; Fletcher & Reese, 2005; Karrass & Braungart-Rieker, 2005; Raikes et al., 2006). More specifically, research has suggested that children who are exposed to literacy materials and activities at a young age have greater vocabulary and more advanced literacy skills in the early years of elementary school (DeBaryshe, 1993; Karrass & Braungart-Rieker, 2005; Payne, Whitehurst, & Angell, 1994; Fletcher & Reese, 2005; Raikes et al., 2006). The purpose of this dissertation study is to expand the knowledge base on effective summer literacy programs for young children at-risk for poor outcomes. This research was designed to examine the effect of a book-reading intervention on the literacy outcomes of children prenatally exposed to cocaine, as well as the extent to which the home environment mediates and/or moderates the effect of the intervention.

## **Derivation of Research Questions and Hypotheses**

The home environment has a significant impact on the language and literacy outcome of young children. For many youngsters, early literacy experiences are filled with language, books, and other literacy materials that promote the development of their early literacy skills (Hart & Risley, 1995). In direct contrast to their middle income peers, children from economically disadvantaged homes are typically exposed to early literacy experiences that are typically hindered by impoverished learning environments and characterized by limited access to both spoken language and literacy materials (Hoff-Ginsberg, 1998; Morisset, Barnard, Greenberg, Booth, & Spieker, 1990).

Hart and Risley (1995) cited that the major discrepancies in vocabulary that had been recorded between children from low-income homes and children from middle income homes were tremendous differences in the vocabulary growth rates of the children. Although a number of variables account for differences in vocabulary in children, the most stable difference, they argued, was parents' frequency of speech. Parents who spoke with greater frequency in the home had children who acquired vocabulary at a faster rate than children whose parents spoke with less frequency with their children (Hart & Risley, 1995). More importantly, parents from middle and high-income families spoke to their children significantly more than parents of low-income families.

Research focused on improving the language and literacy development of at-risk populations has been abundant. In fact, over the past 15 years, researchers have seen a marked increase in the number of studies examining the efficacy and effectiveness of various emergent summer literacy program approaches (Justice & Pullen, 2003). Although some interventions have focused on targeting specific emergent literacy skills, including oral language, alphabet knowledge, phonological awareness, and phonemic awareness others have looked at the more general effects of intervention approaches on early literacy behaviors.

Children prenatally exposed to cocaine represent an early identifiable population at significant risk for poor developmental outcome and most likely to benefit from prevention and early intervention services. Much of the work on prenatal cocaine exposure suggests that the teratogenic effects of cocaine are more limited than previously thought. Instead, research suggests that environmental factors related to the substance

abuse places a child at-risk for early developmental and academic delays (Azuma & Chasnoff 1993; Messinger, Bauer, Seifer, Lester, Lagasse, & Poole, 2004). Prenatally, children exposed to cocaine are also more likely to be exposed to inadequate nutrition, poor prenatal care, and other substances including tobacco, cigarettes, and other illicit substances (Azuma & Chasnoff, 1993; Messinger et al., 2004). Postnatally, children of substance abusing parents are exposed to various other risk factors, including poverty, homelessness, regular changes in custody, low parental education, and parental psychopathology (Phelps et al., 1997; Singer et al., 2004). Recent studies have indicated that the quality of home environment is a better predictor of cognitive and language outcomes than prenatal cocaine exposure (Hurt et al., 2001; Singer et al., 2004). Although research has examined the role of the environment on developmental outcome and the effect of intervention practices, limited research has evaluated the moderating role of family factors on the effects of early intervention.

### **Research Questions and Hypotheses**

Children who establish successful early reading skills are more likely to develop into and remain successful readers, while children who experience difficulty in learning to read are more likely to continue to have difficulties reading throughout the school years (Adams, 1990; Baydar, Brooks-Gunn, & Furstenberg, 1993; Cunningham & Stanovich, 1997; National Research Council, 1998). A better understanding of early literacy interventions as well as the home influences on children's achievement will help the field move forward in developing appropriate early learning programs to facilitate future literacy learning success.



### **Research Question 1**

Does a summer literacy program significantly improve both the language and early literacy outcome of children prenatally exposed to cocaine?

Hypothesis 1a: It is hypothesized that all of the children who received the intervention will demonstrate growth in both expressive and receptive language and early literacy skills from Time 1 to Time 3.

Hypothesis 1b: Selected demographic characteristics such as gender, race/ethnicity and gestational age and attendance (dosage) are expected to moderate the effects of the reading program as measured on expressive and receptive language outcomes and early literacy skills.

### **Research Question 2**

Do children prenatally exposed to cocaine who participated in the summer book-reading program have higher language scores as measured on the Reynell Developmental Language Scale (RDLS) than children prenatally exposed to cocaine who have not participated in the summer book-reading program?

Hypothesis 2: At 36 months, children who participated in the intervention are expected to demonstrate significantly higher language scores as measured on the RDLS, than a matched group of LRIC center-based participants who were not enrolled in the summer literacy program.

### **Research Question 3**

To what extent are family literacy variables predictive of overall language, literacy, and school readiness outcomes at 36 months for the children who participated in the summer literacy program?

Hypothesis 3: It is hypothesized that children who participate in the summer literacy program and live in homes that support literacy through activities such as available and appropriate books in the home and frequency of caregiver reading to child, will have higher language as measured on the RDLS ,emergent literacy as measured on the Literacy Measure and school readiness as measured on the Bracken School Readiness Assessment, than those who participated in the program and live in homes that do not support literacy.

A number of studies reported significant associations between children's home literacy environment and later language and literacy skills (Bailey, 2006; DeJong & Leseman, 2001; Haden, Reese, & Fivush, 1996; Senechal & LeFevre, 2002; van Kleeck, Gillam, Hamilton, & McGrath 1997). It is hypothesized that children who reside in homes where parents reported greater support at home for literacy, such as reading books, talking to their child, going to the library and more, will achieve better receptive language, expressive language, and pre-literacy outcomes than those children whose parents report less support of literacy practices in the home. Exploratory analyses will examine whether specific home variables are more strongly related to language and literacy outcome than others.

The Linda Ray Intervention Program (LRIP) is an early intervention study designed to examine three modalities of intervention and their effect on developmental outcomes of children, birth to three years of age, who were prenatally exposed to cocaine (for a description see Claussen et al., 2004). Research from the LRIP suggests that children who receive center-based early intervention services demonstrate higher cognitive and language scores than a non-intervention control group (Bono et al., 2005).

Yet at 12 months of age, two-thirds of toddlers participating in the program continue to demonstrate language delays. By 36-months, the children were near or in the at-risk range on standardized measures (Bono et al., 2005). Although research has suggested that children prenatally exposed to cocaine benefit from early intervention services (Claussen et al. 2004; Bono et al. 2005, Dinehart et al. 2008), proximal variables outside school also have a dramatic impact on the child's developmental outcome (Dinehart et al., 2006). This study investigated the mediating and moderating effects of the home environment on summer literacy program outcomes with children at-risk for poor developmental outcomes.

### **Rationale**

Children prenatally exposed to cocaine represent an early identifiable population that is likely to benefit from prevention and early intervention services. Despite initial reports of long-term effects of pre-natal drug exposure on children, current evidence indicates that in-utero cocaine exposure is classified, at most, as a mild teratogen. Only a few studies indicate the presence of developmental delays linked specifically to prenatal cocaine exposure (Bandstra, Morrow, Vogel, Fifer, Ofir, Dausa, Xue, & Anthony, 2002; Singer, Arendt, Minnes, Farkas, Salvator, Kirchner, & Kliegman, 2002). Although some of the small, but significant effects of prenatal cocaine exposure have been linked to language functioning and attention processing in early childhood (Bandstra et al., 2001; 2002), most of the work on prenatal cocaine exposure suggests that it is other prenatal and postnatal environmental factors related to living with substance abusing parents that place the child at high risk for developmental delays. Given the typically impoverished home environment of children prenatally exposed to cocaine, the opportunity to develop

emergent literacy skills in the population is well-needed. Although research in the field of early childhood literacy is growing, studies with conflicting outcomes complicate the translation into practice. Conflicting findings may be the result of research failing to examine the mediating role of the family on outcome. This study examined the intervention outcomes as well as the mediating and moderating variables of the home environment, in an effort to expand the knowledge base on effective summer literacy programs for young children.

### **Assumptions**

The researcher made the following assumptions: (a) Parents provide honest responses to questions on the surveys and questionnaires. (b) Teachers accurately report child behavior at pretest and posttest. (c) Research Associates administer language and preschool readiness testing appropriately.

### **Definition of Terms**

The following are the definition of terms used for this research:

**Home environment.** This term is used throughout this study to describe any literacy activities that the child engages in the home. Activities examined are educational television programming, looking at books, family reading, number of books in the home, child enjoyment of book reading, listening to music, and singing. Home environment, measured by the Stony Brook Family Reading Survey, in this study is also measured by caregiver-child joint such as visiting family, playing games, listening to music together, looking at books and more.

**Language.** For the purposes of this study, language, measured by outcomes on the Reynell Developmental Language Scale is defined as expressive and receptive language

skills. Expressive language refers to the language expressed verbally by the child.

Receptive language refers to the language understood, but not necessarily expressed by the child. Children exhibit their receptive language ability by following developmentally appropriate directions communicated by the test administrator.

**At-risk.** Children in this study are at-risk for maltreatment and developmental delays. All children in the study were prenatally exposed to cocaine and reside in neighborhoods with large numbers of single parent families, and in areas with unusually high percentages of children receiving free or reduced lunch. Children born to substance abusing mothers are at-risk for developmental delays, poor academic achievement, and as a result of the impoverished environments in which they reside.

**Summer literacy program.** The summer literacy program used in the current study is a 2-month summer program in which children were read the same book daily, for 3 weeks by their teachers. Books are rotated every three weeks so that children experience consistency with text, learning to “read” familiar text, while still having the opportunity to experience new text, new illustrations, and a new story. The current summer literacy program uses a slight modification of Dialogic Reading practices and print referencing practices.

**Dialogic reading.** Refers to an adult-child reading strategy that uses evocative or interactive behaviors during story book reading. While reading, the adult incorporates behaviors including open-ended questions, following children’s responses with questions, expanding on children’s comments, and offering praise for participation in reading (Whitehurst et al., 1994).

**Print referencing.** Refers to a book reading strategy that utilizes adult-child shared book reading context and incorporates verbal and nonverbal references to the print in the story (Justice & Pullen, 2003).

**School readiness.** School readiness refers to the early skills and concepts that have been significantly correlated with academic success once children enter school. In the current study, The Bracken School Readiness Assessment (BSRA; Pearson Education, Inc. 2010) is used as a measure of early child readiness. The BSRA combines six sections and subtests to determine concept knowledge: colors; letters; numbers/counting; sizes; comparisons; and shapes.

**Emergent literacy.** Emergent literacy is a term used to describe the early literacy skills that are precursors to the development of reading skills in elementary school (Justice & Pullen, 2003; Sulzby, 1989; Teale & Sulzby, 1986). Children in the emergent literacy stage are said to learn through a sociocultural process strongly influenced by the social and cultural experiences of the child. During this time, children learn early reading behaviors such as the function of print and oral and written language (Goodman, 1986; Justice & Ezell, 2001; Justice and Pullen, 2003), the phonological structure of language (Ball, 1997; Bradley & Bryant, 1983; Lonigan, Burgess, Anthony, & Barker, 1998) and various elements of print and speech, including an understanding of the term “word” as a unit of spoken language (Bowey, Tunmer, & Pratt, 1984; Tunmer, Bowey, & Grieve, 1983). Included in these skills is how a child treats books, responds to book reading, and presents early literacy behaviors. Young children demonstrate early literacy by treating books appropriately (holding the book upright, turning pages), engagement with the book

such as pointing, and imitation of book reading such as retelling a story, predicting what happens next or completing a rhyme.

**Prenatal cocaine exposure (in-utero cocaine exposure).** Cocaine readily crosses the placenta and is slowly metabolized by fetuses, therefore causing them to be exposed to high levels of cocaine for extended periods. The most common consequences of prenatal exposure to cocaine are physical, such as premature birth, low birth weight, respiratory distress, and more (Keller & Snyder-Keller, 2006).

### **Overview of the Chapters**

In this chapter, the researcher described the background and the purpose of the study as well as the research questions, rationale, and hypotheses for the study. Chapter 2 is an overview and critique of the literature related to the research questions. In Chapter 3, the researcher illustrates the design of the study and methods used to address each of the research questions. Comprehensive results of the data analysis related to the research questions and hypotheses are described in Chapter 4. Finally, Chapter 5 is a summary of the study, an overview of significant findings, a discussion of the limitations of the study and implications for the study to be translated into practice.

## CHAPTER II

### REVIEW OF THE LITERATURE

Research indicates that the early language and literacy experiences of young children have significant effects on their long-term academic success (Fletcher & Reese, 2005; Karrass & Braungart-Rieker, 2005; Raikes et al., 2006). More specifically, a great deal of work suggests that children who are exposed to literacy materials and activities at a young age have greater vocabulary and more advanced literacy skills in the early years of elementary school (DeBaryshe, 1993; Payne, Whitehurst, & Angell, 1994; Fletcher & Reese, 2005; Karrass & Braungart-Rieker, 2005; Raikes et al., 2006). In light of the No Child Left Behind Act of 2001 and the current focus on school readiness, it is not surprising that both federal and state resources have been dispensed to implement early summer literacy programs to populations at-risk for poor academic achievement, specifically, the President's budget proposal for 2013 includes \$300 million in new funding to improve child care quality and to prepare all children for school success. Significantly less work has focused on children below the age of four (Raikes et al., 2006), and early identifiable populations at greatest risk for failure. The goal of the current study is twofold: (a) to examine the effects of an early summer literacy program designed to improve the receptive language, expressive language, and literacy skills of children prenatally exposed to cocaine and (b) to determine the extent to which the home environment mediates or moderates the impact of the intervention on early language and literacy skills.

Research indicates that early language and literacy skills are critical to long-term academic success (Baydar, Brooks-Gunn, & Furstenberg, 1993; Cunningham &



Stanovich, 1997). Children who establish successful early reading skills are more likely to develop into and remain successful readers, while children who experience difficulty in learning to read are more likely to continue to have difficulties reading throughout the school years (Adams, 1990; Baydar, Brooks-Gunn, & Furstenberg, 1993; Cunningham & Stanovich, 1997; National Research Council, 1998). Emergent literacy is a term used to describe the early literacy behaviors that are precursors to the development of reading skills in elementary school (Justice & Pullen, 2003; Sulzby, 1989; Teale & Sulzby, 1986). Children's emergent literacy skills are important for later reading success (Lonigan et al., 2000; Senechal & LeFevre, 2002; Storch & Whitehurst, 2002; Wagner et al., 1997). Children in this stage are said to learn through a sociocultural process strongly influenced by the social and cultural experiences of the child that are critical to developing language and later reading. The sociocultural examination of learning and development were first noted by Vygotsky in the 1920's and 1930's. In education, sociocultural theory states that learning takes place in a cultural context, mediated by language, symbols and the historical context (John-Steiner & Mahn, 1996). Vygotsky examined his theory along several subjects such as language and thought, art, learning and development (John-Steiner & Mahn, 1996). The power of this theory lies in the interdependence of social and individual processes, emphasizing the interdependence of the external (social or cultural) and the internal (the individual) (John-Steiner & Mahn, 1996). This principal illustrates a learning process where the learner depends on others first, but over time they take the responsibility for their learning and the process becomes a joint activity (John-Steiner & Mahn, 1996). Acquiring language also illustrates the social role in development. It is in the individual relationships that form the foundation

for both cognitive and linguistic mastery and all relationships are based in culture (John-Steiner & Mahn, 1996). During this time, children learn early reading behaviors such as the function of print and oral and written language (Goodman, 1986; Justice & Ezell, 2001; Justice and Pullen, 2003), the phonological structure of language (Ball, 1997; Bradley & Bryant, 1983; Lonigan, Burgess, Anthony, & Barker, 1998) and various elements of print and speech, including an understanding of the term “word” as a unit of spoken language (Bowey, Tunmer, & Pratt, 1984; Tunmer, Bowey, & Grieve, 1983). All of this is learned through language, stories and books.

