ABSTRACT

Title of Document: AN INVESTIGATION OF EARLY LITERACY OUTCOMES BY SOCIO-ECONOMIC STATUS AND RACE/ETHNICITY

Kelly Lane Worthington, Ph.D., 2010

Directed By: Professor Margaret J. McLaughlin
Department of Special Education

The purpose of this study was to examine the early literacy outcomes of children prior to school entry and describe the magnitude of outcome and experiential differences by socio-economic status (SES) and racial/ethnic groups. In addition, I examined the extent to which SES, race/ethnicity, child, home, and early care/education factors and experiences explained early literacy outcomes. My study was an extension of research conducted by Lee and Burkam (2002) about early literacy outcomes at kindergarten entry. I used the full sample data from the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), a study of a nationally representative sample of children in the United States. The results of this study show large gaps in the 48-month early literacy scores when examined by SES and a wide variation in child experiences prior to school entry. The findings suggest a need for specific and targeted consideration of group outcomes when revising, creating, and funding federal early childhood policies that are designed to improve group early literacy outcomes prior to school entry.

AN INVESTIGATION OF EARLY LITERACY OUTCOMES BY SOCIO-ECONOMIC STATUS AND RACE/ETHNICITY

By

Kelly Lane Worthington

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2010

Advisory Committee:
Professor Margaret J. McLaughlin (EDSP), Chair
Professor Joan Lieber (EDSP)
Professor Philip J. Burke (EDSP)
Assistant Professor Rebecca Silverman (EDSP)
Associate Professor Robert Croninger (EDPL)

Dedication

For my nieces and nephews: I finished this race for you. For my parents: thank you for your constant encouragement and refuge. For Steve, my partner in building a home filled with peace and joy: thank you for finishing with me.

Acknowledgements

It took 2075 days, but it is finally done. Thank you to all the friends and family members who tolerated the missed birthdays, weddings, baby/wedding showers, funerals, holidays, graduations, ball games, family reunions, and other special occasions over the last several years. I was blessed by your patience. Steve, you earn top prize. Let's go take that vacation.

A special thank you goes to my advisor, Maggie. I entered the program because of you and I finished because of you. Your unwavering commitment to challenging me to think bigger and deeper was inspiring and deeply appreciated. I enjoyed being your student, value the lessons I am taking with me, and am looking forward to all that is to come. As so often occurred throughout this process, I am at a loss for just the right words. Thank you for the countless times you listened to 'what I meant to say' and helped me translate it to something meaningful. Thank you, also, for the Institute of Fun. We shared a lot of laughter, tossed around endless ideas, cried a few tears (of course, we brought our own tissue!), and you were the catalyst for it all. Thank you for fostering cohorts who cared for one another; I should know since I was there to see several cohorts come and go!

Speaking of cohorts, I want to thank my Maryland friends who provided endless support and understanding. Special thanks to my two officemates, Meredith and Asha, who heard it all; I consider myself greatly blessed by your partnership. Thanks to the

ever-pleasant Val, Judy, Stephanie, Blesilda, and Eppie; your assistance and answers over the years are much appreciated!

Several other people influenced my life at different times, but all the experiences weaved together. Richard Coker, thank you for teaching me that life is too short to worry about it all and that "seize the day" is not just a phrase from a great movie. Hugh and Nancy Martin, thank you for teaching me how small the world is and that another degree never hurt anybody. I can just hear Hugh when I told him I was on some new adventure, "that's terrific!" Yes, it really is terrific and I am happy to be moving on to a new adventure. I wish you were around so we could chat. Thank you for encouraging me to experience a whole lot of life!

To my nieces and nephews, I dedicated the dissertation to you and hope that someday you understand. Being an aunt is the greatest role in the world and I adore you. You can do anything. Do not take life too seriously; fill your circle of influence with those who are good to you. You will recognize a good friend by those who will laugh with you, not at you. Treasure the good stuff and forgive the bad. Ignore those who do not have your best interest at heart.

To my parents, thank you for the sacrifices and opportunities. The older I get, the more I see. Thank you for providing an example of honesty, integrity, and an amazing work ethic. I have lived in many places, but Little York is still my home.

Thank you to all the teachers who taught me to love to read. Mrs. Keithley who made the characters come alive, Mrs. Downey's painted, clawfoot bathtub in second

grade that was a special place to read, and Mrs. Watson's reading contest in fourth grade (that I won because my parents would not replace the broken television). Thank you, also, to those who supported the Little York library in the back of the feed store, the Monmouth library, and the bookmobile so that children in our community had access to books and the wonder that emerges from reading a good story.

I also want to acknowledge the overwhelming support from my colleagues at the U.S. Department of Education. From endless advice to approving large chunks of time away from the office so that I could get this degree, you went over and above the call of duty. Special thanks to Larry Wexler for seeing it through from start to finish and for leading the "you can do it" team. Thank you. To my various bosses during the program (Lois Taylor/Ruth Ryder, Larry W/Lou Danielson, David Egnor/Larry W), thank you for letting me keep my job and pay the mortgage while I was in school; Steve thanks you, too! You probably agree that I could not have asked for more; thank you for the opportunity to get it done. To Ingrid Oxaal and the dissertation support group, thanks for celebrating each milestone. It was good to know I was not alone.

To all the other doc students between 2004 and 2010, it was a pleasure being a Terp with you. Let's go change the world.

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"Estimating, as we did, the magnitude of the differences in children's cumulative experience before the age of 3 gives an indication of how big the problem is. Estimating the hours of intervention needed to equalize children's early experience makes clear the enormity of the effort that would be required to change children's lives. And the longer the effort is put off, the less possible the change becomes. We see why our brief, intense efforts during the War on Poverty did not succeed. But we also see the risk to our nation and its children that makes intervention more urgent than ever." (Hart & Risley, 2003, p. 7)

Chapter 1: Introduction

Children who enter school developmentally behind same-age peers are likely to stay behind, and the skill gap between lower- and higher-achievers generally increases over time (Judge, 2005; Juel, 2006; Levenstein, Levenstein, & Oliver, 2002; Lonigan, Burgess, & Anthony, 2000). To prevent and ameliorate achievement gaps, researchers and policy makers have been working since the 1960s to improve early childhood outcomes and ensure that kindergarteners come to school with a relatively equitable opportunity to participate in and benefit from school (Hart & Risley, 1995; Jenson & Fraser, 2006). In spite of the investment of over 40 years of policy, research, and intervention efforts, wide developmental disparities are evident in samples of children in preschool (Judge, 2005; Snow, Burns, & Griffin, 1998) and at kindergarten entry (Lee & Burkham, 2002). Less is known about the magnitude of population disparities in outcomes and experiences at younger ages or whether initial empirical findings about child experiences between birth and school entry explain outcome differences in the population. Policy makers and researchers are in agreement about the need for data about outcomes and experiences prior to school entry in order to support effective early childhood investments (Jenson & Fraser, 2006; McCardle, Cooper, Houle, Karp, & Paul-

Brown, 2001; The Science of Early Childhood Development, 2007; Shonkoff & Phillips, 2000).

Federal-level early childhood investments include programs that support prevention and intervention practices to improve outcomes of children who are at risk for poor outcomes. One outcome of interest is early literacy. To identify predictors of early literacy outcomes, I organize this chapter into several major sections: early literacy construct; background, or context, for my study; limitations of the current policies and knowledge base; purpose of my study; and research questions. In the section that considers the construct of early literacy, I describe how the research community defined early literacy from birth to school entry. In the background section, I identify key findings about child, home, and early care/educational factors and experiences that are expected to impact early literacy outcomes. Because research related to early literacy development from birth to school age is still emerging, I used three major sources of information to inform the background, including: seminal studies on general early childhood outcomes; national reports and research syntheses about early literacy development; and empirical research about early literacy development for children prior to age 3.

What is Early Literacy for Children Birth to School Entry?

The construct of early literacy does not have a common conceptualization for children ages birth through school entry (Snow et al., 1998). The lack of a commonly accepted definition is reflected in the federal policies that target early literacy outcomes

and the existing research about early literacy. In this chapter, I describe how various sources defined and measured early literacy in children from birth to school entry, as well as the factors identified by the various sources as key predictors of early literacy outcomes.

For my review of the current knowledge base, I adopted a broad conceptualization of the construct of early literacy so I could include a wide range of perspectives and philosophies in my review of the research. A broad conceptualization of early literacy is consistent with a model recently developed by Dunst, Trivette, Masiello, Roper, and Robyak (2006) that depicts early literacy outcomes as a result of a system of co-occurring resources and experiences that are evident in child accomplishments from birth to age 60 months. See Figure 1. The model identifies developmental phases of language and literacy development, as well as accomplishments that align with the developmental phases. For example, children 12 to 30 months are in a phase of developing language and vocabulary; accomplishments in language and vocabulary development between 12 and 30 months include the use of first words, vocabulary development, and early comprehension. A flexible interpretation of literacy development is also consistent with Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, and Poe (2003), who considered language development, phonological awareness, knowledge about print, knowledge about how sounds map to print, and understanding about how to use print as representative of literacy development from birth to school entry. These skills are believed to be important

precursors that children need to fully participate in literacy-based learning opportunities in school (Judge, 2005; Neuman, 2006).

Background

The background for this study is in four sections: (a) federal policy context; (b) key findings from seminal studies on general early childhood outcomes; (c) key findings from national reports and research syntheses on early literacy development, and (d) key findings from empirical research about children prior to age 3 on early literacy development. I describe the policy context to identify ongoing national efforts to improve child outcomes prior to school entry.

Federal policy context. The purpose of early childhood policies and intervention is to increase experience equity prior to school entry; the underlying assumption is that improving or enhancing experiences will result in better early outcomes so children can enter school ready to benefit from and participate in school-based learning opportunities. In other words, a goal of federal early childhood intervention policies is to eliminate the development of predictable achievement gaps that are now evident at school entry.

For the purposes of this study, I define the policy context as federal statutes that target school readiness via intervention programs prior to school entry. The two statutes that align with this criterion include the Improving Head Start for School Readiness Act of 2007 (Head Start; PL 110-134) and the Individuals with Disabilities Education Act of 2004 (IDEA; PL 108-446).

Head Start and IDEA both identify a primary group of children who are at risk for poor school entry outcomes and seek to improve risk group outcomes through intervention programs. The Head Start target group is children living in poverty and the IDEA target group is children with disabilities; both statutes allow grantees wide latitude in establishing eligibility criteria. Both statutes support child interventions in a variety of settings for children starting at birth and both include a family services component. Services in Head Start are designed to improve the expected outcomes for children living in poverty; IDEA services are intended to minimize or ameliorate the effects of a disability and improve individual outcomes.

To quantify the funding allocation relativity for the youngest children in Head Start and IDEA, Head Start grantees received approximately $7400 per child in 2008, and IDEA grantees received approximately $1400 per child. Less than 1% of the population of children under the age of 3 participated in Head Start programs in 2007 (CLASP, 2009); less than 3% of the population of children under the age of 3 participated in IDEA services in 2007 (Data Accountability Center, 2007).

Seminal studies related to general developmental outcomes. My study is an exploratory study and early literacy is an outcome that develops within a larger context of general developmental outcomes (Dickinson & McCabe, 2001; Dunst et al., 2006). Therefore, I started by reviewing seminal studies about general developmental outcomes of children birth to school entry to identify common risk factors.

During the last 40 years, researchers conducted three seminal, longitudinal studies that resulted in a range of findings about factors and experiences prior to school entry that are associated with general early childhood outcomes. The studies are the High/Scope Perry Preschool Project (High/Scope; Parks, 2000), the Abecedarian Study (ABC Study; Ramey & Ramey, 2004), and the Chicago Longitudinal Study (CLS; Reynolds, 1999). Following is a brief description of those studies and key findings about child, home, and early care/educational factors and experiences associated with outcomes. More detailed information about the participants, interventions, and findings are included in Chapter 2.

The original High/Scope participants in 1962 included 123 children who were 3- and 4-years old and growing up in high-poverty (Parks, 2000). The researchers randomly assigned children to an intervention group that participated in preschool programming that lasted 15 hours per week and included weekly home visits or to a control group that did not receive an intervention. Findings from High/Scope suggest that effective child outcomes result from high quality preschool interventions. The study defined high quality programming as a low ratio of educators to students, curriculums that encouraged exploration and creativity, and an intervention component that included engaging with parents (Parks, 2000).

The ABC Study was an experimental study conducted in the 1970s that followed 111 children living in poverty (Ramey, Campbell, Burchinal, Skinner, Gardner, & Ramey, 2000). The intervention group participated in a full-day, year-round child care program, starting during infancy. Children in the intervention group were less likely to

show developmental delays prior to school entry, had higher 48-month Stanford-Binet scores, and had more positive mother-child interactions (Ramey et al., 2000). Children with a higher number of risk factors showed greater gains from intervention than children with only the poverty risk factor (Ramey et al., 2000).

The CLS included 1539 kindergarteners who lived in high-poverty communities and entered Chicago kindergartens in 1985-86 (Reynolds, 1999). Data collection began when children were in kindergarten; the intervention group included those who had attended preschool programs in Chicago while the control group had not. The Chicago preschool programs offered comprehensive child, family, and health interventions; child programming included half day preschool. The preschools that children attended did not use a common curriculum, but researchers described the preschool programs as structured with an emphasis on school readiness skills (Reynolds, 1995, 1999). Findings from the CLS indicated that children who participated in preschool had higher kindergarten reading-readiness outcomes than non-preschool participants; children with parents who participated in family-outreach efforts had higher school readiness outcomes (Miedel & Reynolds, 1999; Reynolds, 1995).

In summary, the primary family risk factor in these studies was poverty but the researchers did not conduct non-poverty comparisons and poverty parameters differed across the studies. All three studies established an association between participation in intervention during preschool and improvements in child outcomes although the type and intensity of interventions and the measured child outcomes differed. The findings noted

above were valuable in identifying indicators to include in a national profile about factors and experiences that may be associated with early literacy outcomes. In addition, the factors highlight policy considerations such as program eligibility criterion and intensity of intervention associated with improvement in expected outcomes.

National reports and research synthesis about literacy development. While the longitudinal studies described above took place in the 1960s, 1970s, and 1980s and focused on general developmental outcomes, researchers in the early childhood community began to focus more narrowly on early literacy development. Two national reports (National Early Literacy Panel [NELP], 2008; Snow et al., 1998) and several books have summarized the research base associated with literacy development (Dickinson & Tabors, 2001; Hart & Risley, 1995; Lee & Burkam, 2002; Snow, Porche, Tabors, & Harris, 2007).

National Research Council report. Preventing Reading Difficulties in Young Children is a national report published by the National Research Council (NRC); the report conceptualized, conducted, and synthesized major empirical findings about early literacy development for children between birth and early elementary school (Snow et al., 1998). The report represents the findings of a committee that examined the evidence about how to define early literacy development for children birth to early school entry and the predictors of early literacy outcomes. The NRC report defined the construct of literacy as a broad range of factors evident in children birth to age 4 that indicate literacy accomplishments. The accomplishments included such things as: pretending to read

books; participating in a book-sharing routine with caregivers; commenting on characters in books; realizing pictures and letters in books represent objects (e.g., a picture of a dog is a representation of a dog); listening to stories; scribbling in imitation of print material; learning the alphabet; interacting with a caregiver about stories; and recognizing patterns of sounds (e.g.. rhyming). The report also concluded that children do not follow a clear trajectory of increasingly advanced skills that result of literacy competence. However, the committee reported that language development, specifically receptive skills, are important precursors to developing literacy skills.

The report identified five risk factors that are most frequently associated with developmental disparities related to literacy outcomes: (a) living in poverty, (b) limited proficiency in English, (c) hearing impairments, (d) preschool language impairments or cognitive deficiencies, and (e) having parents who had difficulty learning to read. The committee also noted that the primary body of research concerning literacy focused on children 3 years and older and that more information specific to infants and toddlers was needed.

NELP report. Ten years later, the NELP also published a report summarizing current research about early literacy development (NELP, 2008). The primary difference between the NRC and NELP reports related to the criteria for inclusion of research to be reviewed. The NRC report included findings from a broad range of both qualitative and quantitative studies; the NELP report only included experimental or quasi-experimental studies and then applied rigorous inclusion criteria to select studies for the review. The

studies meeting the criteria for inclusion in the NELP report primarily dealt with children ages 3 and older, and the majority of those studies focused on children in kindergarten or above. The NELP also noted that early literacy is not an easily defined concept. The construct of early literacy that was defined by NELP included, but was not limited to: language development; concepts about print; and rapid naming of the alphabet, colors, and objects. The NELP synthesis provided several key conclusions: (a) parent-child/shared reading experiences had an unclear association with early literacy development, (b) the existing research did not adequately describe whether frequency of shared reading experiences differed by demographic groupings, (c) an association existed between parent participation in education programs and higher child literacy outcomes, and (d) an adequate research base did not exist for understanding the differences in early experiences or describing differential literacy outcomes in the population.

The Kansas study. The third major synthesis of research findings was derived from a longitudinal study that included monthly home observations of 42 children from various socio-economic groups between the ages of nine- and 36-months in Kansas (Hart & Risley, 1995; 2003). The researchers were concerned that literacy or language interventions beginning after age 3 were too late and that the key to understanding language development and literacy outcomes was to understand development occurring prior to age 3. Findings from this study included a positive correlation between family socio-economic status and interactive conversations between parents and children. A

compelling finding was the magnitude of difference in language exposure among study participants and the negative correlation between limited language exposure and literacy development. The researchers estimated that the there was a gap in the millions in the cumulative number of words heard by children in high-poverty homes versus high income homes prior to school entry (Hart & Risley, 1995).

Home-School Study. The next major source informing literacy development is a compilation of findings from the longitudinal Home-School Study of Language and Literacy Development (HSS) that began in the late 1980s in Boston (Dickinson & Tabors, 2001; Snow et al., 2007). Originally designed to help understand how familial influences prior to school entry impacted elementary school literacy related outcomes, the study followed a sample of 83 3-year old children living in high-poverty who were participating one of the preschool programs that operated in high poverty communities in the metropolitan area. Data collection included child assessment, home and classroom observations, and parent interviews. Child outcomes measured in kindergarten included receptive language; print skills, phonemic awareness, letter knowledge, early writing; and storytelling skills (Dickinson & McCabe, 2001). Key findings from the HSS work emphasized the importance of child language development and its association with later literacy skills. Factors such as home literacy activities (e.g. shared book reading; library visits) and resources (e.g. children's books in the home) were correlated with higher early literacy outcomes (Dickinson et al., 2003; Dickinson & Tabors, 2001).

Lee and Burkam. A final source of data on literacy outcomes that informed my study is a secondary analyses of the Early Childhood Longitudinal Study, Kindergarten Cohort (ECLS-K; Lee & Burkam, 2002). This study examined selected predictors of literacy development at kindergarten entry. The findings documented compelling general developmental disparities between children living in families of different socio-economic status (SES) and belonging to different racial/ethnic groups The literacy outcome used by Lee and Burkam was a literacy scale score that included familiarity with print, letter recognition, phonemic awareness, word recognition, and vocabulary. The primary findings confirmed poverty as a major risk factor for literacy development.

Peer reviewed data about literacy development, infants and toddlers (0-36 months). The majority of the previous research on early literacy development examined children at or after 3 years of age. Both the NRC and NELP reports (NELP, 2008; Snow et al., 1998) and the research syntheses described above note that more research is needed about the trajectory of literacy development about children prior to age 3 (Dickinson & Tabors, 2001; Hart & Risley, 1995; 2003; Snow et al., 2007). However, a small research base exists about literacy development and associated factors and experiences starting at birth. The construct of early literacy from birth to 3 differs across these studies and includes both child outcomes and family behaviors or resources. Measures of early literacy used in these studies included such things as parent reading behaviors, availability of children's books in the home, and child language skills. That is, early

literacy is defined broadly and includes both child and parent behaviors as well as some child outcomes as evidenced in the following studies.

