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AFRICAN AMERICAN CHILDREN LIVING IN URBAN ENVIRONMENTS: AN INVESTIGATION OF EARLY LITERACY AND THE INFLUENCE OF PSYCHOLOGICAL STRENGTHS AND FAMILY SUPPORT

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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Abstract

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Literacy is a basic fundamental skill for academic, professional, and social success in our culture. Children with low exposure to reading can experience reading difficulties, diminished cognitive development, and poor academic outcomes. Inconsistency in the conceptualization of early literacy has hampered research and development of successful, translational early literacy interventions, particularly for children from low-income households. Preschoolers from low-income, urban backgrounds (n = 426), including 221 females and 205 males aged 35 - 60 months (M = 47.46, SD = 6.44) participated in an investigation of the latent factorial structure of early literacy. The study also explored whether children's psychological strengths and their family's literacy-related behaviors support improvement of early literacy skills following completion of a literacy

development intervention. Results support a three-factor model of early literacy proposed by Sénéchal, LeFevre, Smith-Chant, and Colton (2001). This study also found that, despite the influence of age, sex, and family income, children's psychological strengths and family literacy behaviors are predictive of early literacy skills comprised of this three-factor structure. However, only children's psychological strengths predicted improvements in early literacy scores at post-test. Implications for preschool interventions and measurement of early and family literacy constructs are discussed.

African American children living in urban environments: An investigation of early literacy and the influence of psychological strengths and family support

Acquisition of literacy skills at an early age is important for successful academic, professional, and social development. Reading success provides fundamental skills on which other academic, professional, and socio-cultural tasks are built, and is predictive of academic success (North Central Regional Educational Lab, 2002). Early reading ability can influence the amount of interaction children have with print during formative years and, later, in adolescence and early adulthood (Cunningham & Stanovich, 1997). Reading success gives confidence to attempt new challenges in the classroom and beyond [Committee on the Prevention of Reading Difficulties in Young Children (CPRDYC), 1998].

On the other hand, consistently low exposure to reading materials hampers cognitive development due to the countless missed opportunities for learning that would be available during a lifetime of reading (Cunningham & Stanovich, 1997). Given the developmental trajectory of literacy, language, academic skills, and their influences, it is important that all children have the opportunity to achieve reading success. Without intervention, children with literacy difficulties or without access to reading materials often continue being challenged throughout their school years.

Early literacy interventions aim to provide the groundwork for academic success in kindergarten and beyond. Implementation and evaluation of these interventions tend

to focus on group change and group outcomes. Programs are maximized by implementation that is both efficacious and effective. Examination of barriers and solutions to enhancing effectiveness increases the sustainability of an intervention.

Effectiveness studies seek to evaluate intervention efficacy in a natural setting. For early childhood education interventions, post-study gains are difficult to maintain once intervention supports have tapered. Identifying potential obstacles to implementation allows interventionists to equip schools for the expected challenge of maintaining gains. While it is not reasonable to develop solutions for many of the larger, systemic challenges schools face, it is possible to plan for constant classroom and individual challenges, such as working with children and their families. Identifying individual child differences and specific family / home literacy behaviors that support improvement of early literacy skills after completing a preschool early literacy intervention would increase long-term program effectiveness and sustainability.

There are many early literacy skills necessary for literacy skill development that should be included in early literacy interventions. Early literacy is a relatively young construct that has been popularized in recent decades. Researchers have proposed several conceptualizations and taxonomies to understand early reading processes. To continue advancing our understanding of early literacy, it is necessary to identify a common language. This study will utilize a model of early literacy that is concurrent with existing knowledge of language, whose foundation has been well established in the literature. There is little research supporting this model, as well as other models of early literacy,

among children from low-income families. There is also little research to support this model among African American samples.

The proposed investigation examined the structure of an early literacy model and explored the moderating role of children's temperamental characteristics, children's behavior, and family support behaviors in the improvement of children's early literacy skills. The effect of sex was controlled, as it has been found that sex socialization influences early literacy learning (Millard, 2003). Family income was controlled experimentally by enrollment requirements. This study expanded what is known about the influence of sex and other individual differences on early literacy outcomes, and offered support for family-inclusive interventions. Findings provided information about the role of race in early literacy research and direction for future investigations of early literacy models and their programmatic applications.

The following sections provide an overview of research on early literacy and its associations with child behavior, child characteristics, and child home environment. This review will discuss studies that have examined relationships between early literacy skills, individual child differences, and family literacy behaviors. First, research on early literacy is reviewed. Studies addressing low-income urban samples are discussed. Second, empirical findings on the role of temperament and behavior differences in literacy development are explored. Third, the role of family in children's early literacy development is described. Pertinent studies examining the role of race, for African American students, are reviewed within each section along with findings related to sex. Finally, the study hypotheses are proposed.

