The Language Development of Children of Adolescent Mothers: An Investigation of Factors that

Promote Resilient Functioning

A thesis submitted by

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Abstract

The present study examined the language trajectories of a sample of children of adolescent mothers over the course of two years. At ~ 24 months old, children scored below average on a measure of language skills. At ~ 48 months, children scored within the average range, suggesting a trend towards positive language development. Early language scores significantly predicted later scores. Children scoring lowest at 24 months old were predicted to score 10 points lower than their high scoring counterparts at 48 months. Three moderators of language delay were investigated, yielding nonsignificant results: (1) maternal sensitivity, (2) participation in Early Intervention, and (3) participation in the Healthy Families Massachusetts home visiting program. Power to detect significant moderation effects was limited by sample size and child age range. Results of this study support early intervention and highlight the current trend in language intervention towards increasingly individualized and population-specific programs.

Keywords: language development, adolescent mothers, at-risk children, Healthy Families Massachusetts, Early Intervention, maternal sensitivity.

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Introduction

Recent research and writings in the popular press reflect the growing recognition of school readiness in America as a critical issue with widespread effects on child well-being. School readiness consists of both pre-academic skills (such as the recognition of numbers and letters) and self-regulation behaviors (the ability to sit still, focus, and engage with material for substantial periods of time) (Isaacs, 2012). Research has shown that American children are increasingly lacking proficient skills (particularly in terms of literacy) that will lead them to succeed in school (Zill & West, 2001). The building blocks for academic success are provided by a child's interactions with his or her environments, which are fueled by early language abilities (Fewell & Deutscher, 2004). In the past several decades, federal and state governments alike have aimed to tackle the issue of school readiness with program and policy initiatives such as The No Child Left Behind Act and the Head Start programs (Congress, 2002; U.S. Department of Health & Human Services, 2014).

Multiple characteristics of children's environments influence their school readiness. These characteristics may include the behavior of their parents, access to resources, and the family's socioeconomic status, among others (American Psychological Association, 2014; Duncan et al., 2007; Forget-Dubois et al., 2009; Isaacs, 2012). Socioeconomic status is clearly identified in the literature as a foundational mechanism that, along with other factors, influences the school readiness of a child as well as his/her subsequent developmental outcomes (American Psychological Association, 2014; Mistry, Benner, Biesanz, Clark, & Howes, 2010; Pungello, Iruka, Dotterer, Mills-Koonce, & Reznick, 2009). Seventy-five percent of children from families with moderate and high incomes are ready for school at age five (i.e., they exhibit the early skills and behaviors that promote academic success) in comparison to forty-eight percent of children

from low-income families (Isaacs, 2012). The impact of poverty on physical and mental health is widespread and multifactorial in nature. Mechanisms by which poverty may influence school readiness include parent education levels, access to resources, the development of an engaging home environment, child school attendance, and low birth weight, among others (Isaacs, 2012).

In comparison to families headed by adult parents, adolescent parent families are more likely to have low socioeconomic status (Fagan & Lee, 2013; Isaacs, 2012). Two-thirds of families headed by an adolescent are considered to be low income, with one in four teen parent families utilizing welfare programs within three years of the child's birth (The National Campaign to Prevent Teen and Unplanned Pregnancy, 2010). Children of teenage mothers perform more poorly on assessments of school readiness, are at a greater risk for high school dropout, and are fifty percent more likely to repeat a grade in comparison to children of adult mothers (Hoffman & Maynard, 2008; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2010). As a result, it is imperative to investigate mechanisms beyond socioeconomic status that may contribute to the at-risk nature of this group of children.

A strong link has been established between the language and communication skills of a child and his or her school readiness (Forget-Dubois et al., 2009). In turn, school readiness has been linked to academic success, which promotes a host of other positive outcomes. Research shows that early school readiness is directly linked to later academic achievement in mathematics and reading (Duncan et al., 2007). Although the determinants of school readiness are multifactorial in nature (including sociodemographic factors, access to resources, and parental behavior, among others), early child language skills mediate the relation between the home environment and school readiness (Forget-Dubois et al., 2009).

Research suggests that adolescent mothers speak fewer words to their children than do older mothers (Hann, Osofsky, & Culp, 1996). Additionally, the quality of their child-directed speech may be missing key elements that allow for children to learn about their world through language (Culp, Osofsky, & O'Brien, 1996). For example, recent research emphasizes the importance of asking open-ended questions and engaging in joint attention processes (Quenqua, 2014). Conclusions suggest that the content of speech and the number of words spoken to the child may be of equal importance for positive language development (Goldin-Meadow et al., 2014; Quenqua, 2014). With the emergence of new research of this nature, it is increasingly relevant to build upon existing knowledge regarding the language development of children of teenage mothers.

The present thesis aimed to examine key factors that impact the language development of children of teenage mothers. Existing research will be reviewed to examine the claim that these children are at a greater risk for delays in language development. Furthermore, this thesis reviewed evidence that suggests that protective factors in a child's environment (such as sensitive parental behavior or participation in intervention programs that are aimed to support parents and children) may alter the expected link between teen parenting and children's language delays.

Literature Review

Prevalence of Adolescent Pregnancy

Although adolescent pregnancy has steadily declined in incidence over the past twenty years in the United States, there were 305,420 births to teenage mothers in 2012 (Ventura, Hamilton, & Matthews, 2014). Even with rates decreasing by one-third from 1991 to the present, the prevalence of births to teenage mothers in the United States is significantly more than in other equally developed countries (Ventura et al., 2014). Research of the past several decades has been fueled by the social and economic impacts of adolescent motherhood. In 2010, the estimated cost of adolescent parenthood in the United States was $9.4 billion. Declining rates of teen childbearing have the potential to save U.S. taxpayers billions of dollars per year (Ventura et al., 2014).

Within the United States, births to teen mothers vary widely in terms of demographic factors including race/ethnicity and geographic location (Ventura et al., 2014). According to a recent report from the National Center for Health Statistics, Hispanic teenage women had the highest rates of pregnancy, at 46.3 births per 1000 teenagers. Asian or Pacific Islander teens had the lowest rate, at 9.7 births per 1000 adolescents. A downward trend exists for all racial/ethnic groups over the past several years. Geographically, the lowest birth rates to teen mothers in 2012 were in the Northeast, with the highest rates occurring in the Southern and Southwestern United States (Ventura et al., 2014).

Impact of Adolescent Parenthood

Although adolescent pregnancy has been linked to several negative outcomes for the young mother and her child, some cultures and societies define adolescent pregnancy as a norm or celebrated positive life event (Beers & Hollo, 2009). Teenage parents and their children often

thrive with social and other foundational supports (Klein, 2005). Even when controlling for preexisting sociodemographic risk factors, adolescent pregnancy is still associated with potential negative outcomes for both the mother and the child (Beers & Hollo, 2009). Research shows that having a teenage parent has a significant impact on the development of the child, putting him/her at risk for both short-term and long-term difficulties (Brooks-Gunn & Furstenberg, 1986; Hann et al., 1996). Additionally, the adolescent mother herself may face a host of social, economic, mental and physical health issues (Beers & Hollo, 2009).

The impact of early parenthood on the adolescent mother has been examined rather extensively in the research literature (Brooks-Gunn & Furstenberg, 1986; Hann et al., 1996). In comparison to their older-aged counterparts, young mothers are less likely to graduate from high school and are considered more likely to be faced with economic hardship in later life (Furstenberg, Brooks-Gunn, & Chase-Lansdale, 1989). Some research also suggests that adolescent mothers are more likely to have trouble obtaining and maintaining a stable job, which leads to a higher likelihood of dependence on public assistance of some kind (Furstenberg et al., 1989; Hann et al., 1996).

These research findings, along with media response to the prevalence of teen pregnancy, have contributed to the formation of a stereotype of the teenage mother as "Black, urban, poor, and unmarried" (Brooks-Gunn & Furstenberg, 1986). Some research on this topic challenges this stereotype, positing questions regarding how the effects of early childbearing may have been exaggerated (Furstenberg et al., 1989). This questioning is rooted in the idea that previous research may have neglected to address individual differences and variance among teenage mothers that have been studied (Hann et al., 1996). In comparing teenage mothers to older-aged mothers, it is important to consider or control for socioeconomic and other demographic factors

that may impact the parenting behaviors and circumstances of the mother-child relationship (Brooks-Gunn & Furstenberg, 1986).

In addition to the impact of adolescent parenthood on the mother, the development of the child may be greatly influenced. Children of adolescent mothers are at a greater risk for developmental delay, behavioral problems, physical health issues, and academic challenges (Beers & Hollo, 2009). Babies born to teenage mothers are more likely to be born prematurely and to have low birth weight, factors which significantly increase the risk of infant mortality and illness (Ventura et al., 2014). The teenage mothers themselves are at a significantly higher risk to develop anemia, to gain excessive weight, and to have complications with their pregnancy (Beers & Hollo, 2009). In addition to evident physical health concerns, children born to mothers aged 17 and younger have less socioemotional and cognitive skills than the children of older mothers, which can impact their readiness for kindergarten (Terry-Humen, Manlove, Moore, & National Campaign to Prevent Teen Pregnancy [U.S.], 2005). Evidence suggests that as the age of the mother at birth increases, the cognitive outcomes of her child increase as well (Terry-Humen et al., 2005). Research sponsored by the National Campaign to Prevent Teenage Pregnancy found that the children of very young mothers (aged 17 and younger) scored lower on cognitive assessments than did the children of slightly older mothers (aged 22 and above). Children of 18 and 19 year old mothers had similar school readiness scores to the children with mothers aged 17 and younger (Terry-Humen et al., 2005). Similar findings can be found in earlier literature on the cognitive development of the children of teen mothers. In a study that compared the IQs of children born to mothers aged 12 to 15 years old, 16 to 17 years old, and 20 to 29 years old, IQ scores were positively correlated with the rising age of the mother (Broman et al., 1981).

Differences between the cognitive performances of the children of teenage mothers and of older mothers are typically recognized in the preschool years (Brooks-Gunn & Furstenberg, 1986). Furthermore, the children of adolescent mothers are more likely to become teenage parents themselves, to develop substance-abuse problems, and to engage in sexual activity early on in life (Pogarsky, Thornberry, & Lizotte, 2006).

In addition to the impacts of adolescent parenthood on the cognitive and socioemotional aspects of a child's development, language development may also be greatly affected (Terry-Humen et al., 2005). Early language skills are a determinant of school readiness outcomes such as achievement in reading and math, the development of communication skills, and the presence or absence of behavior problems (Fagan & Lee, 2013). Due to the fact that language development is a core component of school readiness, this thesis provides a brief background on typical language development followed by an analysis of the language trajectories of children of adolescent mothers.

Language Development of Children of Adolescent Mothers

Infants typically begin to produce one-word utterances around ten to twelve months of age (Benedict, 1979). However, the development of verbal language is highly individualized and may differ in myriad aspects. For example, variations may occur in the number of words produced, mean length of utterance, and the content of words spoken, among others (Brown, 1973). Although some language theorists posit that the development of language is based largely on reinforcement from experiences had (Skinner, 2014), others propose that humans are born with a predisposed ability or foundational base that promotes the acquisition of speech (Chomsky, 1969).

A critical window for language development occurs during infancy and the early toddler years. Infants are born with the ability to comprehend phonemes from a host of different languages, but lose the ability to differentiate between sounds that are not relevant to the languages spoken around them (Bornstein, Arterberry, & Lamb, 2014). Due to the importance of early language skills in determining child academic, social, and behavioral outcomes, researchers in the field have worked to uncover factors that promote positive language development (Bornstein et al., 2014). Over the course of several decades, language development researchers have debated about whether the quantity or quality of the words spoken to a child has the largest impact on outcome (Oxford & Spieker, 2006).

In their 2.5 year-long study, Hart and Risley (1995) found large and significant differences between the language abilities of children from working class families, low income families, and families on welfare. Data for this study were collected through observations in the home. Results showed that 86 to 98% of words that the observer heard the child speak were also recorded within the speech of the parents. These results provide evidence to support the relation between parental behavior and child language outcomes.

Additionally, results from this study illustrated major differences in the number of words heard in the home environment by children from different SES backgrounds. Children from families on welfare heard on average 616 words per hour, while the child from a working class family heard 1,251 and children from a "professional" family heard 2,153 words/hour (Hart & Risley, 1995). When these data were extrapolated using averages from a 100-hour week, it was estimated that by age three, low-income children have heard 300 million fewer words than their counterparts from more advantaged backgrounds. Results from this study fueled the national campaign to "close the word gap" and to promote an increase in the quantity of words spoken to

children from low SES backgrounds (Clinton Foundation, 2013; Hart & Risley, 1995; Quenqua, 2014).

A recent study using data from the National Institute of Child Health and Human Development found that the quality of the words spoken to the child is of equal importance in determining language outcomes (Quenqua, 2014). Participants included 60 low-income three-year olds. Researchers watched videotaped interactions of parents and their children at age two and again at age three. Results showed that the "quality of communication [from parent to child at age two] accounted for 27 percent of the variance in expressive language skills [of the children at age three]" (Quenqua, 2014). The study defines high quality speech as the use of "shared symbols" or joint attention to a person or object and "conversational fluency" in which the parent actively responds to and poses questions to the child (Quenqua, 2014, p. 3). The overall consensus of recent studies in this area is that both quality and quantity of speech is important for the positive language development of children from low-income backgrounds (Goldin-Meadow et al., 2014; Quenqua, 2014).

For adolescent-headed families, extensive literature supports the relation between socioeconomic status and linguistic outcomes of the child (Fewell & Deutscher, 2004; Lacroix, Pomerleau, & Malcuit, 2002; Pungello et al., 2009; Rowe, 2008). Impacts on language development can include both demographic factors like socioeconomic status, as well as malleable aspects like parenting behavior (Oxford & Spieker, 2006). Specifically, socioeconomic status and parent education level mediate the relation between adolescent parenthood and child outcomes (Oxford & Spieker, 2006). Research has also found that malleable factors, including parent understanding of child development and parenting behavior,

play a role in determining the language outcomes of children of adolescent parents (Elster, McAnarney, & Lamb, 1983; Fewell & Deutscher, 2004).