Infant and toddler characteristics linked with lower early literacy outcomes include low birth weight status (McCarton, Brooks-Gunn, Wallace, Bauer, Bennett, & Bernbaum, 1997; Weitzman, Roy, Walls, & Tomlin, 2004) and disability or developmental delay status (Roberts, Jurgens, & Burchinal, 2005; Weitzman et al., 2004). The primary home factors and experiences of infants and toddlers associated with lower early literacy outcomes include poverty status and limited resources (High, LaGasse, Becker, Ahlgren, & Gardner, 2000; Kuo, Franke, Regalado, & Halfon, 2004; McCarton et al., 1997). Limited exposure to language-rich interactions with caregivers, including low frequency of book-reading, was the primary early care/educational risk factor associated with lower early literacy outcomes (Dodici, Draper, & Peterson, 2003; Kuo et al., 2004). The different conceptions of literacy prior to age 3 that were used in the studies is consistent with the concepts described in a theoretical model developed by the Center for Early Language Learning (CELL; Dunst et al., 2006). As noted earlier in this chapter, CELL's model is displayed in Figure 1 and includes key milestones or accomplishments from birth to 60 months. Examples of the milestones associated with literacy development prior to age 3 include babbling, vocabulary development, language use, and early comprehension.

Limitations of Current Policies and Research

Two federal policy initiatives are designed to improve literacy development of children prior to school entry, but the policies do not define the construct of literacy development. The empirical research base shares the limitation that early literacy is not consistently defined and, despite a recently developed framework of early literacy development (Dunst et al. 2006), a trajectory of early literacy development from birth to school entry is not yet specified that can be fully tested in empirical study. In the case of the NRC and NELP reports, the purpose and scope of the reports were similar; however, the material reviewed for the NELP report was restricted to experimental or quasi-experimental studies and did not indicate how the 2008 NELP findings contradicted or advanced the findings of the 1998 NRC report (Grubb, 2009). All of the sources contribute to the research base, but show that the knowledge base about early literacy is still emerging.

There are also few empirical studies that have identified experiences that occur during the infant and toddlers years and that reliably predicted early literacy outcomes. Further, most of the studies that do exist shared the limitation of relatively small samples. Only the Lee and Burkam (2002) and CLS included more than 200 subjects (Schweinhart, 2003). From a policy perspective, a specific need exists for mining large scale, longitudinal data to examine the generalizability of findings from smaller scale studies. This will add to the knowledge base about early experiences associated with literacy outcomes and determine to what extent an equity gap in the early outcomes and

experiences of infants and toddlers exists (Hart & Risley, 1995; Schneider, Carnoy, Kilpatrick, Schmidt, & Shavelson, 2007).

A further limitation is that samples in the current research almost exclusively examined the experiences of children who were already identified as at risk; limited sample diversity was evident. The Kansas study described a diverse sample but was limited to 42 children (Hart & Risley, 1995). While most utilized some type of comparison group, Lee and Burkam (2002) was the only study to have a large sample size that also included non-risk participants. Within the policy context, understanding the extent of equity gaps between higher- and lower-risk groups (e.g., SES) would be beneficial when difficult policy decisions must be considered when targeting limited resources for high-need groups. In addition, poverty was commonly adopted as a predictor of early literacy outcomes, but participants who are considered at risk due to poverty in one study did not necessarily meet the criteria for poverty in another study. For example, high poverty was defined as 185% of the federal poverty level (Roberts et al., 2005), participation in a public food supplement program (High et al., 2002), or participation in a Head Start program (Dodici et al., 2003).

As noted earlier, studies have been primarily conducted with small, convenience samples and risk groups. Lee and Burkam (2002) generated a profile of kindergarten-entry literacy outcomes using a database with findings that could be applied to the population of children entering kindergarten in 1998, but this study has not been extended to a younger population. An estimated national profile about early literacy outcomes,

experiences from birth to outcome measurement, or equity of experiences from birth to outcome measurement is not available and cannot be pieced together from the current research. In addition, while the relative contribution of factors and experiences that contribute to early literacy development have been explored with small samples (Dickinson & Tabors, 2001), these factors have not been examined using large samples of children from birth. Because federal policies target large groups of children within the general population, data about the current status and outcomes of groups (e.g. SES and racial/ethnic) within the population are needed for making informed policy decisions.

Policy makers are under increasing pressure to make policy decisions based on empirical evidence that is generalizable to large groups in the population (Salinger, 2006; Schneider et al., 2007; The Science of Early Childhood Development, 2007; Shonkoff & Phillips, 2000). The current research is not sufficient to inform the types of policy decisions currently made about eligibility criteria, the array of services to include or encourage in a federal statute designed to improve early literacy outcomes, or the magnitude of resource needs in the national population.

Purpose of the Study

The purpose of my study was two-fold. The first purpose was to create a national profile of 48-month early literacy outcomes and key child, home, and early care/education factors and experiences. The second purpose was to conduct an analysis of child, home, and early care/education factors that help explain early literacy outcomes at age 48 months. Both purposes address limitations in the current research base such as

examining children starting at birth and conducting the research on a national, diverse sample.

I utilized the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) dataset to conduct my study. Several advantages exist with the ECLS-B dataset, including the large sample size, the wide variety of data collected, and the ability to weight findings so that estimated results are representative of the United States (U.S.) population of children born in 2001. ECLS-B is a longitudinal study tracking a complex sample of almost 9,000 children from birth and is intended to track children through kindergarten entry. I used the data at 48 months for my study because the kindergarten entry data was not yet released

The study design is an extension of the work conducted by Lee and Burkam (2002) to a younger population. Lee and Burkam developed an estimated national profile about literacy and math outcomes at kindergarten entry. The authors described the variability of experiences by SES and race/ethnicity, then followed with a regression analyses about how those factors explained observed literacy outcome variance.

Using the Lee and Burkam (2002) model was appealing for several reasons. First was the policy utility of the Lee and Burkam (2002) findings; the end result was a national profile about children entering kindergarten, and the report had high readability for a wide range of audiences. Using the ECLS B dataset, my study is similar in concept, methodology, and potential for policy use. ECLS-B is similar in size and scope to the ECLS-K dataset. Both datasets are applicable to the U.S. population, and extending the

work to a younger population provided an opportunity to observe similarities and differences in the findings at different time points.

Results from my study make a unique contribution to the current knowledge base. Policy investments to improve early literacy outcomes for young children in the U.S. are ongoing and occur in the absence of large scale research about population needs. The findings from this study will likely be most interesting to the policy community because of the macro-perspective about the magnitude of population need and the focus on opportunity equity in the population of interest.

By describing national, estimated literacy outcomes and group differences, the policy community has a source of empirical information to consider for estimating the magnitude of financial investments needed to implement a program with a target group, establishing parameters for program eligibility criteria, considering the range of prevention or intervention efforts needed, and gauging personnel preparation investments needed under different policy options.

Research Questions

I used three questions to guide my analyses. The questions address estimates of the national early literacy score gaps between SES and racial/ethnic groups, experience equity across SES and racial/ethnic groups, and the individual and combined contribution of factors and experiences in explaining literacy score variance in the ECLS-B.

Research question 1: What are the estimated early literacy scores of children in the U.S. at 48-months? Do the average scores vary by SES and race/ethnicity?

Research question 2: How do child, home, and early care/educational factors and experiences that are associated with literacy development differ for children in the U.S. by SES and by race/ethnicity?

Research question 3: What is the individual and combined contribution of child, home, and early care/educational factors and experiences on 48-month early literacy scores, by SES and race/ethnicity?

Chapter Summary

The magnitude of the gaps in early literacy achievement prior to school entry between SES and racial/ethnic groups as well as the factors impacting those gaps are not well understood. Previous research involving older children has provided a rich foundation for my analytic model. To date, no published studies have utilized ECLB-B to examine child, home, and experiential factors among infants and toddlers and early literacy outcomes. My study has created an estimated national profile of early literacy achievement at 48 months using the ECLS-B data. In addition, my study identified specific factors that did and did not predict those outcomes.

Definition of Terms

At risk: is defined by the presence of one or more factors or influences that increase the probability of a negative outcome for a child.

Child with a disability: A child who receives special education supports and services, as specified by IDEA. Eligibility criterion differs by state.

Early childhood: The period between birth and school entry, typically kindergarten.

Early literacy outcome, my study: I adopted the definition and measure used in ECLS-B, which included letter recognition, phonological awareness, and conventions of print. Early literacy development: Early literacy development includes factors and experiences that contribute to early literacy outcomes.

Early literacy gaps: The mean (average) difference between groups of children on early literacy outcome measures.

ECLS-B: The Early Childhood Longitudinal Study – Birth Cohort is a federally funded study of children from birth to kindergarten.

Head Start: The federal statute authorizing the Head Start programs; the full title is Improving Head Start for School Readiness Act (2007).

Head Start program: Services provided to children who meet local eligibility criterion for federal Head Start programming, birth to school entry.

IDEA: The federal statute authorizing services for children and youth birth through 21 with disabilities; the full title is the Individuals with Disabilities Education Act (2004).

Policies: Limited to federal or state statutes and regulations.

Primary care setting/caregiver: One of the predictors examined in my study was the primary care setting/caregiver and the possible responses included parental-care only,

relative care, non-relative care, center-based care, and Head Start. Further examples of each setting are described in Chapter 3 in the description of the primary care variable.

SES: Lee and Burkam (2002) used quintiles to divide the distribution of sample participants into five groups. The variable was a composite of household income, parental education, and occupational prestige. I adopted the same procedures in my study.

Youngest participants in Head Start and IDEA: Children between birth and 3 years.

Chapter 2: Review of the Literature

The stakes for early literacy gaps are high for individuals and society. In school, children with limited literacy skills are more likely to have difficulty with peer interactions, miss advanced learning opportunities due to time devoted to remediation, and develop negative attitudes toward reading that affect future literacy success (Lonigan et al., 2000). The social effects associated with poor literacy skills include higher rates of dropping out from secondary school, criminal activity, teen pregnancy, substance abuse, and unemployment or employment in jobs that do not provide livable wages (Shiel, 2002; Sinclair & Golan, 2002; Snow, et al. 1998). Furthermore, children who do not develop early literacy skills are vulnerable to falling behind as literacy-based learning demands increase (Biemiller, 2006; Snow, et al. 1998). Developing literacy skills is important for equitable educational and life opportunities. In a literacy-based society, children who cannot read simply cannot keep up with same age peers who have proficient literacy skills.

Organization of the Chapter

The time period emphasized in this study about early literacy outcomes and predictors is birth to school entry and this chapter is organized into four review sections. I first set a policy context about early literacy by identifying federal policies that include an emphasis on improving early literacy outcomes for children prior to school entry. To set the early literacy policy context, I describe statutory purpose, funding allocations, target and actual populations, and intervention services in current federal early childhood

policies that support improved developmental outcomes among young children. The second section includes an examination of seminal studies and a summary of key finding (predictors) associated with general early childhood development. The three longitudinal studies are: (a) High/Scope, (b) ABC, and (c) CLS. The third section of the review focuses on reports and research syntheses about early literacy development among young children, primarily ages 3 to early elementary. This research includes two national reports about early literacy development (NELP, 2008; Snow, et al., 1998) and three groups of sources that focused specifically on literacy outcomes and predictors using longitudinal data about children prior to or at school entry (Dickinson & Tabors, 2001; Hart & Risley, 1995, 2003; Lee & Burkam, 2002; Snow et al., 2007). The final section of the review is specific to early literacy outcomes and predictors in children birth to 36 months.

At the end of the chapter I summarize key findings about early literacy outcomes and predictors for children birth to school entry from all material included in the review. The findings are organized into three groupings of factors or experiences: child, home, and early care/education.

Federal Policy Context

Child literacy development occurs within a larger context, and I am interested in the connection between research findings about early literacy and what is enacted in policy to impact early literacy outcomes. Therefore, I set the context for this study by describing federal early childhood policies associated with child outcomes, including

literacy. Two federal statutes target improved outcomes for children who are at risk for poor early achievement prior to school entry. The first statute is the Head Start Act of 2007 (Head Start; PL 110-134), and the second is the Individuals with Disabilities Education Act of 2004 (IDEA; PL 108-446). Following is an overview of the statutes, purposes for the programs, allocation trends, and estimates about the number of children eligible compared to the number served within the two programs.

Two groups at risk for poor academic outcomes are children living in high poverty and those with disabilities. From 1965 to 1995, the Head Start program was the primary program for children ages 36 months to kindergarten entry living below the poverty thresholds or eligible for public assistance; in 1995, the program expanded to include pregnant women and children less than age 36 months (Butler & Gish, 2003).

The second at-risk group is children with disabilities. The federal government began to support model demonstration programs for preschool children with disabilities in the 1960; these continued ever after federal disability policies included services for children ages three and older in 1975 (PL 99-457; U.S. Department of Education, 2007a). The 1986 reauthorization expanded IDEA to include children from birth to 36 months (PL 102-119; PL 108-446).

Both federal statutes acknowledge the importance of a child's experiences prior to attending formal schooling. The following highlights some of the common goals and services, but also notes contrasts in purposes, eligibility criterion and actual participants, allocation, and definitions between the two federal programs.

Head Start and IDEA identify goals for improving school readiness outcomes for young at-risk children, including literacy. In Head Start, children are considered at risk due to poverty status; in IDEA, children are considered at risk due to disability status. Head Start describes promoting school readiness of children living in poverty as the primary purpose of the policy, including early literacy (PL 110-134, Section 636). In contrast, IDEA describes numerous purposes of the policy for all individuals with disabilities (birth through 21) that include access to education services to improve child outcomes, with an emphasis on school readiness skills for children prior to school entry, including early literacy (PL 108-446, Section 601 and Section 619). Five additional purposes of the policy are identified for children birth to age 3 (PL 108-446, Subsection 646): (a) enhancing development, (b) minimizing the chance for developing achievement delays, (c) maximizing individual potential, (d) minimizing the need for special education, and (e) enhancing family capacity. The statute notes that IDEA services are expected to reduce long-term educational costs.

Eligibility criteria are important to a program because they define who can and cannot participate in the program which also affect the estimated costs associated with implementing the program (Kingdon, 1995). Both Head Start and IDEA programs provide services to at-risk children, but eligibility criteria vary between the two programs. The federal Head Start guidelines state that local programs are responsible for establishing local eligibility criteria, but that the program should target low-income families (Butler & Gish, 2003; U.S. Department of Health and Human Services, 2010).

Head Start is not an entitlement program, so services do not have to be provided for all children eligible. Therefore, the number of program participants is limited to the number of funded openings.

To be eligible for IDEA supports and services, a child must demonstrate one of three eligibility options: (1) a developmental delay (birth through age 9), (2) a diagnosed condition (birth through age 21), or (3) at risk of developing delays if services are not provided (birth through age 2; PL 108-446, Subsection 602 and632). States have discretion in setting parameters for the eligibility criteria. The federal policy does not define the level of delay needed to be considered "disabled" and does not define who is at risk for developing a disability. Regardless of federal funding allocations, IDEA statute requires that services be offered to all children who qualify under state eligibility standards.

The policy goals target two risk groups, but only a small proportion of the U.S. population participate in the programs. For example, less than 2.5% of the birth to age three resident population (322,000 infants and toddlers) and 5.3% of the 3 through 5 population (700,000 children) participated in IDEA programs in 2007 (U.S. Department of Education, 2007b). In comparison, less than 1% of the resident population participated in Head Start programming in 2008 (U.S. Department of Health and Human Services, 2008). Of children living in poverty, federal Head Start funding allows less than 3% participation of all children living in poverty who are between the ages of birth and school entry (Center for Law and Social Policy, 2008).

The 2008 federal appropriations for services for children birth to school entry in Head Start were approximately $6.8 billion (U.S. Department of Health and Human Services, 2008) and the appropriations for IDEA, birth through age 5 services, were approximately $813 million (U.S. Department of Education, 2009). On a per child basis, the federal allocation for high-poverty Head Start participants in 2008 was approximately $7400. In contrast, the annual IDEA federal allocation for the children with disabilities from birth through age 5 was less than $1000 per child (The National Early Childhood Technical Assistance Center, 2009).

The two federal programs target a wide range of child and family outcomes via intervention and prevention services provided to children and their families. As described in the purpose sections of both statutes, the designers of these statutes intended to address the discrepancies in outcomes, including early literacy outcomes, by providing funds for intervention or prevention services for (a) children living at-or-below poverty and those living above poverty, and (b) children with and without disabilities.

Seminal Studies Related to General Early Childhood Outcomes

Three seminal studies were identified from the research concerning general early childhood outcomes and are described below. These studies did not assess early literacy as a construct, but the three were foundational in the early childhood research base in identifying factors that impact early childhood outcomes. Because early literacy is still an emerging research base, the findings from these seminal studies were valuable for identifying predictors to include in my analytic model. The studies include the

High/Scope, the ABC, and the CLS. Following is a brief description of participants in each study, the interventions, and major findings.

The participants in the High/Scope study included 120 high-poverty, African American, 3- and 4-year old children (Parks, 2000). The study matched participants on socio-economic status, developmental performance, and gender. Furthermore, the study assigned participants to either an intervention or control group. The intervention program emphasized daily routines and encouragement for exploring their environment and interacting with caregivers. The intervention consisted of approximately 15 hours per week of programming (Schweinhart, 2003). The control group children did not participate in the intervention program described above, but did participate in other preschool programs. The authors found that those who participated in the High/Scope child-directed preschool intervention program and received weekly home visits showed significant improvements in pro-social and school readiness outcomes (Schweinhart, 2003). The authors emphasized the importance of child intervention paired with a parent component.

Launched in the 1970s, the ABC also examined child development prior to school entry (Ramey & Ramey, 2004). The ABC intervention study identified the 111 participants as high-risk based on scores from a survey of 13 poverty and high-risk indicators (Ramey et al., 2000). The study randomly assigned 57 children to treatment programs and the remaining 54 to a preschool control group. The intervention group participated in full-time, year round child education programs that emphasized language

development, including conversational interactions with caregivers. The ABC included child education, child healthcare, and family support services.

The desired outcomes for the preschool portion of the ABC program focused on school readiness (Ramey et al., 2000). The study measured outcomes using three child assessment instruments: Bayley Mental Development Index, Stanford-Binet, and McCarthy Scales of Mental Development. Key findings from the study showed that at 4 years of age, 5% children in treatment groups showed developmental delays compared with 40% of the comparison group; children who showed the largest effects had mothers with IQs less than 70 (Ramey et al., 2000).

The third study was the CLS (Miedel & Reynolds, 1999; Reynolds, 1995, 1999). Children in the CLS lived in high-poverty Chicago neighborhoods. The goals included exploring child development outcomes, with an emphasis on long-term impacts that could be associated with participation in preschool programs. Participants included over 1500 high-poverty, primarily African American children. All participants attended Chicago kindergarten programs in the mid-1980s; the intervention group consisted of children who attended Chicago preschools prior to kindergarten entry. The preschool programs were the Child-Parent Center Programs (CPCs) operated by Chicago public schools, and the programs included both child education and family-support services. The CLS study collected data from parents about preschool participation and experiences when child participants were in kindergarten. Child outcomes were measured using the Iowa Test of Basic skills. CLS findings suggest that participation in preschool programs

results in better short-term academic performance outcomes (Reynolds, 1995). The Chicago study emphasized the potential impact of preschool educational, center-based programs when combined with family services.

These three studies were important contributions to the knowledge base about factors associated with child outcomes. The findings suggest a need to examine the association between early literacy outcomes and: (a) participation in preschool programming, (b) family support services, and (c) the hours per week in intervention. Several limitations are evident in these studies. First was the limited size and diversity of the samples. Each included only participants who were high-risk due to poverty. The Chicago study was limited because data about preschool experiences was collected when children were in kindergarten. However, the identified limitations do not minimize the impact of these three studies.

National Reports and Research Syntheses on Early Literacy

The information above sets a federal policy context and highlights key findings from influential longitudinal studies about general early childhood outcomes. In this section, I review two national reports and synthesize results from three studies that examined factors and experiences associated with early literacy outcomes. Following is a description of the scope of work for each report, how each group defined the construct of early literacy, methods used by each to identify studies to include in the reports, and major findings about factors and experiences associated with early literacy outcomes. In addition, I provide a description of the three studies and major findings from each.