Early Literacy versus Emergent Literacy

It has been acceptable among early literacy researchers to use the terms emergent literacy and early literacy interchangeably. Both phrases refer to the earliest signs of children's interest in reading and writing [Committee on the Prevention of Reading Difficulties in Young Children (CPRDYC), 1998; Justice, Invernizzi, Geller, Sullivan, & Welsch, 2005; Whitehurst & Lonigan, 1998]. Operationally, these are quantified as skills that develop before conventional literacy skills exist. It seems that most writers in the field use the terms interchangeably without considering whether there might be or ought to be a distinction. Since Teale and Sulzby's (1986) introduction of the term *emergent literacy*, there have been a few attempts to develop further conceptualization of the term, despite prolific research in the field of emergent literacy. This section will distinguish early literacy from emergent literacy using a model proposed by Sénéchal, LeFevre, Smith-Chant, and Colton (2001).

As our understanding of the structure and processes of early literacy expands, refinement of conceptualization and nomenclature has become necessary. Accurate communication among researchers, practitioners, and others in the field relies on consistent interpretation of empirical findings and programmatic outcomes. Investigators have begun to address this need and several perspectives of early literacy have developed.

Among authors who have proposed cohesive models focused on explaining early literacy processes, there is incongruity in how to account for the contributions of 1) metalinguistic skills (i.e., sensitivity to hearing and using sounds) and 2) oral language skills to literacy skill development. Authors agree that metalinguistic and oral language

skills are qualitatively different from skills requiring interaction with print (Justice et al., 2005; Sénéchal et al., 2001). However, some investigators have suggested that the term *early literacy*, and all permutations of the term, generally include metalinguistic skills, oral language skills, and interaction with print as a part of a single overall concept (Justice et al., 2005; Snow et al., 1998).

Early literacy has been described as a constellation of all skills that must be acquired to develop proficient reading ability (Justice et al., 2005; CPRDYC, 1998), including oral language skills and metalinguistic skills. Early literacy in this sense includes such skills as knowledge of letters and words, awareness of sounds, understanding of the connection between letters and their sounds, word knowledge, and word manipulation, all of which are critical milestones for development of successful reading ability (Whitehurst & Lonigan, 1998). To include metalinguistic skills and oral language skills as a part of early literacy skills, Justice and colleagues (2005) divided the early literacy construct into literacy-specific skills, which were labeled *written language awareness* skills, and metalinguistic / oral language skills, which were termed *phonological awareness skills*. These authors and other writers using this terminology endorse using the labels of early literacy, emergent literacy, and pre-literacy interchangeably, since each label indicates skills that surface before conventional literacy skills are present (Justice et al., 2005; CPRDYC, 1998).

Whitehurst and Lonigan (1998) proposed a different division of early literacy, which is arguably one of the most popular in the literature. They conceptualized early literacy as the development of two parallel processes that facilitate early literacy learning.

Inside-out processes represent children's understanding of literacy-related context, whereas *outside-in* processes refer to children's knowledge of the rules for translating literacy-related material into sounds (Figure 1; Whitehurst & Lonigan, 1998).

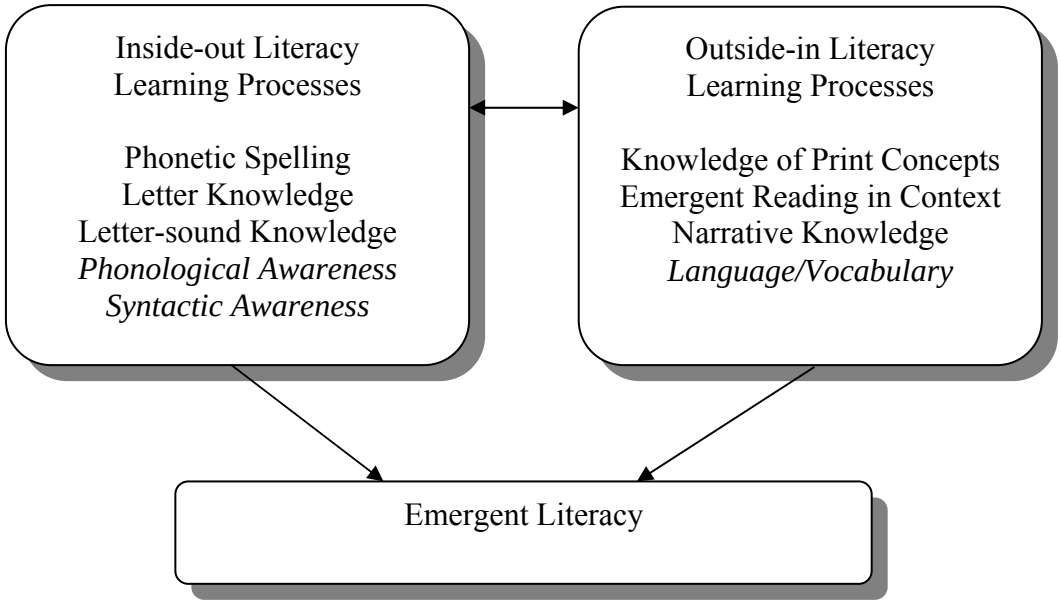

Figure 1. Model of Early Literacy (as described in Whitehurst & Lonigan, 1998)