### **Emergent Literacy**

Historically, little mind was paid to young children not yet enrolled in school as they were not considered to be literate. It was not until the 1980's that a shift in paradigm began a new focus on supporting reading in young children. Emergent literacy, a term established by Marie Clay (1993), refers to the early literacy skills young children develop well before they become conventional readers. These early developmental skills, which include phonological awareness, alphabet knowledge, print awareness, and vocabulary are all significant predictors of future reading development (Badian, 1998; Storch & Whitehurst, 2002). Federal agencies have placed a significant emphasis on early reading with the passing of No Child Left Behind (2001) and program funding associated with the bill, such as Early Reading First. Children that enter school without these skills are often considered at-risk for academic failure. Recently research has shown that emergent literacy skills are directly related to later reading development (Justice & Ezell, 2002). In an attempt to increase the early reading and academic performance of all children, more recent research has evaluated methods of intervention aimed at increasing

young learners' early literacy skills (Christie & Enz, 1992; Justice & Ezell, 2002; Lonigan, Anthony, Bloomfield, Dyer, & Samwel, 1999; Whitehurst et al., 1994). Although research has grown significantly over the last decade, there remains a need to understand the role of literacy programs for children who are at significant risk for delays in the areas of language and literacy. In support of the development of early literacy skills, National Association for the Education of Young Children (NAEYC) and the International Reading Association (IRA) have issued a joint position statement suggesting that book-reading is the most important factor in the development of emergent literacy skills (NAEYC & IRA, 2010).

### **Interventions**

Knowledge of early language and literacy is gained gradually through regular exposure to the written word, both at home and in preschool (Adams, 1990; Dickinson & Tabors, 2001). For many children, environmental risk factors, such as poverty and low levels of parental education can place them at greater risk for experiencing difficulties in the development of critical early literacy skills than children who come from educationally rich environments. As such, researchers have developed interventions designed to improve the language and literacy outcomes of children at-risk for early language and literacy delays, however the majority of these intervention studies examine children age three or older.

Research focused on improving the language and literacy development of at-risk populations has grown significantly. In fact, over the past 15 years, researchers have seen a marked increase in the number of studies examining the efficacy and effectiveness of various emergent summer literacy program approaches (Justice & Pullen, 2003). Many

of these studies have focused primarily on answering the following question: *What types of summer literacy programs have a greater impact on child language and literacy development?* Some interventions focus on targeting specific emergent literacy skills, including oral language, alphabet knowledge, phonological awareness, and phonemic awareness, while others have looked at the more general effects of intervention approaches on global literacy behaviors. Justice and Pullen (2003) describe three programs demonstrating effectiveness in promoting the emergent literacy skills of young children. These include adult-child shared storybook reading, literacy-enriched play interventions, and teacher-led structured phonological awareness curricula. Although all of these strategies have shown promise in improving early language and literacy behaviors; much of the empirical evidence supports programs that implement adult-child shared storybook reading.

### **Adult-child shared storybook reading**

The interactive nature of adult-child shared book reading has been shown to provide children of all ages with repetition, motivation, and meaningful interactions with the written word (Watkins & Bunce, 1996). Thus, it is not surprising that shared book reading is a powerful tool in supporting emergent literacy (Snow et al., 1998). Children with increased access to reading with an adult have been shown to have substantial gains in alphabet knowledge and print concepts (Neuman, 1999). Moreover, adult-child shared book reading allows children to gain knowledge of oral and written language and an understanding of appropriate book reading behaviors modeled by the adult. Shared book reading not only permits the child to gain emergent literacy skills merely as a result of exposure to books, but it provides an opportunity for the adult to modify their behaviors

and actions to the unique needs of the child. As such, the interaction between the adult and the child during book reading sessions accelerates the rate at which the child's emergent literacy skills develop (Justice & Pullen, 2003). Much of the research in the field of adult-child book reading involves two evidence-based practices: dialogic reading and print referencing.

### **Dialogic Reading**

Dialogic Reading refers to an adult-child reading strategy that uses evocative or interactive behaviors during story book reading. While reading, the adult incorporates behaviors including open-ended questions, following children's responses with questions, expanding on children's comments, and offering praise for participation in reading (Whitehurst, et al., 1994). In one study, dialogic reading training was implemented with mothers and their children with mild to moderate language delays. Mothers were trained via videotaped presentation on effective ways to facilitate language during joint reading and were then pre videotaped reading to their child and 8 weeks later posttested using the dialogic reading skills they learned in the training. Results indicated that dialogic reading increased the rate of both the verbal responses and questions asked by participating children. The mean length utterance (or number of consecutive words uttered by the child) was also enhanced by mother's use of dialogic reading (Dale et al., 1996).

Dialogic reading has also been successful in the early childhood classroom. Whitehurst, Arnold, Epstein, Angell, Smith, and Fischel, (1994) and Whitehurst, Zevenbergen, Crone, Schultz, Velting, and Fischel (1999) both examined the impact of dialogic reading interventions on low-income three and four-year-old children in Headstart. Both studies examined the impact of teacher-led dialogic reading multiple

times per week and compared the literacy outcomes of the intervention group with a control group that received the general education curriculum. In one study (Whitehurst et al, 1994), findings suggested the dialogic group improved writing and print concepts, but no difference was observed for phonological awareness. In a later replication (Whitehurst, et al., 1999) similar results were observed, but longitudinally followed the children into kindergarten and first grade. At kindergarten, children who had participated in dialogic reading continued to perform significantly better than the control group in writing and phonological awareness, but not in print concepts.

Many intervention studies have focused on teacher led instruction, however some have also centered on parent and even a combination teacher-parent intervention. One combination of teacher plus parent reading interventions for language delayed children with repeated book reading and dialogic reading found that parents and staff both significantly changed their book reading style (Crain-Thoreson & Dale, 1999). Yet, the intervention's effects were limited with regard to children's vocabulary growth as measured by standardized measures (Crain-Thoreson, & Dale, 1999). Upon closer examination, children in the reading groups significantly improved their mean length utterance (MLU) from pre-intervention to post-intervention (Crain-Thoreson, & Dale, 1999).

In another study, dialogic book reading intervention was compared to an everyday typical book reading treatment. Both were implemented in a daycare-plus-home intervention model. The participants in the study were preschool children scoring 13 months below their chronological age on both expressive and receptive measures of vocabulary. Findings indicated that children in the dialogic book reading intervention

made larger gains in vocabulary than children in the regular book reading treatment (Hargrave & Senechal 2000). Although the initial design of the study was for daily reading practices in the home, parental participation was inconsistent. The study examined participation as a parent report of how their child enjoyed the books and if they were able to identify the books being sent home to read from the school. Although parental participation was inconsistent, with some parents not reading at all, children in the treatment group (participating in dialogic reading with teachers) made greater gains in language, specifically in vocabulary, after a 4 week intervention than those engaged in a non-dialogic intervention. These examples suggest that the results of dialogic reading, with at-risk, language delayed and typically developing children may be significant irrespective of parental participation and family environment.

### **Print Referencing**

Print referencing is a relatively new book reading strategy that utilizes adult-child shared book reading context and incorporates verbal and nonverbal references to the print in the story (Justice & Pullen, 2003). Currently, print referencing techniques are being researched especially with preschool children with language impairments and children educated in early childhood special education programs through grant funding from the Institute of Educational Sciences (IES). The goal of the research is to determine the extent to which a print-referencing intervention accelerates children's emergent literacy skills. Verbal behaviors used during print referencing include questions about the print in the story ("Where should I start reading on this page?"), comments ("We know this letter-it's an A!"), and requests ("Point to the dog's words") (Justice & Pullen, 2003).

Nonverbal cues used during print referencing include pointing to text while reading and tracking (Justice & Pullen, 2003).

Although much of the research on print referencing strategies are limited, one longitudinal study examined the impact of two classroom literacy environments over a 30 week period to determine whether child preschool literacy outcomes differed between a print referencing condition and an everyday shared reading condition (Justice, et al. 2009). The study randomly selected children from classrooms in economically disadvantaged schools and randomly assigned the classrooms to one of the two conditions. Six different measures were used to examine literacy outcomes for children (Justice, et al., 2009). Results indicated that children in the print referencing group demonstrated significant differences from the non-intervention group across three measures of print knowledge, including print concept knowledge, alphabet knowledge, and name writing.

In a group of typically developing preschoolers, children exposed to print referencing strategies have also been found to outperform their control group peers on word awareness, segmentation, and print concepts. Less consistent results were found between the groups with regard to other literacy skills including alphabet knowledge and environmental print (Justice & Ezell, 2000). In another study, preschoolers from low-income families in Head Start who participated in print referencing intervention strategies outperformed control group peers on environmental print, alphabet knowledge as well as word awareness and literacy composite (Justice & Ezell, 2002). This study of low-income children found no significant difference between print referencing and control groups on letter orientation, print concepts and literacy terms (Justice & Ezell,



2002). Authors of the study argue that the lack of significant differences may be that those skills required more time to develop than was allowed in this particular study.

### **Home Literacy Environment**

Research indicates that the home environment has a significant impact on the language and literacy outcome of young children (Hart & Risley, 1995). For many children, early literacy experiences are filled with language, books, and other literacy materials that promote the development of their early literacy skills (Hart & Risley, 1995). In direct contrast to their middle income peers, economically disadvantaged children from economically disadvantaged families are typically exposed to early literacy experiences that are typically hindered by impoverished learning environments and characterized by limited access to both spoken language and literacy materials (Hoff-Ginsberg, 1998; Morisset, Barnard, Greenberg, Booth, & Spieker, 1990).

In 1995, Hart and Risley published their work on uncovering the reasons behind the major discrepancies in vocabulary that had been recorded between children from low-income homes and children from middle income homes. The authors found tremendous differences in the vocabulary growth rates of the economically diverse group of children in their study. Although a number of variables account for differences in vocabulary in children, the most stable difference, they argued, was parents' frequency of speech. Parents who spoke with greater frequency to their children acquired vocabulary at a faster rate (Hart & Risley, 1995) than children whose parents spoke with less frequency with their children. More importantly, parents from middle and high income families spoke to their children significantly more than parents of low-income families.

Limited exposure to language and a rich vocabulary is not the only barrier faced by children from high risk environments. Language is also affected by the extent to which parents engage in literacy practices with their children. A number of studies have reported significant associations between children's home literacy environment and later language and literacy skills (Bailey, 2006; DeJong & Leseman, 2001; Haden, Reese, & Fivush, 1996; Senechal & LeFevre, 2002; van Kleeck, Gillam, Hamilton, & McGrath, 1997). Payne, Whitehurst, and Angell (1994) evaluated the language of 236 low-income preschoolers. Controlling for both maternal IQ and years of education, the authors found that 18.5% of the variance in children's language scores was accounted for by the child's home literacy environment, as measured by: (a) the age when joint book reading began, (b) frequency of caregiver reading, (c) frequency of library visits, and (d) frequency of activities that interfere with book reading, such as TV watching. Despite the importance of early literacy practices at home, basic activities such as frequency of reading aloud are lacking in families who are high risk (Raikes et al., 2006).

Generally, parents report reading to their children with significant frequency. At the turn of the decade, 81% of a nationally representative sample of parents reported reading weekly to children who were between the ages of three and five (National Center for Education Statistics, 1999). Fifty-five percent of mothers surveyed in five biennial samples of the National Longitudinal Survey of Youth from 1986 through 1994 reported reading at least three times per week to their young children (Bradley & Corwyn, 2001). Less frequent reading has typically been reported in low-income families (Anderson, Teale, & Estrada, 1980; Whitehurst et al., 1994). In a sample of 2,581 low-income mothers, Raikes and her colleagues (2006) found that only about half of the mothers

reported reading daily to their infants. Children of color were even less likely to be read to daily, consistent with findings from other notable studies (Administration for Children and Families, 2002a; Bradley & Corwyn, 2001; Yarosz & Barnett, 2001). More affluent parents with greater years of education use book reading as a broader pattern of rich verbal input to children (Hoff, 2003). Given that reading daily or several days a week was also strongly associated with children's vocabulary outcomes, the results of the study highlight the importance of targeting interventions for low-income children much earlier than previous research has suggested.

Other studies have not been as consistent. Roberts, Jurgens, and Burchinal (2005) examined a sample of 72% of African American children recruited from community-based childcare centers. The majority of families were categorized as low-income, and the authors were focused on measuring four specific measures of home literacy practices including: (a) frequency of shared book reading, (b) maternal book reading strategies, (c) child's enjoyment of reading, and (d) maternal sensitivity. Contrary to a number of previous findings, results indicated a lack of significant associations between maternal sensitivity and maternal use of book reading strategies with language and literacy measures through the preschool years. Instead, a global measure of the quality of the home environment, the Infant Toddler- HOME, was significantly related to receptive vocabulary, expressive language, and early literacy skills at age 4 and in subsequently in kindergarten (Roberts, Jurgens, & Burchinal, 2005). One reason for these results, the authors argued, was that the overall index for the HOME measures a more general educational/social milieu of the environment that is supporting language and literacy. The predictive value of the HOME may also be due to the psychometric characteristics of

that measure in comparison to actual book reading strategies or behaviors measures. Since the HOME has undergone extensive testing and evaluation, it may be a better index in statistical analysis.

Yet, studies suggest that various early literacy skills are associated with later reading and achievement. Young children's phonological awareness, for instance, defined as an understanding of the sound structure of language (Bradley & Bryant, 1983; Lonigan et al., 1998), and written language awareness, such as the understanding of alphabet names and features, book handling, print forms and function, print terms and writing (Justice & Pullen, 2003) greatly accounts for the variance associated with later reading ability in elementary school. Print awareness, defined as discriminating letters alphabet names, and features of print in books and environment (such as directionality), has also been found to contribute to the variance in later reading (Badian, 1998; Chaney, 1992; Dickinson & Snow; 1987; Justice & Ezell, 2001; Lonigan et al., 1998; Whitehurst & Lonigan, 1998). Utilizing interventions that globally target all critical skills are important to effective implementation and results.

### **The Risk Associated with Prenatal Cocaine Exposure**

Children prenatally exposed to cocaine represent an early identifiable population that is likely to benefit from prevention and early intervention services. Despite initial reports of the long-term effects of the crack baby, current evidence indicates that in-utero cocaine exposure is classified, at most, as a mild teratogen. Only a few studies indicate the presence of developmental delays linked specifically to prenatal cocaine exposure (Bandstra et al., 2002; Singer et al., 2002). Although some of the small, but significant effects of prenatal cocaine exposure have been linked to language functioning and

attention processing in early childhood (Bandstra et al., 2001; 2002), most of the work on prenatal cocaine exposure suggests that it is other prenatal and postnatal environmental factors related to substance abusing parents that place the child at high risk for developmental delays. Prenatally, these factors include maternal use of other toxic substances such as alcohol, tobacco, and marijuana during pregnancy, as well as inadequate nutrition and prenatal care (Singer et al., 2004). Postnatally, children of substance abusing parents are exposed to various other risk factors, including poverty, homelessness, regular changes in custody, low parental education, and parental psychopathology (Phelps et al., 1997; Singer et al., 2004). More recent work indicates that quality of home environment is a better predictor of cognitive and language outcomes than prenatal cocaine exposure (Hurt et al., 2001; Singer et al., 2004).

One study by Bernstein et al. (1986) evaluated the quality of mother-child communication to determine if it could predict infant cognitive performance at 12 months, ultimately finding that pinpointing predictors in a multi-problem family over time was difficult. The major goal of the study was to find the relationship between mother-infant interaction and child outcomes at 12 months; however this study found there was no significant relationship between the two. Mother-child interactions were at best, a marker for infants exhibiting delays. Another study examined the effectiveness of early intervention on children prenatally exposed to cocaine and the moderating effect on low birth weight on child outcomes (Bono & Sheinberg, 2009). This study is based on the cumulative effect of risk (Samerof, 1993; Samerof & Fiese, 2000), indicating that prenatal exposure plus the associated environmental negative factors contribute to children's developmental delays, in this case, low birth weight. Results of this study

indicated that children with low birth weight and prenatal cocaine exposure experienced poor cognitive and language outcomes and benefited more than normal birth weight children from early intervention. Another study examining proximal variables with the same at-risk population indicated negative correlations with the number of children in the home and the quality of the caregiving environment ( $r = -.30, p = .03$ ) and positively correlated with daily hassles ( $r = .33, p = .02$ ). Caregiver education level was also positively correlated with quality of the environment ( $r = .35, p = .02$ ) (Dinehart et al., 2006). Quality of caregiving environment was positively associated with participation in daily routines and negatively associated with frequency of daily hassles (Dinehart et al., 2006). Other literature indicates that the developmental needs of children are neglected when families basic needs are not met (Dunst & Trivette, 1987; Maslow, 1954).

Very little work exists on the literacy environment of this particularly high risk population. In a recent study, Fletcher et al. (2008) examined how caregiving behaviors of substance abusing mothers affects child language and attention. Fletcher and Reese (2005) hypothesized there would be a bidirectional relationship of parent reading behaviors and their children's response to the reading, such that the more a child interacts with the parent and is engaged with the text, the more the parent engages the child when reading. Using a sample of 87 children age 24 months, Fletcher et al. (2008) videotaped caregivers and their children reading a story together as well as requested the parent to complete a literacy questionnaire. They found that children's language at 24 months was significantly related to frequency of reading in the home. Children who had higher language skills were read to more (Fletcher et al., 2008), however children's language was not associated with their attention to the reading. With this, it seems that children's

language abilities act as a catalyst to the act of reading but what keeps them involved in the story is the parent's ability to engage them in the text. At 30 months, use of expansions and questions was not related to frequency of reading but was significantly related to the child's expressive language.