National Research Council (NRC) report. In 1998, the NRC released a synthesis of the research on early reading development titled *Preventing Reading Difficulties in Young Children* (Snow et al., 1998). The report was completed by the NRC at the National Academy of Science (NAS) and the U.S. Department of Education (USDOE). The NRC mission is to improve government decision making and public policy, increase education and understanding among the public, and promote knowledge acquisition and dissemination (National Research Council, 2010). In the acknowledgements, the editors noted that individuals with wide ranging perspectives and philosophies contributed to the report (Snow et al., 1998).

The charge to the committee was to conceptualize, conduct, and create a synthesis of major empirical findings about early literacy development (Snow et al., 1998). Researchers, educators, and policy makers reviewed the research base about children from birth through early elementary grades. No information was provided about the number of studies identified or included in the review. However, the committee examined a wide range of research (e.g., case, correlational, experimental, quasi-experimental, interviews and surveys, epidemiological studies, ethnographies) to better understand the conditions under which children develop literacy skills. The report noted a limitation in available research; the primary body of research was about children 3 years and older and more information about literacy development in children below age 3 was needed.

The committee conceptualized literacy as a process of development that included skills frequently associated with literacy. For children birth to age 3, the committee described early literacy development as evident in various accomplishments, such as building language and communication skills, engaging in book-sharing activities with caregivers, pretending to read, and looking at pictures and recognizing that pictures represents real objects. The committee distinguished development from literacy skills acquired between the ages of 3 to 4 years old, such as alphabet knowledge, recognizing sounds and patterns in language, building vocabularies, and interacting with a caregiver about story sequences.

At the conclusion of the review, five risk factors were most frequently associated with lower literacy outcomes evident at school entry: (a) living in poverty, (b) limited proficiency in English, (c) hearing impairments, (d) preschool language impairments or cognitive deficiencies, and (e) having parents who had difficulty learning to read. While the report examined factors in preschool programs that support early literacy development, the committee concluded that the research base did not adequately identify attributes of effective prevention or intervention strategies. In addition, the committee found that shared book reading experiences, opportunities to learn about the functions of reading, and formal instruction to develop word recognition and comprehension skills support early literacy development and are important for building vocabulary and knowing how to interpret print material. The committee also concluded that child and

family interventions would be more beneficial for child literacy outcomes when paired together.

NELP report. In 2002, the NELP convened with a charge to synthesize research about the development of early literacy skills in children birth to age 5 (NELP, 2008). The National Institute for Literacy managed the work of the panel with assistance from the National Center for Family Literacy. The NELP published the report, titled *Developing Early Literacy,* in 2008. The charge was similar to the NRC committee, but the conceptualization of literacy outcomes and the synthesis methods varied considerably.

The NELP members conceptualized a literacy outcome for children at or near school entry as "conventional" literacy skills, such as reading comprehension, oral reading fluency, writing, and spelling (NELP, 2008). The panel also noted that a trajectory of early literacy development consisted primarily of information from theory, opinions, and practice documents. However, the panel also identified oral language development, print and letter knowledge, and phonological processing as emergent literacy skills.

The search strategies in the NELP (2008) report were extensive and included thirteen major search terms with dozens of subordinate terms. The range of search terms generated over 7000 studies and the panel applied multiple criteria to screen the studies. Only experimental or quasi-experimental studies met the inclusion criteria. Exclusion criteria included: pretest-posttest-only designs; studies with insufficient information to

generate effect sizes; short-term trials; independent variables that suggested confounding bias; and studies without outcome measures aligned with the panel's conceptualization of conventional literacy skills. The panel members noted that the majority of studies of early literacy development in children birth to kindergarten entry were eliminated due to the selection criterion used for the report.

The results of the NELP (2008) synthesis indicated that: (a) shared reading experiences (i.e. parent-child reading) had an unclear association with early literacy development, (b) current research did not adequately describe whether shared reading frequency differs by demographic groupings, (c) participation in parent education programs was associated with higher outcomes, and (d) the research base was not adequate for understanding the differences in early experiences or describing differential outcomes in the population.

The Kansas study. The third major source of early literacy is a syntheses of findings from a study that began in the 1980s in Kansas (Hart & Risley, 1995, 2003). Hart and Risley had extensive experience studying the language development patterns of children in the University of Kansas laboratory school and a child care setting called the Turner House Preschool. The primary distinction between children enrolled in the laboratory school and the Turner House was social class difference. Professors' children made up the laboratory school participants and the Turner House children were living in poverty. The authors found that high poverty children who participated in preschool programming showed language and literacy skill outcomes gains in preschool. Although

the gaps between high poverty children and other children could be minimized during preschool, the gap reemerged in early elementary school. The authors concluded that site-based interventions starting after age 3 were too late; development that occurred prior to age 3 was key to understanding the language and later literacy outcomes (Hart & Risley, 1995, 2003).

To examine experiences prior to age 3, the researchers recruited 42 families and conducted home observations when the child was between nine and 36 months old. Families in the sample represented a range of SES groups, parental education level, and racial/ethnic groups. In the end, the authors had 2.5 years of transcribed data from home visits about everything that was done by the child, to the child, and around the child (Hart & Risley, 1995). The 3 year old literacy related outcomes were conceptualized as vocabulary growth, vocabulary use, and IQ score (Hart & Risley, 1995).

Hart and Risley (1995) reported that several factors did not significantly impact child language development: gender; birth order; or race/ethnicity. The most significant factor was the amount of language interactions between parents and children. The types of interactions (e.g. instructional, corrective, interactive) that occurred within homes did not show wide variation, but the frequency of the interactions did differ. Most striking was the variation in the estimated number of words that children heard in different homes; children in lower income home heard far fewer words during preschool than children from higher income homes. Higher outcomes were associated with supportive home literacy activities and resources; supportive home literacy activities and resources

included higher frequency of parent-child reading, availability of children's books or book-related activities such as library visits, and interactive conversations. By the age of 4, Hart and Risley (1995) estimated that children in families living in poverty (i.e. receiving welfare) experienced approximately 13 million fewer cumulative words than children from working class families; the differences were even greater between professional parents and those living in poverty. The sample was diverse on various factors, but Hart and Risley (1995) noted the sample size limitations and the need to examine the applicability of their findings to other populations.

Home-School Study of Language and Literacy Development (HSS). Similar to the Kansas study, this source is also a synthesis of findings from a study about early literacy development. The HSS began in the late 1980s in Boston (Dickinson & Tabors, 2001; Snow, Barnes, Chandler, Goodman, & Hemphill, 2000; Snow et al., 2007; Snow, Tabors, & Dickinson, 2001). The purpose of the study was to identify and collect data about the child language and literacy environments of children living in high poverty; the sample for the original longitudinal study included 83 children from low-income families followed from age 3 to kindergarten (Dickinson & McCabe, 2001).

The HSS included annual home visits and annual observations of children in preschools; child assessments were conducted during the home visit. The researchers examined language and literacy using the School-Home Early Language and Literacy Battery– Kindergarten (SHELL; Snow et al., 2001).

Findings from the HSS work emphasized that supportive home literacy environments were associated with higher literacy outcomes in kindergarten (Tabors, Roach, & Snow, 2001). A supportive home literacy environment included such factors as the frequent parent-child reading, children's books are in the home, and library use (DeTemple, 2001; Dickinson & Tabors, 2001).

Lee and Burkam. The final synthesis and summary of findings is a study of literacy and mathematics outcomes at kindergarten entry using the ECLS-K (Lee & Burkam, 2002). For the purpose of my study, I include only information about the literacy outcomes. The analyses provided an estimate of the magnitude of outcome differences evident in the U.S. population at kindergarten entry by SES and race/ethnicity. The researchers also described experiential differences prior to school entry and analyzed the amount of group variance that was explained by the predictors in the model.

The authors identified predictors to include in the analytic model by synthesizing research findings about predictors of literacy outcomes. The secondary analyses was conducted in four parts and included: (a) examining outcomes by social background; (b) describing how home factors and activities differ across SES and racial/ethnic groups; (c) conducting multivariate analyses of how outcomes are associated with SES, race/ethnicity, child demographics, family demographics, parental educational beliefs and child experiences, and in- and out-of-home experiences; and (d) conducting multivariate analyses of the link between social background and school quality indicators.

In the ECLS-K design, the researchers determined that a direct child assessment instrument did not exist that could be completed within the time available nor that would assess all the desired areas of development at kindergarten entry (National Center for Education Statistics, 2000). Therefore, an assessment instrument was developed for ECLS-K that included a literacy subscale that consisted of 72 items. Each child responded to between 12 and 20 of the 72 items, depending on response patterns (e.g. if a child incorrectly answered multiple lower level items, higher level items were not administered). The literacy items were derived from the National Assessment of Educational Progress (NAEP) reading framework and in consultation with literacy experts (NCES, 2000). Further information about the psychometric properties of the assessment instrument is available in Rock and Pollack (2002).

In the ECLS-K dataset, proficiency dichotomous scores, proficiency probability continuous scores, standardized t-scores, and item-response theory (IRT) scale scores was reported (NCES, 2000). Lee and Burkam (2002) selected the IRT scale score as the literacy outcome variable and noted that an IRT scale score is beneficial for longitudinal data comparisons. The IRT scale score was reported on a continuous scale and the score was based on patterns of correct, incorrect, and incomplete responses (NCES, 2000).

The construct of early literacy at kindergarten entry in the ECLS-K and used by Lee and Burkam (2002) was defined as basic literacy skills (e.g. letter recognition, rhyming, word recognition), receptive vocabulary, and listening comprehension (NCES, 2000). The ECLS-K sample included over 16,000 children who entered kindergarten in

the U.S. in 1998; Lee and Burkam (2002) conducted the analyses on the full sample. The authors weighted data to generate nationally representative estimates of early literacy outcomes at kindergarten entry and the experiences of children prior to kindergarten that were included in the dataset. The researcher described child outcomes and experiences of SES and racial/ethnic groups and emphasized the magnitude of differences in group experiences and outcomes. For my study, I refer to this national, estimated presentation of descriptive data as a national profile of early literacy outcomes.

Lee and Burkam (2002) identified compelling outcome and experiential differences between SES and racial/ethnic groups. They found that SES was inversely related to literacy achievement; the higher the poverty level, the lower the literacy achievement outcomes. Using middle class as the comparison group, the authors reported that the lowest SES group had a standardized score that was 0.47 lower than middle class peers and the highest SES group had a standardize score that was d 0.70 standardized above middle class peers. Analyses of race/ethnicity data indicated that White and Asian children had the highest overall literacy achievement scores and that Black and Hispanic students had a standardized score that was 0.40 and 0.45 respectively, below White peers.

Data about child care settings were also examined by Lee and Burkam (2002). The care settings included: parental only, relative home, nonrelative home, center-based, Head Start, and other (primary care varied). Care settings varied by SES quintile: 48% of children in the lowest SES quintile versus 31% of children in the highest SES quintile spent the majority of time in parental, relative, or non-relative care. Sixty-five percent of

children in the highest SES quintile spent the majority of the time in center-based care compared to 20% of children in the lowest SES group; 27% of the lowest SES children spent the majority of time in Head Start settings. Child literacy outcomes differed little by child care settings, with the exception of center-based care; the early literacy outcomes of children in center-based was higher than in all other settings.

Through regression analyses, Lee and Burkam (2002) built models that explained approximately 28% of the variance in kindergarten entry literacy skills, with SES accounting for 12% of the explained variance and race/ethnicity adding an additional 4.5% of the explained variance. The additional predictor variables in the model added only 12% to the explanation of the variance in literacy outcome scores.

Peer Reviewed Research Related to Infant/Toddler Literacy Development

As noted earlier, the largest body of empirical research focuses on children who are 3 years of age and older and key findings from those studies are noted above. The second body of empirical research about early literacy development is an emerging body of research about children ages birth to age 3. In the following section, I review the literature related to literacy development that occurs prior to age 3. I organize the factors into child, home, and early care/education factors and experiences.

Search methods and data sources. To identify empirical studies for inclusion in this literature review, I conducted an electronic database search using the Educational Resources Information Center (ERIC) database. The search terms were “emergent literacy” or “early literacy,” with “early childhood” as a delimiter. In October of 2009,

the result list included over 500 sources. I reviewed each abstract for relevance and applied the selection criteria described below. I examined reference lists from articles identified in the electronic search for additional studies for inclusion.

Selection criteria. I used several criteria for selection of studies. I only included studies published in peer-reviewed journals to ensure rigorous review prior to publication. To be included, the authors had to specify they were measuring a construct that was associated with early literacy and provide a description of the early literacy construct. The construct of early literacy does not have a commonly adopted definition in the current research base (Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006). Therefore, I did not limit the inclusion of studies to a narrow definition of early literacy; the authors only had to identify and define early literacy as the target dependent variable in their study to be included.

The second criterion for selection was that international studies were only included if the primary language in the country was English. I imposed this limitation because literacy development in English has been suggested to involve different cognitive processes than literacy development in other languages (Silven, Poskiparta, & Niemi, 2004; Snow et al., 1998).

Third, study participants had to be children birth to 36 months of age or a primary caretaker of a child less than 36 months. The fourth selection criterion was that the independent and dependent variables had to include at least one child, home, or early care/education experiential factor.

Next, studies establishing reliability and/or validity for literacy screening instruments were not included in the review because the focus of this study is not instrumentation. The final criterion was that the study not be included in either the NRC or NELP reviews. I did this to minimize duplication. A total of six studies met the criteria for inclusion in this review of literature.

Research about infants and toddlers. I describe each study individually in the following pages. After the individual description of each study, I provide a summary of the early literacy construct definitions and findings from all the research included in this review.

Study 1: Dodici, Draper, and Peterson (2003). Dodici et al. (2003) investigated the relationship between parent-child interactions and early literacy skills using a longitudinal design about children who were assessed at 14, 24, 36, and 65 months of age. A total of 27 Caucasian families with children in a Head Start program for infants and toddlers in the Midwest participated in the study; 48% of child participants were boys. The researchers defined the early literacy construct as a compilation of child receptive vocabulary skills, pre-reading skills, and phonemic awareness. The authors measured early literacy outcomes using the Woodcock-Johnson Tests of Achievement-Revised (WJ-R, Letter-Word Identification), Peabody Picture Vocabulary Test-Third Edition (PPVT-III), and the Test of Language Development-Primary: Third Edition (TOLD-P:3) to measure early literacy.

Dodici et al. (2003) examined the predictive strength of the following on early literacy outcomes: amount of language the parent used with the child, emotional tone of verbal comments, type of guidance (informative or directive) from adults to the child, responsiveness of parents to child cues, and amount of time of parent-child interactions. The researchers conducted correlational analyses and found that age appropriate child language skills, the ratings about the quality of parent-child interactions, and assessment results of home literacy experiences were positively associated with higher early literacy outcomes. The authors found that the parent-child interaction scores at 2 years explained 57% of the variance in 36 month early literacy scores.

Study 2: High, LaGasse, Becker, Ahlgren, and Garner (2000). High et al. (2000) evaluated the impact of a literacy-promoting intervention used by pediatric care providers at well-baby check-ups in an urban health clinic. Children in a public health clinic were randomly assigned to either an intervention or control group. The intervention involved pediatricians advising parents about the importance of parent-child book reading and a written pamphlet about benefits of child reading experiences during up to three well-baby appointments when the child was between 5 and 22 months old. Physician training about the intervention included instructions about the purpose of the study; no specific scripts or scenarios were provided and information about treatment fidelity was not included in the study. Parents received children's books (i.e. *Goodnight Moon*; *Babies; Moo Baa La La La!, Bedtime for Bunnies*, and *Three Little Chicks*) to take home. Participants in the control group did not receive pediatrician advisement about

parent-child book reading and were not provided with children's books during well-baby appointments.

The control group included 76 families; the intervention group included 77 families. All participants were considered high poverty; over 92% received federal nutrition supplemental support (WIC). Two-thirds of participants spoke more than one language at home, but doctor visits were in English. Authors found few meaningful differences between the intervention and control group using chi-square analyses on dichotomous variables and t-test analyses on continuous variables. One significant finding was that the control group had more parents with greater than one year of college or vocational education, but the difference was one percentage point. However, the intervention group had more parents who were born in the U.S. (49% intervention versus 29% in the control group).

The early literacy construct was defined as parent-child shared reading frequency. Other literacy behaviors were measured, including parental reading behaviors (e.g. read at home, visit library, number of adult books in the home). After the intervention, High et al. (2006) conducted regression analyses and found significant differences in the early literacy construct between intervention and control groups. After physician education, parent-child reading frequency increased. Parent-child reading frequency increased by 40% in intervention families compared to an increase of 16% in control group families.

Study 3: Kuo, Franke, Regalado, and Halfon (2004). Kuo et al. (2004) conducted a secondary analysis of the National Survey of Early Childhood Health

(NSECH) and also examined the frequency of parent-child book reading. The NSECH was a study of parent perspectives about well-child visits and health care providers. Parents with children between the ages of 4 and 35 months were included in the telephone survey. The NSECH sample was selected from respondents to a different telephone survey sample, the National Immunization Survey. Information about the National Immunization Survey is available in Smith, Battaglia, Huggins, Hoaglin, Roden, Khare, Ezzati-Rice, and Wright, 2001.

NSECH respondents included 2068 high poverty households, with an oversample of Hispanic and Black households. Kuo et al. (2004) reported that data were weighted to address nonresponse, oversampling, and design effects so that results would represent the U.S. population, but did not provide further information about factors considered in the weights. The authors did not identify significant differences between the NSECH sample and the U.S. population. Descriptive data about the sample was provided by child age, race/ethnicity, maternal education, employment status, household income, child care arrangements, number of adults in the household, daily television frequency, and number of children's books in the home.

Using chi-square analyses, the researchers found significant, positive correlation between reading frequency and the following predictor variables: maternal education and household income. A positive association with reading frequency was also identified in homes where parents reported that health care providers discussed literacy behaviors during well-child visits (Kuo et al., 2004).

The researchers defined the construct of early literacy by the frequency parents reported daily reading to children. Kuo et al. (2004) reported that a status indicator of whether or not health care providers discussed literacy with parents during the past year was the primary predictor variable.

Kuo et al. (2004) found that just over half of the children in the sample were read to every day. Children 4 to 18 months old were read to less than children 19 to 35 months (58% vs. 42%); more White children were read to on a daily basis (61%) than Black (46%), Hispanic-English speaking (42%), or Hispanic-Spanish speaking (15%) children. In addition, mothers with less than a high school education were less likely to read to their child daily (35%) than mothers with a high school diploma (48%) and mothers with some post-high school education (63%). Television time and child care participation were not associated with frequency of parent-child reading.

The researchers found that 62% of parents reported that health care providers discussed literacy in the last year during a well-child visit. Other findings included that 55% of respondents who reported receiving physician instruction about literacy behaviors reported daily parent-child reading frequency compared to 47% of respondents who did not receive physician instruction.

Study 4: McCarton et al. (1997). McCarton et al. (1997) conducted a secondary analysis of the Infant Health and Development Program (IHDP) dataset. The IHDP was an intervention program for premature babies who were born at less than 37 weeks gestation and were low-birth weight. Low birth weight was defined as less than 2500

grams, or 5.5 pounds. The study excluded children with neurological impairments or severe health problems. A total of 985 families participated in the study and were randomly assigned to an intervention (377 children) or control group (608 children). Parents in the intervention group received home visits when children were birth to 36 months and participated in parenting groups when children were 12 to 36 months old. The children in the intervention group participated in child development center programs from 12 to 36 months of age. Both intervention and control group children received medical, developmental, and social screenings from hospital discharge until age 36 months. Participants resided in eight locations that were not identified in the study.

The construct of early literacy was defined by child scores at 36 months on the Weschler Intelligence Scale verbal intelligence quotient and the Peabody Picture Vocabulary Test-Revised (McCarton et al., 1997). Follow-up child assessments of child literacy outcomes were also conducted when the children were 8 years old.

McCarton et al. (1997) reported higher early literacy scores for children in the intervention groups at 36 months, but group differences on measures of literacy were not significant at age 8 years of age. At age 8, both the intervention and control group mean literacy scores were below the norm.