The inside-out process is similar to Justice and colleagues' (2005) concept of written language awareness, except it includes metalinguistic skills, such as phonological awareness, in addition to uniquely literacy-related skills, such as letter knowledge. The outside-in process includes oral language skills, such as vocabulary, and again includes uniquely literacy-related skills, such as knowledge of print concepts (Whitehurst & Lonigan, 1998). Oral language and phonological awareness were included in Whitehurst and Lonigan's (1998) conceptualization of early literacy as components of the construct, not contributors to the construct. This conceptualization differs from emergent literacy

conceptualization, which includes oral language and phonological awareness, to acknowledge their role, but define them as contributors to the construct.

While early literacy relates to all knowledge and competencies that are developed and employed before a child is able to read, *emergent literacy* is conceptualized as specific mechanics and understanding of print that lead directly to conventional reading ability (Sénéchal, et al., 2001; Sulzby, Branz, & Buhle, 1993; Teale & Sulzby, 1986). Researchers with this perspective maintain that the term emergent literacy is highly specific and should be reserved for skills uniquely required for interaction with print, and that other skills, including metalinguistic and oral language skills, should be recognized as facilitators of the emergent literacy process. In this view, oral language and metalinguistic skills, such as knowledge of phonemes, contribute to procedural and conceptual knowledge of reading, yet they are conceived as skills applied to reading, not as reading skills.

Geary (1995), Snow (1983; Hemphill & Snow, 1996), and Sénéchal, et al. (2001) have noted that, evolutionarily, language is a primary skill that is hard-wired for human survival, whereas reading is a more recently evolved, secondary skill developed in select cultures. Written language is executed in an area of the brain that was far less developed millennia ago. The development of written language skills requires significant experiential and instructional exposure. Biologically, humans do not acquire written language skills as easily as spoken language and, evolutionarily, written language is nonessential to human survival. This major bio-evolutionary distinction speaks to the differences between the function, utility, and development of language and literacy skills

and supports a theoretical and empirical separation of the two constructs. While there is sufficient evidence that language development is an early skill that facilitates reading development, there is insufficient evidence to support the classification of language skills with reading skills.

Most investigators agree conceptually with this notion. However, few interpret their findings according to this differentiation. Sénéchal and colleagues (2001) discuss an example of this:

> Lonigan, Burgess, and Anthony (2000) conducted confirmatory factor analyses that established that models that separated oral language, phonological awareness, and print knowledge captured young children's performance better than models that used a single factor. Similarly, Whitehurst et al. (1994) found that the measures of oral language, writing, and metalinguistic awareness loaded on different factors. These important findings are consistent with the notion that emergent literacy is not a unitary construct. (Sénéchal et al., 2001)

Despite the findings mentioned above, the above-mentioned researchers continue to utilize inside-out and outside-in processes to conceptualize their findings. Based on the aforementioned evidence, among other considerations, Sénéchal and colleagues (2001) proposed a model (Figure 2) that acknowledged the role of important contributors to literacy development and identified skills unique to emergent literacy.

With Sénéchal's model, evidence of emergent literacy can be evaluated more accurately. This early literacy model evaluates oral language and metalinguistic skills as facilitators of emergent literacy skills. Research using this model for outcome research