Fletcher (2005) conducted another study with toddlers prenatally exposed to cocaine to examine responsiveness and attention during book reading. Twenty-four children were sorted into two conditions, either a read condition or a play condition. There were no differences between the two groups for responsiveness and joint attention, however there were differences on vocabulary knowledge. It was expected that the toddlers exposed to more reading would demonstrate an increase in responsiveness and joint attention, indicating the frequency and length of the intervention may not have allowed for significant differences between groups.

This review summarizes the body of literature on language, literacy, and educational success, the importance of home environment and at-risk families and in-utero cocaine exposure. Clearly, children who are at-risk for difficulties in literacy development (such as children born cocaine-exposed) should be provided opportunities to develop emergent literacy skills. Although research in the field of early childhood literacy is growing, studies with conflicting outcomes complicate the translation into practice, in part because most of the reviewed studies examine the efficacy of the intervention alone. This dissertation study examines the intervention outcomes as well as the mediating and moderating variables of the home environment, in an effort to expand the knowledge base on effective summer literacy programs for young children at-risk.

## **The Current Study**

The LRIP was designed to examine the effects of early intervention on outcomes of children prenatally exposed to cocaine. Research has shown LRIP children improved developmental outcomes (cognitive, language, and behavior) over a 36 month period (Bono et al., 2005; Claussen et al., 2004;) and children who received center-based early intervention LRIP services had higher cognitive and language scores than a non-intervention control group (Bono et al. 2005). Data collected at 12 months, however, indicated that roughly two-thirds of toddlers who participated at LRIP show language delays, and at 36-months, the sample was near or in the at-risk range on standardized measures (Bono et al., 2005). For this population, early intervention is important, but more targeted intervention is needed in order to improve language and emergent literacy skills. This study looked at a book reading targeted intervention that occurred during the summer months (June-August) over a three year period. Children in the study received the general curriculum throughout the year and the targeted book reading intervention for the summer. Questionnaires, survey data, and attendance records were used to gather data to examine the influences of the home environment on the child language and literacy outcomes.



## CHAPTER III

### METHOD

The study utilized an ex post facto research design, merging two data sets. This involved selecting a sample and surveying the same sample over time (Gall, Gall, & Borg, 2003). In the present study, a convenience sample ( $n=54$ ) participated in an intervention program over a three year period. Data sets involving (1) literacy scores and (2) language scores and home environment surveys were merged to examine the progress of these children over a 3-year period.

#### **The Linda Ray Intervention Project**

The Linda Ray Intervention Project (LRIP) was designed to compare the effectiveness of three levels of intervention (i.e., Center-based, Home-based, and Primary Care) on the developmental outcome of children prenatally exposed to cocaine from birth to three-years of age. The Project was conceptualized using a public health model, emphasizing a risk focused strategy (Scott, Hollomon, Claussen, & Katz, 1998.) The three levels from least to greatest intensity were: (a) Primary care/comparison group, which provided access to comprehensive social work services, primary medical care, and scheduled developmental assessments; (b) Home based, which provided two 1.5 hour child- focused home intervention visits by a teacher per week using an Outcome curriculum, as well as access to social services and primary medical care; and (c) Center based, which also provided access to social services and primary medical care, plus a center-based early intervention program for children for 5 hours per day, 5 days per week also utilizing the Outcome curriculum (Claussen, Scott, Mundy, & Katz, 2004.) For children in both the center and home based interventions, curricular activities in the areas

of cognition, fine and gross motor, social/behavioral, self-help and language were geared to their own individual developmental progress and to identify areas of delay.

Developmentally appropriate intervention activities were based on an Outcome curriculum framework developed for the program, as well as incorporating aspects of the High Scope™ fundamental activities. The Outcome curriculum centers on supportive adult-child interactions, creating predictable yet flexible scheduling, and arranging the space to promote active learning. Children are encouraged to explore, ask and answer questions, and solve problems. Content areas include social and emotional development, physical development, communication, language and literacy, cognitive development and creative arts.

Children in the center-based group received all services at the center for 5 hours, 5 days a week. Children in the home-based group received these services at their home for a total of 3 hours weekly. Those in the comparison group did not receive educational services but did have regular developmental assessments and their parents were given information about their child's developmental milestones.

The research study design for the overall intervention program added an additional level of evaluation and accountability, beyond what is mandated by county restrictions. In addition to the mandatory quarterly, semi-annual, and annual reviews of developmental progress required by Early Steps, Florida's early intervention system geared to ensure children at-risk for developmental delays receive appropriate early intervention services, developmental assessments were conducted at regularly scheduled intervals to evaluate the effectiveness of the educational curriculum. Children were assessed at 12, 18, 24, and 36 months of age. Whenever possible, assessments were

conducted within a 2 month window (+- 1 month) calculated from the child's birthday. Children who were born prematurely (<37 weeks gestation) were assessed based on their corrected date of birth until 18 months of age, and based on their actual date of birth from age 24 months on.

Initial research on the effectiveness of this early intervention project indicated moderate to large effects using Glass delta of the center and home-based interventions on cognition (.73), receptive (.62) and expressive language (.92), and gross motor development at 36 months, as well as small effects on behavior problems (.32; Bono, Dinehart, Claussen, Scott, Mundy, & Katz, 2005; Claussen et al., 2004) when compared to the primary care/comparison group. Children who participated in the center-based intervention experienced the best outcomes. One long-term outcome study of a sample of the participating children when they reached age six, found that intervention was successful at producing a positive long-lasting effect on the development of these children, especially on the language outcome of those that had participated in the center-based intervention (Acra, Bono, Mundy, & Scott, 2009.) Thus, the level and dosage of intervention for children in the center-based group had an impact on their cognitive, language and behavioral outcomes.

### **Targeted Intervention- Summer Book-Reading**

Although children in the center-based intervention group experienced the best outcomes for receptive and expressive language, the language skills of the children in the program are consistently delayed. Bono et al.'s (2005) study provided supporting evidence that children who have been prenatally exposed to cocaine show developmental delays in language, among other areas. The authors suggested that despite receiving the

intervention, the children born cocaine-exposed on average scored lower in language abilities than typically developing children. The book reading intervention was implemented in an intensive manner during the summer months with the goal of increasing pre-literacy skills, receptive language, expressive language, and school readiness concepts.

### **Participants**

The current study included a convenience sample of 54 children at risk who participated in a reading intervention every summer for three years. The participants were children enrolled in the center-based modality of the Linda Ray Intervention Project (LRIP). All children enrolled in the study had mild to moderate delays. Families of the children experienced a variety of co-occurring risk factors such as poverty, insecure attachment to caregivers and parenting stress and psychological symptomatology (Claussen et al., 2002). Also included in the study was a convenience sample of previously enrolled LRIP participants who did not receive the intervention. This group was matched to the intervention group on gender, with exactly 50% male and 50% female and a race/ethnic breakdown as follows: 87% African American, 5% Hispanic, 5% White and 3% listed as “other.” Cocaine exposure is obtained as a maternal self-report at enrollment or through meconium drug testing at birth. The amount of cocaine use for this population was unknown due to the method of reporting.

### **Research Design**

The current study implemented an ex post facto, quasi-experimental design. The data employed in the current study were obtained from the LRIP, part of Department of Psychology, University of Miami. Data were collected in two phases. The first phase of

data was collected as part of the LRIP research protocol via self-report questionnaires of parents and direct language assessments of participating children over a period of 3 years. The second phase was collected over three summers via teacher-report literacy questionnaires. This nonequivalent group design involves a pretest and posttest over three time points for a non-randomized treatment group and a matched non-treatment comparison group.

### **Measures**

**Receptive Language and Expressive Language.** The Reynell Developmental Language Scales (RDLS; Reynell & Gruber, 1990), developed in Great Britain, has become widely used for assessing the language skills of very young or children who are developmentally delayed. The entire battery is 134 items, broken into two 67-item scales: verbal comprehension and expressive language. The verbal scale tests a child's receptive language skills while expressive incorporates three sets of items: structure, vocabulary, and content. Each scale yields a total correct score and a standard score. The RDLS was administered to the children at 18, 24 and 36 months of age.

The RDLS is designed to be used with children ages one year to 6 years of age and was standardized on a sample of more than 600 children that reflected the US demographics in terms of geographic region, ethnicity and parental education. The RDLS overall reliability was determined through split-half procedures. Expressive Language coefficients for children ages 1 ½ to 4 ½ were .91 +/- .04. Verbal coefficients were .91 +/- .05 for children ages 2-4 ½ and over .80 for children over 1 ½.

**Literacy.** The Book-reading Inventory, a seven question tool completed by the teacher as a pre and post measure determines the child's pre literacy knowledge. The

Book-reading Inventory was collected for three consecutive summers, before and after the intervention. This short questionnaire was developed in house specifically for the intervention to determine if the specific goals of the intervention were being met. The questionnaire was compiled from previous research and education data citing pre literacy skills necessary for literacy and language success (Levy, Gong, Hessels, Evans, & Jared, 2006).

**Home environment.** The Stony Brook Family Reading Survey (SBFRS) (Whitehurst, 1993) and Activities for Parents and Children measure activities in the home that may or may not support literacy learning. SBFRS, a 12 question reading survey, asks caregivers about the child's speech development, television watching, and family reading. This questionnaire has been cited and used in multiple literacy publications since the early 1990s, however there are no validity or reliability estimates for the SBFRS. Due to the wide use of this instrument, validity is assumed as expert validity (Bracken & Fischel, 2008; Deckner, Adamson & Bakeman, 2006; Massetti, 2002; Fletcher et al., 2008; Payne, Whitehurst, & Angell, 1994). Activities for Parents and Children was developed by Fletcher (2005) to assess the frequency of different parent-child joint activities and also has no validity or reliability estimates, although expert validity can be assumed as it was developed for use by a leading researcher in the field of literacy and at-risk young children.

**Preschool readiness.** The Bracken School Readiness Assessment (BSRA) measures 85 foundational concepts in five categories: colors, letters, numbers/counting, sizes/comparisons and shapes. The receptive format (having children respond by pointing) makes this assessment quick and easy to administer to children between the

ages of 3 and 6 years. Each category yields a sub score and all five categories are calculated to yield a School Readiness Composite score. The internal consistency reliability (split-half) for this instrument was high ( $r=.95$ ). The validity of the BSRA for a population of children with language impairments was determined to be able to discriminate between typically developing children and children with language delays, with an effect size of .89 (Cohen's  $d$ ) ( Bracken, 2007).

**Program Dosage.** Attendance records for each child were maintained to determine dosage of the summer literacy program.

### **Procedure**

The Adult-Child Book Reading Intervention was administered every summer 3 times daily for 10 to 15 minutes each session, during the 3 years a child was enrolled in the Overall Intervention Program. The purpose of the targeted book reading intervention (see Table 1. for schedule) was to increase book behaviors for babies and preschoolers, which involved behaviors such as treatment of books, repetition of lines, proper handling of books (right side up), pointing, gestures and requests for book reading. Preschooler behaviors involved retelling a story by looking at the pictures, questioning, “reading” by rote, “marking” that resemble letters, predicting what happens next in the story, identifying letters and increasing interest in book reading.

Table 1.

*Classroom Schedule*

Time	Activity
9:00 to 9:30	Greetings/Breakfast
9:30 to 10:00	Clean-up
10:00 to 10:15	Book-reading 1/ Circle time
10:15 to 10:45	Playground
10:45 to 11:00	Big Room/Centers
11:00 to 11:15	Book-reading 2
11:15 to 11:30	Art
11:30 to 12:00	Lunch
12:00 to 1:15	Nap
1:15 to 1:30	Snack
1:30 to 1:45	Book-reading 3
1:45 to 2:00	Play time
2:00	Dismissal

Book-Reading Procedures are illustrated in Table 2. Each child worked with a total of three books during the summer. Each book was read 3 times daily (10 to 15 minutes each session) for 3 weeks. After 3 weeks, the books were rotated across classrooms and the children experienced a new book. The individual classrooms each has a designated place for the books that the children may utilize throughout the day.



Table 2.

*Book Reading Procedure*

<b>Book-Reading Session</b>	<b>Activity</b>
Book-Reading Session 1	Children assigned to a group of 3-4 with 1 teacher. Teacher reads book to small group of children.
Book-Reading Session 2	Children break into assigned groups with teacher. Teacher passes out books to children and read book aloud (if children are old enough they are encouraged to follow along.)
Book-Reading Session 3	Children break into assigned groups with teacher. Children interact with books on their own while teacher comments/questions.

Teachers participated in annual hour-long booster trainings before the beginning of each summer to emphasize the book reading structure and some of the book-reading strategies. First, a memo-reminder was sent to all teachers usually 2 weeks before the start of the program. One week before the program, the lead teacher met with all staff on a class-by-class basis to review book behaviors that are suggested for this activity. Some of the encouraged behaviors for children under two years of age are: appropriate treatment of books, joining in rhymes or repeating lines, holding a book right-side up, and pointing at pictures or words in the book. For older children in the program, teachers encourage retelling of the story by looking at pictures, asking questions while reading, pretending to read through memorization, making marks that look like letters, predicting what happens in the story and identifying names of letters. Annually, the teacher went over the book-reading schedule as well as the encouraged behaviors so all staff members

understood and felt comfortable with the program. Staff-turnover at the center was minimal, with only three new staff members added to the group over a 3-year period.

### **Data Collection**

For 3 years, children participating in the intervention program were assessed at 12, 18, 24, and 36 months using a variety of questionnaires and instruments. The RDLS was administered at 18, 24, and 36 months of age for each participant to determine the child's language level and growth. The SBFRS was distributed to caregivers at the child's 24 month birthday; the Activities for Parents and Children was distributed at the child's 18 month birthday; and the Book Reading Inventory was administered to teachers in June (pre) and August (post) for the summer literacy program. Children were tested with the Bracken at the completion of the 3-year program.

**RDLS.** The two language sections, Verbal Comprehension and Expressive Language, are arranged according to developmental progression, but there are no basal and ceiling rules for administration. The examiner in each case started at the beginning of the inventory and continued as long as the child was able. When possible, every section was administered, but completion of any section was at the discretion of the examiner. Materials for the RDLS consisted of stimulus materials that engaged children and encouraged language interaction. For example, eight objects were placed randomly in front of the child (ball, spoon, brush, doll, car, cup, sock, block) and the examiner asked the child to identify the objects by asking, "Where is the ball?", etc. Three sections of the RDLS required the child to identify items by pointing or gesturing to the object in question. The fourth section tested the child's ability to assimilate and relate two verbal concepts, for example, "put the doll on the chair." The next section tested understanding

of functional relations, such as, “which one do we write with?” The verbal concepts grew increasingly more difficult, by increasing the number of manipulatives to choose from and asking children to identify, separate and categorize items.

Scoring the RDLS yielded two scores, one verbal and the other, expressive. The verbal score was calculated by how many question the child answers correctly. The expressive score, which measured spontaneous expression, was scored as a result of the child completing the rest of the test. Children gained points by demonstrating the following: vocalization (other than crying), one syllable sound, two different single-syllable sound, four different single-syllable sounds that must include consonants, double-syllable sound, double-syllable babble, one definite word, expressive jargon and intonation patterns, vocabulary 2-3 words, vocabulary 4-6 words, word combinations vocabulary 20+ words, utterances of 3 or more words, use of at least 2 prepositions, use of two pronouns, use of past tense, use of future tense, mature sentence construction, use of complex sentences.

Administration of the RDLS at each age point (18, 24, 36 months) was conducted by a trained research associate. Children were pulled out of the classroom and tested in a separate testing room furnished with only a small child-sized table and chairs to eliminate distractions. The research associate administered the RDLS at the pace of the child, allowing for breaks if needed. Most children were able to complete the RDLS assessment in one sitting, but others required multiple visits on different days to complete the assessment. The length of time varied depending on the age and developmental level of the child, where children who were older and had higher language ability took longer to test than children who were younger and had lower language ability. The children in

the center were often eager to accompany the research associate outside the classroom, as this gave the child the opportunity to experience one-on-one play time. On the rare occasion when a child exhibited a resistance in accompanying the associate, the associate began the assessment in a quiet space in the classroom to gain the confidence of the child and then completed the assessment with the child outside the classroom.