Study 5: Roberts, Jurgens, and Burchinal (2005). Roberts et al. (2005) conducted a longitudinal study to examine the impact of four home factors on child literacy outcomes measured between ages 3 and 5 years old. Participants included 72 African American children in southern cities; no further information was provided about

the number of cities or size of the geographic areas included in the study. Researchers recruited the participants from community-based child care centers. Seventy-four percent had family incomes of less than $20,600 (185% of the federal poverty level at that time).

The construct of early literacy was defined as child scores at 36 months, 48 months, and just prior to kindergarten entry on the PPVT-R, Clinical Evaluation of Language Fundamentals-Preschool (CELF-P), and the Test of Early Reading Ability (TERA). The home predictors included: frequency of reading, child's enjoyment of reading; maternal sensitivity, maternal book-reading strategies, and a rating of the home environment using the Home Observation for Measurement of the Environmental Inventory (HOME). Home factors were measured annually beginning when the child participants were 18 months old and ended at age 5. All participants had at least 3 years of home factors included in the study.

Roberts et al. (2005) found the frequency of parent-child reading did not change significantly across time; if the parent read daily to the child at 18 months, the parent was likely to read to the child daily near kindergarten entry. The researchers found that the high-poverty sample had an overall average PPVT-R score that was more than one standard deviation below the mean at age 36 and 48 months. The Test of Reading Ability Score was at the norm for 48-month old children, then dropped to 0.5 SD below the mean prior to kindergarten entry. Expressive language scores were at the norm on the CELF, but receptive skills were below the norm. Regardless of the early literacy measure (e.g. PPVT-R, CELF, TAS), the researchers found a positive correlation between child literacy

outcomes and ratings of the home environment. However, frequency of parent-child book reading was not associated with child literacy outcome scores. Higher maternal sensitivity and more advanced book reading strategies showed a significant relationship to higher child receptive language scores.

Study 6: Weitzman, Roy, Walls, and Tomlin (2004). Similarly to High et al. (2000), Weitzman et al. (2004) also examined the impact of a health care provider intervention that occurred during well-baby check-ups. The construct of early literacy was defined as a child home literacy profile created using the Child Home Literacy Index (CHLI). The index included ratings of the following 10 items: bedtime routine, reading frequency, child enjoyment of reading, caregiver enjoyment of reading, child initiation of reading as a shared activity, caregiver purchase of children's books, accessibility of books in the home, number of children's books in the home, child initiation of reading with the caregiver during the home visit, and parent provision of books to the child during the home visit. The researchers created an index rating through a combination of parent report and observer ratings during a home visit that occurred at the conclusion of the 6 month intervention period. No information was provided about the development of the CHLI, but higher total scores indicate a presence of a literacy enriched home environment.

Study participants were identified in waiting rooms at a Yale-New Haven Hospital Primary Care Center (Weitzman et al., 2006) and included 100 children and their caregivers who met two criteria for inclusion: (1) the child's caretaker could speak

English well enough to participate in a verbal interview conducted in English and (2) the child's age was between 18 and 30 months at the beginning of study. The researchers excluded children from the study if they met any of the four exclusion criterion: prematurity (born at less than 34 weeks); disability status; poor health of the child; or family member with substance abuse, criminal behavior, or significant mental illness. Participating parents were primarily Black (57%) or Hispanic (36%), 90% used Medicaid insurance, 36% had more a high school diploma, and 45% were unemployed.

The purpose of the study was to understand the relationship between the frequency of the intervention and a CHLI scores. The intervention was a clinic-based literacy intervention called Reach Out and Read (ROR). The intervention involved three steps: a conversation between health care providers and parents in the examination room about reading aloud to young children and information about age-appropriate literacy activities (including modeling); giving parents a child book to keep; and displays and material in the waiting room to create a literacy rich environment.

During the 6 month period of the study, the average frequency of ROR interventions was 2.76 for the study participants, with a high of six (e.g. most parents took children to the clinic two or three times during the 6 month study period). The researchers determined the number of interventions the parent received via parent interviews in the waiting room, by counting the number of ROR books in the home, and through a review of medical records. When any two sources of information agreed about the frequency of interventions, analyses were conducted using that number. Weitzman et

al. (2004) found a positive and significant correlation between the frequency of ROR interventions and the total CHLI score (r = .32).

Summary of Results

In this review, I identified three seminal studies about general early childhood outcomes, two national reports and three research syntheses about early literacy, and identified six empirical studies specific to early literacy development of children under the age of 3 that were not included in the prior research syntheses.

In the following, I provide a summary of results from all the sources and identify limitations to the current knowledge base about early literacy outcomes in children birth to school entry or near school entry. I start the summary with a brief discussion of how the construct of early literacy was defined across the sources and then organize the summary of predictor variables into three factor groups: child, home, and early care and education.

Construct definitions of early literacy. The two national reports acknowledged that a clear trajectory of early literacy development has not been developed, but both identified broad skills that must be developed between birth and school entry that are precursors to literacy competence (Snow et al., 1998; NELP, 2008). Both reports also acknowledge that early literacy development from birth to school entry involves such accomplishments as understanding and using language (including building vocabularies), social interactions with caregivers to learn how to use literacy material, and learning that letters are symbols that can be used together to represent objects.

That the field does not have a consensus about a construct definition for early literacy from birth to school entry was also evident in the seminal studies, research syntheses, and infant-toddler research reviewed. Across the sources, the following were used by the researchers to represent early literacy: (a) language or vocabulary growth and use (Dodeci et al., 2003; Snow et al., 2001); (b) IQ scores (Hart & Risley, 1995; McCarton et al., 1997; Roberts et al., 2005); (c) home literacy environments (Snow et al., 2001; Tabors et al., 2001; Weitzman et al., 2004); (d) basic literacy skills, receptive vocabulary, and listening comprehension (Lee & Burkam, 2002); and (e) frequency of parent-child reading (High et al., 2000; Kuo et al., 2004).

Predictors: Child factors and experiences. A primary risk factor identified across the research sources was race/ethnicity (Hart & Risley, 2003; Lee & Burkam, 2002; NELP, 2008; Roberts et al., 2005; Snow et al., 1998; Weitzman et al., 2004). However, only a few studies included children from diverse racial/ethnic groups in study samples (Hart & Risley, 2003; Lee & Burkam, 2002). Lee and Burkam (2002) was the only study that examined data with nationally representative race/ethnicity estimates. The primary minority racial/ethnic groups represented in samples were children who were Black or Hispanic; children who were Asian were only discussed in the Lee and Burkam (2002) study and had higher early literacy outcomes (group mean scores) than any other racial/ethnic group.

While gender was an independent variable (Hart & Risley, 2003; Lee & Burkam, 2002), conflicting results were identified. Hart and Risley (2003) did not find a gender

association with early literacy outcomes; Lee and Burkam (2002) found that boys had lower group mean early literacy scores than females. Similarly, birth weight status was examined in one study and the researchers found that low birth weight status was associated with lower early literacy outcomes (McCarton et al., 1997).

Disability status or developmental delays are a primary risk factor identified in both federal policies (PL 108-446; PL 110-134) and delayed language development was identified as a primary predictor of literacy outcomes at or near school entry (Hart & Risley, 2003; McCarton et al, 1997; Roberts et al., 2005; Snow et al., 1998). Children with hearing impairments or cognitive delays were also identified risk factors in the NRC report (Snow et al., 1998).

Predictors: Home factors and experiences. Regardless of how the researchers defined the outcome construct, poverty was overwhelmingly the primary risk factor identified in one federal policy (PL 108-446), the seminal studies about general early childhood outcomes (Parks, 2000; Ramey & Ramey, 2004; Reynolds, 1999) and all the sources about early literacy outcomes (Dickinson & Tabors, 2001; Hart & Risley, 2003; High et al., 2006; Kuo et al., 2004; Lee & Burkam, 2002; NELP, 2008; Roberts et al., 2005; Snow et al., 1998; Weizman et al., 2004). However, the construct of poverty did not have a consistent definition across the studies. This could be a result of the challenge in defining poverty. There is no one consistent measure that is used across studies. The exceptions included Hart and Risley (2003) and Lee and Burkam (2002) who had a range of SES groups included in their samples and analyzed data across SES groups. Hart and

Risley (2003) were limited by a small sample size; Lee and Burkam (2002) conducted analyses of SES quintile groups in a national database and found that SES and early literacy outcomes are positively correlated. A related risk predictor was parents who had difficulty learning to read (Snow et al., 1998).

A home risk factor examined in the studies was having a home language other than English (High et al., 2006) or limited English proficiency (Snow et al., 1998). In both sources, significant differences in child literacy outcomes were identified based on home language. In addition, Kuo et al. (2004) found that families in their sample who were Hispanic and spoke only Spanish in the home were less likely (15%) to read to their child every day than Hispanic, English-speaking families (42%). In the study with the largest sample size (Lee & Burkam, 2002), children with a primary language other than English but who were able to complete the assessment in English were included in the database; children from non-English speaking homes had slightly lower early literacy outcomes than children from English-only homes.

In the sources reviewed, frequency of parent-child reading experiences was a dependent variable in some studies of children under age 3 (High et al., 2000; Kuo et al., 2004; Tabors et al., 2001) and a predictor of early literacy outcomes in other sources (Dodici et al., 2003; NELP, 2008; Roberts et al., 2005). When frequency of parent-child reading was a predictor variable, findings were mixed about the association between the frequency and child early literacy outcomes. The researchers found the following: (a) unclear association (NELP, 2008; Roberts et al., 2005); (b) a small association (Lee &

Burkam, 2002); and (c) a large association (Dodici et al., 2003). The number of children's books in the home was also a predictor variable with a positive association with early literacy outcomes (Kuo et al., 2004).

Predictors: Early care and education factors and experiences. Lee and Burkam (2002) examined the location where children spent the majority of the week and found wide variation by SES and some variation by race/ethnicity. Two of the studies about general early childhood outcomes (Ramey & Ramey, 2004; Schweinhart, 2003) identified participation in programming as a predictor of child outcomes, but the time in intervention varied (15 hours each week compared to 50 hours each week). Across the relevant studies, participation in intervention was associated with higher child outcomes. Including a component of family services was recommended as a part of intervention programs designed to impact early literacy outcomes (Ramey et al., 2000; Reynolds, 1999; Schweinhart, 2003; Snow et al., 1998), but none of the studies examined child programs with and without a parent component.

Limitations to Current Knowledge Base

To date, the knowledge base about literacy development in very young children offers a foundation about factors and experiences that occur prior to school entry and are associated with early literacy outcomes. A range of strengths were evident in the research base about early literacy, such as building the early literacy research base from the general early childhood knowledge base (Snow et al., 1998). However, several limitations to the current knowledge base were evident.

The first limitation is that the majority of studies were conducted with small, risk samples. Only Lee and Burkam (2002) examined data from a nationally representative sample, but the ECLS-K dataset was limited to kindergarten entry data and post-hoc parental reports of experiences prior to kindergarten. All early literacy sources noted the need for further examination of early literacy development in children beginning at birth.

The second limitation is that a limited number of studies attempted to replicate findings from earlier studies to determine the generalizability of findings to similar populations (e.g. other children with the same poverty criterion) or other subgroups (e.g. to other racial/ethnic groups not represented earlier).

Third, the construct of early literacy varied widely, as did the construct definitions of key predictor variables (e.g. poverty). Although exploratory research is appropriate and the research knowledge base is building, the opportunity to influence early literacy policy decisions with a strong research base is limited by the variations. For example, describing the highest risk groups compared to moderate-risk groups would be challenging with the current research base.

Implications

Despite 40 years of intervention efforts, the gap between groups of children on literacy outcomes remains. Children enter school with wide disparities in early literacy outcomes and numerous policies, research agendas, and intervention efforts are aimed at improving early childhood outcomes, including early literacy. The current empirical base

offers findings about early literacy development, but is inadequate in estimating the needs of the U.S. population.

My study is a unique contribution to the current knowledge base because I examine a sample that compares early literacy outcomes and experiences from birth to 48 months using a nationally representative sample; findings are presented by SES and racial/ethnic groups. The predictors in my analytic model are based on findings identified in the current research base. My study is an extension of Lee and Burkam's (2002) model that examined, described, and explained kindergarten-entry early literacy outcomes. I used the same SES and race/ethnicity groups and extended the previous research to a younger population. I was also able to expand on the child, home, and early care/education variables used for their models because the data available in the ECLS-B dataset include birth factors as well as information collected at 9-, 24-, and 48 months about child, home, and early care/educational experiences. The ECLS-B is a longitudinal study tracking a complex sample of almost 9,000 children.

Chapter 3: Data and Methodology

The purpose of the study was two-fold. The first purpose was to extend the current research base by examining developmental disparities in 48-month literacy achievement scores among children across different SES and racial/ethnic groups. The second purpose was to investigate the predictive strength of specific child, home, and early care/educational factors on literacy development as measured at 48 months. I utilized the full sample in the ECLS-B to answer the following research questions:

Research question 1: What are the estimated early literacy scores of children in the U.S. at 48-months? Do the average scores vary by SES and race/ethnicity?

Research question 2: How do child, home, and early care/educational factors and experiences that are associated with literacy development differ for children in the U.S. by SES and by race/ethnicity?

Research question 3: What is the individual and combined contribution of child, home, and early care/educational factors and experiences on 48-month early literacy scores, by SES and race/ethnicity?

The analytic model that guided my research is based on the literature, specifically the Lee and Burkham (2002) model, which found that SES was the strongest predictor of early literacy outcomes. Previous research also has found race/ethnicity to be associated with early literacy outcomes. The other predictors in my model included child, home, and early care/educational factors. My analytic model is shown in Figure 2..

ECLS-B Dataset

I answered the research questions by conducting a secondary analysis of the data collected for the ECLS-B; I used the restricted version of the ECLS-B dataset because the outcome variable of interest was not available in a public-use version of the dataset. The restricted use dataset required institutional licensure. Prior to conducting my study, I participated in a 3-day training about the dataset and analytic considerations specific to ECLS-B. The training was conducted by contractors and federal staff who designed, sponsored, conducted, and provide oversight for the use of the dataset.

I chose the ECLS-B for several reasons. First, the dataset was from a longitudinal study that examined child development from birth through 48 months. Second, the sample allows for nationally representative findings. Third, some outcomes in the ECLS-B were aligned with outcomes collected in the early waves of the ECLS-K. Because of the overlapping design, early literacy outcomes in the ECLS-B could be compared to the findings from Lee and Burkam (2002).

ECLS-B purpose. The ECLS-B study is largely funded by the U.S. Department of Education's National Center for Educational Statistics (NCES) and the primary goal of ECLS-B was to create an inclusive dataset to represent the growth of U.S. children from birth through first grade (West, 2005). The ECLS-B was the first national sample that collected longitudinal data about child development, early care and education experiences, and family factors that were expected to contribute to child outcomes (Chernoff, Flanagan, McPhee, & Park, 2007).

Sampling and research design. ECLS-B was based on a probability sample of children born in the U.S. in 2001 within primary sampling units (PSU). The PSUs were geographical areas (96 counties or county groups) across the U.S. (Bethel, Green, Nord, Kalton, & West, 2005). Before being selected, PSUs were stratified using several criteria, including region, median household income, proportion minority population, and metropolitan status. Stratifications, when possible, were by income and minority status. Two PSUs were selected from each of the strata. More information about the selection of PSUs are in the *ECLS-B 9-Month Sampling Report* (Bethel et al. 2005).

After selecting PSUs, children were sampled using a clustered, list frame design. The list frame was from registered births identified from the National Center of Health Statistics (NCHS) system. Researchers used a representative probability sample to identify possible participants from the birth registry sources (Snow et al. 2007). Participants were selected based on primary sampling units (PSU) and race/ethnicity, birth weight, and plurality (i.e., twin status). Children were excluded from participation in the sample if the child was deceased, adopted after the birth certificate was issued, or born to mothers younger than 15 years of age. Children in the following groups were oversampled: (a) Chinese and other Asian and Pacific Islanders, (b) American Indian/Alaska Native (AI/AN), (c) twins, and (d) low birth weight (Snow et al., 2007).

Of the 14,000 births identified for invitation in the Wave 1 sample, several eligibility criteria and budgetary restrictions resulted in a final sample pool of 10,700. The sample reduction to 10,700 children in Wave 1 is attributed to three primary reasons.

First, budgetary reductions necessitated a twenty percent reduction in the number of parents who could be interviewed. The second primary reason for the reduced number is that parents chose not to participate or could not be contacted. The final reason for the reduction is that 300 cases were ineligible because the mother was less than age 15, the child died, or the child was adopted before age 9-months. The eligibility criteria for each Wave and the number of cases with parent and child assessment data at the conclusion of each Wave are provided below.

At the conclusion of Wave 1 (9 months), 10,200 cases had parent interview and child assessment data. In Wave 2 (24 months), children were eligible to participate if the record showed a complete parent interview at Wave 1, if the child was not deceased, and if the family was living in the U.S. At the conclusion of Wave 2, 8,950 cases had parent interview and child assessment data. In Wave 3, the sample was refreshed. If the child was American Indian/Alaska Native and had 9-month completed parent interview data, the child was brought back into the sample. For all other children, Wave 3 eligibility criteria included: complete parent interview data at Wave 2, child was not deceased, and the family had to be living in the U.S. At the conclusion of Wave 3, 8,000 cases had parent interview and child (literacy) assessment data. Figure 3 provides a flow chart indicating which data were collected at each Wave as well as which children and families were eligible.

The unweighted response rate for Wave 3 participants of the possible participants in the child literacy assessment component was 92% (i.e. 8,000/8,700). The primary

reason for the reduction is due to non-English language; the literacy component of the child assessment was only given to children who could complete the assessment in English. Approximately 600 children did not participate in the literacy assessment because these children did not have sufficient English skills to allow the assessment to be conducted in English.

The unweighted response rates from Wave 1 to Wave 3 showed a wider range. Overall, 84% of children who were in Wave 1 had complete parent interview data for Wave 3. The percentage of Black, Hispanic and White participants in Wave 1 who participated in Wave 3 was 79.0%, 80.3%, and 87.5%, respectively. The unweighted data (rounded to the nearest 50) and rates are provided here as contextual information about the ECLS-B sample and participants. As noted previously, sampling weights were used in the analyses and are discussed in the research design to follow.

The sample design allowed results to be weighted to estimate the experiences, characteristics, and outcomes of approximately four million children born in 2001 in the U.S. Although ECLS-B is a longitudinal study of children birth through first grade, only data from the first three waves were available for these analyses. I used data from the birth certificate registry and data collected when children were at or near the ages of 9-months, 2 years, and preschool (48 months). ECLS-B provides approximately 10,000 variables for each child. In my study, I utilized data about child development, family structure, preparation for school, early care and educational experiences, and early

literacy scores from the cognitive assessment at 48 months. Following is a description of the data collection instruments, variables, and timelines that are relevant to my study.

Multiple direct child assessments were included in the study; some assessments were for all children and some were for a subsample of children. Because the purpose of my study includes describing the outcomes and experiences of the full sample, I utilized data only from direct child assessments administered to the full sample. Those assessments include the Bayley Short Form-Research Edition (BSF-R) and the ECLS-B Direct Cognitive Assessment (Cognitive Assessment). Consistent with age-appropriate standards, the BSF-R was conducted at 9- and 24-months; the Cognitive Assessment was conducted at 48 months and included a literacy score.

Home and early care/education factors and experiences were collected from parent interviews. Interviews were conducted in person, by telephone, and by using a computer assisted survey. The computer was used for interview questions that were unlikely to be discussed openly during another format (e.g. spousal abuse).

Data collection and instrumentation. Data about early development, health care, nutrition, physical well being, home learning experiences, and experiences in early care and education programs were collected at three time-points, from multiple sources, and numerous instruments. Data sources utilized in my study include birth certificate data, children (i.e. direct assessment), and primary caregivers. Data collection methods for the variables used in my study included direct child assessments, face-to-face interviews, telephone interviews, and computer assisted interviews. The types of

assessment and timelines used in my study include: direct child assessments at Wave 2 and Wave 3; and parent interviews at Wave 1, Wave 2, and Wave 3.