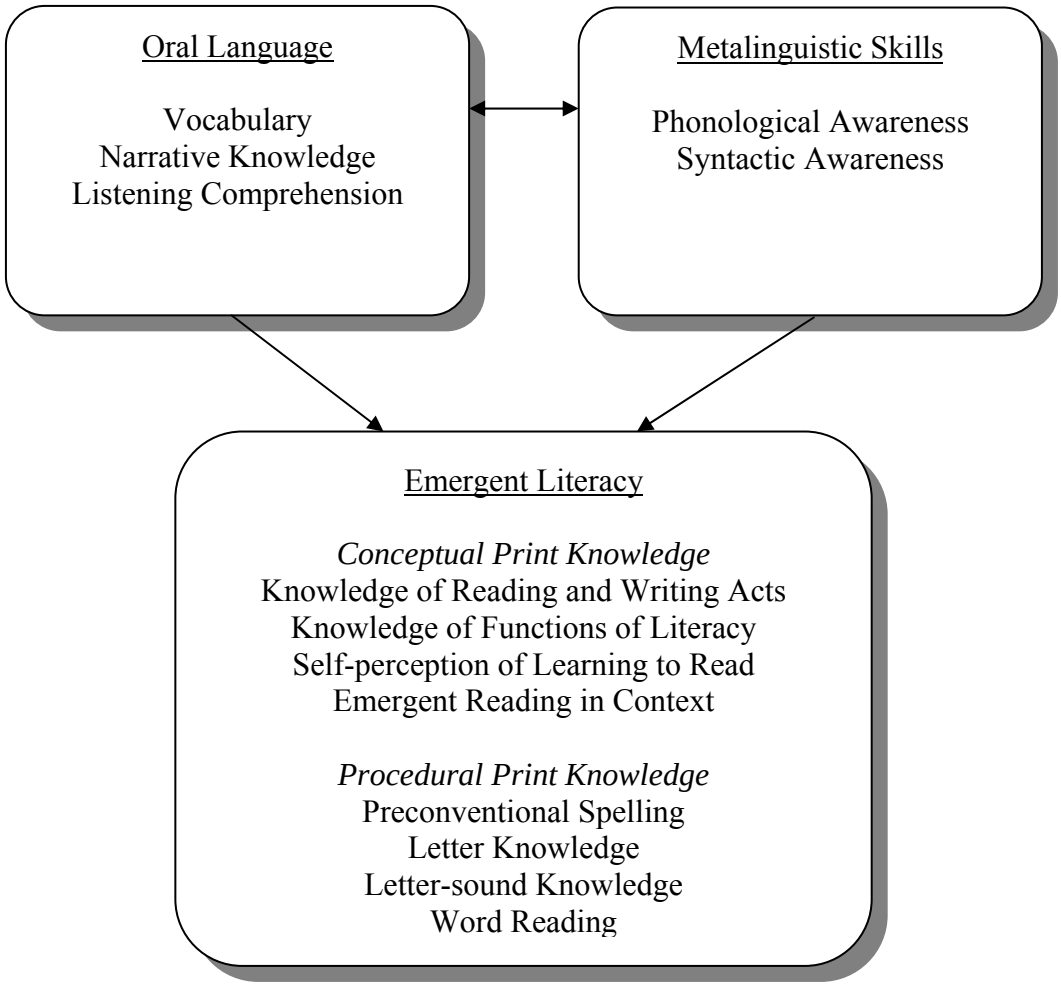

Figure 2. Model of Early Literacy (As described in Sénéchal et al., 2001).

will be able to identify factors that contribute uniquely to the development of emergent literacy skills. The emergent literacy model also identifies a number of interactions with print typically not evaluated in early literacy research, such as an assessment of children's self-perception of learning to read. Given the model introduces constructs that have received empirical little attention, this dissertation will focus on the differential role of constructs that are supported empirically in the literature and recognized as major pieces

of reading development. Herein, the term emergent literacy will refer to skills required uniquely for interaction with print. Early literacy will refer to all skills that facilitate and indicate development of reading skills, including emergent literacy.

Key Components for Successful Literacy Development

While the labels for skills that foster reading success may be somewhat inconsistent, the main ingredients are well established. In 2000, the National Reading Panel (as cited in Kauerz, 2002) established five criteria for development of successful reading ability based on copious research over the previous twenty years. According to this group, phoneme awareness, phonics, vocabulary development, reading fluency, and reading comprehension strategies are the five necessary components of reading success. Acquisition of these literacy, language, and metalinguistic skills are accepted as the structure of competent literacy ability (National Reading Panel, 2000, as cited in Kauerz, 2002).

The panel provides operationalized descriptions of each component, which will be the conceptualizations used herein. The panel explains that *phoneme awareness* represents the ability to hear, identify, and manipulate phonemes, which are individual sounds in spoken words, such as using the sound /c/ in cat (Kauerz, 2002). *Phonics* is the predictable relationship between phonemes and graphemes. A child who understands that the written letter C in cat represents the /c/ sound demonstrates knowledge of phonics. *Vocabulary development*, the development of stored information about the meanings, contexts, and pronunciation of words, facilitates *reading fluency*, or reading speed and accuracy, which is a more advanced reading skill. The final literacy

competency, *reading comprehension*, refers to children's understanding, recall, and articulation of what they have read (Kauerz, 2002), which is another advanced reading skill.