Clear differences in parenting behavior and knowledge of the child are present between adolescent parents and older aged parents (Hann et al., 1996; Culp et al., 1996). Adolescent mothers speak fewer utterances to their children than do adult mothers (Hann et al., 1996). Additionally, teenage mothers engage in joint attention processes with their children less often, label objects less often, and have "fewer utterances of positive affective speech" (Culp et al., 1996). Children of adolescent mothers are born at a greater risk to have lower cognitive skills and verbal ability at a young age (Oxford & Spieker, 2006). Additionally, these children perform worse than do the children of older mothers on assessments of receptive language skills, expressive language, and language comprehension (Keown, Woodward, & Field, 2001). Early cognitive and language delays directly impact the child's school readiness, putting him/her at a greater risk for grade retention and school dropout (Oxford & Spieker, 2006).

Resilience & Children At Risk for Delay

The increased risk of children of teenage mothers to present with cognitive and linguistic delay was established by early research and substantiated by later work in the field (Brooks-Gunn & Furstenberg, 1986; Keown, Woodward, & Field, 2001; Oxford & Spieker, 2006). Early studies that examined at-risk populations largely aimed to uncover the factors that prove detrimental to the trajectories of children facing challenges (Brooks-Gunn & Furstenberg, 1986). During the 1970s, a shift in research on at-risk populations occurred as researchers began to move away from a deficit-based perspective and towards a resilience focus. In recent years, a resilience model has been applied to examine at-risk populations in order to cultivate a greater understanding of protective mechanisms associated with positive outcomes. The change from a

deficit to resilience model reflects a paradigm shift that occurred during this time in the field of

psychology, which allowed for an increased exploration of preventative methods and care

(Masten, 2011; Rutter, 2012).

Resilience is operationalized as the ability of a "dynamic system" (such as at-risk

individuals) to thrive in the face of detrimental life circumstances or adversity (Luthar, Cicchetti,

& Becker, 2000; Masten, 2011; Rutter, 2012). Although many children of adolescent mothers

are considered to be at risk for negative developmental outcomes, many thrive in the face of

evident risks and challenges (Masten, 2011). The relation between teenage motherhood and

child resilience may be understood through a multidimensional model of environmental and

personal factors (Levine, Pollack, & Comfort, 2001). This multidimensional model

conceptualizes the adolescent mother and her child as independent individuals, within their

interacting dyad, and within the scope of their broader contexts or environments. Relational

developmental systems theory provides a theoretical background for examining the adolescent

mother and the child within their multiple contexts (Lerner, Dowling, & Chaudhuri, 2005).

Examination of teenage mothers and their children from this perspective promotes a deeper

understanding of specific risk and protective factors that impact this population.

Theoretical Foundations

In order to understand how the language development of a child of a teenage mother may

be impacted by his/her contexts, it is relevant to consider relational developmental systems

theory (Lerner et al., 2005). This perspective provides an understanding of how the

developmental trajectory of an at-risk child may be changed and altered throughout the life span.

Relational developmental systems theory views human development as having a "probabilistic

character" in that it does not follow an inevitable course. Both the sequence of events and the

developmental outcome are probable, but not certain (Lerner et al., 2005). When applied to the

present study, this theory supports the idea that a child's language development trajectory may

be altered despite increased contextual risk. Because the course and outcome of development is

not certain, it is necessary to examine how the developmental trajectory becomes individualized.

This examination of individual trajectories will shed greater light on the experiences of children

of teenage mothers in relation to language development. Theorist and scientist Gilbert Gottlieb

claimed that development results from a bidirectional relationship between the structure of an

organism and its function within its environment (Gottlieb, 1970). In order to examine this

bidirectional relationship, it is necessary to analyze the person, the contexts, and the relation

between the two. This may be achieved by utilizing person-context relational centered analyses

(Lerner et al., 2005). As a result, the present study examined the language development of

children of teenage mothers with respect to their multiple contexts and surrounding relationships.

Relational developmental systems perspective exists in opposition to behavior genetics

approaches to human behavior, which claim that all contextual influences on development can be

reduced to genetic inheritance (Gottlieb, 1970). Those in support of the behavioral genetics

perspective claim that development is predetermined and that the relation between the structure

and function of an organism is unidirectional (Gottlieb, 1970). From a relational developmental

systems perspective, maladaptive developmental trajectories can be altered as a result of the

relation between the individual and their contexts (Lerner et al., 2005).

The framework for the present study employs two instances of relational developmental

systems theory to examine the development of children of adolescent mothers: Bronfenbrenner's

Bioecological Model and Sameroff's Transactional Model of Development (Bronfenbrenner,

1999; Sameroff, 2009). These theoretical perspectives view the child within several mutually

influential contexts including the family, neighborhood, community, society, and political

climate, among others (Bronfenbrenner, 1999; Sameroff, 2009). The child both acts upon and

reacts to his/her surrounding environments (Bronfenbrenner, 1999; Rogoff, 2003; Sameroff,

2009). Therefore, the individual and his/her environment are conceptualized as "cyclical,

indistinguishable forces" and one entity cannot be understood independent of the other (Rogoff,

2003).

   The bidirectional relationship between child and environment is monumentally influential

throughout the course of the lifespan, but particularly during the early years of life

(Bronfenbrenner, 1999). Individuals and their multiple contexts may be conceptualized not only

as interacting entities, but rather as forces engaged in transactions that leave a lasting impact

(Sameroff, 2009). This transactional ecological perspective provides evidence for the claim that

bidirectional relationships directly impact the developmental trajectory of the individual.

   These relational developmental systems theories claim that the trajectory of one's

development cannot be changed without targeting the contexts of which they are a part. The

family system, particularly the parent-child relationship, is the child's most proximal context and

therefore a natural target of intervention. Furthermore, these close relationships play a large role

in language development outcomes via the child's exposure to words and joint attention

processes in the home environment.

   In addition to relational developmental systems theory, it is relevant to consider

Bowlby's Ethological Attachment Theory when examining the developmental trajectories of at-

risk children of teenage mothers. Attachment theory claims that a child's attachment style plays

a major role in determining his/her developmental trajectory and outcomes (Bowlby, 1988).

Although attachment theory may be useful in understanding developmental outcomes of a child,

it fails to acknowledge the mother-child dyad as a functional unit within multiple contexts. The attachment perspective therefore is useful in conjunction with a transactional ecological perspective, which acknowledges the mother, the child, their relation, and the dyadic relationship in regards to language development.

Transactional Ecological Theory & Resilience

A transactional ecological theoretical perspective provides a framework for understanding several salient questions related to risk for language delay and resilient functioning. What determines a child's resilient functioning in the face of challenges? Is resilience malleable? From a transactional ecological perspective, resilient functioning in the area of language development is impacted by a multitude of environmental and interpersonal factors surrounding the child. The transactions that occur between the child and their contexts may be changed if the contexts themselves are being altered or impacted. Change in the contexts themselves will therefore incite change in the child, and vice versa (Sameroff, 2009). This may be done through the bidirectional transactions occurring between the different entities.

According to transactional ecological theory, targeting malleable aspects of a child's environments can subsequently impact multiple developmental outcomes including his/her language development (Bronfenbrenner, 1999; Sameroff, 2009). Several social service programs that target the wellbeing of mothers and their children may be applicable. These supportive programs can take several forms, including Early Intervention programs as well as home visiting programs. These programs allow for change in both the more distal environments that surround the child (i.e. the community and/or the broader home environment) as well as the proximal, familial contexts.

The proximal levels of a child's environment include his/her interactions and relationships with parents and other family members. Due to the proximity of those relationships and their importance during the early years of language development, the behavior of family members towards the child have distinct and powerful impacts on the child's later language skills (Bronfenbrenner, 1999). Parenting behavior has been identified as a key factor in determining the language development outcomes of the child (Lacroix et al., 2002; Culp et al., 1996).

On average, the parenting behavior of teenage mothers is notably different from that of older mothers (Elster et al., 1983). This difference is thought to be a result of many factors, including a lack of understanding of appropriate developmental milestones, unrealistic expectations of the child's behavior, and a lack of social support (Elster et al., 1983; Rowe, 2008). Maternal sensitivity and responsivity are specified in the literature as two major aspects of parenting behavior that impact child language outcomes (Baumwell, Tamis-LeMonda, & Bornstein, 1997; Belsky & Fearon, 2002; Fewell & Deutscher, 2004).

With both proximal and distal factors contributing to the risk and resilience of at-risk children, it is imperative to understand which factors make a difference specifically for the children of adolescent mothers. It is therefore relevant to examine Early Intervention services, home visiting programs, and maternal sensitivity as specific factors that may contribute proximally and distally to a child's resilient functioning in the area of language development.

Promoting Resilient Functioning: Potential Protective Factors

Parenting behavior: Maternal sensitivity & children's language. The construct of maternal sensitivity may be understood as "parental qualities that tap the parent's ability to be warm and emotionally connected with the child" (Biringen, Robinson, & Emde, 2000). Maternal sensitivity may be understood as one aspect of the overall emotional availability of the parent

(Biringen et al., 2000). In order for a mother to be sensitive to her child's cues, she must match her behaviors to the developmental stage and current needs/wants of her child (Baumwell et al., 1997). Aspects of maternal sensitivity include responsiveness to the child, accurate perception of the child's communications, and the ability to resolve issues or conflicts as they arise (Biringen et al., 2000). When sensitivity is present in the mother-child relationship, the most beneficial cognitive and linguistic outcomes for the child are possible (Baumwell et al., 1997).

Mothers who are verbally sensitive to their children are more likely to engage in joint attention processes, which allows for the mother to teach the child words or phrases that appropriately describe their surroundings (Moore & Dunham, 2014). Maternal sensitivity, particularly during infancy, predicts speech and receptive vocabulary during toddlerhood (Baumwell et al., 1997). These findings are applicable to teenage mothers and their offspring as well. One study found that the quality and formation of a teenage mother's speech to her child accounted for almost half of the variance in her child's scores on the Stanford-Binet cognitive assessment, and significantly impacted his/her score on an evaluation of language (Lacroix et al., 2002).

Attachment theory proposes that sensitive parenting is crucial to the child's development of Internal Working Models (IWMs) that will shape their expectations and interactions with the world (Belsky & Fearon, 2002). In a study conducted with longitudinal data from the NICHD Study of Early Child Care, Belsky and Fearon (2002) found that 3-year old children with secure attachments (at 15 months) and highly sensitive mothers (measured at 24 months) had better developmental outcomes in five areas. Those five areas include: problem behavior, social competence, expressive and receptive language, and school readiness.

The transactional ecological perspective allows us to conceptualize the relation between maternal sensitivity and the outcomes of children of teen mothers. The child is nested within his or her different contexts, with the family at the most proximal level. The child and the mother are engaged in a bidirectional relationship influenced by characteristics of both parties. In this way, the maternal behavior towards the child can impact the developmental trajectory.

In considering determinants of parent behavior, it is imperative to consider the adolescent mother within her nested contexts. These nested contexts can include the influence of the young mother's own childhood experiences, socioeconomic status during childhood, educational experiences, mental health problems, and exposure to maltreatment, among others (Belsky, 1993). In addition to the aforementioned factors, an adolescent mother's functioning may be influenced by her own developmental status and level of comprehension of herself as an individual (Karracker & Evans, 1996). In considering the impacts that an adolescent mother can have on her child's development, it is imperative to consider the risk factors from her own childhood, experiences, and contexts. Transactional ecological theory supports the idea that multiple determinants of parent behavior exist, including the mother's history, current contexts, and transactions with other individuals or environments (Sameroff, 2009).

In consideration of the plethora of contexts within which the mother is situated, her parenting behaviors may be impacted. Therefore, the present study views the adolescent mother and her child within their individual and interacting contexts. This transactional ecological perspective provides rationale for the investigation of potential protective factors (such as maternal sensitivity) that may influence positive language development among the children of teenage mothers.

Social Services/ Community Support

      Early Intervention. In addition to the influence of family relationships, the child's

transactions with other levels of his/her environment have effects on the subsequent

developmental trajectory (Sameroff, 2009). Social service programs including Early

Intervention impact the environments surrounding the child as well as the child's development

directly. Early Intervention (EI) can be conceptualized as "a broad range of activities designed

to enhance a young child's development" that begins within the early years of the child's life

(Ramey & Ramey, 1998). Early Intervention services can take many different forms, with some

services provided on-site, in the home, or in a community setting. Services are federally funded

for individuals with developmental disabilities from birth until their third birthday through the

Individuals with Disabilities Education Act (IDEA) of 2004 (U.S. Department of Education,

2014).

      A meta-analysis of the effects of Early Intervention on early experiences shows a dose-

response relationship between EI programs and child development outcomes (Ramey & Ramey,

1998). Programs of longer duration and of greater intensity and frequency have the greatest

success in reaching the individualized goals for each child. For children from low SES

backgrounds, Early Intervention services are most effective if the parents are highly involved in

the program (Mahoney, Boyce, Fewell, Spiker, & Wheeden, 1998; Miedel & Reynolds, 2000).

In a study conducted with a sample of inner-city children enrolled in an Early Intervention

program, the number of program-related activities that a parent participated in during the

kindergarten and preschool years was significantly associated with higher reading skills and

fewer years in special education (Miedel & Reynolds, 2000). By targeting and requiring parent

involvement, EI programs can impact the parent's understanding of typical developmental

milestones. This may be particularly beneficial for adolescent parents who have lower levels of understanding of developmental milestones than do older aged parents (Ryan-Krause, Meadows-Oliver, Sadler, & Swartz, 2009).