BSF-R. In Wave 2, several direct child assessments were conducted and all were completed within 60 minutes. I used data from the BSF-R that included an assessment of receptive and expressive language. The BSF-R was designed for the ECLS-B and included a subset of items from the Bayley Scales of Infant Development, Second Edition (BSID-II). The full BSID-II includes 178 mental items; the BSF-R included 33 mental items. The assessment was conducted during a home visit and children were given objects and verbal instructions for tasks such as naming pictures, comparing sizes, and matching colors. Assessments were scored if children completed at least two-thirds of the items. The core set of assessment items were ranged in developmental difficulty from 17 to 37 months, but basal items were included for children with skills as low as at the 12 month level and ceiling items were included to score children as high as the 42 month level. In psychometric testing, the reliability rating of BSF-R mental score was .98 with the full version of the Bailey (BSID-II). Details about item selection and the development of the BSF-R can be found in the ECLS-B Psychometric Report for the 24-Month Data Collection (Andreassen & Fletcher, 2005).

Cognitive assessment (48 months). The information the researchers needed for the direct child assessment during Wave 3 included language, literacy, mathematics, and color knowledge elements and needed to be completed in less than 45 minutes. An instrument that met all the needs of the study design could not be identified, so an

assessment was created for ECLS-B. The Cognitive Assessment was field tested on over 1200 children the same age as sample participants and included items from: Peabody Picture Vocabulary Test (PPVT), the Preschool Comprehensive Test of Phonological and Print Processing (Pre-CTOPPP), the PreLAS 2000, the Test of Early Mathematics Ability-2 (TEMA-2), the Family and Child Experiences Study (FACES), and the Head Start Impact Study. Items included in the assessment were field tested for psychometric soundness. Field test scores were correlated with subtests of the Bracken Basic Concept Scale and the psychometric properties of the field test item data were examined using classical item analysis, item response theory, and differential item functioning (DIF). The classical item analysis included an examination of the percent correct for each item and the correlation of performance on the item to the full test, resulting in a correlation biserial. The IRT analysis examined the reliability of items in relation to omitted items and the probability that the child was guessing the correct response; the IRT analysis resulted in a discrimination parameter that has a comparable use as the correlation biserial. The DIF analysis examined the relative advantage or disadvantage of test items for children in different population groups. An extensive examination of the procedures used for psychometric testing and further details about the field testing can be reviewed in the ECLS-B Preschool Psychometric Report (Najarian, Snow, Lennon, Kinsey, & Mulligan, 2010).

In the literacy assessment, 37 items were scored across phonological awareness, letter sound knowledge, letter recognition, knowledge of print conventions, and word

recognition. The assessment was adapted to the child, so not all children received all items. However, the literacy IRT scale score was calculated based on item response theory (IRT). In IRT, patterns of correct and incorrect responses are used to generate scores that are comparable across children, regardless of the items used. English fluency screenings were conducted by the home visitor and, as noted earlier, the literacy portion of the cognitive assessment was not attempted for children who could not complete the literacy portion of the cognitive assessment in English.

Parent information. Much of the data in ECLS-B is from parents. Parent interviews were conducted at all three waves using one or a combination of three methods: face-to-face (i.e. home visits), telephone, and computer assisted. All participants received a home visit at all three waves. If the home visit could not be conducted in person, a telephone interview was conducted. During the home visits, information was collected about child and family demographics, developmental milestones, child temperament, and home language and learning environment. Computer assisted personal interviews (CAPI) ensured uniformity of the questions asked across home visits; the CAPI took approximately 90 minutes to complete. The respondent was the person identified as most knowledgeable about the child's care/education and living in the home with the child. In most cases, the respondent was the biological mother. The CAPI was available in both English and Spanish and bilingual interviewers were used, where appropriate. Interpreters were from the community or household.

An audio computer-assisted self-interview (ACASI) was a self-administered component of the home visit. The elements of the ACASI were questions that might be considered sensitive (e.g. marital happiness). After receiving instruction in using the computer, respondents were asked to complete the questions away from the interviewer and so no one in the household could see the keystrokes. The ACASI was available in English and Spanish; headphones were provided so the questions could be heard. The ACASI was not administered in households where parent interviews were conducted using an interpreter or via telephone.

Variables

In this section, I describe the variables used in my study, including the instrument from which the variable was collected, the data source, and how I used the data in the analyses. Wherever possible, I aligned my treatment of variables with the Lee and Burkam (2002) treatment of variables (e.g. race/ethnicity groups) to allow maximum comparability of findings about the experiences and early literacy outcomes patterns of SES and racial/ethnic groups.

Dependent variable. The dependent variable used in my study is the literacy IRT scale score (X3LITSC). The literacy IRT scale score is from the Direct Child Cognitive Assessment and is a continuous variable with a possible score from 0 to 37. The variable is aligned with the literacy IRT scale score utilized by Lee and Burkam (2002). Of the 8550 children assessed, 8200 received literacy scores. Of the 8200 children with scores, 8000 children had data from parents and were included in the

baseline sample in my study. For the descriptive component of my study, I used the continuous scale score. For the regression analyses, I created a standardized score using the scale score. All variables described below were in both the descriptive and regression analyses.

Independent variables. Independent variables included: mediators, child-, home-, and early care/education-factors and experiences.

Mediating variables. Consistent with Lee and Burkam (2002), one purpose in my study was to explore whether the magnitude of the association between SES and race/ethnicity and early literacy scores would be diminished once child, home, and early care/educational factors were taken into account. SES and race/ethnicity were used as mediating variables; a mediating variable intervenes, or mediates, the relationship between the independent variables (i.e. child, home, and early care/educational factors) and the dependent variable (Pedhazur, 1997). In the descriptive portion of my study, I emphasized the magnitude of difference between SES and race/ethnicity groups and 48 month early literacy scores. Through the regression analyses, I used SES and race/ethnicity as mediators by examining how the gap between non-middle and middle SES groups changed when additional variables (child, home, early care/educational) were added to the model and also how the gap between White and non-White racial/ethnic groups changed when additional variables were added to the model.

SES. The SES variable (X3SESQ5) is a composite that was created within the ECLS-B database and which is categorized into one of five levels, or quintiles. The

variable was computed using data from the parent CAPI and reflects parent education, occupation, and household income. In the development of the composite variable, missing data were imputed from prior waves of parent CAPI responses. For the regression model, the comparison group was the third quintile (middle).

Race/ethnicity. Race/ethnicity status (X3CHRACE) is a composite variable provided by ECLS-B. The variable is based on the child race/ethnicity; missing data were imputed from prior waves of parent CAPI responses. I recoded the variable from eight categories into five: Black, Hispanic, Asian, White, and Other. Hispanic, race-specified and Hispanic, race-not-specified were merged and other represents Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, and more than one race. White was the comparison group in the regression model.

Child factors. The following child specific variables were used in my study: gender, birth weight, disability, and Bayley cognitive score.

Gender. Female (X3CHSEX) is a dummy coded gender variable where 1 = female and 0 = male. The composite variable was collected from the birth certificate data and confirmed by the home visitor.

Birth weight. Child birth weight status (X1BTHWGT) was derived from birth certificate data. The composite used three categories of birth weight status: normal (2500 grams or more), moderately low (1500 - 2499 grams), and very low (1499 grams and lower). I recoded the variable into a dummy where 1 = low or moderately low and 0 = normal birth weight status.

Disability. Child disability status (P3SPEDU) is a dummy coded variable where 1 = child has disability status at Wave 3 and 0 = child does not have disability status at Wave 3. The data source is the parent interview where parents were asked whether the child had an Individualized Family Service Plan or Individualized Education Plan, consistent with IDEA. The variable is dichotomous and no indication of severity of disability is reflected in the disability status.

Bayley Cognitive Score. The Bayley Mental t-score (X2MTLSC) is a continuous value from the 24 month child assessment that was conducted during the home visit. Although the score fits in the category of "child factor or experience," the score was added in the last step of the regression. I used a standardized score in the regression analyses for interpretability across groups.

Home factors/experiences. I included nine variables representing the children's home factors and experience: teen mother, maternal marital status, home language, urbanicity, parent learning disability, reading frequency, tell stories frequency, sing songs frequency, and children's books in the home.

Teen mother. Mother's age (BCMOMAGE) is from the birth certificate data and was recoded as a dummy variable where 1 = teen mother and 0 = not-teen mother.

Maternal marital status. Mother not married (P1MARSTS) was a categorical variable from the parent interview at Wave 1; in all but a small number of cases, the mother was the respondent. The non-missing possible responses included married,

separated, divorced, never married, or widowed. I recoded to a dummy variable where 1 = not married and 0 = married.

Home language. Non-English household (X1LANGST) is a dichotomous variable from the parent interview and indicates if the primary home language was English or non-English at Wave 1. I created a dummy coded variable where 1 = non-English (primary) language) and 0 = English was the primary home language.

Urbanicity. An indicator of the urbanicity of home residence (X3HHLOCL) is a derived variable using 2000 census categories and the home residence zip code. I created four dummy codes for urbanicity: (a) large city, defined as a central city in a Consolidated Metropolitan Statistical Area (CMSA) with a population greater than or equal to 250,000; (b) suburban, defined as in the CMSA, but a community with less than 250,000; (c) town, defined as a Metropolitan Statistical Area (MSA) with a population great than or equal to 25,000 and less than 250,000; and (d) rural, defined as a community that was designated as rural in the 2000 Census. The dummy code was 1 = residence is in the category and 0 = residence is not in the category. The comparison group in the regression model is suburban.

Parent learning disability. During the parent interview, the responded was asked if either the mother or father had a learning disability (P2LNDSMO) and (P2LNDSFA). I created a composite variable from the two responses and generated a dummy code where 1 = yes for mother or father, or yes to both and 0 = no for both.

Reading frequency. During parent interviews at Wave 1, 2, and 3, the respondent was asked how often the parent reads to the child each week. Possible responses included: not at all, once or twice, four to six times, or everyday. I created a composite variable from the three waves (P1READBO, P2READBO, P3READBO) to get an average shared reading experience rating across time. For comparability, I standardized the score in the regression model.

Tell stories frequency. During parent interviews at Wave 1, 2, and 3, the respondent was asked how often the parent tells the child stories each week. Possible responses included: not at all, once or twice, four to six times, or everyday. I created a composite variable from the three waves (P1TELLST, P2READBO, P3READBO) to get an average about story telling experiences across time. For comparability, I standardized the score in the regression model.

Sing songs frequency. During parent interviews at Wave 1, 2, and 3, the respondent was asked how often the parent sang songs to the child each week. Possible responses included: not at all, once or twice, four to six times, or everyday. I created a composite variable from the three waves (P1SINGSO, P2SINGSO, P3SINGSO) to get an average about singing experiences across time. For comparability, I standardized the score in the regression model.

Children's books in the home. At Wave 2 and 3, a parent interview question asked for an approximate number of children's books in the home (P2NMKDBK and P3NMKDBK). I created a composite from the average responses that were originally

continuous variables. From the composite average, I created a dummy coded variable where 1 = 50 or fewer children's books were in the home and 0 = more than 50 children's books were in the home.

Early care/education factors and experiences. I included two variables representing the children's early care/education factors and experiences: primary care setting and parental support for child learning.

Primary care setting/caregiver. During the parent interview at Wave 3, parents were asked to indicate the primary care setting where the child spent the most time during a week (X3PRMARR). Possible responses included: no nonparental care; relative care (in child's home, in another home, location varies); nonrelative care (in child's home, in another home, location varies), center-based, Head Start, or multiple care arrangements with same hours in each. I recoded the original variable into five major groupings and created dummy codes where

1 = location/caregiver and 0 = not the location/caregiver for the following groups: parental care only, relative care, nonrelative care, center-based, or Head Start. The comparison group in Lee and Burkam (2002) was parental care only; I used the same comparison group in the regression model.

Parental support for child learning. During parent interviews, parents indicated that the child received parental care only or participated in nonparental child care. For those who participated in nonparental child care, parents were asked if the care program provided information through workshops, materials, or advice about how to help the child

learn at home (P3LRNHOM). Possible responses included: does it very well; just ok; does not do it at all. Children in parental care only received a score of "not applicable." I recoded the responses and created a dummy coded variable where 1 = parent does not receive information from a care provider (not applicable and does not do it at all in P3LRNHOM) and 0 = does it well or just ok. The variable is labeled "Parent does not receive information from a care provider about helping the child learn at home."

Methodology

In this section, I describe how the analytic sample was identified in the ECLS-B dataset and the methodology used to address the research questions. To begin, I describe the use of sampling weights and missing data considerations.

Sampling weights. ECLS-B is a sample from the population of babies born in the U.S. in 2001 and not all children had an equal probability of being selected for the sample. In addition, not all children identified in the sample participated in the study. Weighting the data allowed each child to be counted in a manner that represents the population; weights allow adjustments for nonresponse of sample participants and to correct for underrepresentation in sample selection.

In ECLS-B, weights are provided by the U.S. Department of Education because some groups of children were sampled at a higher rate than others. For example, not all parents agreed to participate in the study and those who chose not to participate had some systematic characteristics similarities, and because characteristics of the sample did not entirely align with the population characteristics (e.g. twins). The three concerns

associated with the sample considerations include differential sampling rates, differential nonresponse, and undercoverage of known population characteristics.

Weights used in the analyses adjust for the differential sampling rates, differential nonresponse, and undercoverage, but the selection of a weight is based on the research question. In my case, each research question used Wave 3 child assessment data as the outcome of interest and included the full universe of participants. My study is about estimating population parameters about early literacy, so I selected the population-based weight adjustment associated with the Wave 3 child assessment data (W3CO).

I applied a normalized weight when conducting my analyses. I normalized the weight so the standard error was based on the analytic sample and not on the population. In the data tables presented in Chapter 4, I provided weighted percentages and regression results, but I also describe the unweighted sample sizes in the descriptive table. In accordance with USDOE standards to protect the privacy of participants in the ECLS-B study, I rounded the unweighted sample sizes to the nearest 50.

Missing data. Missing data are a concern when conducting secondary analyses. Missing data can impact construct validity, internal validity, or generalizability of findings (McKnight, McKnight, Sidani, & Figueredo, 2007). To know how to respond to missing data, analyses of what is missing must be conducted, then one of multiple responses can be used to address missing data. Possible responses to missing data include data deletion (e.g. listwise, pairwise), data augmentation (e.g. weighting), single imputation, multiple imputation, or reporting the missing data (McKnight et al., 2007).

The USDOE addressed missing data in the ECLS-B by using imputation (e.g. race/ethnicity at Wave 3, using race/ethnicity data from Wave 2) and weighted sequential hotdeck imputation (e.g. household income; Snow et al., 2007).

The missing data in ECLS-B was evident from one of five different codes. The codes include the following: not applicable (-1), refused (-7), do not know (-8), not ascertained (-9), and system missing (left blank).

In my final model, the base sample included 8,000 children; my analytic sample included 7,400 children. I conducted a missing data analyses by comparing the analytic sample to the base sample. The missing data analyses included comparisons of categorical variables using chi-square analyses and group means of scaled variables by using *t*-tests. I also examined dropped cases compared to the cases included in the analytic sample. The results of the missing data analyses, including dropped cases, are reported in Chapter 4.

Analyses. I conducted two types of analyses to answer my research questions. Descriptive statistics were utilized to describe findings in research questions 1 and 2. Ordinary least-squares (OLS) regression using SPSS 17.0 was used to answer research questions 3.

The result of the analyses conducted for research questions 1 and 2 is a national profile of the early literacy outcomes by SES and racial/ethnic groups, as well as a description of the group differences on various child, home, and early care/education factors and experiences. Findings for research question 1 are presented in both scale

scores and standardized scores and provide estimates of the magnitude of differences in the population.

In research question 3, I used OLS regression in a six step analyses. Factors and experiences represented in each step are cumulative; by step 6, all variables in the model are included. To conduct the regression analyses, I coded all categorical variables as dummy variables with the comparison group coded as zero (not added in the model). Continuous variables were standardized.

Regression results are presented in effect sizes for the interpretability considerations noted above and for consistency with Lee and Burkam (2002). As described in Chapter 3, my analytic model is aligned with the analyses conducted by Lee and Burkam (2002). Consistent with their results, I anticipated that each step of the model would explain more of the variance in the dependent measure and that significant differences between the SES and racial/ethnic groups would decrease at each step of the analyses. Although the Bayley total score is a child factor and could have been added in Step 3, I wanted to understand the individual contribution of the 24 month Bayley score and added the information in Step 6, rather than as a child factor:

Step 1: SES;

Step 2: race/ethnicity;

Step 3: child factors;

Step 4: home factors;

Step 5: early care/education factors; and

Step 6: 24-month Bayley total mental score.

Because the regression analysis was hierarchical, groups of factors could be examined separately (e.g. contribution of each variable set to explain the variance in literacy scores). In addition, the end model shows the cumulative contribution of all factors in explaining variance of the outcomes scores. Each model reflects the following equation:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \ldots\ldots \beta_n X_n$$

In the equation, Y is the literacy score at 48 months. The α (alpha) is the intercept or constant. X_1 is the variances in literacy score at 48-months as explained by the first predictor group (β_1). βs represents beta coefficients or the strength on the relationship between the predictor group and the outcome variables. X_2 is the variances in literacy score at 48 months as explained by the second predictor group (β_2). This process continues until all variables in the model are accounted for in step 6.

The display of the data is important in understanding both what is and is not explained about literacy outcome variance. I display the proportion of total variance explained by each step of the regression model as R^2 and the change in R^2 that results from adding variables to the model in each step. Findings that are significant at the .05 level are indicated in the display of data. Results from the analyses conducted for this study and described above are presented in Chapter 4.

Statistical software. Statistics were computed using SPSS. Because ECLS-B is a large-scale dataset with data from a complex sample, adjustments to *t* ratios and *F*

statistics were made to account for design effects. Design effect data was provided by NCES in the ECLS-B handbook.

Chapter Summary

The ECLS-B dataset offers an opportunity to examine the literacy outcomes of a sample of children and create a national profile of factors and experiences associated with those outcomes. My study is an extension of work conducted by Lee and Burkam (2002) because I examined a younger sample. I used descriptive statistics and regression analyses to answer the research questions. Analytic considerations, such as sampling design, response rates, data collection methods, missing data, and software limitations were addressed. I provided a description of variables used in the models and the steps those variables were added to the regression model. Statistical software appropriate for the analyses was utilized.

Chapter 4: Analyses and Findings

In this chapter, I discuss the results of my various analyses. First, I discuss the results from the missing data analyses and follow with the results associated with each research question. Two missing data analyses were conducted. The first was to compare the cases from the base sample that were included in the analytic sample versus those that were dropped from the analytic sample due to missing data. The second analyses compared the base sample of cases included in ECLS-B at Wave 3 to the analytic sample used in my analyses.

For research question 1, I describe the early literacy scale scores and standardized effect sizes by SES and race/ethnicity. For research questions 2, I provide descriptive statistics about child, home, and early care/education factors and experiences and highlight the differences between higher and lower SES groups. Consistent with Lee and Burkam (2002), I did not conduct analyses to show statistically significant differences in the group outcomes because the emphasis in research questions 1 and 2 is to better understand child experiences across SES and racial/ethnic groups prior to school entry. Given the large sample size, one would anticipate statistically significant differences in many of the tests of group means, but the utility of the statistically significant differences in the initial, exploratory analysis of group experiences is limited. For research question 3, I provide results from the regression analyses in effect sizes, or standardized scores, to show the magnitude of differences between SES and racial/ethnic groups.

Presenting findings as standardized scores is consistent with the data display in Lee and Burkam (2002) and helps facilitate the comparison of results in my study to the findings from Lee and Burkam. Effect sizes are not designed to show statistically significant differences between group means and standards for evaluating effects sizes vary. For interpretation purposes, I adopted 0.20, 0.50, and 0.80 to indicate small, medium, and large differences between groups (Huck, 2004; Shavelson, 1998).

Missing Data Analysis

I conducted missing data analyses to examine the impact of excluding cases with missing data from the analytic sample and to determine how the analytic sample compared to the base sample in ECLS-B at Wave 3. Missing data analyses helped to determine the population to which I could generalize the findings. The analyses and summary follow. Results from the missing data analyses are presented in Tables 1 and 2.