Developmentally, most children can read competently by about seven-years-old (DeBruin-Parecki, Perkinson, & Ferderer, 2008) and proficiently by grade three, or about age nine. Literacy disability can be determined by age eight, based on difficulties in language and linguistic development (Shapiro, Nix, & Foster, 1990). According to Yaden, Rowe, and MacGillivray (1999), the typical child meets the National Reading Panel's criteria for skillful reading by age seven. Children begin to progressively achieve relevant early literacy developmental milestones at birth. Literacy-related activities from birth, such as early exposure to sounds, words, and print, foster further development of early literacy skills (DeBruin-Parecki et al., 2008; North Central Regional Educational Laboratory, 2002). Development or delay of oral language at this age has major implications for future reading ability, as oral language will continue to be a major component of reading development into the early elementary years. According to Spira and colleagues (2005), children who start kindergarten with reading difficulties tend to remain behind their peers at least until grade four (Spira et al., 2005).

By two- or three-years-old, children's initial emergent literacy skills, such as identifying letters in their name, can be observed (DeBruin-Parecki et al., 2008; CPRDYC, 1998). Then, between age two and five, children begin to take their first steps towards achieving the five competencies for reading success by reaching developmentally appropriate levels of phoneme awareness, word knowledge, letter-sound

knowledge, and understanding of print concepts (e.g., understanding that print has purpose, meaning, and rules; CPRDYC, 1998). In the following section, these four developmental milestones for children ages two and five will be described in relation to the five competencies of reading success and in relation to the three major components of early literacy -- metalinguistic skills, oral language skills, and emergent literacy skills.

Metalinguistic Skills

Phonological Awareness. Phoneme awareness is the first of the four preschool milestones supportive of achieving the five reading competencies by age 7. Phoneme awareness and phoneme sensitivity are metalinguistic early literacy skills that predict oral language skills and word decoding (e.g., reading ability; Burgess, 2002; Burgess, 2006) and facilitate phonological processing of printed materials (Foulin, 2005). *Phoneme sensitivity* is a term that, similar to phoneme awareness, involves awareness and manipulation of phonemes, but additionally includes phoneme processing skills, such as rhyming, alliteration, and phoneme blending (Burgess, 2006). Phoneme sensitivity, phoneme awareness skills, and phoneme manipulation skills prime for learning letter sounds (de Jong, 2007) and aid in the development of letter naming skills and sound knowledge skills (Adams, 1990). According to the Sénéchal model, letter naming and sound knowledge skills are procedural emergent literacy skills.

For example, one study conceptualized phonological sensitivity as distinct from other emergent literacy skills and found that emergent literacy, oral language, home literacy activities, and age were each uniquely related to phonological sensitivity (e.g., rhyme oddity, alliteration oddity, blending, and elision) and accounted for 31.6% of the

variance in phoneme sensitivity among four- and five-year olds (Burgess, 2002). In this study, phoneme sensitivity was predicted by oral language and emergent literacy skills. Other studies have found that development of phoneme awareness is so critical to the literacy development process that children with phonemic awareness difficulties can be identified as at risk for developing reading disabilities (Torgesen, 1998; Vellutino, Scanlon, & Tanzman, 1998 as cited in Washington, 2001).

Phoneme awareness and sensitivity predict emergent literacy and decoding skills in older children (Burgess, 2006; Justice et al., 2005; Wagner, Torgesen, & Rashotte, 1994), while, in turn, oral language and emergent literacy skills continue to expand children's phoneme sensitivity skills (Burgess, 2002), which continue to foster reading skills. Metalinguistic skills, such as phoneme awareness and phoneme sensitivity, are strong predictors of later reading achievement (Sénéchal & LeFevre, 2002). This indicates that phoneme sensitivity aids in development of emergent literacy skills and assists with later development of conventional literacy skills by supporting phonological processing of print (Burgess, 2002; Burgess, 2006; Foulin, 2005).

The functionality of phoneme sensitivity in the literacy acquisition process evidences its early role in literacy development and supports Sénéchal and colleagues' (2001) proposal to characterize metalinguistic skills as distinct from emergent literacy skills. By acknowledging phoneme sensitivity and awareness as distinct from emergent literacy skills, researchers are able to investigate the differential role of metalinguistic skills in literacy development.

Oral Language

Word knowledge. Preschoolers' development of word knowledge is the second developmental step toward achieving the five competencies for reading success. Knowledge of words is assessed typically by an evaluation of their oral vocabulary because it is too difficult to tap into their word knowledge without the use of oral language. Oral vocabulary consists of expressive vocabulary skills and receptive vocabulary skills. Expressive vocabulary is a child's ability to accurately label or define words. In young children, expressive vocabulary often is measured by viewing pictures of objects or places and providing the correct name. Receptive vocabulary represents a child's conceptual understanding of words and their contexts. Children demonstrate receptive vocabulary by listening to a word and demonstrating awareness of the word's meaning. This is usually done by pointing, touching, or describing the object or given word. Oral vocabulary is the most popular aspect of oral language measured at this age, but it is not the only.