For children with language delays and/or speech disorders, Early Intervention services are beneficial, although results are variable depending on the nature of the child's impairment (Law, Garrett, & Nye, 2004). One meta-analysis of work in this field claims that Early Intervention may be particularly effective for children with "phonological or expressive vocabulary difficulties", but there is little evidence for its effectiveness with regards to those with receptive language challenges (Law et al., 2004).

In summary, Early Intervention typically targets at-risk children and those with developmental or other disabilities. The efficacy of these programs is often debated due to the variability in program-specific structure and goals (Ramey & Ramey, 1998). Research demonstrates that the efficacy of EI programs increased with parent involvement for low-income families (Miedel & Reynolds, 2000). The success of the program may be dependent on the frequency, intensity, and duration of services (Ramey & Ramey, 1998). In addition to the variability in the delivery of services, EI programs often include children who present with a variety of delays and/or disabilities. Research shows that for those interventions that specifically aim to impact language development, children with phonological or expressive difficulties may be benefitting the most from services (Law et al., 2004).

Due to the fact that the efficacy of EI services depends on multiple factors, it is relevant to investigate its protective capacities for language development within a sample of adolescent mothers and their children.

Home Visiting Programs. In addition to Early Intervention programs, home visiting programs are another form of service that may impact the developmental outcomes of at-risk children, specifically in the area of language development (Olds et al., 2004). Home visiting programs are a longstanding method of service that targets high-risk families through a community-based approach (Barnet, Liu, DeVoe, Alperovitz-Bichell, & Duggan, 2007). Services are delivered by professionals or paraprofessionals who provide support for parents and their children in the home or in a community setting (Wasik, 1990). An underlying theme of these programs is the assumption that parent support and education can mediate change in child outcomes (Sweet & Appelbaum, 2004). A major strength of this form of service is its accessibility to families who may face challenges finding childcare or transportation (Sweet & Appelbaum, 2004; Wasik, 1990).

The literature on the efficacy of home visiting programs is extensive and presents mixed results (Barnet et al., 2007; de la Rosa, 2005; Sweet & Appelbaum, 2004). One evaluated program targeted families with first-born children in a close-knit community in New Mexico (de la Rosa, 2005). Participation in the home visiting program was associated with increased family resiliency and social support, positive caregiver characteristics, positive family interactions, and a reduction in personal problems that affect parenting (de la Rosa, 2005). Other programs, particularly for adolescent-headed families, show mixed results (Barnet et al., 2007; Stevens–Simon, Nelligan, & Kelly, 2001). In a study of 122 pregnant adolescents from low-income backgrounds, a home visiting program was found to improve the adolescents' parenting attitudes and increase their odds for school continuation and completion. The program was not successful in reducing the odds for repeat pregnancy or depression in the expectant mothers (Barnet et al.,

2007). Research suggests that home visiting programs for teen mothers may increase their

effectiveness by further incorporating the teen's support network (Stevens-Simon et al., 2001).

One explanation for the debated efficacy of these programs is their diversity in design

and targeted goals (Sweet & Appelbaum, 2004). Others argue that randomized control trials are

necessary to determine the true efficacy of these programs (Olds et al., 2004). In a randomized

control trial of a nurse home visiting program for low income urban mothers, researchers found

lasting positive results for the outcomes of the child and mother alike (Olds et al., 2004).

Participants in the full treatment condition received intensive nurse home visiting services from

pregnancy through the child's 2nd birthday as well as transportation to and from prenatal care

appointments. Participants were evaluated four years later and results showed that children

visited by nurses were found to have positive outcomes in all developmental areas measured.

The language development of the children was positively affected as those in the treatment group

scored consistently better on measures of receptive language, expressive language, and

vocabulary (Olds et al., 2004). Results of this study provide evidence for the positive effects of

home visiting programs on child language development.

Despite debate about the efficacy of this approach, home visiting programs remain a

widely used form of service. Supporters of these programs emphasize the importance of home

visiting for the distribution of early intervention services to hard-to-reach, high-risk families. A

meta-analysis of the effectiveness of home visiting programs claims that individualization of the

program to a specific population will lead to the most positive outcomes for participants (Sweet

& Appelbaum, 2004). Furthermore, a program's success may depend on the understanding of

the targeted population (de la Rosa, 2005). The variability of the programs makes it difficult to

draw conclusions from the evaluation studies that have been conducted thus far (Sweet & Appelbaum, 2004).

Due to the debated efficacy of these programs, the U.S. Department of Health and Family services sponsored the creation of an evaluation program in 2009 that provides a comprehensive review of home visiting program models. This program, called Home Visiting Evidence of Effectiveness (HomVEE), reviews the efficacy of home visiting models that target families with pregnant women and children ages birth to five years old (U.S. Department of Health and Family Services [DHHS], 2014). HomVEE considers a program model to be "evidence-based" if the following criteria are satisfied: (1) At least 1 high- or moderate- quality impact study of the model finds favorable, statistically significant impacts in 2 or more of the 8 outcome domains; (2) at least 2 high- or moderate- quality impact studies of the model using non-overlapping study samples find 1 or more favorable, statistically significant impacts in the same domain. Furthermore, the program evaluates whether favorable impacts occurred for the full sample, whether effects were sustained over 12 months, and whether an impact study of the program with favorable, statistically significant results has been published in a peer-reviewed journal.

In consideration of the information provided by HomVEE, there is an apparent lack of literature that examines language development outcomes of children of adolescent mothers enrolled in home visiting programs across the U.S. Some programs, such as the Early Intervention Program for Adolescent Mothers, target teenage mothers specifically, but do not evaluate child language outcomes. Other HomVEE evaluated programs measure child language development but do not specifically target adolescent-headed families (i.e. Child FIRST, Early Head Start-Home Visiting). Overall, variability in the structure, design, and goals of home

visiting interventions necessitates the continued investigation of program efficacy for specific

populations of at-risk individuals.

      Current approaches to intervention. In light of recent nationwide campaigns to "close

the word gap", research initiatives have promoted the development of specialized interventions

that specifically target language development. One recently developed intervention of this

nature is "Providence Talks", a citywide home visiting program that fuses early intervention and

home visiting approaches to impact child language development. The program aims to "close

the 300 million word gap" through early intervention to promote kindergarten readiness

(Providence Talks, 2015). The intervention claims that awareness of a child's language

development and subsequent intervention during the first four years of life will promote positive

linguistic and school readiness outcomes. Sponsored by Bloomberg Philanthropies, children

enrolled in this program wear a "pedometer" one time per month that is designed to measure and

record the number of words spoken by and directed towards the child. The pedometer

additionally records surrounding sounds, therefore creating awareness of other environmental

factors that may play a role in their language development (e.g. television sounds). Biweekly

home visits from a "trained early childhood educator" include the review of feedback from the

pedometer, including graphs and other statistical measures of the child's linguistic experiences.

Additionally, the home visitor is intended to model positive literacy behaviors and conversations

that promote language development. This programmatic approach to language development is

supported by numerous previous findings that promote the specialization of intervention to target

one developmental outcome rather than many (Sweet & Applebaum, 2004; de la Rosa, 2005).

      Although many programs including Providence Talks specifically target families from

less affluent socioeconomic backgrounds, there is an apparent lack of language development

interventions that target adolescent parents and their children. In order to inform the creation of specialized interventions that target the children of teenage mothers, further exploration of risk and protective factors among this population is essential.

Present Study

Research shows that adolescent parenting presents risks for both the mother and child, however many thrive despite an increased risk from contextual and genetic factors (Brooks-Gunn & Furstenberg, 1986). Children of teenage mothers are at a greater risk for socioemotional, cognitive, and linguistic delay, which directly impacts later school readiness and academic performance (Beers & Hollo, 2009; Terry-Humen et al., 2005). Although the determinants of school readiness are multifactorial, early child language skills mediate the relation between characteristics of the home environment (i.e. access to resources) and skills that promote success in school (Forget-Dubois et al., 2009). Children of teenage mothers who lack the pre-academic skills and self-regulation behaviors that will allow them to succeed in school are more likely to struggle academically, repeat a grade, and drop out of high school (Hoffman & Maynard, 2008; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2010). In order to promote the school readiness and academic outcomes of the children of teenage mothers, it is imperative to investigate factors that contribute to the risk and resilience of this population.

Current research on diverse at-risk populations aims to investigate potential protective factors that may lead to resilient outcomes (Levine, Pollack, & Comfort, 2001; Keown, Woodward, & Field, 2001; Oxford & Spieker, 2006). Although a child's development may be examined on a broad level, in order to uncover specific protective mechanisms it is necessary to examine each developmental component individually (Rutter, 2012). In this way, a greater understanding of the parts of a child's development allow for a greater understanding of the whole child. The present study aimed to specifically examine the trajectory of language development among children of teenage mothers. To gain a deeper understanding of determinants of risk and resilience for this population of children, three potential moderators of

language delay were investigated: (1) maternal sensitivity, (2) participation in Early Intervention, and (3) participation in a home visiting program for teenage mothers.

The present study views the adolescent mother and her child as independent individuals who are bidirectionally related to each other and their respective environmental contexts. For the teenage mother, this transactional ecological perspective takes into account her own accumulated risk as determined by her personal experiences and childhood, which may in turn influence her parenting attitudes and behaviors. Viewing both the mother and child as complex individuals who are impacted by their multiple contexts is supported by relational developmental systems theory (Lerner et al., 2005). This theoretical perspective views development as probabilistic rather than predetermined in nature. Therefore, an individual's developmental trajectory may be altered and influenced throughout the course of life. In this way, the language development trajectory of children of teenage mothers may be understood and impacted by contextual and interpersonal factors.

The present study aimed to contribute to the growing body of research that examines the contextual and interpersonal factors that contribute to the functioning of teen mothers and their children. Previous literature has extensively explored differences between teen mothers and their older aged counterparts (Karraker & Evans, 1996; Beers & Hollo, 2009). Studies in this area have noted differences in the parenting attitudes and behavior of teen mothers (Elster, McAnarney & Lamb, 1983). Additionally, teenage mothers continue to develop themselves during the time of impending and early motherhood and are less likely to have a clear understanding of their child's developmental milestones (Karraker & Evans, 1996). The present study aimed to expand on this body of research by examining one specific parenting behavior (maternal sensitivity) and its effect on child language development. Teenage mothers are less

likely to exhibit sensitivity and responsivity towards their child when compared to older mothers (Karraker & Evans, 1996). Responsive and interactive parenting during the child's early years has been directly linked to higher child vocabulary and expressive language skills at a later age (Baumwell et al., 1997). As a result, this study aimed to further investigate the predictive and protective power of maternal sensitivity as a determinant of language development over the early years of the child's life.

In addition to an examination of interpersonal factors like maternal sensitivity, the present study explored the impact of several aspects of community contexts on language outcomes for the children of adolescent mothers. Community and social service programs are widely used avenues of intervention for at-risk populations (Sweet & Appelbaum, 2004). One form of service delivery includes Early Intervention programs, which include a broad range of activities that aim to promote positive child development for at-risk children and/or those with disabilities (Ramey & Ramey, 1998). While the need for Early Intervention for at-risk children is well substantiated, the efficacy of these programs is unclear (Ramey & Ramey, 1998). Research suggests that Early Intervention programs are successful in improving language skills but these results may be dependent on the specific kind of language delay that the child presents with (Law et al., 2004). Additionally, the efficacy of these programs may be dependent upon the intensity, frequency, and duration of services (Ramey & Ramey, 1998). Due to the diverse nature of these programs and the behaviors they target, further exploration of their efficacy in improving language outcomes of children of teenage mothers is needed.

Other widely used community service programs directed towards at-risk populations include home visiting programs (Sweet and Applebaum, 2004). Like Early Intervention programs, these services are highly diverse in terms of programmatic goals and structure,

therefore leading to diverse outcomes and debated efficacy (Barnet et al., 2007). Research

suggests that the success of these programs may be dependent upon their ability to individualize

services to a specific population (Barnet et al., 2007; de la Rosa, 2005; Olds et al., 2004; Sweet

& Appelbaum, 2004; Wasik, 1990). As a result, the present study aimed to understand the

efficacy of the Healthy Families Massachusetts home visiting program in promoting positive

language development among the children of teenage mothers. Further investigation of the role

of community services in determining language outcomes of children of adolescent mothers will

inform the creation of future programs and services for use with this population.

The present study aimed to evaluate the impact of maternal sensitivity and participation

in community services on language development outcomes of the children of teenage mothers.

For the purpose of the present study, resilience is operationalized as positive language

development over time in the face of increased contextual risk. Positive language development

was conceptualized in terms of a child's scores from baseline (age 24 months) to outcome (age

48 months). Those scores were interpreted in reference to the average scores of children from a

normed sample for each age range.

Research Questions

The present study aimed to answer the following questions.

- Research Question #1: Is there a significant relation between early and later language

  development of the children of adolescent mothers?

This was investigated by posing the following question that is specific to the sample used in

the present study: What is the relation between a baseline measure of child language at age

24 months and an outcome measure of language at 48 months?

- Hypothesis: A significant relation will exist between early and later language development (at 24 months and 48 months) of the children of adolescent mothers.

- Research Question # 2: Are there moderators of the relation between early and later language development for this population? How is this relation impacted by the following potential moderators: maternal sensitivity, participation in Early Intervention services (if necessary), and participation in the HFM home visiting program?

  - Hypothesis: Early Intervention participation, home visiting program participation, and maternal sensitivity will all have a significant positive impact on the relation between baseline child language scores and outcome child language scores.

Method

Participants and Procedure

The sample for the present study includes first-time mothers under age twenty-one who are enrolled in the evaluation of a statewide home visiting program. This program, Healthy Families Massachusetts (HFM), is a state-specific program that stems from the Healthy Families America home visiting model. Healthy Families America was developed by Prevent Child Abuse America in 1992 and was determined to show "evidence of program model effectiveness" according to HomVEE (DHHS, 2014; Healthy Families America, 2014). HFM provides services that aim to support the mental and physical well-being of the parents and child. This aim is accomplished through the pursuit of the following five goals: 1) to prevent child abuse and neglect by fostering positive parenting behaviors, 2) to achieve optimal health, growth, and development in infancy and early adulthood, 3) to encourage educational attainment, jobs, and life skills among parents, 4) to prevent repeat pregnancies during the teen years, and 5) to promote parental health and well-being.