Analytic sample compared to dropped cases. I conducted statistical analyses of the cases included in the analytic sample compared to the cases dropped due to missing data. The base sample included 8000 cases; 7400 cases from the base sample were included in the analytic sample and 600 cases were excluded due to missing data. Statistically significant differences between the dropped cases and analytic sample were evident. The child case was more likely to have missing data under the following conditions: lower SES; Hispanic; city or suburban residence; had a disability; home language was not English; mother was not married; child care was primarily parental; if the family had a lower number of children's books in the home, and if the parent did not

receive information from a child care provider about helping the child learn at home. (See Table 1 for a comparison of the distribution of cases in the baseline sample that were included in the analytic sample versus dropped from the analytic sample due to missing data.) The number of dropped cases was 7.5% of the baseline sample.

Base sample compared to the analytic sample. I examined the means, standard deviations, and distributions of the base sample compared to the analytic sample. The comparisons are presented in Table 2. The analytic sample has a smaller low-SES group, more White children, fewer Hispanic children, lower percentage of children who have a non-English home language, slightly more children living in rural areas, and a larger group with 50 or more children's books in the home. In all cases except the SES groups, the differences are minimal; between 1.9 and 2.9 percentage points.

Missing data summary. The results from the missing data analyses suggest that the base sample and the analytic sample are similar on most variables. Because my study emphasizes SES quintile and racial/ethnic group differences, the SES and race/ethnicity variations are of primary interest. Cases from the lowest SES quintiles were more likely to be dropped and more children in the highest SES group were more likely to be retained. The expected distribution of quintile groups is 20% in each of the groups; the results suggest the generalizability of the findings may not be as strong for the lowest SES quintile or for children whose primary language at 48 months is other than English. Some observed differences between the baseline and analytic samples are likely due to

the study design; children who were unable to take the literacy portion of the cognitive assessment in English did not have a literacy assessment score.

Research Question One

Research question 1: What are the estimated early literacy scores of children in the U.S. at 48-months? Do the average scores vary by SES and race/ethnicity?

I used descriptive statistics to examine the early literacy outcomes by SES quintile and race/ethnicity. For research question 1, I provide the results of the SES and race/ethnicity analyses in both scale scores and standardized scores. The results are presented as mean scale scores in Figures 4 and 6 and as standardized scores in Figures 5 and 7. In scale scores, the mean early literacy outcome of the analytic sample was 13.0, with a range of scores from 5.4 to 34.7.

SES. As observed in Table 2, the distribution of the children across quintiles groups in the analytic sample is slightly biased toward the higher income groups. The expected distribution in a quintile distribution is 20% in each of five groups. In the analytic sample, the weighted distribution from the lowest to the highest SES group is: 17.6%, 19.6%, 20.9%, 20.9% and 20.9% (see Table 3).

A clear trend between SES quintile groups and early literacy scale scores is evident in a visual inspection of the results that are displayed in Figures 4 and 5. The mean literacy IRT scale score for SES groups ranges from 9.30 to 17.46 (see Figure 4). In standardized scores (see Figure 5), the gap between the lowest and highest SES group is more than one standard deviation and exceeds the criteria of 0.80 to indicate a large

effect size (-0.54 to 0.65). The largest one-step difference is evident between the fourth and fifth quintile group at 0.48, an upper-range small effect difference. The next largest one-step gaps are between the third and fourth quintile groups (0.28) and the first and second quintile groups (0.26). In summary, the mean difference in scores is relatively constant across quintiles with the exception of the difference between the fourth and fifth quintiles.

Another perspective about the SES groups is looking at within group variability in the early literacy scores. The same trend that was observed in the group mean scale scores is evident as SES increases. In other words, the scores of children in the lowest SES group are more like other children in the lowest SES group than are the scores of children in the highest SES group like other children in the highest SES group. The standard deviation of early literacy scores for children increased steadily from lowest to highest SES groups (i.e. 4.6, 5.7, 6.4, 6.7, and 7.3).

Race/ethnicity. The distribution of the racial/ethnic groups is presented in five categories: Asian (2.6%), Black (14.2%), Hispanic (23.0%), White (55.4%), and Other (4.7%). The mean literacy IRT scale score range for racial/ethnic groups is from 11.06 to 17.88 (see Figure 6); in standardized scores, the racial/ethnic group scores range from -0.29 to 0.71 (see Figure 7). Children who are Asian have the highest mean literacy IRT scale score at 48 months (17.88), followed by children who are White (13.78). The standardized score difference between children who are identified as Asian and White is 0.60, a moderate effect size. The next largest gap between racial/ethnic group

standardized scores is 0.40 between children who are identified as White (0.11) and Hispanic (-0.29), followed by a gap of 0.25 standardized scores between children who are identified as White (0.11) and Black (-0.14).

The variability of the within group early literacy scores differ by racial/ethnic group. The standard deviation was lowest for children who were Hispanic (6.1) and showed greater variability as early literacy scores increased to a high for children who were Asian (7.8); an exception to the pattern was evident in the Other group who had a standard deviation of 7.2. Overall, the racial/ethnic group with the highest mean early literacy scores had the greatest within group variability.

Research Question 2

Research question 2: How do child, home, and early care/educational factors and experiences that are associated with literacy development differ for children in the U.S. by SES and by race/ethnicity?

I used descriptive statistics to examine how child, home, and early care/educational factors and experiences differ by SES quintile and race/ethnicity. Results are presented as mean scores (e.g. 24-month Bayley), percentages, or mean number (e.g. number of books). Results by SES quintile for all variables in the model are presented in Table 3; results by racial/ethnic groups are presented in Table 4. In the following, I describe relationships between the dependent variable and SES, the dependent variable and race/ethnicity, and discuss differences between the lowest and highest SES quintiles if the differences are greater than 10 percentage points. In addition,

the 24 month Bayley score is an outcome variable of interest in the early childhood community and I include a description of the relationship trend between the Bayley and both SES and race/ethnicity.

SES. As noted in research question 1, the early literacy score was progressively higher from the lowest to highest SES quintile. In addition, relationships between SES and child, home, and early care and education factors and experiences are evident. Children in the lowest SES quintile compared to children in the highest SES group are more likely to have a teen mother (24.8% versus 0.0%); live in a home where English is not the primary language (32.0% versus 10.4%); more likely to have a mother who was not married when the child was born (64.6% versus 4.6%); more likely to live in the city (39.9% versus 23.9%), less likely to live in a suburban area (31.8% versus 55.0%); less likely to have more than 50 children's books in the home (88.1% versus 27.6%); more likely to spend the majority of the week in parental care (28.5% versus 10.3%) or in Head Start (25.5% versus 1.0%); less likely to spend the majority of the week in center based care (24.9% versus 70.6%), and less likely to have parents who access information from a child care provider about helping the child learn at home (49.8% versus 34.7%). All other differences between the highest and lowest SES quintiles were less than 10 percentage points.

The pattern described in research question 1 between SES and the 48-month literacy IRT scale scores is parallel with the 24-month child assessment score pattern. Children in the lowest SES group had the lowest mean Bayley scores (46.4, SD 8.6) and

the mean score was progressively higher to the highest SES group (54.7, SD 9.6). The standard deviation was not progressively higher from low to high SES quintile.

Race/ethnicity. At 48 months, the early literacy assessment mean score was highest for children in the Asian group, followed by White, Other, Black, and Hispanic (i.e., 17.9 to 11.1 points). At 24 months, the average 24 month Bayley total score varied by 3.0 points across the racial/ethnic groups (i.e., 50.1 to 47.1 points

Similar to the SES differences described above, several differences of greater than 10 percentage points exist. Because White is the comparison group in the regression model for race/ethnicity, I describe differences below if group mean percentages varied by greater than 10 percentage points from the results for children who were White. All results by race/ethnicity are displayed in Table 4.

Home factors and experiences also differed by race/ethnicity. Children who were White were: less likely to have teen mothers (7.8%) than children who were Black (19.8%); less likely to have a non-English home language (2.5%) than children who were Hispanic (50.8%) or Asian (74.1%); less likely to have a mother who was not married (19.1%) than children who were Black (70.1%), Hispanic (42.5%), or Other (45.6%); more likely to have a mother who was not married than children who were Asian (7.4%); less likely to live in the city (20.4%) than children who were Black (43.5%), Hispanic (37.5%), or Asian (37.0); less likely to live in town (14.5%) than children who were Asian (4.2%); more likely to live in rural areas (23.9) than children who were Black (9.0%), Hispanic (3.4%), or Asian (3.2%); and less likely to have 50 or fewer child books

in the home (38.4%) than children who were Black (51.8%), Hispanic (80.3%), Asian (75.6%), or Other (60.4%).

Early care/educational factors and experiences that differenced by greater than 10 percentage points show that children who were White were: less likely to have Head Start as a primary care setting (6.1%) than children who were Black (26.5%) or Hispanic (18.3%); more likely to have center-based care as the primary care setting (53.9%) than children who were Black (36.2%) or Hispanic (35.7%). All other average group differences that used White as the comparison group were less than 10 percentage points.

Research Question 3

Research question 3: What is the individual and combined contribution of child, home, and early care/educational factors and experiences on 48-month early literacy scores, by SES and race/ethnicity?

I ran OLS regression analyses with the standardized literacy IRT scale score as the dependent variable to examine the relationship between early literacy outcomes and the independent variables in the model that included child, home, and early care/educational factors and experiences. The first two steps of the regression model include SES and race/ethnicity. Child, home, and early care/education factors are added in steps 3 through 5. In the final step, I include 24-month development as measured using the Bayley mental score (standardized). Because I was extending work conducted by Lee and Burkam (2002), I used the same comparison groups in my regression model

for SES (third/middle quintile), race/ethnicity (White), urbanicity (suburban); and primary child care setting (parental care only).

The full model included SES, race/ethnicity, child factors, home factors, early care/education factors, and 24-month child outcomes. The results of the regression showed that the full model explained approximately 25% of the variance in the 48-month early literacy scores (R^2=.247). The results from the regression analyses are displayed in Table 5. In the following, I emphasize how the variables that were added in each step contribute to the understanding of the variance in early literacy scores for the SES and racial/ethnic groups.

Step 1: SES. The relationship between SES and mean early literacy scores was described in research question 1 above and is not repeated here. The results in the regression show that the mean early literacy score of each SES group is significantly different from the comparison group (middle SES quintile). SES explained approximately 17% (R^2=.165; $p \leq .05$) of the variance in the mean early literacy scores.

Step 2: Add race/ethnicity. The relationship between race/ethnicity and mean early literacy scores was described in research question 1 above and is not repeated. When controlling for SES, the mean early literacy score differs for two racial/ethnic groups: White and Hispanic, and White and Asian. Race/ethnicity adds little to understanding the differences in early literacy score variance in the various SES groups; the race/ethnicity addition only decreased the SES regression coefficients by 0.031 or less for all SES quintile groups (e.g. .764-.733) and did not change the statistically significant

differences between groups. The small SES quintile changes are evident in the lowest and highest SES groups. Step 2 of the model adds approximately 1.0% to the overall explained variance in early literacy scores (R^2=.174; ΔR^2 =.009; p≤.05).

Step 3: Add child factors and experiences. The primary child factors identified in the literature review that predict early literacy outcomes included gender, birth weight, and disability status. When controlling for SES and race/ethnicity, adding these child factors to the model added limited information to explain the variance in early literacy scores at 48 months. However, the statistically significant early literacy means scores between children who were White and Black was eliminated after adding child factors into the model. The differences with only SES and race/ethnicity in the model suggest that the early literacy scores for children identified as having a disability are only 0.17 SD below their non-disabled peers. Step 3 of the model adds less than 1.0% to the overall explained variance in early literacy scores (R^2=.182; ΔR^2 =.008; p≤.05).

Step 4: Add home factors and experiences. The home factors in the model include age of the mother; home language; marital status of the mother when the child was born; parental learning disability status; urbanicity of home residence; number of children's books in the home; and parent-child reading, story-telling, and singing. When controlling for SES, race/ethnicity, and child factors, the home factors change the regression coefficients more for the lowest and highest SES groups than for the middle quintile groups. In the previous step, the significant differences between race/ethnicity groups were between children who were White and Hispanic and White and Asian. By

adding the home factors in Step 4, the White and Hispanic difference was no longer evident. However, the difference in the variance reappeared for children who were White and Black. Step 4 of the model adds 3.0% to the overall explained variance in early literacy scores (R^2=.211; ΔR^2 =.030; p≤.05).

Step 5: Add early care/education factors and experiences. Information in the ECLS-B regarding how children spent the majority of time was limited, but the dataset did include information about where the child spent the majority of time during the week. The early care/educational factors included primary child care setting and whether parents received information from a child care provider about help the child learn at home. The added variables did not eliminate the significant differences between SES or racial/ethnic groups that were evident in Step 4. The variance in early literacy scores by teen mother status was not significant in Step 4 but became significantly different in Step 5. When controlling for SES, race/ethnicity, child factors, and home factors, Step 5 of the model added 1.4% to the overall explained variance in early literacy outcomes (R^2=.225; ΔR^2 =.014; p≤.05).

Step 6: Add 24-month Bayley. The final step in the model was associated with an indicator of 24-month child development using the Bayley. From the literature review, language development is a predictor of early literacy outcomes. The Bayley mental score included both expressive and receptive language evaluation and was added in Step 6 of the model to examine the unique contribution of the 24-month score to the early literacy outcome. Adding the Bayley to the model did decrease the regression

coefficient for all SES quintile groups and eliminated the significant difference between children in the middle and the low-middle quintile group. However, adding the Bayley *increased* the regression coefficient for children who were Black, Asian, and Other. When controlling for SES, race/ethnicity, child, home, and early care/education factors, Step 6 of the model added approximately 2.2% to the overall explained variance in early literacy outcomes (R^2=.247; ΔR^2 =.022; $p \leq .05$).

Chapter Summary

Results of my analyses indicate that the ECLS-B dataset is a valuable source of information for understanding the magnitude of differences in early literacy scores at 48 months by SES and race/ethnicity. The dataset is also a rich source for examining child, home, and early care/educational factors and experiences from birth.

Gaps in early literacy outcomes between all SES groups were evident; in fact, the gap between the highest and lowest SES groups was over one standard deviation at 48 months. The largest one-step gap was between the middle-high and the highest SES quintile, suggesting that children in the lower SES groups are more alike on early literacy outcomes than children in the upper SES groups. Regardless of the one-step differences between quintile groups, a clear relationship was clearly evident between SES and early literacy outcomes. The data provide an opportunity to better understand the magnitude of the outcome differences that exist well before school entry between the "highest risk" SES groups and those who may be at lower risk.

Patterns were also observed across racial/ethnic groups: children who were Asian had the highest 48-month outcome scores and children who were Hispanic had the lowest 48-month outcome scores. However, after controlling for SES, race/ethnicity was not a strong predictor of early literacy outcomes. Children with and without disabilities had statistically significant group differences until controlling for SES, race/ethnicity, child, home, and early care/education factors and experiences. This suggests that disability status alone is not a strong predictor of 48-month early literacy outcomes.

My analyses also provided an examination of child, home, and early care/educational experiences that were identified in the review of the research. Overall, children who are in different SES and racial/ethnic groups have a wide range of experiences prior to age 48 months of age that may contribute to early literacy outcomes. Wide variation was not evident in the interactions between parent and child across SES or racial/ethnic groups (e.g. reading), but status indicators did vary. For example, children in lower SES groups were more likely to have teen and unmarried mothers and be raised in a home where English was not the primary language. The location where children spent the majority of time varied across SES groups; lower SES groups were also more likely to spend the majority of time in Head Start or in parental care only. The differences suggest a greater need to understand what is occurring within those various environments that may contribute to early literacy outcomes.

The regression analyses contributed some understanding to the variance in early literacy outcomes at 48 months by SES and race/ethnicity. However, almost three-

fourths of the variance in early literacy outcomes remained unexplained after examining the primary predictors of early literacy outcomes in a nationally representative dataset. Despite the lack of explained variance, the magnitude differences observed between SES groups suggests that the parameters of risk status and funding be carefully considered when creating or revising early childhood policies that are designed to have a wide impact on early literacy outcomes prior to school entry.

Chapter 5: Discussion

The purpose of my study was to (a) examine and present 48-month early literacy outcomes and key child, home, and early care/education factors and experiences using the ECLS-B and (b) conduct an analysis of child, home, and early care/education factors that help explain early literacy outcomes at age 48 months. In this study, I created a descriptive, national profile of early literacy outcomes and factors/experiences of young children by SES and race/ethnicity using the ECLS-B dataset. In my review of the current research base related to literacy development among samples of very young children, I concluded that there was a need for a study of a large diverse sample of young children to provide a picture of early literacy. The descriptive portion of my study should be considered the start of a conversation about the characteristics of young children and their families as they relate to literacy development. For example, the scope of my study was to describe the early literacy outcomes and experiences of the U.S. population using SES and race/ethnicity individually and to then analyze the explained variance in early literacy outcomes using a six-step model. The results of my study point to the need to consider literacy gaps at a very young age and to examine the equity of opportunities that these children have prior to pre-school entry. My study is an important step in building the knowledge base about the early literacy and experiential differences of children from birth to 48 months, but should be followed by an examination of the interaction between literacy outcomes and SES and race/ethnicity.

Descriptive data of early literacy outcomes in the population are of particular interest to policy makers when considering the adequacy of resources that are dedicated to impact large social issues (Shonkoff & Phillips, 2000). In this chapter, I discuss the findings of this study and the implications for policy and future research. The findings are presented by research question, with an emphasis on the results from the regression analyses.

Findings

A common conceptualization of early literacy development for children from birth to school entry does not exist in the current research base. The research about the experiences of infants and toddlers that may be associated with literacy development is particularly limited. In addition, replication of previous findings about predictors of early literacy outcomes conducted on children who are aged 3 to school entry and research that includes large, diverse samples is limited. Therefore, my study is primarily an exploration of early literacy outcomes at 48 months and experiences prior to 48 months in a nationally representative dataset. In the following, I describe my findings and link back to the predictors that were identified in the review of the current research.

Early literacy outcomes at 48-months. The findings from my analyses suggest that early literacy outcome scores at 48 months do vary by SES quintile. Because I used a similar population and dependent variable, it is not surprising that the patterns of findings in my analyses are nearly identical to the patterns of findings from Lee and Burkam (2002). I expected to see a smaller gap at age 48 months than Lee and Burkam

(2002) found at kindergarten entry because the evidence from school level data show that gaps in achievement tend to grow over time (Judge, 2005; Juel, 2006; Levenstein et al., 2002; Lonigan et al., 2000). Rather than a smaller gap, my findings show that the gap at 48 months was just as large on the same early literacy measure as at kindergarten entry.

A few variations by race/ethnicity that were evident in the 48-month literacy gaps also were identified by Lee and Burkam (2002). For example, the standardized score gap between White and a Hispanic child was similar at 0.40 for my study and 0.45 in the Lee and Burkam (2002) study. However, the gap between White and Black children in my study was 0.25 standardized scores, whereas Lee and Burkam (2002) found that the gap was 0.40 by kindergarten entry. It is not clear from my study which factors might contribute to such a sharp increase in the White/Black literacy gap. However, given the differences between White and Black children in primary care settings (described in the following section), further examination of what occurs in primary care settings may be beneficial for identifying strategies to prevent the growth of the gap between 48 months and kindergarten entry.

Child, home, and early care/education factors. Some predictors of early literacy outcomes that were identified in the review of research were consistent with my findings and others were not. Using the effect size guidelines for small, medium, and large effects that I described in Chapter 3, I identified a small difference in the early literacy standardized scores (0.14) between females and males, similar to Lee and Burkam findings (2002). Similar to McCarton et al. (1997), I also found that low birth

weight status was associated with lower mean early literacy scores, but this difference was also small at-0.14.