**BSRA.** Administration of the BSRA took about 10 to 15 minutes utilizing a stimulus book and a question sheet. The test was administered in numerical order within a subscale and was discontinued if the child incorrectly answered three questions in a row. While the child sat aside the testing administrator, trial items were first administered so the child had familiarity with the tasks. Each subscale was administered starting with item one and continued until the child incorrectly answered three consecutive questions within a subscale. Questions for each item in the stimulus book were framed the same, “Which one is ...?” For example: “Which one is a square?” “Which one is red?” “Which girl has long hair?” Due to the nature of this assessment and the rapid administration time, the BSRA was administered in the classroom by a trained research associate.

**Caregiver Questionnaires.** The caregiver questionnaires, The Stony Brook Family Reading Survey and the Activities for Parents and Children were also collected around the child’s birthdate. Caregivers were contacted by a research associate and asked to visit the school, where they completed questionnaire packets based on the child’s age. SBFRS and Activities for Parents and Children were collected at 24 months and 18 months respectively. Caregivers completed each of the questionnaires paper and pencil at the intervention center facility. Assistance was provided by the research associate if

needed. At times, the research associate needed to read the questionnaires to caregivers or to manually fill in the form for the caregiver.

**Book Reading Inventory.** This inventory was completed by the child's lead teacher at the beginning and the end of the adult-child book reading intervention. Lead teachers in the Overall Intervention Project were graduate level, trained in special education and were very familiar with observational reporting. As part of the county requirements, the lead teachers conducted developmental evaluation of the child every quarter and were skilled in providing documentation of both observational data as well as evaluations for young children.

## CHAPTER IV

### RESULTS

The results section is divided into four parts. The first section consists of exploratory data analysis examining the demographic variables relevant to the group of children involved in the study. The next three parts address the three hypotheses posed in previous chapters: (1) children who received the intervention will demonstrate growth in both language and early literacy skills over the 3 year period, (2) children who participated in the intervention will demonstrate significantly higher language scores than a randomly-selected group of LRIC center-based participants who were not enrolled in the summer literacy program, and (3) children enrolled in the summer literacy program and who live in homes that support literacy through activities will have higher language, literacy and school readiness scores than those enrolled in the summer program who live in homes that do not support literacy.

#### **Discussion of Missing Data**

Working with a complicated population such as this traditionally has its challenges with incomplete data (Buchanan, Fisher, & Gable, 2009). Although the groups of children who participated in this program were in attendance for most of the 3 years, there is missing data across outcomes due to irregular attendance at the time of data collection and lack of caregiver participation. This section seeks to explain the missing data across outcomes.

Children at the center were assessed on language measures at 18, 24 and 36 months of age. Most missing data for language occurred at the 18 month mark ( $n=10$ ). As per program policy, if a child started the program just before 18 months of age,

assessment at the 18 month mark would be suspended depending on the school-adjustment of that child. Also, poor attendance during that time point contributed to missed data. At the 24 month period more children were assessed than missed data ( $n=3$ ). This missing data was attributed to poor attendance during that time, however one child ( $n=1$ ) was withdrawn at the 24 month age point. At 36 months, most children were assessed, with 2 children missing data, both attributed to school withdrawal. Due to late enrollment, some children did not have literacy scores at each time point, with two (2) missing data at time 1, one (1) missing data at time 2 and two (2) missing data at time 3. The Pre School Readiness Assessment was assessed around the 36 month age; three (3) children miss data at this time point. One child was withdrawn and two were just under 36 months and were not assessed, as the BSRA is not normed for below 36 months.

Parent data was even more complicated to collect. Research staff contacted parents by phone and invited them in to the center to complete parent questionnaires. Bus tokens were also offered if they were available to ease the burden of transportation. For the Stony Brook Family Reading Survey, 11 did not complete the assessment, and 13 did not complete the Activities for Young Children questionnaire.

There was no consistency between missing literacy, language or parent data, therefore when conducting analysis, the total  $n$  was often reduced again to the total participants who had complete data for the variables in that analysis.

### **Exploring Demographic Factors**

An initial descriptive analysis was conducted to determine the effects of demographic characteristics on the language and literacy outcomes of the children enrolled in the summer literacy program. These variables were either dichotomous or

continuous factors. The following sections are organized by variable type and generally describe the demographic overview of the sample population. Demographic characteristics of the children in the control group will be discussed in greater detail in a later section of the analyses.

## **Exploring Dichotomous Variables**

### **Gender**

In order to examine mean differences in gender on language outcomes, ANOVA were conducted by time point and change scores. These analyses did not yield any significant results although there were some noteworthy data trends attributed to gender. Descriptive statistics seemed to indicate some mean difference between males and females receptive and expressive language scores at each time point. This was particularly noticeable for the expressive language change scores, where boys made negative gains in expressive language from 18 to 24 months of age and girls made a small gain. Similarly, boys' increase in expressive language scores appeared to be greater from 24 to 36 months than the increase made by girls at that age. However, independent *t*-tests analyses did not reveal these differences to be statistically significant for each time point or for the change scores.

Similar analyses were conducted to determine whether there were gender differences in literacy scores of the participating children. Means and standard deviations of literacy scores at pretest and posttest for each time point are presented below in the top portion of Table 3. In the middle portion of the table, change scores are presented as changes from pretest to posttest by time point. Finally, in the bottom portion of the table, change scores are presented as changes from posttest scores only across time points. For



all scores the result of each independent t-test is reported. Significant findings are bolded in Table 3.

Table 3.

*Mean Differences in Literacy Outcomes by Gender*

Outcome	Males <i>M</i> (SD)	Females <i>M</i> (SD)	<i>t</i> value	<i>p</i> value
Literacy scores				
Time point 1 ( <i>N</i> = 40)				
Pretest	9.94 (2.6)	11.14 (3.4)	1.24	.222
Posttest	13.05 (2.1)	12.66 (2.8)	.476	.637
Time point 2 ( <i>N</i> = 47)				
Pretest	13.26 (2.7)	14.83 (2.54)	<b>2.061</b>	<b>.045</b>
Posttest	16.69 (2.7)	17.91 (2.1)	1.745	.088
Time point 3 ( <i>N</i> = 40)				
Pretest	19.00 (2.7)	17.43 (2.7)	-1.608	.115
Posttest	19.60 (2.1)	19.5 (2.2)	-.332	.741
Pretest - Posttest Change Scores				
Time point 1	3.17 (2.35)	1.52 (2.9)	-1.908	.06
Time point 2	3.43 (3.02)	3.08 (1.6)	-.492	.626
Time point 3	-2.18 (2.95)	.391 (3.20)	<b>2.79</b>	<b>.008</b>
Posttest Change Scores				
Time point 2 - Time point 1	4.29 (3.2)	5.38 (2.3)	1.211	.234
Time point 3 - Time point 2	2.72 (2.8)	1.52 (1.9)	-1.61	.113

Descriptive statistics again seemed to indicate some mean difference between males and females on literacy scores at each time point. This was particularly noticeable at time point 2, where females performed better at both pre and post test. Statistically significant differences were noted at time point 2 pre. Even more noteworthy were pre/post change scores at time point 3 where males showed negative change and females showed positive gains.

**Race/Ethnicity**

Children were mostly African American (68%) or Hispanic (25%) with 4% identifying their race/ethnicity as Haitian and 4%, White. Table 4 illustrates the mean differences in language outcomes by race/ethnicity for each time point and change score.

Table 4.

*Mean Differences in Language Outcomes by Race/Ethnicity*

Outcome	African American <i>M (SD)</i>	Hispanic <i>M (SD)</i>	White <i>M (SD)</i>	Haitian <i>M (SD)</i>	<i>F</i> value	<i>p</i> value
Receptive Language						
18 months ( <i>N</i> = 38)	73.48 (12.1)	80.22 (16.5)	71.0 (9.9)	63.0 (0)	.53	.60
24 months ( <i>N</i> = 45)	73.73 (11.2)	80.50 (14.1)	63.0 (0)	63.0 (0)	.12	.90
36 months ( <i>N</i> = 46)	74.55 (11.3)	80.66 (11.7)	73.5 (4.9)	63.0 (0)	-.33	.74
Change Scores						
24 months – 18 months	1.68 (11.7)	2.85 (13.1)	-8.00 (9.9)	0 (0)	.19	.85
36 months – 24 months	1.85 (10.6)	-0.10 (15.2)	10.5 (4.94)	0 (0)	-.14	.89
Expressive Language						
18 months ( <i>N</i> = 38)	78.12 (12.6)	85.22 (16.4)	64.00 (0.0)	63.00 (0)	.75	.46
24 months ( <i>N</i> = 45)	78.63 (13.8)	77.80 (14.5)	66.50 (5.0)	63.00 (0)	-.06	.95
36 months ( <i>N</i> = 46)	82.91 (10.1)	79.39 (10.5)	82.00 (7.1)	63.00 (0)	1.16	.25
Change Scores						
24 months – 18 months	1.28 (9.2)	-7.85 (12.3)	2.50 (4.9)	0 (0)	-1.06	.30
36 months – 24 months	2.84 (13.8)	5.9 (15.6)	15.5 (2.1)	0 (0)	.76	.45

Descriptive statistics seemed to indicate some mean difference racial/ethnic groups receptive and expressive language scores at each time point. Overall higher Hispanic receptive language scores were evident, where mean scores centered around 80 at all data points. Difference scores for 24 to 36 months, however, revealed a slight negative gain as compared to their African American counterparts who showed a positive gain from 24 to 36 months. The sample sizes for the other two groups, identifying as “White” or “Haitian” were very small ( $n=1$ ) and made true analysis involving these groups difficult.

Similar analyses were conducted to determine whether there were ethnic differences in literacy scores of the participating children. Means and standard deviations of literacy scores at pretest and posttest for each time point are presented below in the top portion of Table 5. In the middle portion of the table, change scores are presented as changes from pretest to posttest by time point. Finally, in the bottom portion of the table, change scores are presented as changes from posttest scores only across time points. For all scores the result of each ANOVA is reported. Significant findings are noted in Table 5.

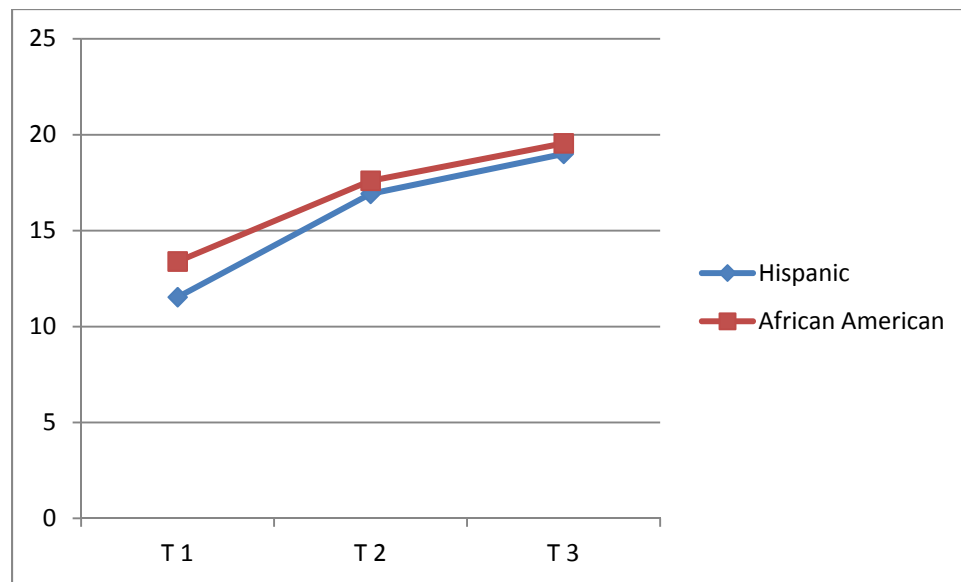
Table 5.

*Mean Differences in Literacy Outcomes by Ethnicity*

Outcome	African American <i>M (SD)</i>	Hispanic <i>M (SD)</i>	White <i>M (SD)</i>	Haitian <i>M (SD)</i>	<i>F</i> value	<i>p</i> value
Literacy scores						
Time point 1 ( <i>N</i> =39)						
Pretest	10.80 (3.37)	10.30 (2.62)	8.0 (1.41)	11.00 (0)	.443	.776
Posttest	12.96 (2.84)	12.80 (1.81)	12.5 (2.12)	0	.198	.897
Time point 2 ( <i>N</i> =46)						
Pretest	14.41 (2.56)	14.09 (3.01)	13.00 (.00)	9.50 (.707)	1.73	.159
Posttest	17.19 (2.31)	18.72 (2.28)	15.00 (2.82)	14.50 (2.12)	2.36	.069
Time point 3 ( <i>N</i> =45)						
Pretest	18.67 (3.05)	18.00 (2.82)	19.0 (0)	14.5 (9.19)	1.44	.238
Posttest	20.00 (1.83)	19.09 (2.42)	0	15.5 (3.53)	3.746	<b>.018</b>
Pretest - Posttest Change Scores	2.15 (2.97)	2.5 (2.32)	4.5 (.707)	0	.928	.437
Time point 1						
Time point 2	2.77 (2.12)	4.63 (2.83)	2.00 (2.82)	5.00 (1.41)	1.81	.145
Time point 3	-1.48 (3.17)	.600 (2.98)	-2.00 (0)	.000 (7.07)	1.18	.334
Posttest Change Scores	4.65 (2.79)	6.11 (2.75)	2.5 (.707)	0	1.15	.340
Time point 2 - Time point 1						
Time point 3 - Time point 2	2.83 (2.39)	.400 (2.17)	0	1.0 (1.41)	3.00	<b>.042</b>

Descriptive statistics again seemed to indicate some mean difference between ethnic groups on literacy scores at each time point. Time point 2 revealed similar mean scores across groups; however Hispanics showed more increases at post, although not significant. Time point 3 showed mean scores virtually the same but African American children showed stronger gains, revealing statistically significant post score differences. Differences were statistically significant also between time 2 and 3 as African American groups showed much stronger gains than Hispanic children. Again, small sample size made analysis difficult for the white and Haitian groups.

It is important to note that the Hispanic ethnic group, while identifying as Hispanic, were primary English speakers. Although one research associate was fully bilingual English-Spanish and caregiver communication was occasionally in Spanish, the children were primary English speakers.



*Figure 1.* Mean Differences in Literacy Outcomes by Ethnicity

## Prematurity

Prematurity was coded as premature=1 and not-premature=0. Of the group, 13 (27%) were premature (born before 36 weeks.) Table 6 describes the language outcomes for children who were premature and full term.

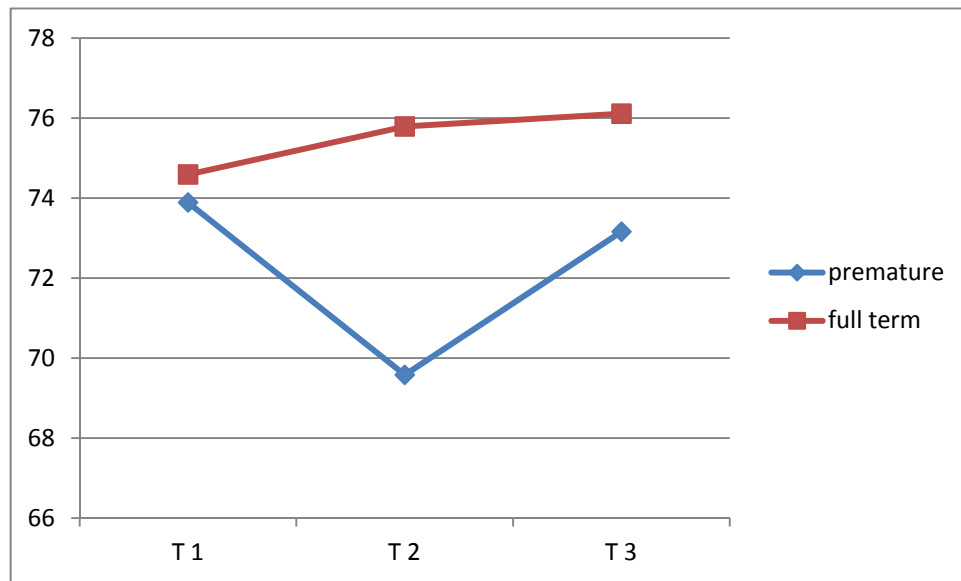
Table 6.