Services provided by HFM include home visits, group center-based meetings, and the delivery of information and referrals. Service providers are paraprofessionals, although their education and experience levels vary among the different sites in Massachusetts. The home visitor's objective is to be a person of support and resource for the adolescent parent and her family. More specifically, the home visitor aims to model positive parenting behaviors, educate parents about relevant developmental milestones, and develop a relationship with the mother that promotes her success as well as her child's success. The number and frequency of home visits is individualized to the family being served and its unique needs.

Recruitment for the program was completed through multiple avenues including public advertisement as well as referrals from pediatricians and other service providers. Mothers were eligible for the program if Spanish or English was their primary language and were over 16 years old. Participants were enrolled in HFM during their pregnancy and throughout the first year of their child's life, with services lasting until the child's third birthday.

An evaluation of HFM sponsored by the Massachusetts Children's Trust is being conducted at Tufts University under the direction of M. Ann Easterbrooks, Ph.D., Francine Jacobs, Ed.D., and Jayanthi Mistry, Ph.D. The purpose of this evaluation is to determine the program's effectiveness in reaching its self-prescribed goals from its inception in 2001 to the present. The first phase of the HFM evaluation was quasi-experimental in nature and was completed in 2005 (Jacobs, Easterbrooks, Brady, & Mistry, 2005). The theoretical foundation for this evaluation can be found in Jacobs's Five-Tiered Approach to evaluation, which takes a developmental approach to the systematic analysis of a program, moving from descriptive to outcome evaluation over time (Jacobs, 2003). Participants were recruited for the evaluation by both HFM program staff and evaluation researchers.

The second phase of the evaluation (2007-present) is a randomized controlled trial designed to measure positive changes in the sample and attribute them to the home visiting program. The present study used data from this second phase of evaluation. Data were collected over four time points: Time 1 (time of initial enrollment), Time 2 (12 months after enrollment), Time 3 (24 months after enrollment), and Time 4 (36 months after enrollment). Participants were randomly assigned to one of two conditions: those who receive the HFM program and those who receive referrals and information regarding other programs and services. Once

assigned to a condition, participants were given the option of taking part in different forms of the evaluation (Mistry, Easterbrooks, & Jacobs, 2013).

All participants were asked to take part in a half-hour phone interview and to sign a release granting access to their state agency data from the Department of Public Health and Department of Child and Family Services; participants could choose to do either or both of those activities. Seven hundred and four participants were enrolled in this part of the study with 690 (98%) consenting to the release of their state agency data. The level of participation in the phone interviews differed over time points, with 564 (80%) of mothers at Time 2 and 594 (84%) of mothers at Time 3 agreeing to take part.

All participants were additionally given the option to participate in a 2.5-hour in-person interview. Seventy-one percent of mothers agreed to participate at Time 2 and 69% at Time 3. The interview was semi-structured in nature, including both a verbal component and nine different questionnaires. The mothers were offered the option of doing the questionnaires with the interviewer or on their own. Interviewers asked questions related to childcare, maternal mental health, family history, education, parenting stress, history of intimate partner violence, and satisfaction with the HFM program (if applicable). Beginning at Time 4, assessments of the child were conducted in addition to the parent interview. The child protocol included assessments of executive functioning, school readiness, self-regulation, and receptive and expressive language skills, among others. The present study used data collected during the in-person protocols of the mother and child at Time 3 and Time 4.

Measures

    Baseline measure of language and communication skills. The receptive and expressive language skills of the child were measured using The MacArthur Bates

Communicative Development Inventories: Short Forms (MCDI-SF) (Fenson et al., 2000).

Mothers completed this measure at Time 3 when the average child age was 24 months old (age

range: 14.72- 43.90 months). This form is available in three different levels depending on the

child's age. The infant short form (for 8-18 month olds) consists of an 89-word vocabulary list

with separate columns for word production and comprehension. The mother is instructed to

check off the sounds/words that are produced, understood, or both understood and produced by

their child.

There are two toddler short forms: level II-A and level II-B which collectively measure

the receptive and expressive language abilities of children ages 16-30 months old. The toddler

short forms include a 100-word vocabulary checklist and probe regarding the child's ability to

combine words. For children ages 16-18 months old, respondents have the option of using either

the infant or toddler form depending on the outcome information sought. Fenson and colleagues

note that the use of the infant form during this age range may speak more to the child's receptive

language abilities, but use of the toddler form will allow for more accurate comparisons between

forms as the child grows older (Fenson et al., 2000).

The MacArthur Bates Short Form Vocabulary Checklist is considered to have high

internal consistency as determined by the Cronbach's Coefficient Alpha which was .97, .99, and

.99 for the infant form, toddler form A, and toddler form B (Fenson et al., 2000). Proportion

scores were computed from raw scores for each child. For those participants who received the

Short Form Level I, this proportion score represents both receptive and expressive language

skills. For those who completed Short Form Level II (both versions) the proportion score

represents the child's expressive language skills. The majority of the sample of the present study

(over 60%) completed a version of the Short Form Level II.

Short Form Level I and version A of level II are available in both English and Spanish. Version B of the level II form was available only in English at the time of data collection for the HFM evaluation study. Due to this discrepancy, older Spanish-speaking children with advanced vocabulary abilities cannot be evaluated consistently with their English-speaking counterparts. Therefore, only monolingual English speaking children were included in statistical analyses for this study. The sample size for the present study is impacted by this limitation and includes 216 participants.

Outcome measure of language and communication skills. The language and communication skills of the child were evaluated at Time 4 using the Receptive One-Word Picture Vocabulary Test (ROWPVT) (Brownell, 2000). The ROWPVT is a norm-referenced assessment that tests a child's receptive language abilities. The child is shown four images on a page and asked to select the picture that depicts the action, concept, or word spoken. There are 190 test items and all items are administered to the child during the assessment. The ROWPVT may be used with individuals aged 2 years and above and has been normed for use with Spanish-speaking bilingual populations of varying proficiencies (Brownell, 2001). For bilingual participants, the ROWPVT is administered in both English and Spanish in accordance with the individual preferences of the child. This measure provides a raw score, standard score, age-equivalent score, and percentile rank for each participant. The present study used the raw score of each participant for subsequent analyses. The raw score was used in analyses in an attempt to be consistent with the proportion scores calculated for the MCDI-SF (which include the raw scores).

Maternal sensitivity. The construct of maternal sensitivity is defined in this study as "parental qualities that tap the parent's ability to be warm and emotionally connected with the

child" (Biringen et al., 2000). Examples of parenting qualities that relate to maternal sensitivity include responsiveness to the child, accurate perception of the child's communications, and the ability to resolve issues or conflicts as they arise. Maternal sensitivity may be understood as one aspect of the overall emotional availability of the parent. Within the present study, maternal sensitivity was measured using the Emotional Availability (EA) scales developed by Biringen and colleagues (Biringen et al., 2000). The EA scales provide a coding scheme for scoring maternal sensitivity as it is assessed within videotaped interactions of the parent and child.

The theoretical work at the foundation of this coding scheme subscribes to the idea that "emotions are apt to be a sensitive barometer of early developmental functioning in the child-parent system" (Emde & Easterbrooks, 1985). This theoretical framework is applicable to the present study as it provides further rationale for the exploration of the relation between parent behavior and child outcomes.

As a part of the HFM evaluation study, mothers and their children were asked to participate in two 5-minute videotaped interactions during an interview in the home. The first task, called the "teaching task", presents the mother-child dyad with a game or toy and a set of instructions. The dyad is instructed to work together to build shapes, play together, or create an image. The second video is a free play task during which the dyad is free to engage in unrestricted play for five minutes. The present thesis used a maternal sensitivity score averaged from both the teaching and free play tasks.

The videos were coded for maternal sensitivity on a scale of 9 (highly sensitive) to 1 (highly insensitive). Videos were coded for the following constructs: awareness of timing (i.e. maternal approach to transitions between activities), flexibility within play, variety and creativity in modes of play, parental acceptance of the child's needs, wishes and goals, amount of

interaction between mother and child, and how conflict situations are handled. According to

Biringen and colleagues, scores under 5 may indicate a need for therapeutic or clinical

intervention (Biringen et al., 2000). Further details regarding the coding scheme may be found

within the Appendix B.

Participants received two scores of maternal sensitivity, with one score for the teaching

task and the second score for the free play task. For the purpose of the present study, the scores

from the free play and teaching tasks were averaged to create a mean score for each participant.

Therefore, the mean score measures maternal sensitivity on a scale of 1 to 9, with lower scores

indicating less maternal sensitivity. The scores of those participants who did not complete one or

both of the videos were excluded from the analyses.

Early Intervention participation. Participation in Early Intervention services (EI) was

measured via self-report as a part of an intake phone interview administered to participants at

Time 3. Participants are asked the question, "Do you receive Early Intervention for your child?"

The response is recorded as a "yes" or "no" and participants are given the option of providing a

reason for their utilization of Early Intervention services. Those who answer yes to the above

question are then asked about the source of referral, their current utilization of services, and the

duration of time they received or have been receiving EI.

Home visiting program participation. Home Visiting Program Participation was

measured by the participant's random group assignment in MHFE and is a dichotomous variable.

Participants who received information and referrals only as a part of the HFM evaluation will be

considered those who did not take part in a home visiting program.

Control variables. Control variables included child age, Community Clusters, and

maternal depression. Children's ages were obtained using date of birth information via maternal

report. Children's ages (in years) at Time 3 were calculated using date of birth information and the date of the Time 3 research interview. Child age was selected as a control variable due to the rationale that a child's language skills will increase as they grow older. Additionally, child age was chosen as a control due to the diversity of child age in the sample.

Community Clusters is a variable that examines patterns of structural dimensions in neighborhoods, specifically population density, income level, and ethnic composition of groups. The variable is composed of three different groups: (1) Moderate income, homogeneous European American; (2) Low moderate income, ethnically diverse; and (3) Low income, minority majority ethnicity. Forty nine percent of participants in the present study were categorized as moderate income, homogeneous European American ($n = 106$). Thirty percent were categorized as low moderate income, ethnically diverse ($n = 65$), and 21% as low income, minority majority ethnicity ($n = 45$). For the purpose of this study, the Community Clusters variable was dummy coded into the following two variables: (1) Low moderate income, ethnically diverse vs. Moderate income, homogeneous European American and (2) Low income, minority majority ethnicity vs. Moderate income, homogeneous European American. Due to the strong relation between socioeconomic status and child language development established in the literature, it was necessary to control for the Community Clusters variable in the analyses to follow.

Maternal depression was assessed using the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977). The CES-D is a 20 question assessment that tests for depression and depressive symptoms. Participants rate how often they have felt certain symptoms on a zero to three scale (0 = not at all, 3 = everyday/a lot) (e.g. my appetite was poor). A summary score is calculated by summing all 20 items. Summary scores of 16 and above

indicate a risk for depression. Due to the effects of depression on parental behavior (as

substantiated in previous literature), it was hypothesized that maternal depression would have a

significant impact on maternal sensitivity (Elgar, Mills, McGrath, Waschbusch, Brownridge,

2007). 32.9% ($n = 71$) of the mothers included in the present study scored at or above 16 points

on this measure, indicating risk for clinical depression.

Results

Preliminary Analyses

Descriptive analyses were conducted in order to finalize the sample size and gather more information about the sample for the present study. The final sample includes 216 participants who are monolingual English-speaking and received scores on both the MacArthur Bates Short Form Vocabulary Checklist (MCDI-SF) at Time 3 and the ROWPVT at Time 4 of the study. The sample size was restricted to only monolingual English-speaking families as a result of limitations of the MCDI-SF, which was not available in corresponding levels in both English and Spanish at the time the data were collected. To create the sample for the present study, a filter was created to examine only those participants who completed both the MCDI-SF and the ROWPVT in English. The sample size for the present study differed slightly for each analysis conducted and will be presented in the sections that follow.

Within the sample, the average child age at Time 3 was 24.32 months (range: 14.72-43.90 months) and the average age at Time 4 was 4.88 years (range: 3.75-6.49 years). Male and female children were equally represented with 50.5% identifying as female and 49.5% as male. In terms of social services, 53% of the sample received the Healthy Families Massachusetts home visiting program and 32% received Early Intervention. The majority of the sample (38.6%) self-identified as White (non-Hispanic), while 27.9% of individuals identified as Black (non-Hispanic) and 26.5% as Hispanic. Additionally, the majority (84%) specified English as their preferred language, which reflects the fact that those included in subsequent analyses were those who received the measures in English. At Time 3, 45% of the sample lived with parents/guardians or older relatives, without a partner. About 19% of the sample lived with a partner, 14% lived alone, 10% with a partner and parent/older relatives, 6.5% in an institution,

and 5.5% lived in a different living situation. A maternal sensitivity score for each participant

was derived by averaging the free play and teaching task scores, yielding a sample mean of 4.79

with scores ranging from 1 to 7.17. Additional descriptive information for the sample is

presented in Table 1.

The average MCDI-SF proportion score was 0.44, with scores ranging from 0.03 to 1.00.

The MCDI-SF was administered at Time 3, when the average child age was 24.32 months with a

wide range of ages (14.72 - 43.90 months). At this time point, 63.9% of the sample received the

MCDI-SF level II toddler form, which measures words produced by the child. For 79.2% of the

sample, the MCDI-SF was self-administered by the mother. Approximately 19% received

assistance from the home visitor in completing the measure. Due to the wide range of child ages

at Time 3, it is difficult to provide accurate score comparisons to the norm. In the norm-

referenced sample, children 24 months of age receive a proportion score of .60 on average

(Fenson et al., 2000). Within the present study, a score of .60 represents those who are scoring

in the 71st percentile of the sample. Therefore, participants in the present study generally scored

lower on the MCDI-SF in comparison to the norm-referenced sample. Comparisons to the norm

referenced sample must be interpreted with caution due to the fact that individuals from middle

and upper socioeconomic classes were overrepresented. Those with high education levels were

additionally overrepresented in the normed sample (Fenson et al., 2000).