I found that children with an identified disability at or before 48 months had lower early literacy scores than peers without disabilities, which is consistent with prior research (Hart & Risley, 2003; McCarton et al, 1997; Roberts et al., 2005; Snow et al., 1998). In my analysis, the difference in standardized early literacy scores between children with and without disabilities increased from -0.17 to -0.22 (both significant) when early care/educational factors were added to the model that included SES, race/ethnicity, child, and home factors. After adding the 24-month Bayley scores into the model, the statistically significant difference between children with and without disabilities was eliminated. Given the small number of children with an identified disability and the fact that the severity of the disability could not be determined, the findings are limited about the characteristics of children with disabilities included in the sample. Further research about the developmental experiences of children with disabilities who are identified prior to school entry is warranted.

SES was the primary risk factor identified in virtually all prior research about general early childhood outcomes and early literacy (Dickinson & Tabors, 2001; Hart & Risley, 2003; High et al., 2006; Kuo et al., 2004; Lee & Burkam, 2002; NELP, 2008; Parks, 2000; Ramey & Ramey, 2004; Reynolds, 199; Roberts et al., 2005; Snow et al., 1998; Weizman et al., 2004). I also found SES was the biggest contributor to the explained variance in early literacy scores. With only SES in the regression model, the

standardized score gap between the highest and lowest SES groups was 1.19; after adding all the variables in the regression model, the early literacy standardized score gap between the highest and lowest SES groups was 0.77. In my regression model, I expected a meaningful decrease in the gaps between children as more variables were added to the model. Although some significant differences were eliminated, the additional variables only explained about one-third of the variance associated with SES. A limitation in the ECLS-B dataset was that children who could not take the literacy assessment in English were not assessed for literacy; approximately 600 children from the base sample were eliminated as a result. Children who had a non-English home language at 9 months but who were determined to have sufficient English skills at 48 months were included in my analytic sample. In my analyses, statistically significant differences were not identified in the early literacy scores of children with and without English as a home language. In my study, the home language was not known, but it children who had other home languages were distributed primarily at the highest and lowest SES group. My findings did not confirm the High et al. (2006) findings that home language other than English is a risk factor associated with early literacy outcome.

Another predictor of early literacy outcomes in prior studies was frequency of parent-child reading (Dodici et al., 2003; Lee & Burkam, 2002; NELP, 2008; Roberts et al., 2005). However, researchers found either: (a) an unclear association (NELP, 2008; Roberts et al., 2005); (b) a small association (Lee & Burkam, 2002); or (c) a large association (Dodici et al., 2003). Kuo et al. (2004) also found that the number of

children's books in the home was also positively associated with early literacy outcomes. In my analyses, I found a small association between frequency of parent-child book reading, but limited variation across SES groups and racial/ethnic groups in the frequency of parent-child book reading per week. Unlike Kuo et al. (2004), I did not find a statistically significant difference between the early literacy outcomes of children based on the number of children's books in the home.

Another predictor of early literacy is early care/education and experiences. Similar to Lee and Burkam (2002), I found systematic variation by SES and race/ethnicity in where children spent the majority of the week (see Tables 3 and 4). Prior research found that participation in all non-parental child care was associated with higher general developmental outcomes (Ramey & Ramey, 2004; Schweinhart, 2003). In my study, only children who spent primary care time in center-based programs had significant and higher early literacy scores than children who were in parental-care only. Further research is needed about how children spend the majority of time prior to school entry. As evident in Hart and Risley (2003), it appears the earliest experiences of children may vary widely. In-depth understanding of primary care activities was a limitation in the ECLS-B study design due to time constraints for observational assessments and breadth of coverage of the data elements (Bethel et al., 2005).

Prior research has suggested that a parent training component was critical to all intervention programs designed to impact early literacy outcomes (Ramey et al., 2000; Reynolds, 1999; Schweinhart, 2003; Snow et al., 1998). Therefore, I included a variable

to examine whether or not parents received information about how to help the child learn at home from a care provider. Less than 50% of parents reported receiving information about helping the child learn at home. If access to information about helping children learn at home is a critical component to impacting early literacy development and less than half the families are accessing this information from primary care providers, my findings suggest a possible need to increase the interactions between caregivers and parents about how to help the child acquire literacy skills. Further research is needed to determine if families have adequate access to information about stimulating early literacy development from sources other than primary care providers.

As noted previously, the variables that were added at each step of the regression model were expected to decrease the variance in early literacy scores. However, after adding the 24 months Bayley scores in the final step of the model the gap in the standardized early literacy scores between the highest and lowest SES groups was still 0.77 while the gap between children who were White and Black was 0.15. These findings suggest that outcome gaps evident at 48 months are also evident at 24 months. Further longitudinal research is needed to determine when gaps between children emerge to identify when to target prevention and intervention efforts. In addition, further research is needed to identify effective intervention strategies for children from birth to school entry.

Implications for Policy and Future Research

Analyzing data about a large sample within the context of current federal early childhood policies is valuable for informing future policy decisions. As noted by the quotation I used to introduce my study, group outcome discrepancies persist after decades of efforts to reverse those outcomes. I described two federal policies that specifically target an improvement in the early literacy outcomes of children with disabilities and children living in poverty prior to school entry: IDEA (PL 108-446) and Head Start (PL 110-134). As defined in my study, the lowest SES group comprised almost 20% of the sample (i.e. the lowest quintile). The scores of that group fell well below the average scores of the middle income children and substantially below the highest SES group. That these differences are so clearly evident at 48 months may not be a surprise within the early childhood community, but will likely be provocative to those who are not well-versed in early childhood research. Data about the magnitude of gaps evident at such early ages and the research about achievement gaps increasing across time are powerful arguments for those advocating for prevention efforts prior to school entry. They are also powerful for advocating the need for targeted research efforts about prevention and intervention efficacy prior to school entry.

The findings about the wide discrepancies at 48-months should be used to stimulate conversations about national policies with goals to decrease or prevent early literacy outcomes gaps that emerge prior to school entry. In Chapter 2, I described the goals of IDEA and Head Start that include improving the outcomes of children in two risk groups: high poverty and disability. Some argue that federal resources allocated to

these two programs that are designed to minimize or prevent kindergarten-entry achievement gaps are inconsequential relative to the estimated proportion of the population at risk for poor early outcomes (Barnett, 1995; The Science of Early Childhood Development, 2007; Shonkoff & Phillips, 2000). The findings of my study support this critique of federal resource allocations. The Head Start statute has a stated goal of changing the outcomes of children in the U.S. at risk due to poverty, but allocations for the statute provide interventions for less than 1% of the U.S. population at a level of less than $8000 per child. The likelihood of large scale changes in the outcome for children at risk due to poverty from this level of prevention and early intervention is questionable. Findings such as those from my study and Lee and Burkam (2002) about large gaps in early literacy at and prior to school entry should be used to inform federal and state policies and decisions about which children and families to target and when to intervene. Clearly my findings point to the need to concentrate on the families with the highest poverty and certainly earlier than age 4. Nationally representative descriptive profiles provide the policy community with a unique source of empirical data for estimating what it would cost to implement prevention and intervention efforts prior to school entry. Using a nationally representative dataset for my analyses was also important for its generalizability to the population of very young children in the US. My results indicated that significant gaps can be identified at 48 months and likely at 24 months. Ideally, good prediction will lead to early and high quality intervention; that early intervention will ideally lead to improved child outcomes that closes the gap

between risk and non-risk groups. I also want to emphasize the importance of evidence based prevention and intervention efforts; if prevention and intervention strategies are not effective in impacting outcomes, the level of financial allocation is irrelevant. To date, there is no evidence that more money will equal better outcomes and the data in the ECLS-B do not allow us to estimate quality differences among similar settings for instance.

In Chapter 2, I discussed the need for research about the population and the use of research findings to inform specific federal policies issues. A major policy component of both IDEA (PL 108-446) and Head Start (110-134) is eligibility criteria. In IDEA, broad eligibility parameters are provided; services are to be provided to children with disabilities or to infants/toddlers at risk of developing disabilities. States have wide discretion in establishing standards about eligibility criterion, but the federal statute requires that all children who are eligible receive services. In contrast, Head Start eligibility policies requires that 10% of children who participate in Head Start be children with disabilities and those services must be provided at an intensity level that limits the number of participants. Poverty is repeatedly linked to developing gaps in achievement and achievement gaps are persistent and predictable; it is therefore important to align data about risk groups and access to intervention services prior to school entry. Specifically, IDEA eligibility criteria could include a similar component of poverty. For example, a percentage of children who are served in the state could be children who are close-but-

not-eligible for IDEA services based on assessment results, but whose poverty status is considered as part of the eligibility determination.

Chapter Summary

My study about early literacy outcomes prior to school entry was an extension of work conducted by Lee and Burkam (2002) to a younger population. Through the analyses, I created a national, descriptive profile of early literacy outcomes at 48 months and key child, home, and early care/education factors from birth to 48 months. The descriptive profile about the population should be considered an initial step in better understanding what we do and do not know about the literacy outcomes of the population, the sufficiency of the current knowledge base about predictors of early literacy outcomes, and future research needed.

The findings about SES and race/ethnicity in my study were similar to Lee and Burkam's (2002) study, but the magnitude of differences varied for some groups within the analyses (e.g. larger literacy outcome gap between children who were White and Black at kindergarten entry than at 48-months). I also found that children have a wide range of experiences prior to 48 months in some areas, but in other areas the variation was minimal. The dataset was limited in the information about disability status and no information was available about what occurred within the primary care setting. Future research should address both of these limitations to better understand the emergence of disabilities and strategies that may be effective in impacting early literacy outcomes.

My study is a contribution to the current research base in that is addresses early literacy development. To date, no one has conducted large scale studies concerning early literacy development that includes infants and toddlers in the dataset. For informed, data-driven, and targeted policy decisions to be possible, the research community needs to describe the experiences of children prior to school entry and analyze the association between early experiences and later development (Gorey, 2001; Ramey & Ramey, 2004).

In addition to advancing the field of research, the data should inform policy makers about subgroup performance, describe magnitude of population need, and extend knowledge about findings from smaller scale studies. Researchers agree that waiting until children show signs of failure before implementing intervention programs is not effective in eliminating literacy achievement gaps (Knudsen, Heckman, Cameron, & Shonkoff, 2006; McCardle, Cooper, et al., 2001). Continued research can inform decisions about federal policy elements such as eligibility criteria, service options, and resource allocation in the Part C and EHS programs and hopefully better align policy decisions with empirical research to improve opportunities for very young children to develop skills necessary for school success.

Tables

Table 1

Distribution of Baseline Cases Included in the Analytic Sample Versus Dropped Due to Missing Data.

	Cases in Analytic Sample (n=7400[1]) %	Cases Dropped Due to Missing Data (n=600) %
SES* (percentage)		
Low	17.9	42.7
Low-middle	19.6	25.2
Middle	20.9	14.9
High-middle	20.9	11.0
High	20.8	8.0
Race/ethnicity* (percentage)		
Asian	2.6	2.0
Black	14.1	11.5
Hispanic	22.7	54.8
White	44.0	27.5
Other	4.5	4.2
Urbanicity of residence* (percentage)		
City	28.3	38.2
Suburban	42.8	39.2
Town	12.4	14.1
Rural	16.6	8.5
Child variables		
Female	49.2	45.3
Low or very low birth weight	7.4	8.4
Children with disability*	4.4	10.6
Home variables		
Teen mother	11.0	11.4
Home language not English*	15.7	51.5

[1] Per US Department of Education privacy rules, N's are rounded to the nearest 50. Baseline sample included all cases at Wave 3; examined using normalized weight W3CO.

Parental learning disability	1.5	0.8
Mother not married*	32.5	38.7
Early care/education variables		
Primary care arrangement*		
Parental only	18.6	32.3
Relative	12.9	14.3
Non-relative	7.7	5.5
Center based	47.8	28.8
Head Start	12.0	18.6
Parent does not receive information from care provider to help child learn at home*	44.3	59.2

Continuous Variables	Mean Score in Analytic Sample (Standard Deviation)	Mean Score of Dropped Cases (Standard Deviation)
Literacy IRT Scale Score	13.8 (7.1)	13.0 (6.8)
Bayley's 24 month mental total	44.3 (10.3)	50.5 (9.8)
Parent-child reading frequency	2.3 (.83)	2.7 (.81)
Parent tells stories frequency	2.1 (.84)	2.3 (.81)
Parents sings songs frequency	3.0 (.76)	3.2 (.72)
Number of children's books*	50.5 (48.8)	28.8 (39.9)

*$p \leq .05$

Table 2

Comparison of Baseline Sample and Analytic Sample

	Baseline Sample Unweighted N=8000[1]	Analytic Sample Unweighted N = 7400[2]
SES (percentage)		
Low	19.8	16.3
Low-middle	19.9	18.6
Middle	20.4	20.3
High-middle	20.1	20.5
High	19.8	24.3
Race/ethnicity (percentage)		
Asian	2.6	2.6
Black	13.8	14.1
Hispanic	25.1	22.7
White	53.7	56.0
Other	4.6	4.6
Child variables		
Female	48.8	49.2
Low or very low birth weight	7.5	7.4
Children with a disability	4.9	4.4
Home variables		
Teen mother	11.0	11.0
Non-English home language	18.5	15.7
Parental learning disability	1.4	1.5
Mother not married	33.0	32.5
Urbanicity of residence (percentage)		
City	28.9	28.3
Suburban	42.5	42.8
Town	12.5	12.4

[1] Per US Department of Education privacy rules, N's are rounded to the nearest 50.
[2] Analytic sample included only cases with no missing data; examined using renormalized weight W3CO.

Rural residence	16.0	16.6
Early care/education variables		
Primary care		
Parental-only	19.7	19.8
Relative care	13.0	12.9
Non-relative care	7.5	7.7
Head Start	12.5	12.0
Center-based	45.4	46.8
Parent does not receive information from a care provider about helping the child learn at home	45.4	44.3

Continuous Variables	Mean Score of Baseline Sample (Standard Deviation)	Mean Score of Analytic Sample (Standard Deviation)
Literacy IRT Scale Score	13.0 (6.8)	13.0 (6.8)
Bayley's 24 month mental total	50.0 (10.0)	50.5 (9.8)
Parent-child reading frequency	2.7 (.82)	2.7 (.81)
Parent tells stories frequency	2.3 (.81)	2.3 (.81)
Parents sings songs frequency	3.2 (.72)	3.2 (.72)
Number of children's books*	50.5 (48.8)	28.8 (39.9)

Table 3
48-month Literacy Outcomes and Predictors by SES Quintile

	Low	Low-middle	Middle	High-middle	High
Sample size (rounded)	1300	1450	1550	1550	1550
Weighted percentages (rounded)	17.6	19.6	20.9	20.9	20.9
Literacy IRT Scale score	9.3	11.1	12.2	14.2	17.5
(SD)	(4.6)	(5.7)	(6.4)	(6.7)	(7.3)
Child factors and experiences					
Female	49.0	51.0	48.0	50.1	48.1
Low or very low birth weight	8.8	9.0	7.5	6.0	6.1
Children with disability status	3.4	4.8	5.0	4.4	4.3
Bayley 24 month t-score	46.4	48.2	50.3	52.1	54.7
(SD)	(8.6)	(9.3)	(9.9)	(9.4)	(9.6)
Home factors and experiences					
Teen mother	24.8	18.6	9.6	4.1	0
Non-English home language	32.0	16.8	13.1	8.8	10.4
Parental learning disability	1.3	1.6	1.5	1.3	1.7
Mother not married	64.6	49.9	31.9	17.1	4.6
Live in city	39.9	30.2	25.3	23.8	23.9
Live in suburban area	31.8	34.6	40.7	49.8	55.0
Live in town	14.2	12.9	14.9	10.4	9.9
Live in rural area	14.2	22.2	19.2	16.0	11.2
Parent-child reading frequency	2.2	2.5	2.7	2.9	3.2
Parent tells stories frequency	2.1	2.2	2.3	2.4	2.4
Parents sings songs frequency	3.2	3.1	3.2	3.3	3.3
Mean number of children's books	25.0	44.0	58.0	79.0	99.0
(SD)	(27)	(45)	(52)	(64)	(79)
50 or fewer children's books	88.1	71.5	58.6	42.7	27.6
Early care/education factors					
Parental care only	28.5	24.5	16.3	15.2	10.3
Relative care	13.7	18.2	17.0	10.3	5.6
Nonrelative care	4.6	6.1	9.7	7.3	10.4
Head Start	25.5	20.1	10.8	4.7	1.0
Center-based	24.9	29.7	44.3	60.3	70.6
Parent does not receive information about helping the child learn at home	49.8	49.5	47.4	41.3	34.7

Table 4

48-Month Literacy Outcomes and Predictors by Race/Ethnicity

	White	Black	Hispanic	Asian	Other
Sample size (rounded)	4100	1050	1700	200	350
Weighted percentages	55.4	14.2	23.0	2.7	4.7
Literacy IRT Scale score	13.8	12.0	11.1	17.9	13.0
(SD)	(6.9)	(6.5)	(6.1)	(7.8)	(7.2)
Child factors and experiences					
Female	49.3	47.4	49.1	49.3	53.3
Low or very low birth weight status	6.4	12.4	6.8	6.2	8.1
Children with disability status	5.5	2.1	3.4	1.4	4.3
Bayley 24 month mental t score	47.7	47.6	47.1	49.4	50.1
(SD)	(9.6)	(9.4)	(9.1)	(10.3)	(9.3)
Home factors and experiences					
Teen mother	7.8	19.8	14.5	3.9	9.7
Non-English home language	2.5	4.9	50.8	74.1	3.3
Parental learning disability	1.7	1.3	0.8	0.0	3.5
Mother not married	19.1	70.1	42.5	7.4	45.6
Live in city	20.4	43.5	37.5	37.0	26.6
Live in suburban area	41.2	39.9	48.4	55.6	35.8
Live in town	14.5	7.6	10.1	4.2	17.4
Live in rural area	23.9	9.0	3.4	3.2	20.3
Parent-child reading frequency	2.9	2.3	2.3	2.6	2.7
Parent tells stories frequency	2.4	2.1	2.2	2.3	2.3
Parents sings songs frequency	3.2	3.2	3.1	3.0	3.3
Number of children's books in the home	83.0	28.0	35.0	41.0	57.0
(SD)	(67)	(29)	(64)	(45)	(63)
50 or fewer children's books in the home	38.4	51.8	80.3	75.6	60.4
Early care/education factors and experiences					
Parental care only	18.1	15.5	22.4	15.9	17.5
Relative care	11.0	13.2	15.6	13.8	19.7
Nonrelative care	9.0	4.7	6.6	3.8	8.8
Head Start	6.1	26.5	18.3	4.8	12.2
Center-based	53.9	36.2	35.7	59.6	40.4
Parent does not receive information about helping the child learn at home	43.8	37.8	49.5	38.7	48.8

Table 5

ECLS-B Literacy Outcome at 48 Months: Six Step OLS Regression Model of Factors and Experiences

	1. SES[1]	2. Race[2]	3. Child	4. Home	5. Early Care	6. Bayley
SES quintiles						
Low	-.432*	-.414*	-.416*	-.316*	-.297*	-.266*
Low middle	-.164*	-.164*	-.167*	-.113*	-.096*	-.072
High middle	.283*	.275*	.269*	.206*	.179*	.167*
High	.764*	.733*	.729*	.591*	.545*	.499*
Race/ethnicity						
Black		.044	.048	.129*	.111*	.152*
Hispanic		-.104*	-.107*	-.067	-.055	-.025
Asian		.476*	.469*	.505*	.505*	.522*
Other		.040	.034	.072	.084	.109
Child						
Female			.141*	.123*	.125*	.076*
Low/very low birth weight			-.135*	-.129*	-.127*	-.101*
Disability status			-.169*	-.169*	-.221*	-.056
Home						
Teen mother				-.036	-.034*	-.047
Home language not English				.039	.026	.075
Parent learning disability status				-.247*	-.210	-.170
Mother not married				-.033	-.042	-.034
Urbanicity[3]						
City				-.122*	-.115*	-.122*
Town				-.216*	-.204*	-.213*
Rural				-.165*	-.144*	-.158*
≤50 children's books in home				-.046	-.038	-.012
Weekly parent-				.151*	.145*	.131*