### *Mean Differences in Language Outcomes by Gestational Age*

Outcome	Premature <i>M (SD)</i>	Full Term <i>M (SD)</i>	<i>t</i> value	<i>p</i> value
<b>Receptive Language</b>				
18 months ( <i>N</i> = 38)	73.89 (12.47)	74.59 (13.49)	.138	.891
24 months ( <i>N</i> =45)	69.58 (9.37)	75.79 (12.57)	1.78	.086
36 months ( <i>N</i> =46 )	73.16 (11.62)	76.11 (11.50)	.762	.450
Change Scores	-2.11 (11.47)	2.51 (11.51)	1.04	.303
24 months – 18 months				
Change Scores	4.36 (6.26)	.6250 (12.51)	.945	.350
36 months – 24 months				
<b>Expressive Language</b>				
18 months ( <i>N</i> =38 )	71.78 (11.12)	80.31(14.37)	1.63	.112
24 months ( <i>N</i> = 45)	69.33 (9.88)	79.97 (13.7)	2.45	<b>.018</b>
36 months ( <i>N</i> =46 )	78.41 (11.14)	82.11 (10.03)	1.01	.324
Change Scores	-.333 (10.16)	-.407 (10.06)	.019	.985
24 months – 18 months				
Change Scores	8.45 (10.48)	2.34 (14.29)	1.29	.201
36 months – 24 months				

The largest difference between full-term and premature children was noted at the 24 month data point. A dip of 2.11 existed for the premature children. This probably occurred as a result of testing, where premature infants have their age adjusted based on their due date. It is not unusual for health care providers, also to use an adjusted age to evaluate a premature child's growth and development as identified by March of Dimes. Most children, however, catch up to their peers at 2 to 3 years of age. At the center,

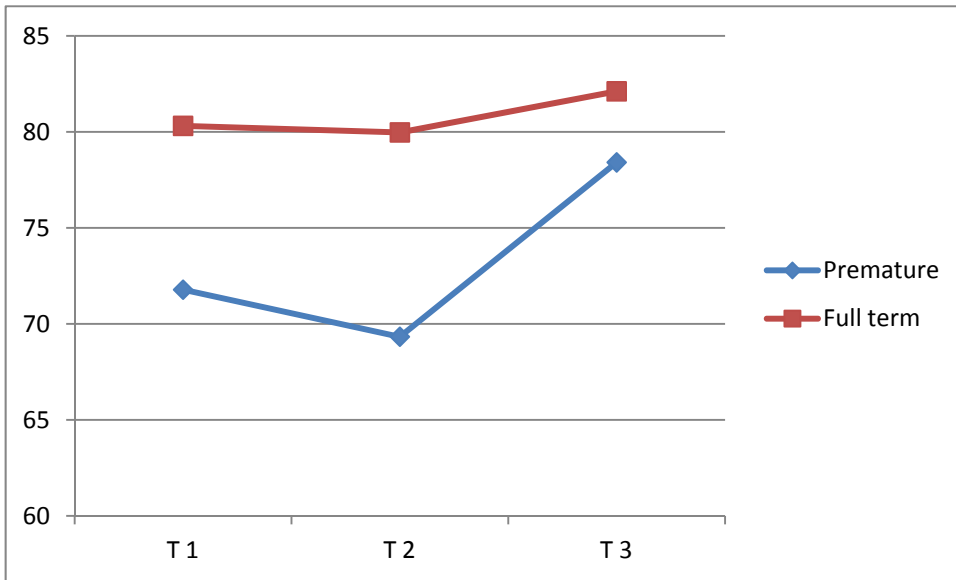
starting with the 24 month data point, children's age is no longer adjusted. At both 24 and 36 months, full-term children out-performed premature children.



*Figure 2.* Gestational Age and Receptive Language

On expressive language, premature children did perform worse than full-term children across all time points, however significant differences were only noted at the 24 month time point. Again, this drop was noted at the 24 month time point due to no age adjustment for the premature children.





*Figure 3. Gestational Age and Expressive Language*

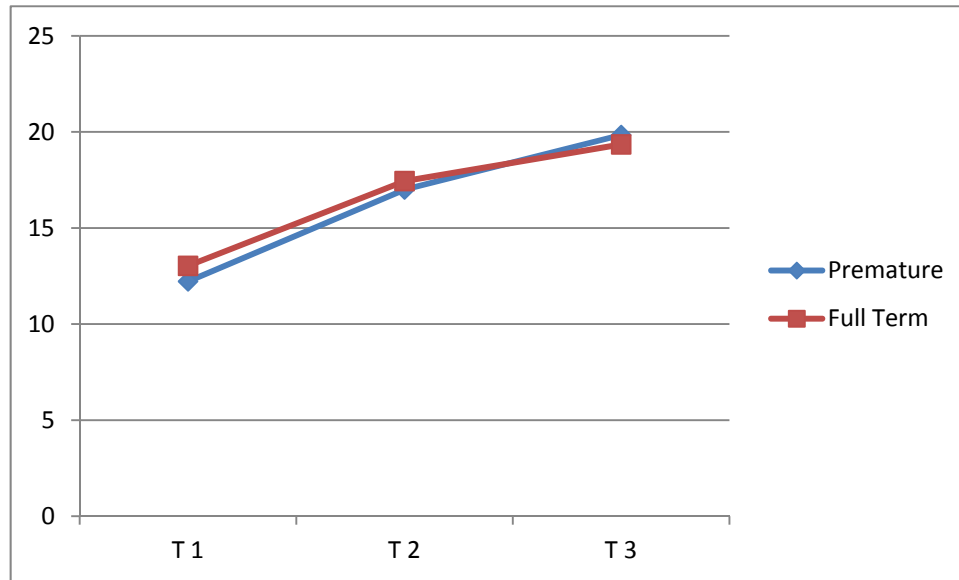
Similar analyses were conducted to determine whether there were gestational age differences in literacy scores of the participating children. Means and standard deviations of literacy scores at pretest and posttest for each time point are presented below in the top portion of Table 7. In the middle portion of the table, change scores are presented as changes from pretest to posttest by time point. Finally, in the bottom portion of the table, change scores are presented as changes from posttest scores only across time points. For all scores the result of each independent *t*-test is reported. Significant findings are bolded in the Table.

Table 7.

*Mean Differences in Literacy Outcomes by Gestational Age*

Outcome	Premature <i>M (SD)</i>	Full Term <i>M (SD)</i>	<i>t</i> value	<i>p</i> value
Literacy scores				
Time point 1 ( <i>N</i> = 40)				
Pretest	10.33 (2.23)	10.64 (3.29)	-.266	.792
Posttest	12.22 (2.53)	13.03 (2.52)	-.844	.404
Time point 2 ( <i>N</i> = 47)				
Pretest	14.00 (3.00)	14.08 (2.63)	-.099	.922
Posttest	17.00 (2.44)	17.44 (2.47)	-.548	.586
Time point 3 ( <i>N</i> = 46)				
Pretest	17.30 (4.17)	18.57 (2.97)	-1.15	.253
Posttest	19.84 (2.07)	19.35 (2.33)	.658	.514
Pretest - Posttest Change Scores				
Time point 1	1.88 (3.37)	2.40 (2.62)	-.480	.634
Time point 2	3.00 (1.91)	3.35 (2.58)	-.447	.657
Time point 3	-.3077 (4.30)	-.1.09 (2.86)	.717	.477
Posttest Change Scores				
Time point 2 - Time point 1	5.55 (2.87)	4.68 (2.75)	.816	.420
Time point 3 - Time point 2	2.84 (2.33)	1.83 (2.52)	1.23	.224

Although there were also mean differences between groups for literacy they were not as obvious as the language differences described above. Full term children overall performed better and showed slightly greater gains pre and post especially at time point 1 and 2, however by time point three, premature children exhibited greater gains.



*Figure 4. Mean Differences in Literacy Outcomes by Gestational Age*

*Types of Caregivers*

Caregivers for these young children varied widely (aunt, uncle, cousin, maternal grandmother, maternal grandfather, paternal grandmother, maternal grandfather, mother, father, adoptive mother, foster parent) and in order to facilitate analyses, caregivers were categorized into the following groups: (a) biological parents ( $n=21$ ), (b) family member other than parent ( $n=13$ ), adoptive parent ( $n=6$ ) and foster parent, non-family ( $n=7$ ).

Almost half of the caregivers (46%) of the children in enrolled in the summer literacy program had a high school diploma or a GED, while 28% ( $n=14$ ) indicated they did not complete high school. A small percentage was unknown, as they felt they did not want to disclose that information at enrollment for their child. Table 8 shows the relationship between language outcomes and caregiver status.

Table 8.  
*Language and Caregiver Status*

	18 months	24 months	36 months	18-24 mo	24 -36 mo
Receptive Language	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Parent	N=14 72.71 (11.06)	N=20 72.85 (11.35)	N=20 76.4 (10.35)	N=13 3.30 (12.60)	N=19 2.89 (9.88)
Family Non-parent	N=11 74.91 (12.86)	N=11 75.27 (12.01)	N=12 76.83 (14.08)	N=10 .4000 (11.40)	N=10 4.80 (14.14)
Foster Parent	N=6 72.50 (8.36)	N=7 70.14 (8.76)	N=7 69.28 (6.39)	N=6 -1.16 (10.72)	N=7 -.8571 (8.55)
Adoptive Parent	N=6 80.67 (21.96)	N=6 82.67 (16.21)	N=6 77.50 (14.44)	N=6 2.00 (13.22)	N=6 5.16 (13.49)
Expressive Language	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Parent	N=14 75.64 (11.86)	N=20 74.70 (12.14)	N=20 81.75 (8.81)	N=13 -.9231 (13.03)	N=19 6.68 (10.95)
Family Non-parent	N=11 79.45 (12.37)	N=11 78.64 (12.5)	N=12 83.58 (13.15)	N=10 -.2000 (8.05)	N=10 5.80 (17.09)
Foster Parent	N=6 77.17 (14.86)	N=7 76.71 (12.73)	N=7 79.14 (10.30)	N=6 .6667 (6.15)	N=7 2.42 (7.54)
Adoptive Parent	N=6 84.50 (21.98)	N=6 85.17 (20.18)	N=6 77.00 (10.8)	N=6 .6667 (10.68)	N=6 8.166 (16.80)

Descriptive statistics seemed to indicate some mean difference between caregiver status receptive and expressive language scores at each time point. Generally children of adoptive parents performed better in receptive language scores at all data points (18, 24, 36 months). Children of adoptive parents also experienced greater gain scores scores at all data points (18 to 24 months; 24 to 36 months). For expressive language, children of adoptive parents also experiences higher language scores at 18 and 24 month data point, however they experienced a slight dip at 36 months. For language, there were no significant differences between groups.

Similar analyses were conducted to determine whether there were caregiver status differences in literacy scores of the participating children. Means and standard deviations of literacy scores at pretest and posttest for each time point are presented below in the top portion of Table 9. In the middle portion of the table, change scores are presented as changes from pretest to posttest by time point. Finally, in the bottom portion of the table, change scores are presented as changes from posttest scores only across time points. For all scores the result of each ANOVA is reported. Significant findings are bolded in Table 9.

Table 9.

*Mean Differences in Literacy Outcomes by Caregiver Type*

Outcome	P <i>M (SD)</i>	FNP <i>M (SD)</i>	FP <i>M (SD)</i>	AP <i>M (SD)</i>	<i>F</i> value	<i>p</i> value
Literacy scores						
Time point 1 ( <i>N</i> =39)						
Pretest	9.87 (2.3)	10.9 (3.3)	11.1 (2.5)	12.0 (5.1)	.74	.53
Posttest	12.2 (2.4)	13.2 (3.2)	13.4 (1.9)	14.6 (2.1)	1.2	<b>.01</b>
Time point 2 ( <i>N</i> =46)						
Pretest	13.9 (2.5)	14.8 (2.7)	13.4 (2.0)	14.5 (4.1)	.49	.69
Posttest	17.1 (2.6)	17.5 (2.2)	16.9 (1.8)	18.5 (3.4)	.61	.61
Time point 3 ( <i>N</i> =45)						
Pretest	18.3 (2.8)	17.8 (4.3)	18.0 (2.9)	18.8 (4.4)	.101	.96
Posttest	19.5 (2.4)	19.5 (2.1)	19.3 (1.9)	19.6 (3.1)	.02	1.0
Pretest - Posttest Change Scores						
Time point 1	2.31 (2.9)	2.27 (2.7)	1.50 (2.8)	2.60 (3.2)	.16	.92
Time point 2	3.25 (3.0)	2.76 (2.1)	3.42 (1.6)	4.00 (1.7)	.34	.80
Time point 3	-1.0 (3.7)	-0.3 (3.5)	-1.1 (2.7)	0.60 (1.5)	.13	.94
Posttest Change Scores						
TP 2 – TP 2	5.1 (3.5)	4.9 (2.5)	4.3 (2.06)	5.2 (2.28)	.124	.945
TP 3 – TP 2	2.2 (3.2)	2.0 (2.12)	2.5 (1.22)	1.4 (1.34)	.184	.907

Similarly with literacy outcomes, children in homes with adoptive parents experience higher literacy scores for both pre and post, especially at the first and second time point. Significant differences were noted at time point one, post score.

To analyze caregiver education, education level was re-coded to 1 (high school diploma *n*=30) or 0 (no high school diploma *n*=13). Table 10 illustrates mean differences in language by caregiver education for each time point.

Table 10.

*Mean Differences in Language Outcomes by Caregiver Education*

Outcome	High School <i>M (SD)</i>	No High School <i>M (SD)</i>	<i>t</i> value	<i>p</i> value
<b>Receptive Language</b>				
18 months ( <i>N</i> = 34)	73.77 (14.56)	76.58 (11.79)	-.573	.57
24 months ( <i>N</i> = 41)	74.04 (13.02)	74.54 (10.57)	-.122	.904
36 months ( <i>N</i> = 42)	73.51 (10.27)	79.69 (13.99)	-1.606	.116
<b>Change Scores</b>				
24 months – 18 months	2.52 (10.57)	-1.09 (13.01)	.849	.403
36 months – 24 months	.4815 (9.23)	4.25 (15.62)	-.944	.352
<b>Expressive Language</b>				
18 months ( <i>N</i> = 34)	79.77 (15.44)	77.42 (11.84)	.459	.649
24 months ( <i>N</i> = 41)	78.54 (15.62)	75.23 (9.61)	.830	.412
36 months ( <i>N</i> = 42)	80.00 (10.75)	84.53 (9.18)	-1.31	.195
<b>Change Scores</b>				
24 months – 18 months	1.00 (8.49)	-3.45 (12.97)	1.17	.250
36 months – 24 months	1.51 (14.73)	8.91 (11.34)	-1.54	.131

Descriptive statistics seemed to indicate some mean difference caregiver education receptive and expressive language scores at each time point. Language scores for high school versus no high school showed no significant differences between groups. In fact, children with caregivers with no high school showed greater gains at 24 to 36 month on the receptive language measure. Expressive language also showed greater gains for this group from 24 to 36 months of age.

Similar analyses were conducted to determine whether there caregiver education differences in literacy scores of the participating children. Means and standard deviations of literacy scores at pretest and posttest for each time point are presented below in the top portion of Table 11. In the middle portion of the table, change scores are presented as changes from pretest to posttest by time point. Finally, in the bottom portion of the table, change scores are presented as changes from posttest scores only across time points. For

all scores the result of each independent *t*-test is reported. Significant findings are bolded in Table 11.

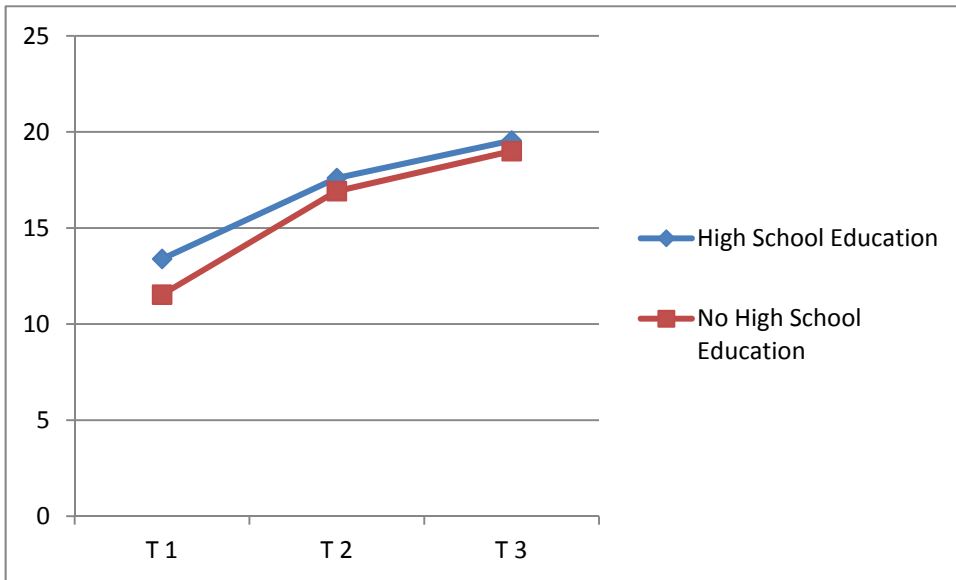
Table 11.