The mean outcome language score on the ROWPVT was 55.64, with scores ranging from

0 to 84. Average child age at Time 4 was 4.88 years (range: 3.75-6.49 years). For the norm-

referenced sample, the age equivalent for a raw score of 56 is 5 years, 6 months (Martin &

Rapalyea, 2013). Children ages 4 to 6 years range in terms of average raw score from 40 to 60.

The average raw score from the present study (55.64) fits into this range, illustrating that participants are scoring at an age-expected level on this measure at Time 4.

In terms of social services, by Time 3, 90.2% of the sample had made contact with their home visitor. In fact, some participants had finished with the services provided by the Healthy Families Massachusetts program at Time 3. On average, participants in the HVS group had received 37.4 home visits when surveyed at Time 3, although the range in number of visits was wide (0 to 208 visits).

Within the sample for this thesis, 32.4% (n = 70) received Early Intervention, while 67.6% (n = 146) did not. When surveyed at Time 3, participants in the sample who received Early Intervention had received 5.12 months of services on average (range = .03- 24 months). About 30% of those who received EI during their child's lifetime were still actively enrolled at Time 3. The majority of the sample utilized EI services for issues related to speech delay or acquisition, although reasons for participation in the services as reported by mothers were diverse and varied. Other reasons for utilization of services include infant prematurity at birth, high-risk pregnancies, motor skill concerns, and requirements set by shelters, institutions, or the Department of Child and Family Services (DCF). A more comprehensive review of reasons for EI involvement are presented in Table 2. At Time 3, 18.6% of the sample reported being referred to Early Intervention by their Healthy Families Massachusetts home visitor. Other frequently reported sources of referral included DCF, a pediatrician, hospital, or shelter.

Research Question #1: Is there a significant relation between early and later language development of the children of adolescent mothers? In order to determine whether a significant relation exists between the baseline and outcome measures of language, Pearson's correlation was conducted. Results showed that MCDI-SF proportion scores were significantly

related to ROWPVT raw scores ($r = .35$, $p < .001$). After a significant relation between the variables was established, multiple regression analysis was used to determine whether MCDI-SF baseline language scores predict ROWPVT outcome scores for the sample. The initial model (Model 1) examined control variables (child age, Community Clusters, and maternal depression) as predictors of ROWPVT scores ($n = 187$). The overall model with all controls included was not significant ($F (4, 93) = .857$, $p > .05$, $R^2 = .036$). However, in examining each individual control variable, child age at Time 3 was found to significantly predict ROWPVT scores ($B = .477$, $\beta = .216$, $p < .01$).

The final model (Model 2) added the MacArthur proportion score variable to investigate whether baseline language scores predict outcome language scores for the sample. Results indicated that MCDI-SF proportion scores significantly predict ROWPVT raw scores ($R^2 = .128$, $F (5, 181) = 5.33$, $p < .001$). When controlling for child age, Community Clusters, and maternal depression, there was a positive, significant relation between baseline and outcome language scores, with higher MacArthur scores predicting higher ROWPVT scores. Table 3 presents the results of these analyses.

Research Question #2: Are there moderators of the relation between early and later language development for this population? In order to investigate the moderating potential of home visiting program participation, Early Intervention participation, and maternal sensitivity on the relation between early and later language development, several independent multiple regression analyses were conducted. Furthermore, three groups were created from the MCDI-SF proportion score (high scoring, average scoring, and low scoring groups) in order to examine whether the effects of the moderators differed as a result of group assignment. Multiple regression analyses were conducted to examine the moderation effects among the subgroups. All

of the subsequent analyses were conducted using the sample of participants who completed both

the MCDI-SF and the ROWPVT in English. Some of the analyses included slightly smaller

sample sizes, as limited by missing data. Sample sizes for each analysis are provided in the

descriptions to follow.

     Maternal sensitivity as a moderator of the relation between baseline & outcome scores.

A multiple regression analysis was used to test the moderating potential of maternal sensitivity

on the relation between MCDI-SF score at Time 3 and ROWPVT score at Time 4. Due to the

fact that several participants did not agree to complete one or both of the videos from which a

maternal sensitivity score was derived, the sample size for this analysis was 133. Model 1

examined the control variables (maternal depression, Community Clusters, and child age) as

predictors of ROWPVT raw scores. Child age was found to significantly predict ROWPVT

scores ($B = .482$, $\beta = .206$, p < .05). The overall model with controls was not significant, $R^2 =$

.051, $F(4, 108) = 1.463$, $p = .219$. Model 2 tested both the MCDI-SF proportion score and the

maternal sensitivity mean score as predictors of ROWPVT scores. The overall model was

significantly improved with the addition of these variables, $R^2 = .154$, $F(6, 106) = 3.212$, $p <$

.01. MCDI-SF score significantly predicted ROWPVT scores ($B = 15.322$, $\beta = .330$, $p < .01$).

Maternal sensitivity did not have a significant main effect on ROWPVT scores ($B = .930$, $\beta =$

.089, p > .05). Model 3 tested the moderating potential of maternal sensitivity on the relation

between baseline and outcome language scores. The addition of the moderator did not

significantly improve the model, $R^2 = .154$, $F(7, 105) = 2.729$, $p = .914$. Therefore, maternal

sensitivity does not significantly moderate the relation between baseline and outcome language

scores. Results for these analyses are shown in Table 4.

Early Intervention as a moderator of the relation between baseline and outcome scores.
In order to investigate whether Early Intervention participation acts as a moderator of the relation
between MCDI-SF and ROWPVT scores, a multiple regression analysis was conducted ($n =$
187). The Early Intervention participation variable is dichotomous, with a zero indicating no
participation and a one representing participation in the services. The initial model, Model 1,
examined the control variables (child age, Community Clusters, and maternal depression) as
predictors of ROWPVT scores. The overall model was not significant, $R^2 = .048$, $F(4, 182) =$
2.312, $p = .059$. Child age was the only control found to significantly predict ROWPVT scores,
($B = .477$, $\beta = .216$, $p < .01$), indicating a positive relation between child age and outcome
language scores. The second model, Model 2, added the MCDI-SF proportion score variable and
the Early Intervention participation variable to examine their effects on ROWPVT scores. The
overall model was significant ($R^2 = .129$, $F(6, 180) = 4.438$, $p < .001$) with higher MCDI-SF
scores predicting higher ROWPVT scores ($B = 15.688$, $\beta = .328$, $p < .001$). Early Intervention
participation did not significantly predict outcome scores ($B = .708$, $\beta = .026$, $p > .05$).

The third and final model, Model 3, investigated the moderating potential of Early
Intervention participation on the relation between baseline and outcome language scores. While
controlling for child age, Community Clusters, and maternal depression, Early Intervention did
not significantly moderate the relation between MCDI-SF and ROWPVT scores ($R^2 = .129$, $F(7,$
179) = 3.793, $p = .801$). Results for these analyses are depicted in Table 5.

Home visiting participation as a moderator of the relation between baseline and
outcome scores. To investigate the hypothesis that Healthy Families home visiting program
participation acts as a moderator of the relation between MCDI-SF and ROWPVT scores, a
multiple regression analysis was conducted ($n = 187$). The initial model, Model 1, investigated

the control variables (child age, Community Clusters, and maternal depression) as predictors of

ROWPVT scores. As in all previous regression models run with the control variables, child age

at Time 3 was the only significant predictor of ROWPVT scores, $B = .477$, $\beta = .216$, $p < .01$.

Model 2 added both the MCDI-SF variable and the home visiting participation variable to the

model. The home visiting variable is dichotomous, with those who received the Healthy

Families program receiving a 1, while those who received referrals and information were coded

as a 0. The second model was significant overall ($R^2 = .132$, $F (6, 180) = 4.425$, $p < .001$) due to

the MCDI-SF score variable, which was a significant predictor of ROWPVT scores ($B = 15.511$,

$\beta = .324$, $p < .001$). Home visiting program participation did not have a significant main effect

on ROWPVT raw scores ($B = .451$, $\beta = .018$, $p > .05$).

The third model, Model 3, examined the potential of home visiting participation to act as

a moderator of the relation between baseline and outcome language scores. The overall model

was not significant, $R^2 = .132$, $F (7, 179) = 3.887$, $p = .403$. Results are presented in Table 6.

Investigation of subgroup differences. In order to examine whether the results of the

moderation analyses differ for groups with different baseline language scores, MCDI-SF scores

were used to create three subgroups of individuals (low scoring, average scoring, and high

scoring). First, the MCDI-SF variable was recoded into the three groups, with the mean score of

0.44 used as a reference point for subgroup creation. Individuals with scores more than one

standard deviation below the mean were categorized as the low scoring group ($n = 38$, $SD = .27$,

mean = .44, range = .00- .16). Those who scored within one standard deviation below or above

the mean were categorized as the mid scoring group ($n = 111$, range = .17-.71). The high scoring

group consisted of individuals with scores of .72 and above ($n = 38$). With these group

assignments, the low MCDI-SF group consists of those scoring at the twentieth percentile or below and the high MCDI-SF group includes those scoring at the eightieth percentile and above.

Due to the fact that the MCDI-SF does not specify a clinical cutoff point, it was necessary to determine a method for the creation of subgroups. This was done with reference to previous studies that aimed to determine risk for language delay (i.e., Ghassabian, Rescorla, Henrichs, Jaddoe, Verhulst, & Tiemeier, 2013). Evidence suggests that a clinical cutoff for delay typically includes scores approximately 1.25 standard deviations below the mean or scores below the tenth to fifteenth percentile on a given measure (Ghassabian et al., 2013; Eun, Lee, & Kim, 2014). As a result, the present study utilized a clinical cutoff point that includes scores that are more than one standard deviation below the mean. The low scoring group includes those scoring below the twentieth percentile of this sample. To create the low, mid, and high scoring subgroups the MCDI-SF variable was recoded. The high scoring group was chosen as the reference group for comparisons due to theoretical rationale that the greatest differences would be evident in comparison to the highest scoring children. The variable was then dummy coded into the following groups: (1) low scoring vs. high scoring and (2) mid scoring vs. high scoring. These dummy coded groups were used in all subsequent analyses. Additionally, for exploratory purposes, group differences in comparison to the mid scoring group were investigated within the first regression model. To do this, the grouping variable was again dummy coded to create the following variables: (1) low scoring vs. mid scoring and (2) high scoring vs. mid scoring.

MCDI-SF score as a predictor of ROWPVT score. Multiple regression analyses were conducted to investigate group differences in the relation between MCDI-SF scores at Time 3 and ROWPVT scores at Time 4. Model 1 examined the control variables (child age, Community Clusters, and maternal depression) as predictors of ROWPVT scores ($n = 187$). The overall

model with all controls included was not significant (F (4, 93) = .857, p > .05, R^2 = .036). Child

age at Time 3 was found to significantly predict ROWPVT scores (β = .216, p < .01). Model 2

added the MCDI-SF variable to investigate group differences in whether baseline language

scores predict outcome language scores. Results indicated a significant difference between the

low scoring group and the high scoring group in terms of the relation between baseline and

outcome language scores. For the low scoring group, results illustrated a significant relation

between baseline and outcome language scores, with lower baseline scores predicting lower

ROWPVT scores (R^2 = .091, p < .05, B = -9.277, β = -.291). Additionally, a significant

difference in scores was found between the low group and the mid group. Results showed that

those with lower baseline scores were predicted to score significantly lower on the outcome

measure than the mid scoring group (B = -5.680, p < .05).   No significant differences were

found between the mid scoring group and the high scoring group. Results are presented in Table

7.

  Maternal Sensitivity as a moderator of the relation between baseline & outcome scores.

In order to examine group differences in the moderation of baseline and outcome scores,

multiple regression analyses were conducted. Model 1 examined the control variables (maternal

depression, child age, and Community Clusters) on the relation between MCDI-SF and

ROWPVT scores (n = 113). Child age significantly predicted ROWPVT scores, B = .482, β =

.201, p < .05. The model was not significant, R^2 = .051, F (4, 108) = 1.463, p = .219. Model 2

added the following two dummy coded groups: (1) low MCDI-SF scoring group vs. high MCDI-

SF scoring group, (2) mid MCDI-SF scoring group vs. high MCDI-SF scoring group.

Additionally, the maternal sensitivity mean score variable was added into the model. A

significant difference was found between the low scoring group in comparison to the high

scoring group, (B = -9.485, β = -.325, p < .05). Model 2 was significant, (R^2 = .123, F (7, 105) = 2.106, p < .05). The third model examined the moderating potential of maternal sensitivity on the relation between baseline and outcome language scores. The moderator did not significantly improve the model (R^2 = .144, F (9, 103) = 1.921, p = .294) and results showed no significant group differences. Results for these analyses are provided in Table 8.

Early Intervention as a moderator of the relation between baseline and outcome scores. Multiple regression analyses were conducted to examine group differences in the moderation potential of Early Intervention participation on the relation between baseline and outcome language scores (n = 187). Model 1 examined the control variables on the relation between MCDI-SF and ROWPVT scores (R^2 = .048, F (4, 182) = 2.312, p = .059) with child age as a significant predictor of outcome language scores (B = .477, β = .216, p <.01). The second model added each dummy coded group variable and the Early Intervention participation variable (R^2 = .091, F (7, 179) = 2.575, p < .05), with results showing that the low group assignment predicts lower ROWPVT scores (B = -9.263, β = -.004). The addition of the moderator in the third step did not significantly improve the model (R^2 = .094, F (9, 177) = 2.050, p = .744). Again, low group assignment was a significant predictor of ROWPVT scores (B = -8.859, β = -.278, p < .05), yet this significance was present prior to the addition of the moderator to the model. Results are presented in Table 9.