[1] Comparison group: Middle SES
[2] Comparison group: White
[3] Comparison group: Suburban

child book reading (standardized)						
Weekly story telling (standardized)				.010	.011	.002
Weekly singing songs (standardized)				.011	.013	.006
Early care						
Primary setting[4]						
Nonrelative					-.010	-.019
Relative					-.034	-.025
Head Start					.054	.042
Center-based					.130*	.125*
Parent does not receive info about helping child learn at home from caregiver					-.147*	-.154*
Bayley 24 month						.170*
Constant	-.111	-.103	-.151	-.026	-.022	-.031
R^2	.165*	.174*	.182*	.211*	.225*	.247*
ΔR^2	.165*	.009*	.008*	.030*	.014*	.022*

*p≤.05

[4] Comparison group: Parental care only

Figures

Figure 1

CELL Developmental Model

Months	Developmental Levels (Phases)	Selected Accomplishments
0-15	Prelanguage and Early Nonverbal Communication Development	Joint attention, intent to communicate, gestural communication, babbling, mutual vocal play, language/speech perception, phoneme speech stem acquisition
12-30	Language Onset and Vocabulary Development	First words, vocabulary development, language use, semantic development, early comprehension
24-42	Language Growth and Emergent Literacy Development	Phonological awareness of sounds, morphological awareness, syntactic development, pragmatic skill acquisition
36-48	Early Literacy Development and Metalanguage Awareness	Phonological, morphological and syntactic growth, prewriting, pretend reading, story telling
48-60	Literacy and Reading and Writing Development	Phonology refinement, complex syllable use, invented spelling/writing, shared reading

Figure 1. CELL Early Literacy Developmental Model. (2010). *Developmental Model.* Retrieved from http://www.earlyliteracylearning.org/frameworksrtpdm.php

Figure 2

Analytic Model: Early Literacy Development

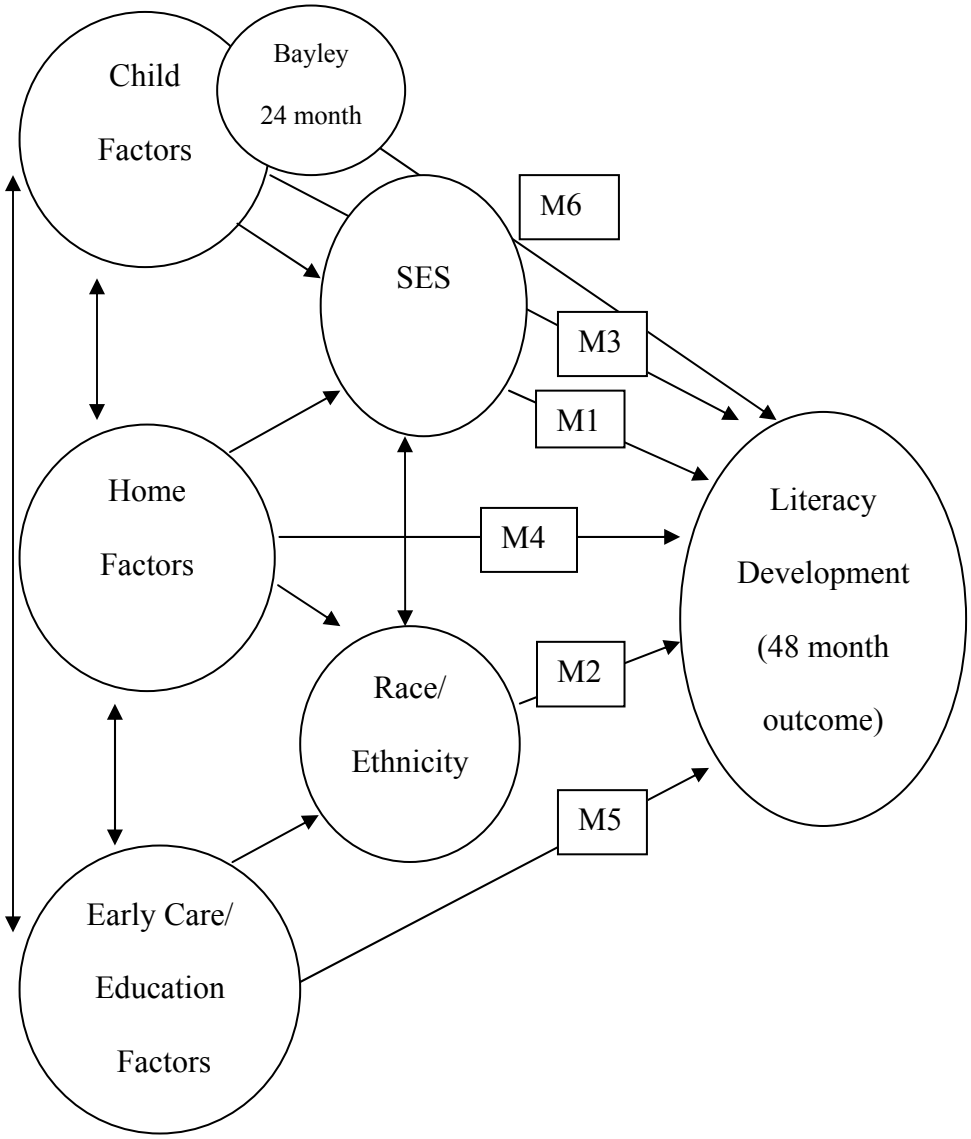


Figure 3

ECLS-B Sample Eligibility and Participants at Waves 1, 2, and 3.

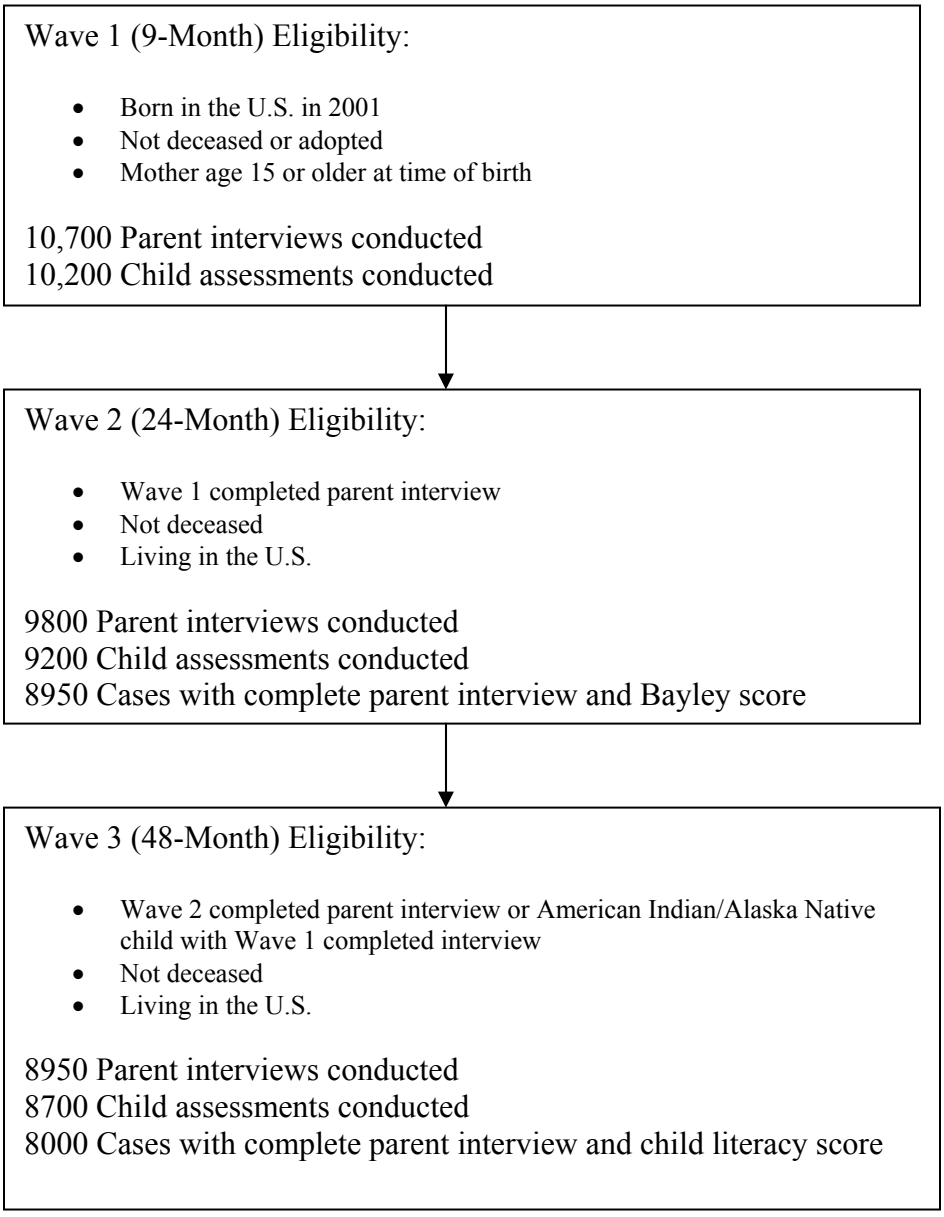


Figure 3 is a flow chart of eligibility for participation at the various Waves and the number of cases with parent interview data and some direct child assessment data at each wave (Snow et. al., 2007).

Figure 4

Literacy Development as Mean IRT Scale Score, by SES

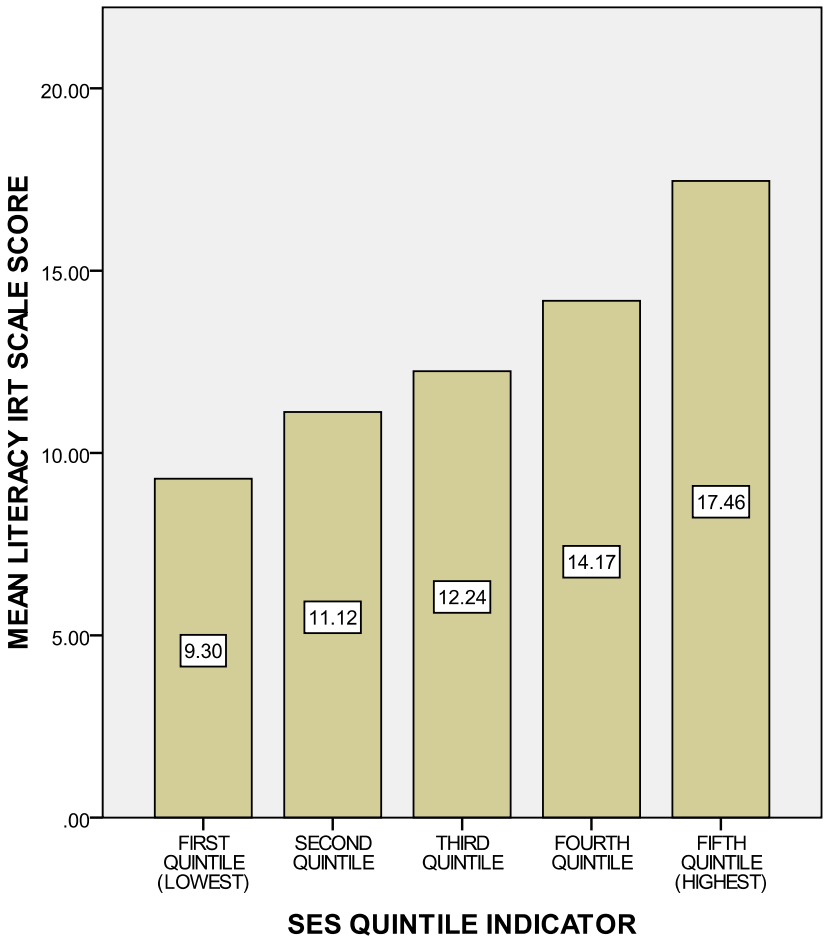


Figure 5

Literacy Development as Standardized Scores, by SES Quintile.

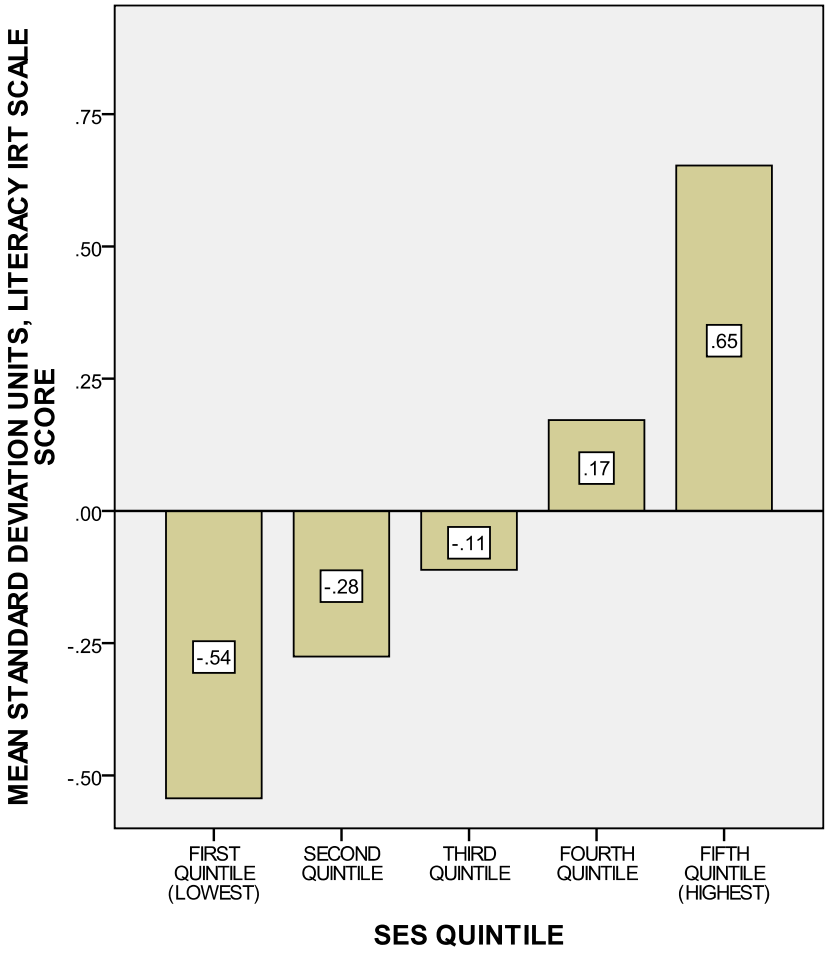


Figure 6

Literacy Development as IRT Scale Score, by Race/Ethnicity

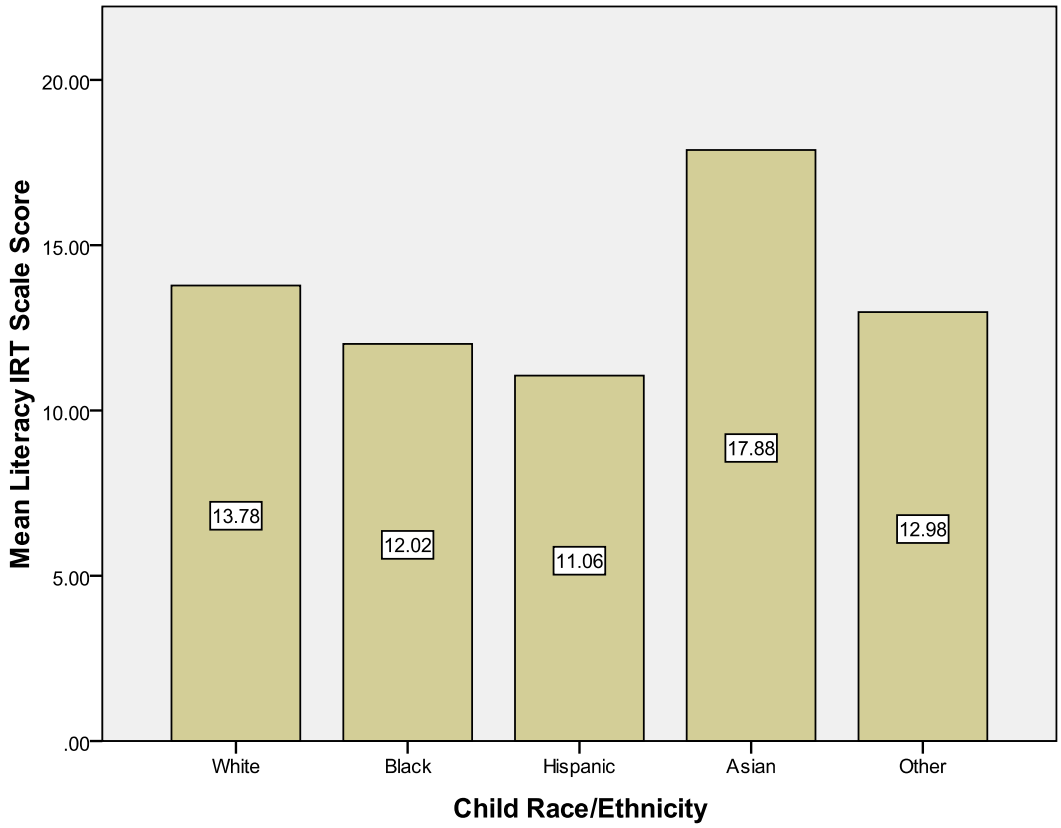
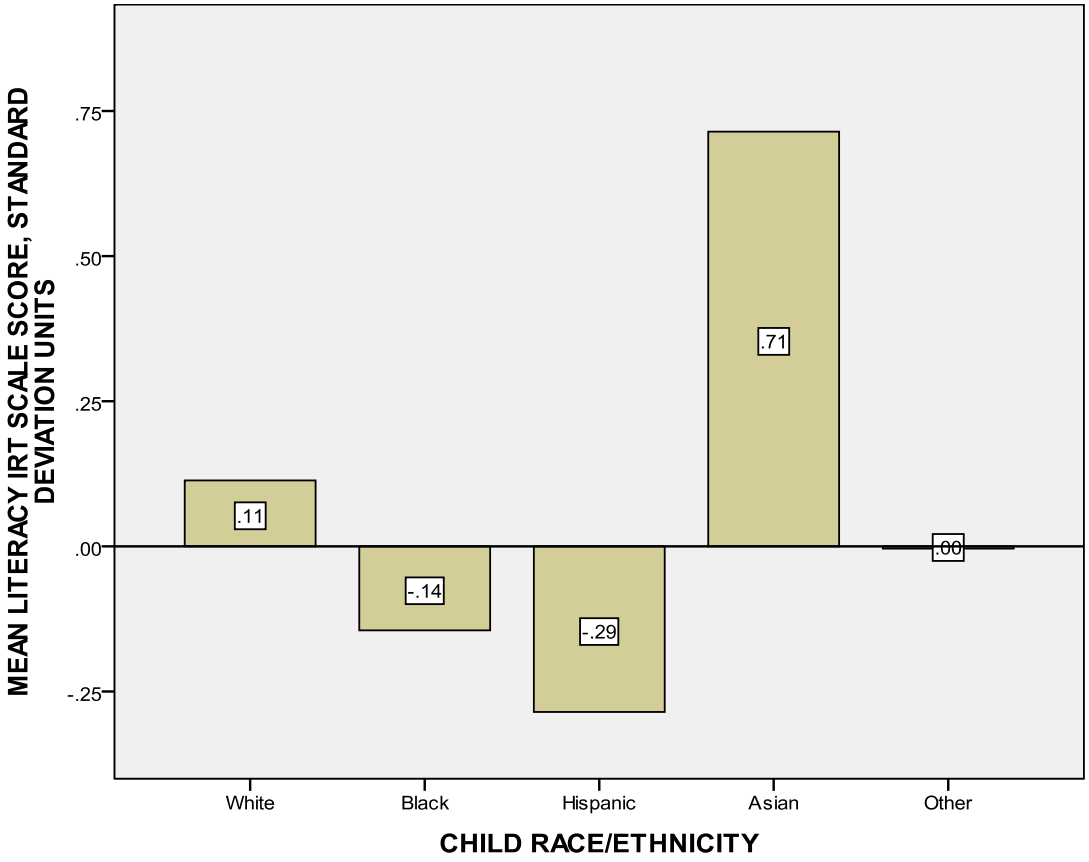


Figure 7

Literacy Development in Standardized Scores, by Race/Ethnicity.



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