*Mean Differences in Literacy Outcomes by Caregiver Education*

Outcome	High School M( <i>SD</i> )	No High School M( <i>SD</i> )	<i>t</i> value	<i>p</i> value
Literacy Scores				
Time point 1 (n=37)				
Pre test	11.20 (3.37)	9.46 (2.36)	1.65	.107
Post test	13.39 (2.4)	11.53 (2.47)	2.19	<b>.035</b>
Time point 2 (n=43)				
Pre test	14.03 (2.35)	14.30 (2.39)	-.306	.761
Post test	17.6 (2.35)	16.92 (2.72)	.825	.414
Time point 3 (n=42)				
Pre test	18.34 (3.39)	18.46 (2.5)	-.111	.912
Post test	19.55 (2.02)	19 (2.22)	-.160	.873
Pre test- Post test Change Scores				
Time point 1	2.17 (2.34)	2.07 (3.63)	.097	.923
Time point 2	3.56 (2.52)	2.61 (2.36)	1.15	.255
Time point 3	-.827 (3.48)	-1.25 (3.07)	.365	.717
Post test change scores				
Time point 2- time point 1	4.73 (2.41)	5.58 (3.57)	-.830	.413
Time point 3- time point 2	2.03 (2.57)	2.45 (2.54)	1.463	.646

Descriptive statistics again seemed to indicate some mean difference between caregiver education groups on literacy scores at each time point. Literacy outcomes between these two education groups revealed different trends that language outcomes, with children of high school educated caregivers performing better at each time point, but over time these means converge.





*Figure 5.* Mean Differences in Literacy Outcomes by Caregiver Education

### **Summary of Dichotomous Variables**

#### **Language**

In sum, language scores for the children were impacted by a variety of demographic factors. Although not statistically significant for language, differences were noted between boys and girls, specifically, girls appeared to make greater gains in language than boys early on, while boys made greater gains as they grew older. Ethnicity also appeared to impact child language performance, with large mean differences seen between African American and Hispanic children, although these differences were not statistically significant. Prematurity also appeared to impact child outcomes, significantly at the 24 month data point. Premature children experienced a dip in language scores at this time, but then tended to experience gains by 36 months of age. Caregiver status did not significantly impact language scores, although there were noticeable mean score differences between the groups with adoptive parents exhibiting the higher language

scores. Caregiver education did not appear to impact language as expected, with children with caregivers who had no high school yielding the same or better mean scores across time points than children of caregivers with high school degrees.

### **Literacy**

In sum, literacy scores for the children were impacted by a variety of demographic factors. Statistically significant differences were noted in literacy for girls at time two, indicating the literacy intervention impacted girls more than boys. Ethnicity also appeared to impact child literacy performance, with a trend toward significance at time 2 of Hispanic children exhibiting higher mean scores, and at time 3 post test, where African American children exhibit higher mean scores. Change scores between time 2 and time 3 were higher for African American children than other racial/ethnic groups. Premature children, although exhibiting lower literacy scores at the first two time points, catch up to their full term counterparts by time three. Caregiver status did significantly impact outcomes on literacy, especially at time point 1 post. Although differences were noted at time 1 and 2, by time 3 all children performed equally. Contrary to language outcomes, caregiver education did impact literacy scores, especially at time 1 and 2. By time 3, however, children of both groups perform the same. Change scores, also were more profound for children whose caregiver has no high school education.

### **Exploring Overall Literacy and Language Data Trends**

Initial analyses were conducted to demonstrate changes in the literacy skills of participating children within each time point. Paired sample *t*-test indicated differences in literacy scores from pretest to posttest within each time point as shown in Table 12.

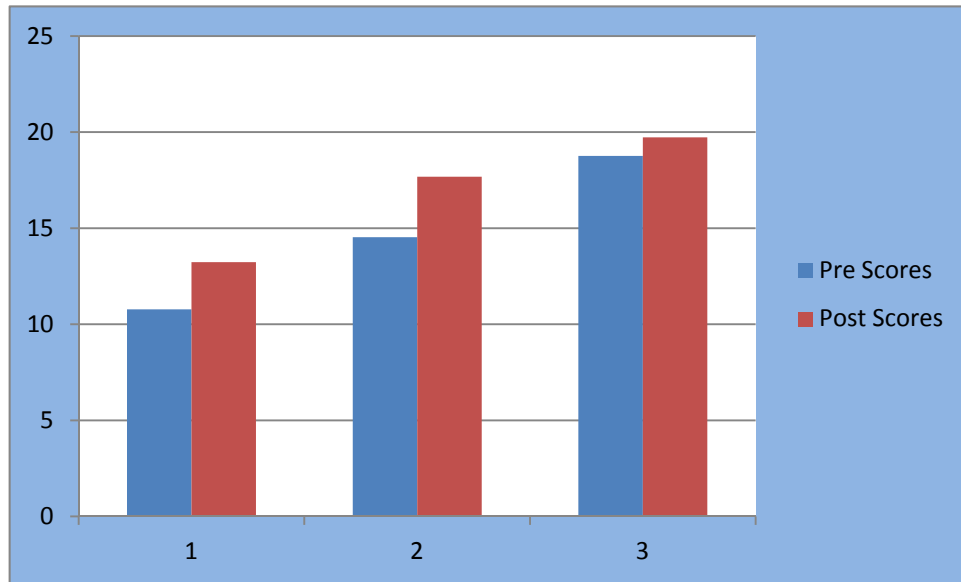
As shown below in Figure 6, time point one and two showed greater rates of pre-post change, whereas time point three showed a smaller jump from pre to post.

Table 12.

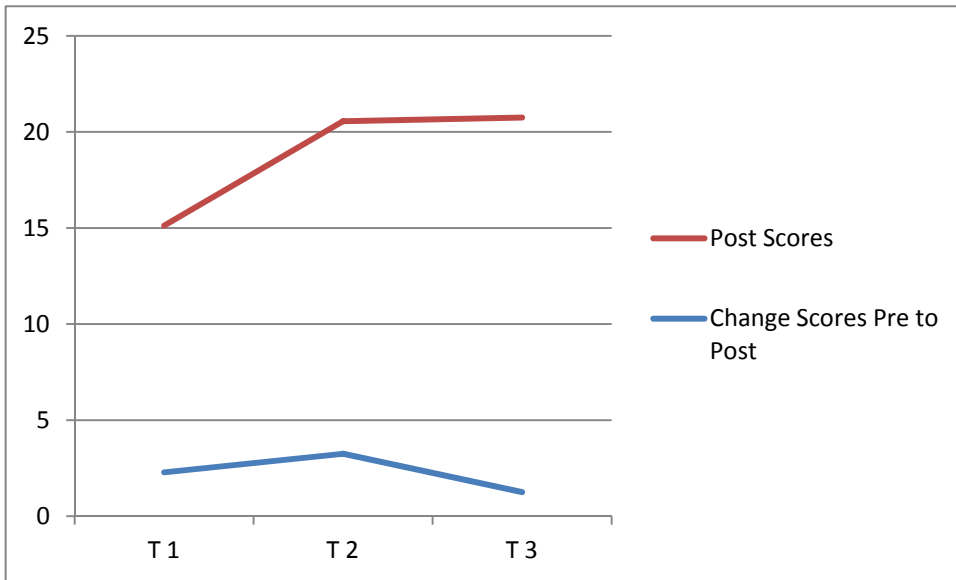
*Mean (SD) Literacy Scores for the Overall Sample across Time points*

	TP 1 N=40		TP 2 N=47		TP 3 N= 46	
	Pre	Post	Pre	Post	Pre	Post
<i>M</i>	10.57	12.84	14.06	17.31	18.21	19.5
<i>(SD)</i>	(3.06)	(2.51)	(2.70)	(2.45)	(3.35)	(2.24)
<i>t</i>	<b>5.14**</b>		<b>9.29**</b>		<b>3.35*</b>	

\* $p < .03$  \*\* $p < .01$



*Figure 6. Annual Effects of Summer Literacy Program from Pretest to Posttest*



*Figure 7. Post Score Change Over Time with Change Score Over Time*

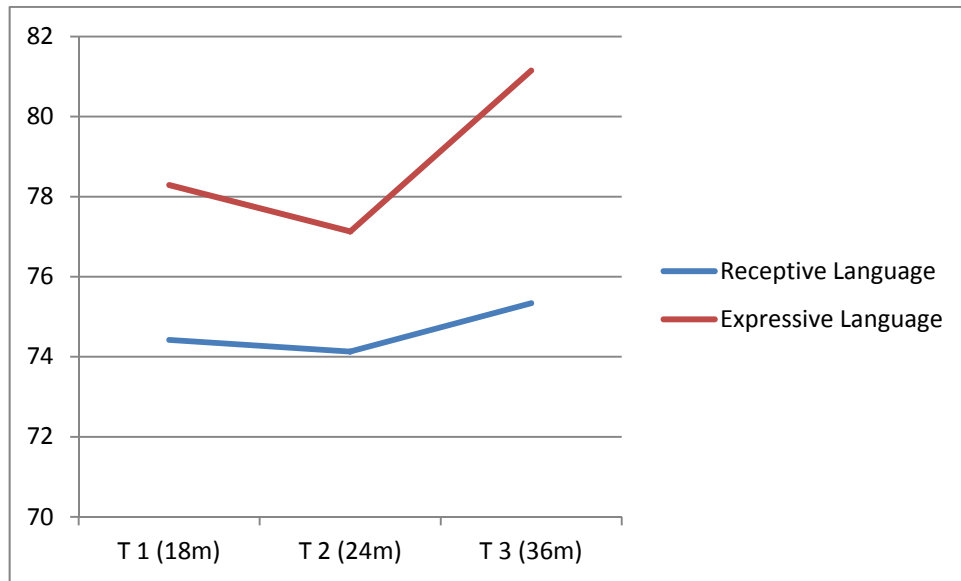
As illustrated in Figure 7, post scores increased overall dramatically from time 1 to time two, but show only a slight increase in post scores from time 2 to time 3. Change scores are greatest at time 2 and the least at time 3. This seems noteworthy considering language gains are greatly seen from time 2 to time 3 and a language dip is noted between time 1 to time 2.

To determine if there were significant changes in language, paired sample *t*-tests were run on both Reynell receptive and expressive scores, pairing 18 month receptive/expressive scores with 24 month receptive/expressive scores and then 24 month receptive/expressive scores with 36 month receptive/expressive scores. Although there were mean increases mostly noted in language over time, paired sample *t*-tests indicated that differences in language were not significant at the  $p < .05$  level, for 18 to 24 month or 24 to 36 month receptive, however the score differences were yielding significance  $t(42) = 1.877, p = .06$  from 24 to 36 months on the Reynell expressive measure. Table 13 shows the results of language change over time.

Table 13.

*Mean (SD) Language Difference Scores for the Overall Sample across Time points*

	Receptive		Expressive	
	Change 18-24 N=36	Change 24- 36 N= 43	Change 18-24 N=36	Change 24-36 N=43
<i>M</i>	1.36	1.58	-.389	3.90
<i>(SD)</i>	(11.51)	(11.29)	(9.94)	(13.57)



*Figure 8. Language Change Over Time*

As illustrated in Figure 8, expressive and receptive language did not follow similar change trends over time. At the 24 month time point, expressive language showed a greater drop in scores but then increased dramatically at the following data point. Receptive language showed slower growth, with a slight decrease in scores at the 24 month data point and a slight increase at 36 months.

### **Exploring Research Questions and Hypotheses**

The study was guided by three research questions. Based on research that addresses the importance of early literacy learning and language acquisition (DeBaryshe,

1993; Fletcher & Reese, 2005; Karrass & Braungart-Rieker, 2005; Payne, Whitehurst, & Angell, 1994; Raikes et al., 2006) the first question asks: Does a summer literacy program significantly improve both the language and early literacy outcome of children prenatally exposed to cocaine? The research hypothesis states that all of the children who received the intervention will demonstrate growth in both language and early literacy skills over 3 years time.

### **Research Question 1: Literacy**

#### **Literacy pre test.**

Linear mixed modeling was used to evaluate the effects of the summer literacy intervention on early literacy scores over time. In this case, a repeated measures model utilized the child as a grouping variable and evaluated time as a repeated measure as well as a random effect so that linear growth of posttest literacy scores may be analyzed. As per common practice, the model was run assuming an unstructured covariance model, indicating that the effect of time (a within subjects effect) should be greater than any between subject effect. Moreover, time was modeled as a repeated measure to adjust for correlated residuals, as the scores in time two can be predicted from time one. Time is both a random effect and a repeated measure, and also adjusts for the child grouping variable for their test scores.

One linear mixed model (LMM) was run examining the effect of time alone on the literacy pre test score. This analysis indicated that time did indeed impact the pre literacy score. A follow-up LMM was conducted to determine other external effects on literacy pre scores, yielding significance for the following variables in addition to time: attendance; gestational age \* caregiver status; gestational age. Test of fixed effects are

detailed below with significant variables at the  $p < .05$  level identified with an asterisk in Table 14.

### **Literacy post test.**

One linear mixed model (LMM) was run examining the effect of time alone on the literacy post test score. This analysis indicated that time did indeed impact the post literacy score. A follow-up LMM was conducted to determine other external effects on literacy post scores. The following variables were entered step-wise into the model since they yielded significance or trends to significance in previous analysis: gender, ethnicity and gestational age, caregiver status and caregiver education. In this model the following variables yielded significance in addition to time: attendance; gestational age \* caregiver status; gestational age. Test of fixed effects are detailed in Table 14 with significant variables at the  $p < .05$  identified with an asterisk.

Table 14.

*Summary of Fixed Effects on Literacy Pre and Post*

Variables	<i>Pre</i> <i>Est (SE)</i>	<i>Pre</i> <i>E.S.</i>	<i>Post</i> <i>Est (SE)</i>	<i>Post</i> <i>E.S.</i>
Fixed effects				
Intercept (constant)	-1.81 (3.4)		1.00 (1.78)	
<i>Variables</i>				
Time	3.72 (0.4)***	2.72	3.25 (.218)***	4.25
Attendance	0.06 (0.0)*	.51	.071 (.017)***	0.97
Gender				
Female (ref)	-		--	
Male	-1.01 (0.5)	.63		
Premature * Caregiver				
Parent	5.70 (3.3)	.60	6.06 (1.79)**	1.07
Family Non-Parent	5.51 (3.2)	.62	6.69 (1.72)***	1.62
Foster Parent	7.00 (3.1)*	.85	6.31 (1.54)***	1.40
Adoptive Parent	-		-	
Full term * Caregiver				
Parent	6.15 (3.16)	.72	5.16 (1.66)**	1.57
Family Non-Parent	7.99 (3.09)*	.99	6.71 (1.53)***	1.11
Foster Parent	6.04 (3.09)	.75	5.81 (1.53)***	1.38
Adoptive Parent	7.25 (3.18)*	.83	7.52 (1.65)***	1.51

Note: \* $p < .05$  \*\*  $p < .01$  \*\*\* $p < .001$

**Research Question 1: Receptive Language**

One linear mixed model (LMM) was run examining the effect of time alone on the receptive language scores. This analysis indicated that time alone did not impact the receptive language scores of this population. A follow-up LMM was conducted to determine other external effects on receptive language scores. Previous analysis indicated the following variables impacted child outcomes in language: gender, ethnicity, gestational age, and attendance. After entering these variables step-wise into the model only one combination yielding significance was the interaction variable ethnicity \*



attendance. Test of fixed effects are detailed in Table 15 with significant variables at the  $p < .05$  identified with an asterisk.

Table 15.

*Summary of Fixed Effects on Receptive Language*

Variables	<i>Est (SE)</i>	<i>E.S.</i>
Fixed effects		
Intercept (constant)	65.96 (4.47)	
<i>Variables</i>		
Ethnicity *Attendance		
African American	.18 (0.1)	0.34
Hispanic	.37 (.12)**	0.64
Caucasian	-.13 (0.2)	0.13
Haitian	-.07 (0.2)	0.08

Note: \* $p < .05$  \*\*  $p < .01$  \*\*\* $p < .001$

Closer examination of racial/ethnic groups shows that Hispanic children with higher attendance made greater language gains. Caucasian and Haitian racial/ethnic groups showed inverse relationships, however these were not significant and findings may have been impacted by low sample size.

**Research Question 1: Expressive Language**

One linear mixed model (LMM) was run examining the effect of time alone on the expressive language scores. This analysis indicated that time alone did not impact the expressive language scores of this population. A follow-up LMM was conducted to determine other external effects on expressive language scores. Previous analysis indicated the following variables impacted child outcomes in language: Gender, ethnicity, gestational age and attendance. After entering these variables step-wise into the model the combination yielding significance was gestational age and attendance. Test of fixed

effects are detailed in Table 16 with significant variables at the  $p < .05$  identified with an asterisk.