Home visiting program participation as a moderator of the relation between baseline and outcome scores.   Multiple regression analyses were conducted to investigate group differences in the moderation potential of home visiting program participation. Model 1 examined the control variables (maternal depression, child age, and Community Clusters) as predictors of ROWPVT scores (n =187). Child age was a significant predictor of ROWPVT

scores ($B = .477$, $\beta = .216$, $p < .01$). The overall model was not significant, $R^2 = .048$, F (4, 182) = 2.312, $p = .059$. Model 2 included the addition of the low group vs. high group and mid group vs. high group variables, as well as the HVS/RIO variable and was significant ($R^2 = .092$, F (7, 179) = 2.584, $p < .05$). With the addition of the moderator in Model 3, there was no significant improvement of the overall model ($R^2 = .097$, F (9, 177) = 2.104, $p = .621$). Results are presented in Table 10.

Investigation of sex differences. Child sex was examined descriptively and statistically to investigate potential language score differences due to sex. Overall, boys and girls were equally represented in the sample as a whole (50.5% female, 49.5% male). First, MCDI-SF scores were examined descriptively for sex differences (male $n = 91$, female $n = 96$). On average, males scored lower on the MCDI-SF in comparison to females (Male mean score = .39, Range = .03-.97; Female mean score = .49, Range = .07-1.00). An independent samples t-test revealed that the differences in mean scores on the MCDI-SF were statistically significant (mean difference = -.0975, p < .05). Next, ROWPVT scores were examined descriptively to investigate sex differences in raw scores (male $n = 107$, female $n = 109$). On average, males scored lower than females (male mean score = 53.71, female mean score = 57.55). Again, an independent samples t-test revealed that the difference in mean scores was statistically significant (mean difference = -3.85, p < .05). As a result of these analyses, child sex was examined as a potential moderator of the relation between MCDI-SF scores and ROWPVT scores. Results demonstrated that child sex was not a significant moderator of the relation between baseline and outcome scores ($R^2 = .134$, F (7, 179) = 3.971, p > .05). Furthermore, child sex did not significantly predict ROWPVT raw scores (B = 2.044, $\beta = .080$).

Investigation of differences due to maternal education level. Maternal education level

was examined to determine its effect on language scores within this sample. The maternal

education variable measured the mother's highest level of education attained at Time 3. This

variable had 5 groups: (1) still in high school/GED program (9.9%), (2) finished high

school/GED (26.2%), (3) in or finished a training program/some college (27.7%), (4) finished at

least one year of college (19.9%), (5) dropped out of school(16.2%). The majority of the sample

was in group 2 (in or finished a training program/ some college) (n = 53). This variable was

dummy coded into the following groups: (1) dropped out vs. still in high school/GED program,

(2) dropped out vs. finished high school/GED, (3) dropped out vs. in or finished training

program/ some college, (4) dropped out vs. finished at least one year of college. The dummy

coded variables were tested as both controls and moderators on the relation between baseline and

outcome language scores. Maternal education level did not significantly predict outcome scores.

Additionally, maternal education level did not significantly moderate the relation between

baseline and outcome language scores.

Discussion

Not all children in the U.S. enter school prepared to learn, due to a lack of pre-academic and self-regulation skills that facilitate academic success (Zill & West, 2001). This risk is increased for children from low socioeconomic backgrounds, with only half of children from less affluent families ready to enter school at age 5 (Isaacs, 2012). Two-thirds of adolescent-headed families are considered to be low income, resulting in decreased access to resources and clear effects on the school readiness on children who grow up with a teenage mother (Isaacs, 2012). Children of adolescent mothers are at a greater risk for socioemotional, cognitive, and linguistic delay (Brooks-Gunn & Furstenberg, 1986). Additionally, children from adolescent-headed families are at a greater risk to repeat a grade, exhibit poor academic performance, and drop out of high school (Hoffman & Maynard, 2008; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2010). With this said, many children born to adolescent mothers exhibit resilient functioning in the face of increased risk for various delays in development (Beers & Hollo, 2009). As a result, it is relevant to consider the factors that may influence an at-risk child's capacity for or propensity towards resilient functioning.

Early research examining adolescent mothers and their children aimed to understand factors with detrimental effects on the developmental trajectories of both the mother and the child (Brooks-Gunn & Furstenberg, 1986). More current research with this at-risk population aims to uncover factors that promote the resilience of the mother and child in the face of increased environmental, genetic, and intergenerational factors (Keown, Woodward, & Field, 2001; Oxford & Spieker, 2006). In order to understand the multifactorial determinants of risk and resilience for this population, the mother and child may be conceptualized as individuals within their respective nested contextual environments. This transactional ecological perspective

draws on relational developmental systems theory to understand the bidirectional relationships between the child of a teenage mother and the factors that shape his/her development. In this way, the child's development may be expected to follow a probable course that is continually altered by the transactions between the child and his/her proximal and distal contexts. This transactional ecological perspective promotes the idea that development is not predetermined, and therefore trajectories that are at-risk for delay and disability may be altered. This theoretical perspective may be applied to multiple areas of development, including the language development trajectory, which was examined within this thesis among children of teenage mothers.

Proximal contexts that impact a child's language development may include relationships with familial and parental figures, among others who closely interact with the child on a frequent basis. The attitudes and behaviors of the adolescent mother play an important role in determining developmental outcomes of the child (Elster, McAnarney, & Lamb, 1983). In general, the parenting behaviors of teenage mothers are different from those of their older-aged counterparts (Beers & Hollo, 2009). Evident differences include a lack of comprehensive understanding of the child's developmental milestones, and less sensitive responses to the child's cues and needs (Karraker & Evans, 1996). Existing research in this area illustrates a strong link between maternal behaviors and developmental outcomes, but there is a lack of information on how these behaviors specifically impact the language development of children of teenage mothers. As a result, the present study aimed to investigate the potential protective quality of high maternal sensitivity on the language development trajectory of children of adolescent mothers. Based on previous research that affirms the importance of the interaction between

mother and child in determining child language ability, it was hypothesized that maternal

sensitivity would act as a moderator of language delay in this at-risk population.

Additionally, the present study aimed to examine several distal contexts that may have an

impact on the language development of children of adolescent mothers. Research on the efficacy

of community services such as Early Intervention and home visiting programs demonstrates

mixed results (Ramey & Ramey, 1998; Barnet et al., 2007; de la Rosa, 2005; Sweet &

Appelbaum, 2004, DHHS, 2014). Meta-analyses that examine these programs claim that their

success may be dependent upon the program's ability to develop specific and individualized

approaches to intervention for each family and child (Ramey & Ramey, 1998). The diversity in

design and organization of these programs is broad in scope, therefore contributing to the

difficulty in accurately assessing their efficacy. Program goals are often equally diverse and

broad in nature. The present study examined both Early Intervention services and the Healthy

Families Massachusetts home visiting program as potential moderators of language delay among

a sample of children of adolescent mothers. It was hypothesized that both community services

would have a protective and positive effect on language development outcomes for this

population. This hypothesis was created in consideration of previous research that demonstrates

the potential benefits of these programs for at-risk families. For example, some research

illustrates that home visiting programs may be beneficial in reaching high-risk families who face

transportation challenges, therefore limiting access to community resources that may otherwise

be available (Sweet & Appelbaum, 2004; Wasik, 1990). Additionally, Early Intervention

programs work to specifically target children at-risk for delay during the first years of life

(Ramey & Ramey, 1998). Due to the timing-specific nature of language development, early

intervention in this area was hypothesized to promote more positive outcomes in comparison to

the lack of these services. The present study therefore aimed to gain further understanding of the role of these distal factors in promoting resilient functioning in the area of language among the children of adolescent mothers.

Although the proximal and distal factors examined in the present study were discussed separately for analysis purposes, these factors are inextricably linked. Research on community programs that target at-risk, low income families demonstrates that the efficacy of services increases significantly with parent involvement (Mahoney et al., 1998; Miedel & Reynolds, 2000). Therefore, increased parental responsivity, involvement, and sensitivity may facilitate the success of these programs to reach their specific goals. Additionally, distal programs like home visiting and early intervention services may target and influence parental characteristics, attitudes, and behaviors. For example, a home visitor may aim to increase parental sensitivity by modeling specific behaviors that facilitate healthy interactions between the mother and child. To promote positive language development, a home visitor could model conversations that the mother may have in the presence of her young child. Specifically, this could include narrating her experiences and surroundings, singing songs during bath time, or playing with consonant and vowel sounds. In this way, the distal and proximal realms that surround the child of an adolescent mother interact and affect one another in a bidirectional manner. Therefore, targeting one contextual environment surrounding a child may additionally lead to effect upon and changes within additional environments.

Overall, the present study aimed to contribute to the growing knowledge of risk and protective factors that exist for adolescent mothers and their children. Furthermore, this study aimed to gain additional insight into the malleable contextual and/or interpersonal factors that make a difference in altering at-risk trajectories of this group of children.

This thesis examined the language trajectories of a sample of children of adolescent

mothers. Language scores of the sample were compared to those of their age equivalent peers.

Within this sample, children at Time 3 (age range: 14.72- 40.73 months) scored below average

for their age on the Macarthur Bates Short Form Vocabulary Checklist (sample mean = 0.44,

normative sample mean ~ 0.60). This finding provides support for previous studies that illustrate

that on average, children of teenage mothers score one standard deviation below the mean on

standardized measures of early language and vocabulary skills (Dunn & Dunn, 1981; Luster &

Vandenbelt, 1999). At Time 4, the mean language score for this sample was within the average

range when compared to the sample of the norm-referenced study. Due to the fact that child age

ranged significantly at both Times 3 and 4 of the present study, score comparisons were made to

the corresponding age ranges within the norm-reference study. For example, when language

development was evaluated at Time 4 of the study, child age ranged from 3.75 years to 6.49

years old. As a result, comparisons were made to the norm-reference sample raw scores on the

ROWPVT for ages 4 to 7 years old. Results from the ROWPVT normed reference study

illustrate that children ages 4 to 7 years old typically have raw scores between 40 and 72

(Brownell, 2000). Therefore, the sample used in the present study scored in the average range

for their age group on the outcome measure of language. A similar procedure was used to

compare the sample mean score on the baseline measure of language (MCDI-SF) to the norm-

referenced sample, as the age range at Time 3 was also significantly broad.

Overall, whereas the mean of the sample scored below average at baseline, they scored

within the average range for their age on the outcome measure of language. These findings

demonstrate an improvement in scores, suggesting a trend towards positive language

development and resilient functioning within the sample. These results must be interpreted with

caution due to the large range of child ages at each time point at which data was collected. After

descriptive analyses and comparisons to norm-referenced samples were conducted, further

analyses were used to determine whether there was a relation between baseline and outcome

language scores for the sample.

The Relation between Baseline and Outcome Measures of Language

Child scores on the baseline and outcome measures of language used in this study were

significantly correlated with a coefficient of .353, which is considered to be a moderate

correlation ($p < .001$). Additionally, results showed that the baseline measure of language ability

at age 24 months (age range = 14.73-43.90 months) significantly predicted child language scores

at 4 years old (range = 3.75-6.49 years). A positive relation between baseline and outcome

scores was identified, with those scoring higher at a younger age predicted to score highly on the

later measure of language. In consideration of the control variables that were assessed within

this regression model, child age was the only significant predictor of outcome language scores.

Maternal depression and the Community Clusters variable were not significant predictors of

ROWPVT scores. These results provide support for existent research that claims that a child's

language trajectory is specified within the first few years of life, with his/her future language

skills determined by the early linguistic foundation (Fewell & Deutscher, 2004; Forget-Dubois et

al., 2009). These results provide support for the implementation of early services and

intervention, particularly for at-risk children.

Additionally, the aforementioned results suggest the validity of both measures used (the

MCDI-SF and ROWPVT) as accurate evaluations of child language for this sample. The baseline

evaluation of language for the present study, the MCDI-SF, is a maternal self-report measure that

requires the mother to indicate whether her child can understand, produce, or understand and

produce a host of words that make up the vocabulary checklist. The outcome measure, the

Receptive One-word Picture Vocabulary Test (ROWPVT), is an assessment that is administered

to the child by an examiner, which therefore allows for greater objectivity of results. Results of

the present study suggest the validity of the MCDI-SF measure and additionally validate the

mothers' evaluations of their children's language abilities at 24 months.

In considering the relation between baseline and outcome scores in this sample, it must

be noted that the ROWPVT evaluates receptive language skills while the MCDI-SF measures

mainly expressive skills (in levels II-A and II-B). This fact should be taken into consideration

while interpreting results, as two different aspects of language development may have been

measured for some participants.

Influence of Moderators on the Relation between Baseline and Outcome Language Scores

Multiple regression analyses were used to investigate the hypothesis that maternal

sensitivity, Early Intervention participation, and home visiting program participation moderate

the relation between baseline and outcome language scores for this sample. Due to the fact that

several families did not complete either one or both video measures of maternal sensitivity, the

sample size for the moderation analysis was significantly decreased from the overall sample size

for this study ($n = 113$, $N = 216$). The restricted size of the sample may have led to a decrease in

power to detect a significant effect of maternal sensitivity as a moderator of language delay in

this analysis. When tested using multiple regression, maternal sensitivity did not significantly

moderate the relation between baseline and outcome language scores for the sample. The

average maternal sensitivity mean score for the sample was about 4.8 out of 9, with scores

ranging from 1.00-7.17. The moderating power of maternal sensitivity may have been impacted

by the fact that no participants scored above 7.17. Additionally, the moderating potential of the

maternal sensitivity variable may have been impacted by the measures of sensitivity used in this study. A maternal sensitivity score was assigned to each participant based on her behavior during a 10-minute video. This is a limitation in that the behaviors exhibited during the video may not be representative of the mother's typical behavior towards her child.