Listening comprehension and narrative knowledge are two other aspects of oral language defined within Sénéchal and colleagues' model (2001). However, these two constructs merit further research, and are not included in the National Reading Panel's five criteria for successful reading development and will not be covered in this review. This section will focus on oral language, as defined by expressive vocabulary and receptive vocabulary.

Receptive and expressive vocabulary are critical pieces of literacy development because they are essential for helping children to make sense of what is being read (Sénéchal, Ouellette, & Rodney, 2006). Early in development, vocabulary predicts phoneme sensitivity skills and facilitates both oral language and emergent literacy development (Bryant, MacLean, Bradley, & Crossland, 1990; Burgess, 2006; Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Sénéchal et al., 2006; CPRDYC, 1998). Children with larger vocabularies have better listening comprehension skills, which may be because they can integrate information in a story easier if they know the meaning of most of the words being used (Sénéchal et al., 2006). Vocabulary skills also provide the oral language necessary for future reading comprehension (Bryant et al., 1990; Sénéchal et al., 2006). In fact, early expressive and receptive vocabulary skills are connected to overall reading ability at grade 2 (Scarborough, 1991).

Some investigators have found that expressive vocabulary may have a stronger influence on reading ability than receptive vocabulary among young children and elementary age children (Scarborough, 1991; Ouellette, 2006). Expressive vocabulary facilitates phoneme awareness and growth in phoneme awareness (Sénéchal et al., 2006), which support word decoding and oral language. Receptive vocabulary, on the other hand, is important for word recognition in older children (Ouellette, 2006). Word recognition helps process words quickly during reading, which is a more useful skill once reading ability has been developed. Considering the limited research contrasting influences of expressive and receptive vocabulary on emergent literacy skills, it is unclear

which may be more influential, ultimately. In application, both are critical pieces of literacy development (CPRDYC, 1998).

Similar to phoneme skills, vocabulary skills share a reciprocal and synergistic relationship with emergent literacy skills. Vocabulary facilitates literacy development, and reading facilitates vocabulary development. Expressive and receptive vocabulary each influence reciprocal relationships found between phonemic, vocabulary, and reading skills. In general, literacy development is a dynamic process with many bidirectional influences. It seems essential that researchers begin to incorporate the multiple roles of early literacy constructs into the theoretical and statistical models of research studies to continue making progressive developments in our understanding of early literacy.

Emergent Literacy

Emergent literacy refers to specific mechanics and understanding of print that lead to conventional reading ability (Sénéchal et al., 2001; Teale & Sulzby, 1986; Sulzby, Branz, & Buhle, 1993). According to Sénéchal, emergent literacy can be considered in terms of two types of knowledge, conceptual, and procedural print knowledge. Conceptual print knowledge consists of understanding behavioral skills related to reading and writing, functions of literacy, self-perception of learning to read, and contextual emergent reading skills. Procedural print knowledge includes understanding letters, letter-sounds, preconventional spelling, and word reading. Emergent literacy skills are developmentally secondary to oral language and metalinguistic skills, which begin to develop first. This section will review letter-sound knowledge and print concepts, which

are the literacy skills found to emerge during preschool years and support reading ability as children develop.

Letter-Sound Knowledge. Letter knowledge and letter-sound knowledge are the next level of skill mastery for preschool children. Letter-sound knowledge, which is knowledge of letter names and knowledge of letter-sound associations, is a precursor to grasping phonics and an important piece of emergent literacy development. The first step of letter-sound association involves identifying letters. One study found that identification of letters, along with phoneme sensitivity, uniquely account for half of the variance in kindergarten and first grade decoding skills (Lonigan et al., 2000). Letter naming is associated with print concept knowledge (Molfese, Modglin, Beswick, Neamon, Berg, Berg, & Molnar, 2006) and emerging spelling skills (Sénéchal et al., 2006). Letter naming skills predict children's later reading ability (Adams, 1990; Kirby, Parrila, & Pfeiffer, 2003; Wagner et al., 1994). Knowledge of letter names also facilitates phoneme sensitivity, phoneme awareness, development of phonics skills, and phonological processing of print (Adams, 1990; Foulin, 2005; Molfese et al., 2006; Sénéchal et al., 2006; Wagner et al., 1994).

The Committee on the Prevention of Reading Difficulties in Young Children (1998) recommends that letter-sound awareness is one of the more developmentally advanced emergent literacy skills that should be acquired before kindergarten entry. Letter-sound awareness builds upon letter naming skills and requires phonological awareness. Letter-name awareness often involves purposeful guidance at home or in preschool. Still, letter-sound awareness can be taught easily to children at this age (de

Jong, 2007) and is a critical piece of learning the functional knowledge of the principles and symbols of the alphabetic writing system (CPRDYC, 1998). This functional knowledge is called the alphabetic principle and it represents many children's first understanding of print.