Table 16.

*Summary of Fixed Effects on Expressive Language*

<i>Variables</i>	<i>Est (SE)</i>	<i>E.S.</i>
<i>Fixed effects</i>		
Intercept (constant)	59.76 (6.0)***	
<i>Variables</i>		
Time	1.87 (1.3)	0.40
<i>Gestational Age</i>		
Premature	-	
Full Term	7.01 (3.0)*	0.63
Attendance	.25 (0.1)*	0.47

Note: \* $p < .05$     \*\*  $p < .01$     \*\*\* $p < .001$

**Summarizing Hypothesis 1**

Hypothesis 1 examines the impact of a literacy program on language and literacy outcomes. Literacy outcomes proved to be impacted by time, attendance, gestational age and caregiver status at pre test and time, attendance, gestational age and caregiver status at post test.

For receptive language, ethnicity and attendance did impact language scores, with Hispanic children with good attendance showing significant improvements, however other ethnic groups were not significantly impacted by attendance. For expressive language, only gestational age and attendance proved significant.

*Research Question 2*

Question two asked: Do children prenatally exposed to cocaine who participated in the summer book-reading program have higher language scores than children

prenatally exposed to cocaine who have not participated in the summer book-reading program?

It was hypothesized that at 36 months, children who participated in the intervention were expected to demonstrate significantly higher language scores than a matched group of LRIC center-based participants who were not enrolled in the summer literacy program. Study children were matched based on gender with children who participated in the center-based model but did not enroll in the summer literacy program. A one-way ANOVA was used to determine whether the 36-month language scores of children enrolled in the summer reading program were significantly higher than those of a non-participant comparison group. Scores on the Reynell receptive measure were significantly higher  $F(90)= 8.576, p=.004$  for children in the literacy intervention compared with the control group. Reynell expressive language gains were also seen in the literacy group compared with the control group, however these gains were not statistically significant  $F(90) = .970, p=.327$ . Figures 9 and 10 illustrate differences in receptive and expressive language.

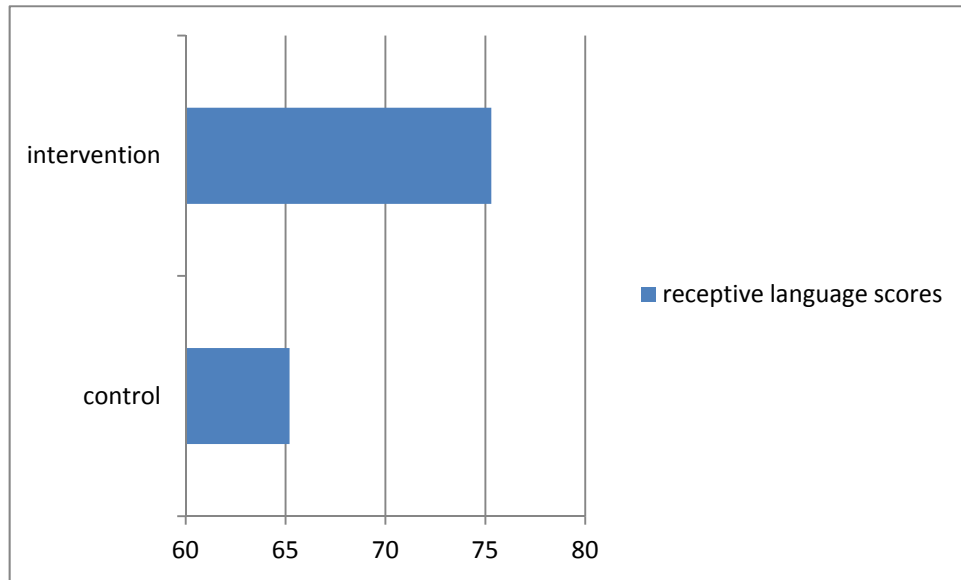


Figure 9. Receptive Language by Group

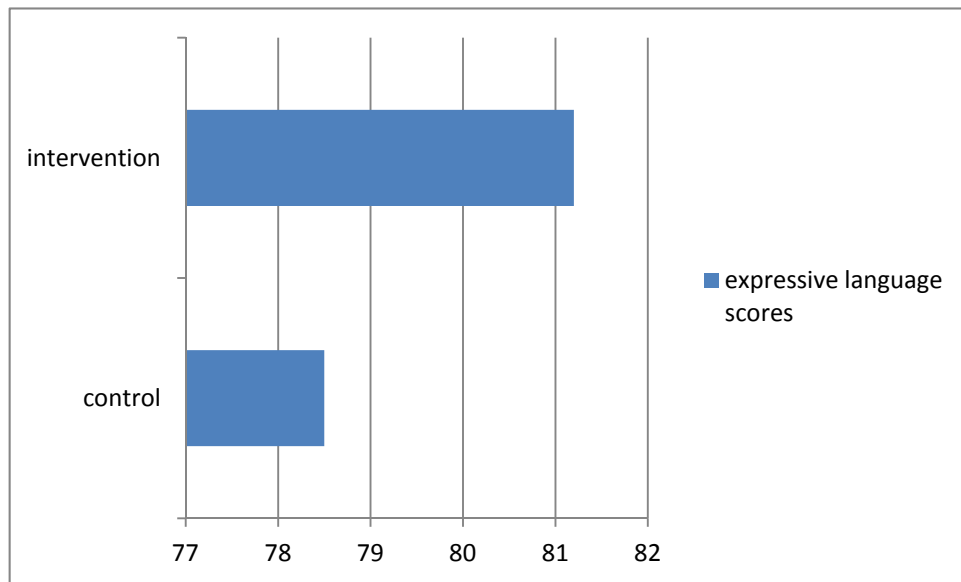


Figure 10. Expressive Language by Group

## **Summarizing Hypothesis 2**

As was expected, the language of young children exposed to a literacy program was higher than those who did not have the opportunity to participate. Statistical analysis indicated that receptive language is more responsive to this type of learning program than expressive. Although both receptive and expressive language indicated higher mean language scores for those who participated in the literacy program, only receptive language yielded significance at the  $p < .05$  level.

## **Research Question 3**

The third question asked: to what extent are family literacy variables predictors of overall language, literacy, and school readiness outcomes at 36 months for the children who participated in the summer literacy program? It was hypothesized that children who live in homes that support literacy through activities will have higher language, literacy and school readiness scores than those who live in homes that do not support literacy.

Home literacy was measured via two instruments: The Stony Brook Family Reading Survey and Activities for Young Children. A Sub Scale was created for the Stony Brook Family Reading Survey to analyze the following data. A correlation matrix was run to determine which questions correlated for this sample population. Table 17 shows these results. This subscale was created using questions that yielded correlation significance at the  $p < .05$  level. Seven questions were then used to create a sub scale to combine questions that indicated similar positive literacy behaviors within the home. A high score on the sub score indicates a high level of literacy support in the home, while a low score indicates low levels of literacy support in the home.

Table 17.

*Correlation Matrix for Stony Brook Family Reading Survey Sub Scale*

Items	1	2	3	4	5	6	7
1. How often do you or a family member read a picture book to your child?	-						
2. At what age did you or another family member begin to read to your child?	.691**	-					
3. How many minutes did you or another family member read to your child yesterday?	.625**	.625**	-				
4. About how many picture books do you have in your home for your child's use?	.472**	.290**	.589**	-			
5. How often does your child ask to be read to?	.467**	.198*	.169	.367**	-		
6. How often does your child look at books by himself or herself?	.461**	.383**	.417**	.317**	.556**	-	
7. If your child is read to, how much does your child enjoy it?	.301**	.419**	.368**	.282**	.330**	.387**	-

\*significant at p<.05 \*\*significant at p<.01

Activities for Young Children used a sum score for data analysis. The Activity for Young Children Sum Score was calculated to indicate either high or low family activity levels. These questions reflected not only on literacy practices but on family activities in general. A high score on this measure indicated higher levels of family activity and a low score would indicate fewer family activities together. Table 18 shows the mean and standard deviation of the Activity Sum Score for the families.

Table 18.

*Activities for Young Children Sum Scores M(SD)*

<i>M (SD)</i>	Activities for Young Children Sum Score
	<i>N</i> (35)
<i>M</i>	40.65
<i>(SD)</i>	(3.42)
Min	34
Max	46

### **Receptive Language and Home Literacy Measures**

One linear mixed model (LMM) was run examining the effect of the SBR-Sub Scale score on receptive language scores. This analysis indicated that the SBR-Sub Scale score alone did impact the receptive language scores of this population. A follow-up LMM was conducted to determine other external effects on receptive language scores. Previous analysis indicated the following variables impacted child outcomes in language: Gender, ethnicity, gestational age. After entering these variables step-wise into the model along with the SBR-Sub Scale Score the variable reaching significance was the interaction variable: ethnicity \* attendance. Test of fixed effects are detailed in Table 19 with significant variables at the  $p < .05$  identified with an asterisk.

Table 19.

*Summary of Fixed Effects of Home Environment on Receptive Language*

Variables	<i>Est (SE)</i>	<i>E.S.</i>
Fixed effects		
Intercept (constant)	49.03 (8.61)***	
<i>Variables</i>		
SB Sum Score	.65 (.305)*	.63
Ethnicity * Attendance		
African American	.275 (.12)*	.55
Hispanic	.435 (.12)***	.84
Caucasian	-.02 (.22)	.01
Haitian	.09 (.22)	.12

Note: \* $p < .05$  \*\*  $p < .01$  \*\*\* $p < .001$

Closer examination of ethnic groups shows that Hispanic and African American children with higher attendance and more home literacy support made greater language gains. The other ethnic groups showed no significance in these areas although again, these findings may have been impacted by low sample size.

One linear mixed model (LMM) was run examining the effect of the Activities for Young Children sum scale (ACT Sum) score on the receptive language scores. This analysis indicated that the ACT Sum score alone impacted the receptive language scores of this population. A follow-up LMM was conducted to determine other external effects on receptive language scores. Previous analysis indicated the following variables impacted child outcomes in language: Gender, ethnicity, gestational age, After entering these variables step-wise into the model along with the ACT Sum Score there were no combinations yielding significance at the  $p < .05$  level.



## Expressive Language and Home Literacy Measures

One linear mixed model (LMM) was run examining the effect of the SBR-Sub Scale score on expressive language scores. This analysis indicated that the SBR-Sub Scale score alone did not impact the expressive language scores of this population. A follow-up LMM was conducted to determine other external effects on expressive language scores. Previous analysis indicated the following variables impacted child outcomes in language: gender, ethnicity, gestational age. After entering these variables step-wise into the model along with the SBR-Sub Scale Score the combination that best significantly fit the model was attendance, gestational age and ethnicity \* SBR-Sub Scale score. Test of fixed effects are detailed in Table 20 with significant variables at the  $p < .05$  identified with an asterisk.

Table 20.

### *Test of Fixed Effects on SBR-Sub Scale Scores and Expressive Language*

Variables	Est (SE)	E.S.
Fixed effects		
Intercept (constant)	47.82 (9.9)*	
<i>Variables</i>		
Gestational Age		
Premature	-	
Full Term	6.85 (3.9)	.56
Attendance	.26 (.13)*	.53
Ethnicity * SB Sum Score		
African American	.66 (.33)	.64
Hispanic	.71 (.33)*	.67
Caucasian	.45 (.44)	.35
Haitian	.09 (.56)	.05

Note: \* $p < .05$     \*\*  $p < .01$     \*\*\* $p < .001$

Results indicate that attendance is a significant contributor to higher expressive language scores. Also, Hispanic children who have higher levels of home literacy support have better expressive language. Other ethnic groups did not show this relationship.

One linear mixed model (LMM) was run examining the effect of the ACT Sum score on the expressive language scores. This analysis indicated that the ACT Sum score alone did not impact the expressive language scores of this population. A follow-up LMM was conducted to determine other external effects on expressive language scores. Previous analysis indicated the following variables impacted child outcomes in language: gender, ethnicity, gestational age. After entering these variables step-wise into the model along with the ACT Sum Score, the variables that fit the model, were: attendance, gestational age \* ACT Sum Score, and gestational age. Test of fixed effects are detailed below in Table 21 with significant variables at the  $p < .05$  identified with an asterisk.

Table 21.

*Test of Fixed Effects on Expressive Language, Home Literacy*

Variables	<i>Est (SE)</i>	<i>E.S.</i>
<b>Fixed effects</b>		
Intercept (constant)	89.18 (31.8)**	
<i>Variables</i>		
Attendance	.24 (.12)	.50
Gestational Age * ACT Sum Score		
Premature	-.58 (.74)	.72
Full Term	1.35 (.55)*	.21
Gestational Age		
Premature	-	
Full Term	-73.3 (38.0)	.54

Note: \* $p < .05$     \*\*  $p < .01$     \*\*\* $p < .001$

Results indicated that children who were full-term and had high scores on the ACT Sum had higher expressive language. Children who were premature did not exhibit this relationship.

### **Literacy Outcomes and Home Literacy Measures**

One linear mixed model (LMM) was run examining the effect of the SBR-Sub Scale score on the literacy post test scores, indicating that the SBR-Sub Scale score alone did indeed impact the literacy post test scores for this population. A follow-up LMM was conducted to determine other external effects on literacy post test scores. Previous analysis indicated the following variables impacted child outcomes in language: gender, ethnicity, gestational age, caregiver status and caregiver education. After entering these variables step-wise into the model along with the SBR-Sub Scale Score, the variables found significant were SBR-Sub Scale score, time, attendance and the interaction of ethnicity \* SBR-Sub Scale Score yielding significance. Test of fixed effects are detailed in Table 22 with significant variables at the  $p < .05$  level identified with an asterisk.

Table 22.

*Home Literacy (SBR-Sub Scale) and Literacy Post Scores*

Variables	<i>Est (SE)</i>	<i>E.S.</i>
Fixed effects		
Intercept (constant)	1.91 (1.5)	
<i>Variables</i>		
SB Sum Score	.12 (.06)	.78
Time	3.16 (.26)***	3.97
Attendance	.09 (.02)***	1.51
Ethnicity * SB Sum Score		
African American	.14 (.05)**	1.14
Hispanic	.10 (.05)*	.82
Caucasian	.05 (.14)	.10
Haitian	.16 (.10)	.52

Note: \* $p < .05$  \*\*  $p < .01$  \*\*\* $p < .001$

Results indicated that both time and attendance were contributing factors to higher literacy gains. Also, African American and Hispanic children who had higher levels of home literacy support made greater gains in literacy.

One linear mixed model (LMM) was run examining the effect of the ACT Sum score on the literacy post test scores. This analysis indicated that the ACT Sum score alone did not impact the literacy post test scores for this population. A follow-up LMM was conducted to determine other external effects on literacy post test scores. Previous analysis indicated the following variables impacted child outcomes in language: gender, ethnicity, gestational age, caregiver status and caregiver education. After entering these variables step-wise into the model along with the ACT Sum Score the combinations that best significantly fit the model were: time, attendance, gestational age \* caregiver status,

gestational age, ACT Sum score. Test of fixed effects are detailed in Table 23 with significant variables at the  $p < .05$  level identified with an asterisk.

Table 23.

*Home Literacy (ACT Sum Score) and Literacy Post Scores*

Variables	<i>Est (SE)</i>	<i>E.S.</i>
Fixed effects		
Intercept (constant)	-7.42 (4.5)	
<i>Variables</i>		
Time	3.14 (.23)***	4.65
Attendance	.05 (.02)*	.63
Premature * Caregiver		
Parent	7.45 (2.0)**	1.75
Family Non-Parent	6.35 (1.7)**	1.80
Foster Parent	7.13 (1.6)***	2.15
Adoptive Parent	-	
Full term * Caregiver		
Parent	6.49 (1.8)**	1.64
Family Non-Parent	7.8 (1.6)***	2.37
Foster Parent	6.94 (1.6)***	2.12
Adoptive Parent	7.89 (1.7)***	2.24
ACT Sum Score	.22 (0.1)*	1.01

Note: \* $p < .05$     \*\*  $p < .01$     \*\*\* $p < .001$

Results indicated that, again, time and attendance are significant contributing factors to increasing literacy scores. Also, all caregiver types are impacted by gestational age, where full-term children in any home perform better, especially when that caregiver scores high on the ACT Sum Score.