In examining Early Intervention participation as a moderator of language delay in this sample, the analysis was run with a significantly decreased sample size ($n = 187$, $N = 216$). Descriptive analyses revealed that out of 216 participants, only 70 had participated in Early Intervention services as measured at Time 3 of the study. The small number of individuals in the intervention group may have further limited the power to detect significant moderation as a function of Early Intervention participation. Furthermore, the measure of Early Intervention used in analyses provided information regarding participant's involvement with the services but did not account for the frequency, duration, or intensity of services received. Descriptive information for the sample demonstrates that on average, participants received 5.12 months of Early Intervention services (range: .03- 24 months). However, at Time 3, 30% of those who received EI had only one month of services. The relatively low duration of time spent in services may partially explain a lack of significance for the EI moderator, as the literature shows that the efficacy of services may largely be a function of the frequency and duration of participation (Ramey & Ramey, 1998).

Additionally, the EI measure used in this analysis did not take into account reasons for use of services. Approximately 30% of those who participated in EI cited child speech issues as their reason for entry into the program. Reasons for participation among this sample were diverse including child motor issues, physical concerns, high-risk pregnancy, prematurity, and referrals from shelters or DCF, among others. Therefore, for many EI participants, their child's

speech/ language development was not specifically targeted by the services delivered. This fact

may have impacted the significance of the moderator on determining language skills among the

children in this sample. Previous research provides further explanation for the lack of

moderating significance, as many studies have shown that the wide variability in services

provided by Early Intervention programs makes measuring their efficacy challenging (Ramey &

Ramey, 1998).

Additionally, participants included in the EI group for this study may have started and

ended services before Time 3. For those children, their baseline scores of language may have

already been positively influenced by EI participation. As a result, the present study did not have

the opportunity to see an effect of Early Intervention on the relation between Time 3 and Time 4

scores for those individuals. This is relevant in that only 21 of the 70 participants who received

EI at one time were still participating in the services at Time 3. Therefore, the opportunity to

observe an effect of the services between Time 3 and Time 4 was significantly decreased,

providing further explanation for the lack of significance of the EI moderator. Future studies

may utilize a more specific and in depth measure of Early Intervention in order to determine its

moderating potential on language development for this population.

Home visiting program enrollment was additionally examined as a potential moderator of

the relation between baseline and outcome language scores for this sample. Fifty-three percent

of the sample received home visits from the Healthy Families Massachusetts home visiting

program (HFM). The remaining 47% of the sample received referrals to other programs and

information regarding similar services. With this said, a portion of the mothers in the

intervention group received either a limited number of home visits or no visits. Within this

sample, 23.6% of those in the HFM intervention group received less than 5 home visits at Time

3. This may have impacted power to detect a program effect for this sample. Furthermore, many of those who received home visits from HFM may have completed the program prior to Time 3, therefore preventing the detection of a program effect between later time points (Times 3 and 4). Power to detect a program effect may have been additionally decreased as individuals in the RIO group may have been enrolled in other home visiting programs, potentially confounding results.

Both measures of home visiting and Early Intervention program participation were dichotomous within the scope of this study, therefore presenting limitations in analyses and interpretation of results. The dichotomous nature of the variables grouped participants into one of two groups: those who received the services and those who did not. As a result, specificities of frequency, duration, and intensity of services were not accounted for in the analyses. Due to the importance of these factors in determining program outcomes and efficacy, the lack of detail provided by the dichotomous variables likely influenced the significance of the interventions as moderators of language delay.

Additionally, the goals of the Healthy Families Massachusetts program do not explicitly mention child language development as a program goal. The HFM program targets five broad goals having to do with maternal well-being, decreased rates of repeat pregnancy, and to promote parenting behaviors that decrease the incidence of child abuse and neglect (Healthy Families America, 2014). In addition to the fact that language development is not targeted within this intervention, home visitors are not specifically trained to model positive language and literacy behaviors. The lack of specificity in the program goals to target language development may have contributed to a lack of significant findings for this analysis.

Child Sex and Maternal Education Level

Research on early language development provides evidence for the impact of maternal education level and child sex on language scores (Fenson et al., 2000; Oxford & Spieker, 2006). Therefore, both child sex and maternal education level were investigated as potential predictors of child language scores among the sample of the present study. Descriptive analyses demonstrated significant differences in child language scores as a function of child sex. However, when tested in subsequent regression analyses, child sex did not significantly predict outcome scores. Additionally, sex did not moderate the relation between baseline and outcome language scores for this sample. Similarly, maternal education level was not a significant predictor of outcome scores, nor a significant moderator of the relation between baseline and outcome language scores. These findings confirm that results from the present study were not significantly impacted as a function of group differences due to child sex or maternal education level.

Subgroup Analyses

In an attempt to examine those at most risk for language delay within the sample, participants were grouped into three categories based on their MCDI-SF score. A low, mid, and high scoring group were specified according to participant's scores in reference to the mean (mean = .44). The "low scoring group" consisted of those with scores below the twentieth percentile, or more than one standard deviation below the mean. Those scoring within one standard deviation above or below the sample mean were considered the "mid scoring group". Those scoring higher than one standard deviation above the mean were considered the "high scoring group". An analysis of the relation between baseline and outcome language scores was conducted by subgroup. Multiple regression analyses revealed significant differences in the

outcome language scores of the low scoring versus high scoring groups and the low scoring

versus mid scoring groups. Those in the low scoring group at baseline were predicted to score

almost ten points lower on the ROWPVT than the high scoring group. Additionally, those in the

low scoring group were predicted to score almost 6 points lower on the ROWPVT than the mid

scoring group. These findings further support existing literature that demonstrates a clear link

between early language experiences and later linguistic skill and performance. Furthermore,

these findings demonstrate the timing-specific nature of language development, in agreement

with previous literature on early language acquisition (Forget-Dubois et al., 2009; Zill & West,

2001). No significant differences were found between the subgroups in subsequent moderation

analyses.

Subgroups were created from the larger sample in order to gain additional knowledge of

risk and resilience factors that may affect the most high-risk participants. This study may have

benefitted from qualitative analyses to gather further information regarding the characteristics of

the low scoring subgroup and to explore patterns and themes that may be present within the

group as a whole. The discovery of relevant patterns and themes could provide insight into

factors that may contribute to both risk and resilient functioning for this subgroup.

Limitations

In addition to the previously noted limitations, the present study was limited due to

restrictions to the Macarthur Short Form Vocabulary Checklist (MCDI-SF) measure. At Time 3

of this study, the MCDI-SF was available in levels 1, 2, and 3 in English and only levels 1 and 2

in Spanish. As a result, Spanish-speaking participants did not receive the option to complete the

level 3 form, limiting the collection of data from those individuals with the oldest children at that

time point. As a result of this limitation, the present study utilized MCDI-SF data from only

monolingual English-speaking participants. Due to the restricted sample, results from the present study cannot be generalized beyond the sample measured.

Additionally, the norm-referenced sample utilized by the MCDI-SF measure was not wholly representative of the population at large (Fenson et al., 2000). Fenson and colleagues caution that the normed sample was skewed in that participants had higher education levels and socioeconomic statuses in comparison to the United States population as a whole. In 2000, a second study was conducted in an attempt to norm the measure to a more representative population. Results from this second iteration were utilized to make comparisons for this study. With this said, some literature continues to debate the measure's validity for use in low income, minority populations (Arriaga, Fenson, Cronan, & Pethick, 2008).

In addition to these issues with the MCDI-SF measure, other limitations of the present study included the small sample sizes used for the multiple regression analyses. The already restricted sample of this study was further decreased due to missing data. As previously stated, the power to detect significant effects in some analyses may have been impacted.

Lastly, the large range of child ages at both data collection time points made comparisons to the normed samples difficult. As a result, comparisons were made based off of age ranges, and inferences were made accordingly. Comparisons of the sample to the population at large may have been more accurate if the range in child age at each time point was less broad.

Program and Policy Implications

Results from this thesis may be used to inform intervention programs and policy with regards to the language development of the children of adolescent mothers. This thesis supports previous literature that identifies the importance of the early identification of language delay and intervention at an early age. Additionally, I have reviewed literature on community services like

Early Intervention and home visiting programs. Both the results of this study and preexisting literature suggest that the efficacy of these programs may be increased with further specialization of programs to target a specific group of at-risk individuals. Furthermore, efficacy may be increased with individualization of services to the specific needs of the population and individuals enrolled. This trend towards increasingly individualized, population-specific interventions may be seen within current programs like Providence Talks and the Talking is Teaching campaign sponsored by the Clinton Foundation (Clinton Foundation, 2013). These interventions fuse EI and home visiting program approaches to deliver specific, language development curriculum to low income families.

The Talking is Teaching campaign may be of particular relevance when considering the development of intervention that targets adolescent mothers. The campaign delivers information regarding language development milestones over text message alert and/or email. This approach may be particularly useful and adaptive for use with adolescent mothers. Additionally, the campaign provides a website (in English and Spanish) with videos that model parent behavior that encourages positive language development. Future community-centered interventions may consider these examples and the results of this study when tailoring programs to adolescent mothers and their children.

Results of this thesis may also be utilized to inform the service content of the Healthy Families Massachusetts home visiting program to promote positive language development among participants and their children. This is relevant in that Healthy Families Massachusetts and programs like it provide an opportunity to intervene at a time in the child's life when the language development trajectory is particularly malleable.

Conclusions

The present study examined a set of potential moderators of language delay in a sample of monolingual English-speaking children of adolescent mothers. A resilience framework and relational developmental theories were used to inform the theory of change. Environmental and intergenerational factors are acknowledged for their influence on both the risk and resilience of the mother and the child. Development is understood as probabilistic in nature, therefore subject to change and influence. As a result, a developmental trajectory may be altered throughout the life course, allowing for language outcomes of the children of teenage mothers to be impacted. Results demonstrated partial support for the hypotheses. On average, the sample of the present study performed significantly below age-level on a measure of language at approximately 24 months old. However, at 48 months of age, the sample on average performed at an age-equivalent level. These results indicate positive language development over time for this sample. Furthermore, early child language skills were found to significantly predict later language skills, with those scoring lowest at approximately 24 months of age at the greatest risk to perform poorly on a language measure at 48 months old. These results provide support for existing research that emphasizes the importance of early intervention to promote positive language development trajectories among at-risk populations. Additionally, the lack of moderating significance of the intervention programs tested prompts further analysis of the characteristics of interventions that may promote the most beneficial outcomes for adolescent mothers and their children. Previous literature, the results of this thesis, and current interventions that target language development suggest that increasingly individualized and population-specific interventions may better promote positive outcomes for adolescent mothers and their children.

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APPENDIX A

Tables

Table 1

Sample Descriptives

Construct	Variable	N	Mean	Percent	SD	Range
Program Assignment (T1)	HVS vs. RIO	216		HVS: 53.2% (*n* =101) RIO: 46.8% (*n* =115)		
T3 Child Age (in months)	Age at T3 RI	216	24.32		5.97	14.72-43.90
T4 Child Age (in years)	Age at T4 RI	216	4.95		0.43	3.91-6.27
T3 Mother Age (in years)	Age at T3 RI	216	20.91		1.37	18.15-24.17
T4 Mother Age (in years)	Age at T4 RI	216	23.77		1.35	20.52-26.45
Child Sex (T1)	Female vs. Male	216		Female: 50.5% Male: 49.5%		
Mother Race/Ethnicity (T1)	White (non-Hispanic)	215		38.6%		
	Black (non-Hispanic)			27.9%		
	Hispanic			26.5%		
	Other			7.0%		
Mother Preferred Language (T1)	English	214		83.8%		
	Spanish			0.9%		
	English and Other			13.4%		
	Other			0.9%		
Early Intervention Participation (T3)	EI vs. No EI	216		EI: 32.4% (*n* = 70) No EI: 67.6% (*n* = 146)		
Baseline Language Measure (T3)	MacArthur Bates Communicative Development Inventories	187	0.44		0.27	0.03-1.00
Outcome Language Measure (T4)	Receptive One-word Picture Vocabulary Test	216	55.64		13.51	0.00-84
Maternal Sensitivity (T3)	Mean scores from free play and teaching tasks (1-9 Scale)	133	4.79		1.26	1.00-7.17

Table 2

Summary of Reported Reasons for Early Intervention Participation (n = 68).

Reported Reason	*n*
Speech issues	18 (26.5%)
Prematurity	10 (14.7%)
Physical concerns	6 (8.8%)
Motor issues	8 (11.8%)
Shelter/ Program requirement	5 (7.4%)
High-risk pregnancy (e.g. maternal use of drugs, surgery during birth).	4 (5.9%)
DCF requirement	3 (4.4%)
DSS requirement	1 (1.5%)
Social/ behavioral issues	2 (2.9%)
Referred by doctor, school, or friends	3 (4.4%)
Don't know	3 (4.4%)
Other	5 (7.4%)

Table 3

Summary of Hierarchical Regression Analysis that Describes the Relation Between MCDI-SF Proportion Scores and ROWPVT Raw Scores Controlling for Child Age, Community Clusters, and Maternal Depression (n =187).

	M1			M2		
	B	*SE(B)*	*β*	*B*	*SE(B)*	*β*
Child Age	.477	.162	.216**	.150	.175	.068
Low Income/Minority Majority Ethnicity vs. Mod Income/Homogeneous European American	-.960	2.435	-.030	.442	2.363	.014
Low Mod Income/Ethnically Diverse vs. Mod Income/Homogeneous European American	-1.255	2.171	-.045	-.031	2.105	-.001
Maternal Depression	-.783	1.991	-.029	-.027	1.920	-.001
Macarthur Bates Short Form Vocabulary Checklist Proportion Score				15.469	3.798	.324***
R^2		.036			.128	
df(Residual)		182			181	
ΔR^2					.080***	
df (ΔR^2)					1	
Key: *p < .05, **p < .01, ***p < .001						

Table 4

Summary of Hierarchical Regression Analysis that Describes the Moderating Potential of Maternal Sensitivity on the Relation Between MCDI-SF Scores and ROWPVT Raw Scores Controlling for Child Age, Community Clusters, and Maternal Depression (n =133).