The Committee on the Prevention of Reading Difficulties in Young Children's (1998) reviewed research investigating the relationship between letter-sound awareness and children's grasp of the alphabetic principle. They concluded that neither letter-sound awareness nor phoneme awareness were sufficient to support acquisition of the alphabetic principle, which is essential for reading. The studies found that children's reading success required the combination of letter-sound awareness and phoneme awareness skills.

Similar to expressive and receptive vocabulary, expressive and receptive letter-sound awareness represent two distinct types of letter-sound awareness. Interestingly, few studies differentiate the two skill sets. Differences in the measurement of letter-sound awareness restrict the strength of conclusions made from studies of letter-sound skills. There are few standardized measures of letter-sound awareness. Many investigators develop study-specific measures.

Letter-sound recall and letter-sound recognition are the most frequently reported types of letter-sound awareness measures (Dodd & Carr, 2003). Assessment by letter-sound recognition and letter-sound recall are qualitatively different (Dodd & Carr, 2003). Letter-sound recall is measured by asking children to provide the sound of a given letter, whereas letter-sound recognition tasks provide the sound and asks children to provide the

corresponding letter (Dodd & Carr, 2003). One study demonstrated that letter-sound recognition is more fully developed in young children than letter-sound recall, which seems to develop a bit later (Dodd & Carr, 2003).

Early literacy research often measures letter-sound awareness, without designating whether the assessment utilized is evaluating letter-sound recognition or letter-sound recall. Outcomes of investigations on letter-sound awareness are then related to earlier studies on both letter-sound recognition and letter-sounds recall, without distinction. As a result, the influence of letter-sound awareness in studies of emergent literacy is often small and the respective role of both letter-sound recognition and letter-sound recall is still unclear.

Concepts of print. Three of the key concepts emergent readers must understand about print are that 1) book reading has conventions (i.e., reading left to right); 2) spoken words map onto printed words; and 3) print has purpose and meaning (Clay, 1998). Book and print orientation skills are important for directing and filtering children's attention during reading tasks (Clay, 1998). Knowing which direction a book should be opened or a page should be read primes early readers to take in text in books accurately. Being able to identify text amidst pictures and other symbols in books helps to support word recognition skills and improves reading fluency, which facilitates reading comprehension as children develop (Kauerz, 2002).

Difficulty measuring children's understanding of print concepts has created challenges in understanding the influence of print convention knowledge in overall emergent literacy development. Despite the central role of print awareness in conceptual

models of early literacy (Sénéchal et al., 2001; Justice et al., 2005), one study indicated that knowledge of print concepts in preschool may not contribute as strongly to kindergarten and first grade reading skills as previously theorized (Lonigan et al., 2000). To understand mechanisms that might underlie this finding, another group of researchers identified 13 major violations of print conventions in the English language (Levy, Gong, Hessels, Evans, & Jared, 2006). They used these violations as indicators of children's ability to discriminate between correct print conventions and incorrect print conventions (Levy et al., 2006). Violations such as spacing, linearity, and letter-number combination were classified into three major groups of violations, which included shape, orientation, and spelling. With this expansive operationalization of print concepts, the authors concluded that knowledge of print concepts was a better predictor of early reading skills than phoneme sensitivity among four- and five-year-old children in the study (Levy et al., 2006).

The authors' identification of 13 individual indicators and three major categories of print conventions demonstrate that measurement of print concepts should be varied and precise. Levy and colleagues found a number of developmentally appropriate indicators that might relate to children's emergent literacy development. These indicators can be used to improve evaluation of children's print concept skills and to expand our understanding of children's print concepts.

Sex Difference in Early Literacy.

It is unclear why sex differences are rarely measured in early literacy literature (see Ready, LoGerfo, Burkam, & Lee, 2005 for a brief review). Many investigators do

not report whether sex differences were evaluated before hypothesis testing. There are several reasons this could be true. There may be a lack of theoretical implication for sex difference. It could be also that investigators test for sex differences and do not report null findings. Researchers may not consider sex relevant for evaluation. Though it is not possible to ascertain why so many investigators do not evaluate the influence of sex on literacy development, among those who have, the implications of their findings are still uncertain. While some authors have reported no significant sex differences among early literacy skills (e.g., Dodd & Carr, 2003; Doctoroff, Greer, & Arnold, 2006), it is important to consider the research of those who have found differences.

It has been suggested that girls may have better-developed early literacy skills than boys of the same age might have (Justice et al., 2005; Qi, Kaiser, Milan, & Hancock, 2006; Ready et al., 2005; Restrepo, Schwanenflugel, Blake, Neuharth-Pritchett, Cramer, & Ruston, 2006). One study evaluated data on over 8,000 boys and 8,000 girls and found that girls entered kindergarten with more developed early literacy skills and made more gains throughout the kindergarten year than did boys (Ready et al., 2005). African American girls have been shown to outperform African American boys in receptive vocabulary skills during preschool years and in kindergarten (Qi et al., 2006; Restrepo et al., 2006).