Linear regression using the Activities Sum Score as an independent variable and Literacy post scores as an independent variable indicated that high degrees of Family Activities did have some impact on post literacy scores however this relationship was only nearing significance ( $\beta = .182$ ,  $t(98) = 2.107$ ,  $p = .07$ ). In this case, receptive and

expressive language were not significant at the  $p < .05$  level. An LMM analysis was conducted to determine best model fit on literacy post scores. The following variables were added to the model: ACT sum score, Time, Prematurity and attendance. With this, ACT sum score ( $p = .014$ ), time ( $p = .001$ ) and attendance ( $p = .018$ ) achieved significance. An LMM analysis was conducted on receptive language as well using the following variables in the model: ACT sum score, caregiver education, attendance, ACT sum score \* caregiver, ACT sum \* gender. Although the ACT sum score did not achieve significance itself, adding it to the model improved the fit. In this model attendance alone achieved significance ( $p = .007$ ). A model for expressive language score and ACT sum scores could not be found.

### **School Readiness Outcome**

The Bracken School Readiness Assessment (BSRA) was used to measure preschool readiness for the children. Home literacy was expected to impact scores on the BSRA, with homes supporting literacy having children with higher scores as compared with children in homes with lower scores. Table 24 illustrates mean and standard deviations for the children in the study.

Table 24.

*Mean and Standard Deviation of Bracken School Readiness*

<i>M(SD)</i>	Bracken School Readiness Assessment Raw Score	
	Male <i>N</i> = 22	Female <i>N</i> = 23
<i>M</i>	15.72	14.34
<i>(SD)</i>	(9.9)	(9.06)
Min	3	5
Max	43	49

One-Way Anova indicated that the BSRA was influenced by the home environment as measured in the SBR-Sub Scale  $F(1, 32) = 3.24, p=.009$ . This was not evident as measured by the Activities Sum Scale  $F(1, 32) = .994, p=.483$ . Also, receptive language was seen as a significant predictor for overall preschool readiness as measured by the BSRA:  $F(1, 34) = 10.79, p=.002$ .

### **Summarizing Hypothesis 3**

Hypothesis 3 examines the impact of home literacy support on language, literacy and preschool readiness, with the expectation that homes that engage in activities that support literacy would have higher gains in language, literacy and school readiness. Individual variables pulled from the SBFRS that indicated higher language scores were: age a child is read to; number of books in the home; child's enjoyment of reading and whether a child looks at books on their own. Whether a child looks at books alone also predicted higher literacy scores. The SBR-Sub Scale was calculated to create a "home literacy support" variable that would indicate either high or low home literacy support. The scores on this sub scale predicted both receptive and expressive language scores indicating that high home literacy support facilitated higher language abilities. The SBR-Sub Scale also predicted receptive language in combination with ethnicity and attendance and expressive language with attendance and ethnicity. Finally, the SBR-Sub Scale was not found to predict literacy scores at pre test, however at post, the SBR-Sub Scale predicted post literacy scores in combination with other variables (time, attendance, and ethnicity).

Activities for Young Children Sum Score was also predictive, yielding some significant results as well. Linear regression did not yield significant results for language

or literacy. LMM analysis did indicate the ACT sum score did predict literacy pre test scores in combination with other variables (time, gestational age, caregiver status, gender) as well as post test (time, attendance, gestational age, caregiver status). The ACT sum score was not significant in predicting receptive language; however on expressive language ACT-Sum Score did predict language in combination with other variables (gestational age, attendance.)

School Readiness was even more elusive to measure for this population. There was a relationship between school readiness outcomes and home literacy support as measured on only the Stony Brook Family Reading Inventory but not the Activities for Young Children. Even more importantly was the predictive value of receptive language on preschool readiness indicating that children who had higher receptive language scores preformed better than on the BSRA.



## CHAPTER V

### DISCUSSION

The major goal of this study was to examine the impact of a summer literacy program and the effects of the home literacy environment on the language and literacy outcomes of a group of children at-risk for long-term developmental and academic delays. Based on previous studies suggesting that children who are exposed to literacy materials and activities at a young age have greater vocabulary and more advanced literacy skills in the early years of elementary school (DeBaryshe, 1993; Fletcher & Reese, 2005; Karrass & Braungart-Rieker, 2005; Payne, Whitehurst, & Angell, 1994; Raikes et al., 2006), the present study hypothesized that (a) children who received the intervention would demonstrate growth in both language and early literacy skills over 3 years time; (b) children who participated in the intervention were expected to demonstrate significantly higher language scores than a matched group of LRIC center-based participants who were not enrolled in the summer literacy program; and (c) children who participated in the summer program and live in homes that support literacy through activities had higher language, literacy and school readiness scores than those who participated in the program and live in homes that do not support literacy. The current chapter will provide a summary of the findings, interpret the findings, detail implications, address limitations and recommend areas of continued research.

#### **Summary of Findings**

Results indicated that, as expected, literacy scores did improve for the children over the three year period; however, language scores did not experience the same rate of change over time. Receptive language was impacted by other variables such as

attendance, and ethnicity. Expressive language was impacted significantly by gestational age and attendance. The dip in language scores at the 24 month time point was evident for both receptive and expressive language. Since language delays are prominent for these at-risk young children it seems logical that they would experience a later language increase than typically developing children, somewhere between 24 and 36 months of age.

Results also indicated that language outcomes for young children who were exposed to a literacy program were higher than those who did not participate. Although there were mean score differences in both receptive and expressive language, only receptive language yielded significance at the  $p < .05$  level. These study results also found that activities in the home that support literacy and learning do indeed impact language and literacy outcomes for these children, specifically, the age a child is read to; the number of books in the home; a child's enjoyment of reading and whether a child looks at books on their own impact language scores. A sub-scale score (SBR-Sub Scale) created from the SBFRS indicating "home literacy support" predicted both receptive and expressive language indicating that high home literacy support facilitated higher language abilities. The SBR-Sub Scale also impacted receptive language in combination with other variables (ethnicity and attendance) and expressive language in combination with other variables (attendance, gestational age and ethnicity). Finally, the SBR-Sub Scale was not found to impact literacy scores at pre test, however at post, the SBR-Sub Scale impacted post literacy scores in combination with other variables (time, attendance, and ethnicity).

Activities for Young Children Sum Score was also predictive of child outcomes in this study. LMM analysis indicated the ACT sum score impacted literacy pre test scores

in combination with other variables (time, gestational age, caregiver status, gender) as well as post test (time, attendance, gestational age, caregiver status). The ACT sum score revealed an impact on receptive language, and on expressive language, but in combination with other variables (gestational age, attendance.)

Finally, for this particular population, home literacy was not as predictive as expected for preschool readiness, with only the SBR-Sub Scale yielding significance, however it was noteworthy that the BSRA scores was significantly impacted by a child's receptive language.

### **Interpretation of Findings**

This section provides and interpretation of the findings corresponding to several of the topics described in the literature review. Topics include dialogic reading, home literacy environment, and the risk associated with prenatal cocaine exposure.

#### **Dialogic Reading**

Previous studies indicated that dialogic reading increased the rate of both the verbal responses and questions asked by participating children. The mean length utterance (or number of consecutive words uttered by the child) was also enhanced by mother's use of dialogic reading (Dale et al., 1996). In one study (Whitehurst et al, 1994), findings suggested the dialogic group improved writing and print concepts, but no difference was observed for phonological awareness. In a later replication (Whitehurst et al., 1999) similar results were observed, but longitudinally followed the children into kindergarten and first grade. At kindergarten, children who had participated in dialogic reading continued to perform significantly better than the control group in writing and phonological awareness, but not in print concepts. Another study indicated children in the

reading groups significantly improved their mean length utterance (MLU) from pre-intervention to post-intervention (Crain-Thoreson & Dale, 1999). Yet another study indicated that children in the dialogic book reading intervention made larger gains in vocabulary than children in the regular book reading treatment (Hargrave & Senechal 2000). These previous examples suggest that the results of dialogic reading, with at-risk, language delayed and typically developing children may be significant irrespective of parental participation and family environment.

The current study found that both receptive and expressive language of young children exposed to a literacy program was higher than those who did not have the opportunity to participate. Statistical analysis further indicated that receptive language is more responsive to this type of learning program than expressive. In the case of this particular population, it is evident that the child's receptive language can greatly benefit from this type of learning program, however expressive language, as evidenced by a child's verbal communication and use of vocabulary is not as impacted by this type of program. Contrary to what some previous studies have found, though, was that children are indeed impacted by the home literacy environment, although gains in language can be seen in a literacy intervention group irrespective of the home environment literacy support.

### **Home Literacy Environment**

Previous research indicated that the home environment has a significant impact on the language and literacy outcome of young children (Hart & Risley, 1995). A number of studies have reported significant associations between children's home literacy environment and later language and literacy skills (Bailey, 2006; DeJong & Leseman,

2001; Haden, Reese, & Fivush, 1996; Senechal & LeFevre, 2002; van Kleeck, Gillam, Hamilton, & McGrath, 1997). Payne, Whitehurst, and Angell (1994) evaluated the language of 236 low-income preschoolers. Controlling for both maternal IQ and years of education, the authors found that 18.5% of the variance in children's language scores was accounted for by the child's home literacy environment, as measured by: (a) the age when joint book reading began, (b) frequency of caregiver reading, (c) frequency of library visits, and (d) frequency of activities that interfere with book reading, such as TV watching. In contrast, another study indicated that instead, a global measure of the quality of the home environment, the Infant Toddler- HOME, was significantly related to receptive vocabulary, expressive language, and early literacy skills at age 4 and in subsequently in kindergarten (Roberts, Jurgens, & Burchinal, 2005).

The current study also confirmed many of these same conclusions in that the home environment did impact language outcomes for children. This research study found that "the age a child is read to," "the number of books in the home," "a child's enjoyment of reading" and "whether a child looks at books on their own" all effect child outcomes in language. It is noteworthy that "the number of times a child is read to" did not reveal to be significant, however "number of books in the home", "a child's enjoyment of reading" and "whether a child looks at books on their own" did. This may indicate there is a more intrinsic interest in reading for certain children that may facilitate language.

The SBR- Sub Scale, reflecting a combined home literacy support, predicted both receptive and expressive language. The SBR- Sub Scale predicted both receptive and expressive language indicating that high home literacy support facilitated higher language

abilities. The SBR-Sub Scale also impacted receptive language in combination with other variables (ethnicity and attendance) and expressive language in combination with other variables (attendance, ethnicity). In addition, the SBR-Sub Scale was not found to impact literacy scores at pre test, however at post, the SBR-Sub Scale impacted scores in combination with other variables (time, attendance, and ethnicity). Finally, significant findings linked high scores on the SBR-Sub Scale and the BSRA indicating that higher scores on preschool readiness were related to supportive home environments.

### **Risk Associated with Prenatal Cocaine Exposure**

Previous studies on children born with prenatal cocaine exposure indicate that although some of the small, but significant effects of prenatal cocaine exposure have been linked to language functioning and attention processing in early childhood (Bandstra et al., 2001, 2002), most of the work on prenatal cocaine exposure suggests that it is other prenatal and postnatal environmental factors related to substance abusing parents that place the child at high risk for developmental delays. More recent work indicates that quality of home environment is a better predictor of cognitive and language outcomes than prenatal cocaine exposure (Hurt et al., 2001; Singer et al., 2004). Results of another study indicated that children with low birth weight and prenatal cocaine exposure experienced poor cognitive and language outcomes and benefited more than normal birth weight children from early intervention. This current study also found that prematurity did impact child outcomes in both receptive and expressive language, in that children who were premature had lower receptive and expressive language scores over time than their classmates who were not born prematurely, irrespective of the 24 month dip in language.

Another study examining proximal variables with the same at-risk population indicated negative correlations with the number of children in the home and the quality of the caregiving environment and positively correlated with daily hassles. Caregiver education level was also positively correlated with quality of the environment (Dinehart et al., 2006). Analysis from this current study indicated that caregiver status and caregiver education did indeed impact literacy outcomes.

Another study found that children's language at 24 months was significantly related to frequency of reading in the home. Children who had higher language skills were read to more (Fletcher et al., 2008), however children's language was not associated with their attention to the reading. The home environment for this current study was also a factor in how these young children improved language and literacy outcomes.

This current study found that for receptive language attendance rates, prematurity and the interaction of gender and prematurity impacted the changes in receptive language scores over time. Expressive language was significantly predicated by prematurity, but this was in combination with other factors such as caregiver status and time. The addition of the summer reading program impacted receptive language much differently than expressive language. Change in language however were not measured solely by the literacy program but were in conjunction with other demographic factors.

### **Implications for Educators**

Findings from this study indicated that at-risk young children do benefit from center-based literacy intervention. This literacy experience, however, is also driven by the child's home environment, their attendance to the program, whether they were premature or not and the education level of their caregiver. This particular research study

analyzed data that had been collected over a 3-year period during the summer months, but still saw language gains over time for each of the children. This evidence supports adding more literacy-intensive curriculum such as dialogic reading to early childhood education programs specifically for children at risk in an effort to increase the language skills of the children. It would be expected that adding an intensive literacy model two or even three times over a year would yield more gains in language and literacy. These analyses indicate that children who have language delays may benefit both in literacy and in language from more intensive center-based literacy interventions.

Educators in general should understand that contrary to current literature on early intervention and special needs children, this unique population requires a child-centered approach to learning over a family-centered approach, given the inconsistent home experience of these children. This study showed that the home environment did impact the child outcomes, however it also showed that children improved over time irrespective of it. This requires a paradigm shift for many of our future educators, as most teacher preparation programs are emphasizing family-centered and natural environment approaches for young learners.

In addition, educators for this population of young children should understand the relationship between literacy, language and home environment. Quite often, children at risk exhibit language delays that are also related to the lack of a supportive literacy environment in the home. To compensate for this lack of literacy support at home is a challenge for teachers in early childhood programs. Creating a support system for caregivers so that they may both learn about supportive literacy activities in the home as



well as provide literacy materials in the home for the child to experiment with may help young children experience greater outcomes in language.

The impact of early intervention attendance is one that cannot be ignored in these findings. If anything this study shows the positive impact of early intervention services on children with developmental delays. Programs should strongly consider the barriers to attendance and provide or facilitate transportation when appropriate to ensure attendance.

The lack of statistical findings for change in preschool readiness is also noteworthy. For this population, it may have been unrealistic to expect preschool readiness to be impacted greatly by this type of literacy intervention, especially given the age of the children. First the BSRA is a measure of basic concept knowledge, normed for children starting at 36 months of age. The children in the study were assessed using this measure around their 3<sup>rd</sup> birthday and given they are developmentally delayed, this measure could have been too advanced for many of them at that time. More accurate results would have been found if the children had been assessed later; however the children graduated the program just after their 3 year birth date, making that impossible for this particular study. Also, material that all children generally know at preschool age is not necessarily targeted by Dialogic Book Reading. Especially for this population, gains in specific areas may more readily be detected when instruction is targeted to the learning goals. Expectations that the literacy intervention might improve preschool readiness alone were not realistic.

### **Limitations**

First, using The Activities for Young Children and Stony Brook Family Reading Survey for home literacy activities may have impacted the results of this study. In

hindsight, using the Infant-toddler HOME as in previous studies, (Roberts, Jurgens, & Burchinal, 2005) may have been a better measure of activities in the home for this population. Second, caregivers completed the questionnaires on their own. It was expected that their responses were not biased, but there may have been a level of self-report bias. The fact that this research study did indeed detect statistical differences indicates that actual differences may have been greater, since caregivers' bias would have been responding in a more socially desirable manner rather than negative.

### **Areas for Continued Research**

Findings from this research study indicated that Dialogic Book Reading is beneficial for this at-risk population. Improvements were noted not only in literacy gains but in receptive language as well. Follow-up studies should involve larger samples with a more intensive book reading program. Also, using the Infant-toddler HOME to gauge home literacy practices and activities would give a more objective measure to determine more specifically how the quality and stimulation in a child's home can impact a child's outcome on literacy interventions offered within the school environment.

Some questions that arose from the study came from the use of the home literacy questionnaires. As stated previously, the frequency in which a caregiver reads to a child did not appear to be a significant contributor to language success, however a child's enjoyment of reading, number of books in the home and child reading alone did. Examining some intrinsic motivators of reading for very young children at risk may be interesting. Also, this study was conducted in three parts daily. It is unknown which specific modality facilitates language for these children. Continued research on the three different modalities could answer this question. Finally, it is noteworthy that children

significantly improved only their receptive language skills. Given their age at the time of the study it might be interesting to conduct a follow-up study to see if expressive language gains could be seen as they age.

The next step in literacy research for very young children at risk may also involve an exploration into curriculum and the emphasis of literacy in the classroom. Having full classroom sets of books is a unique way of exploring literature for this young population. Also, the repeated-reading activity proved successful for this population; however it may be worth exploring alternatives to reading the same book over time or adding other materials to the reading protocol.

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## PUBLICATIONS AND PRESENTATIONS

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Early School Readiness in Children Within and Outside the Child Welfare System: An examination of the impact of childcare quality, family stability and developmental status. By: L. Katz, L. Dinehart, M. Ullery, M. Kaiser, C. Maze and K. Bono.