	M1			**M2**			**M3**		
	B	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*
Child Age	.482	.226	.206*	.115	.241	.048	.119	.244	.050
Low Income/Minority Majority Ethnicity vs. Mod Income/Homogeneous European American	-3.042	3.073	-.100	-1.576	2.958	-.052	-1.586	2.973	-.052
Low Mod Income/Ethnically Diverse vs. Mod Income/Homogeneous European American	-3.334	2.804	-.123	-1.334	2.734	-.049	-1.312	2.754	-.048
Maternal Depression	1.478	2.601	.055	2.077	2.504	.077	2.080	2.516	.077
Macarthur Bates Short Form Vocabulary Checklist Proportion Score				15.322	4.810	.330**	17.437	20.154	.376
Maternal Sensitivity mean score				.930	.971	.089	1.092	1.785	.105
Maternal sensitivity x MCDI-SF scores							-.434	4.019	-.053
R^2		.051			.154			.154	
df(Residual)		108			106			105	
ΔR^2					.102**			.000	
df (ΔR^2)					2			1	

Key: *p < .05, **p < .01, ***p < .001

Table 5

Summary of Hierarchical Regression Analysis that Describes the Moderating Potential of Early Intervention Participation on the Relation Between MCDI-SF Scores and ROWPVT Raw Scores Controlling for Child Age, Community Clusters, and Maternal Depression (n =187).

	M1			**M2**			**M3**		
	B	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*
Child Age	.477	.126	.216**	.138	.178	.063	.132	.180	.060
Low Income/Minority Majority Ethnicity vs. Mod Income/Homogeneous European American	-.960	2.435	-.030	.457	2.369	.014	.518	2.387	.016
Low Mod Income/Ethnically Diverse vs. Mod Income/Homogeneous European American	-1.255	2.171	-.045	-.117	2.124	-.004	-.011	2.170	.000
Maternal Depression	-.783	1.991	-.029	-.068	1.928	-.002	-.103	1.938	-.004
MCDI-SF proportion score				15.688	3.856	.328***	16.408	4.803	.343**
Early Intervention Participation				.708	1.968	.026	1.478	3.632	.054
Early Intervention x MCDI-SF scores							-1.803	7.138	-.035
R^2		.048			.129			.129	
df(Residual)		182			180			179	
ΔR^2					.081***			.000	
df (ΔR^2)					2			1	

Key: *p < .05, **p < .01, ***p < .001

Table 6

Summary of Hierarchical Regression Analysis that Describes the Moderating Potential of Home Visiting Program Participation on the Relation Between MCDI-SF Scores and ROWPVT Raw Scores Controlling for Child Age, Community Clusters, and Maternal Depression (n =187).

	M1			**M2**			**M3**		
	B	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*
Child Age	.477	.162	.216**	.153	.176	.069	.154	.176	.070
Low Income/Minority Majority Ethnicity vs. Mod Income/Homogeneous European American	-.960	2.435	-.030	.393	2.377	.012	.558	2.387	.018
Low Mod Income/Ethnically Diverse vs. Mod Income/Homogeneous European American	-1.255	2.171	-.045	-.116	2.138	-.004	-.028	2.142	-.001
Maternal Depression	-.783	1.991	-.029	-.010	1.927	.000	-.076	1.930	-.003
MCDI-SF proportion score				15.511	3.812	.324***	12.415	5.313	.260*
Home Visiting Participation				.451	1.824	.018	-2.088	3.539	-.081
Home Visiting x MCDI-SF scores							5.655	6.751	.127
R^2		.048			.129			.132	
df(Residual)		182			180			179	
ΔR^2					.080***			.003	
df (ΔR^2)					2			1	

Key: *p < .05, **p < .01, ***p < .001

Table 7

*Summary of Hierarchical Regression Analysis that Investigates **Subgroup Differences** in the Relation Between MCDI-SF Proportion Scores and ROWPVT Raw Scores Controlling for Child Age, Community Clusters, and Maternal Depression (n =187).*

	M1			M2		
	B	*SE(B)*	*β*	*B*	*SE(B)*	*β*
Child Age	.477	.162	.216**	.256	.177	.116
Low Income/Minority Majority Ethnicity vs. Mod Income/Homogeneous European American	-.960	2.435	-.030	.047	2.420	.001
Low Mod Income/Ethnically Diverse vs. Mod Income/Homogeneous European American	-1.255	2.171	-.045	.010	2.177	.000
Maternal Depression	-.783	1.991	-.029	-.325	1.963	-.012
Low MCDI-SF group vs. high MCDI-SF group				-9.277	3.238	-.291**
Mid MCDI-SF group vs. high MCDI-SF group				-3.547	2.458	-.136
Low MCDI-SF group vs. mid MCDI-SF group				-5.680	-.178	.023*
High MCDI-SF group vs. mid MCDI-SF group				3.486	.109	.161
R^2		.048			.091	
df(Residual)		182			180	
ΔR^2					.043*	
df (ΔR^2)					2	
Key: *p < .05, **p < .01, ***p < .001						

Table 8

*Summary of Hierarchical Regression Analysis that Examines **Subgroup Differences** in the Moderating Potential of Maternal Sensitivity on the Relation Between MCDI-SF Scores and ROWPVT Raw Scores Controlling for Child Age, Community Clusters, and Maternal Depression (n =133).*

	M1			**M2**			**M3**		
	B	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*
Child Age	.482	.226	.201*	.186	.247	.078	.093	.254	.039
Low Income/Minority Majority Ethnicity vs. Mod Income/Homogeneous European American	-3.042	3.073	-.100	-1.923	3.031	-.063	-1.617	3.031	-.053
Low Mod Income/Ethnically Diverse vs. Mod Income/Homogeneous European American	-3.334	2.804	-.123	-1.237	2.861	-.046	-1.561	2.870	-.058
Maternal Depression	1.478	2.601	.055	2.077	2.567	.075	2.532	2.587	.094
Low scoring MCDI-SF vs. high scoring MCDI-SF				-9.485	4.181	-.325*	3.194	17.855	.109
Mid scoring MCDI-SF vs. high scoring MCDI-SF				-2.912	3.252	-.114	-7.588	16.283	-.298
Maternal Sensitivity mean score				1.015	.998	.097	1.156	2.781	.111
Maternal sensitivity x low scoring group							-3.021	3.537	-.470
Maternal sensitivity x mid scoring group							.917	3.045	.190
R^2		.051			.123			.144	
df(Residual)		108			105			103	
ΔR^2					.072*			.021	
df (ΔR^2)					3			2	

Key: *p < .05, **p < .01, ***p < .001

Table 9

*Summary of Hierarchical Regression Analysis that Investigates **Subgroup Differences** in the Moderating Potential of Early Intervention Participation on the Relation Between MCDI-SF Scores and ROWPVT Raw Scores Controlling for Child Age, Community Clusters, and Maternal Depression (n =187).*

	M1			M2			M3		
	B	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*
Child Age	.477	.162	.216**	.258	.179	.117	.272	.181	.123
Low Income/Minority Majority Ethnicity vs. Mod Income/Homogeneous European American	-.960	2.435	-.030	.047	2.427	.001	.120	2.442	.004
Low Mod Income/Ethnically Diverse vs. Mod Income/Homogeneous European American	-1.255	2.171	-.045	.025	2.198	.001	-.138	2.243	-.005
Maternal Depression	-.783	1.991	-.029	-.317	1.973	-.012	-.462	2.004	-.017
Low scoring MCDI-SF vs. high scoring MCDI-SF				-9.263	3.256	-.290***	-8.859	3.996	-.278*
Mid scoring MCDI-SF vs. high scoring MCDI-SF				-3.541	2.466	-.135	-2.333	3.034	-.089
Early Intervention Participation				-.115	1.996	-.004	2.226	4.496	.082
Early Intervention x low group							-1.046	6.216	-.021
Early Intervention x mid group							-3.575	5.174	-.110
R^2		.048			.091			.094	
df(Residual)		182			179			177	
ΔR^2					.043*			.003	
df (ΔR^2)					3			2	

Key: *p < .05, **p < .01, ***p < .001

Table 10

*Summary of Hierarchical Regression Analysis that Investigates **Subgroup Differences** in the Moderating Potential of Home Visiting Program Participation on the Relation Between MCDI-SF Scores and ROWPVT Raw Scores Controlling for Child Age, Community Clusters, and Maternal Depression (n =187).*

	M1			M2			M3		
	B	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*
Child Age	.477	.162	.216**	.260	.178	.118	.248	.179	.112
Low Income/Minority Majority Ethnicity vs. Mod Income/Homogeneous European American	-.960	2.435	-.030	-.006	2.434	.000	-.035	2.441	-.001
Low Mod Income/Ethnically Diverse vs. Mod Income/Homogeneous European American	-1.255	2.171	-.045	-.083	2.207	-.003	.187	2.235	.007
Maternal Depression	-.783	1.991	-.029	-.010	1.927	.000	-.076	1.930	-.003
Low scoring MCDI-SF vs. high scoring				-9.337	3.253	-.292***	-9.815	4.663	-.307*
Mid scoring MCDI-SF vs. high scoring				-3.544	2.464	-.136	-5.670	3.375	-.217
Home Visiting Participation				.532	1.873	.021	-2.403	4.114	-.093
Home Visiting x low group							1.424	5.952	.038
Home Visiting x mid group							4.338	4.758	.154
R^2		.048			.092			.097	
df(Residual)		182			179			177	
ΔR^2					.043*			.005	
df (ΔR^2)					3			2	

Key: *p < .05, **p < .01, ***p < .001

APPENDIX B

Maternal Sensitivity Coding Scheme

(Biringen, Robinson, & Emde, 2000)

9 HIGHLY SENSITIVE: *Emotional communication between parent and infant is for the most part positive, appropriate, and creative. The highly sensitive parent displays genuine, authentic, and congruent interest, pleasure, and amusement with the infant (as opposed to performing these behaviors), as demonstrated by warm smiles and giggles, interested eye contact, and comforting and playful physical contact.* Parental facial expressions and tone of voice are pleasant and there are no sudden or marked shifts in emotional tone. In fact, both the parent and child show clear enjoyment and delight with each other. The parent accurately reads the child's signals, even subtle ones that may not be clear to an outsider, and reacts appropriately. He or she has a well-developed sense of timing and rhythmicity during interactions with transitions between activities appearing smooth rather than abrupt and enforced. Parental behavior appears flexible and adaptable, according to the demands of particular situations. When parent and child are physically separated, they are likely to maintain emotional connectedness at a distance, at the very least by the parent occasionally calling the child's name or looking in on him or her. Thus, verbal and visual communications between parent and child are ongoing but not constant or overwhelming. Statements to and regarding the child are affirmative and accepting, rather than sarcastic, critical, or highly prohibitive. The amount of interaction is fairly high. Play interactions are creative and joyful for both parent and child. The parent further responds with short latency to distress signals, attempting to soothe and to explore reasons for such communications. Conflict situations do not lead to long breakdowns in the relationship; instead, they too are handled smoothly and effectively. Overall, the observer sees a very 'special' quality in these

interactions, and delights in the dancelike quality of this interaction. This is the most optimal rating.

7 GENERALLY SENSITIVE: *This parent is very similar to a '9', except that there is a less spectacular quality to these parent–child exchanges. This rating refers to a 'good enough' parent.* Typically, very positive interactions get rated down to '7' for some of the following reasons: the parent did not interact in a creative manner, although he or she was affectively connected to the infant and interactions were harmonious and enjoyable; or the parent's affect and behavioral style were extremely well suited to this infant, creating a generally lively and engaging climate, but at brief moments, he or she displayed subtle preoccupation with his/her own thoughts, as if processing another agenda; or the like. However, the differences between a '9' and a '7' are small.

5 INCONSISTENTLY SENSITIVE: *The parent is sensitive in some ways, but the observer finds it difficult to give this relationship a clean bill of health. Parental inconsistency in behavior may be one tell- tale sign (including signs of inconsistency discussed at the end of the section on sensitivity).* For example, the parent may fluctuate from being creative and joyful during play times to being preoccupied with other concerns, or other questionable (though not clearly negative/insensitive) behaviors. This characteristic is particularly significant, given that parents usually want to look their best for a videotaped session. Thus, some parents may 'leak' inconsistencies of behavior; it may simply be too stressful for some to maintain well-modulated positivity for long. Such variability may be observed on different days or at different times in the same session.

3 SOMEWHAT INSENSITIVE: *Insensitivity is typically displayed in one of two general ways, one being an active/harsh style (overly active and over- bearing) and the other being a passive/depressed/affectively flat (non-interactive and silent) style. Still, there are positives here.* Both styles suggest unresponsiveness to infant communications and lack many of the features of sensitive interactions described earlier. The active/harsh/volatile style involves facial expressions of disgust and anger and harsh/abrasive/condescending tones of voice. The passive/depressed/affectively flat style involves facial expressions that are depressed and disinterested, and a vocal tempo that is slow, lethargic, or simply unenthusiastic. Also often seen is a businesslike, matter-of-fact style that combines features of both abrasiveness and passivity. The observer may note situations in which there are sudden shifts in mood without gestural or verbal indicators. In other words, the subtle gestural system is not well used, resulting in affect regulation that is not well modulated. Such shifts are likely to be more extreme or upsetting to the child or for the observer to watch than is the case for a '5'.

1 HIGHLY INSENSITIVE: This parent displays few areas of strength in interaction with his/her child. This 1 rating, like a '2', is uncommonly used in normal or unselected samples and denotes extreme insensitivity to the child's communications and little apparent knowledge of crucial child- rearing techniques. In at- risk populations, however, such lower ratings are more commonly used. The highly insensitive parent is low on almost all qualities discussed in the introduction. Affective negativity (in the form of either active harshness or passive disinterest/depression) is more extreme, as are many of the other qualities. Basically, a '1' is a more extreme version of the sort of insensitivity described for a '3'.