Studies are particularly prone to finding differences between boys and girls when behavioral or dispositional differences are examined. In the same study, evaluating 16,000 children, teachers reported that girls used more constructive approaches to learning, demonstrated more self-control in the classroom, used more productive

interpersonal skills, and displayed fewer internalizing and externalizing behaviors than did boys. Of these dispositional differences observed by teachers, the strongest predictors of early literacy learning were the positive, prosocial behaviors. The high prevalence of problem behaviors among boys was less critical to early literacy learning than the absence of the positive (and potentially academically engaging) prosocial behaviors (Ready et al., 2005).

It is also important to note that the female sample had fewer outliers on each of the behavioral measures than did the male sample. Behavioral and oral language studies have found that males tend to have more variability in scores than females, who tend to have fewer scores in the extremes (Ready et al., 2005; Qi et al., 2006). This may reflect the presence of biological influences on behavior at a very early age or early influences of differences in social context that have already begun to shape children's behavior and learning before the start of school. Interestingly, the parents of girls tended to report reading to their children more than did parents of boys (Ready et al., 2005). Again, the socio-economic influence of the parent's expectations and responses to their children was unaccounted for in this study.

Racial Differences in Early Literacy

The role of race in the early literacy literature often is confounded by education and income differences. Many African Americans[1] in the early literacy literature tend to be involved in social service programs (i.e., reduced lunch programs or Head Start) or otherwise classified as having a low income. While income is a relevant co-variable

[1] The term African American includes all study participants who identify as Black or of African descent.

influencing educational outcomes, it is important that income be measured as distinct from racial and sociocultural influences (Washington, 2001).

In studies of early literacy, race is rarely investigated across income and educational levels, and examination of cultural influences on literacy development is even less common in American early education literature. As such, we know much about the effects of poverty and other risk factors, and very little about the effect of various cultural practices and beliefs.

Sociocultural differences in literacy practices have been observed among African Americans and other groups when participants' income and education are closer to equitable (Washington, 2001). For example, among African American children, it has been found that African American mothers' reading style and responsiveness while reading to their children is a better predictor of children's vocabulary skills than exposure to print or frequency of book reading (Roberts, Jurgens, & Burchinal, 2005).

In a review of early literacy research among African Americans, Washington (2001) found that African American parents, regardless of income level, believed that reading instruction prior to the start of kindergarten was nonessential to school success. Parents expressed having the expectation that their child's reading instruction and skill development would begin in school. As a result, many African American children enter school with fewer early literacy skills than other children. Indeed, once African American children enter kindergarten, similar rates of reading ability are observed by the end of the school year (Washington, 2001).

Results from the review demonstrate that differences in cultural beliefs and practices influence children's reading skill level at school entry, but do not fully account for differences in student's performance as they progress throughout the year. For African Americans or any large demographic group, within-group differences in income, education, neighborhood, and other factors, are too diverse to yield predictors able to account for variance in early literacy skill development. Instead, identification of more specific cultural beliefs or exploration of unique individual or family characteristics, such as family literacy practices or beliefs about education, might yield results that are more fruitful.

Methodological Challenges to Evaluating African Americans' Early Literacy Skills.

One of the largest challenges to measuring African American children's literacy skills seems to be identifying what to measure. In the past, researchers have reported that African American children are not exposed to much printed material at home (Scarborough, Dobrich, & Hager, 1991). However, more recent research points out that few studies evaluate the wide variety of print to which children are possibly exposed, such as street signs, bus schedules, labels, coupons, and other familiar print regularly utilized in children's surroundings (Washington, 2001). One investigator expressed that, in neglecting to measure these types of environmental print, researchers are likely underestimating the level of print exposure, and perhaps early literacy skills, present among African American children (Washington, 2001).

Of Sénéchal and colleagues' (2001) three branches of early literacy, oral language among African American children has received much attention. Few studies have

evaluated the uniqueness of metalinguistic skill development, or early literacy skill development, among African American children. However, accurate measurement of expressive and receptive vocabulary to evaluate oral language has been important for many researchers who have sought to understand emergent literacy and language skills among African American children. The following section will review measurement of expressive and receptive vocabulary among African American children in emergent literacy and language studies.

Measurement of expressive language among African American children. African American English is a systematic, rule-governed dialect with distinctive syntax, phonology, morphology, and pragmatics (Washington, 2001). In 2006, Connor and Craig found that preschool children's use of African American English and emergent literacy skills shared a U-shaped relationship, in which children who used forms of African American English "very frequently" or "very infrequently" performed better on rhyming, letter-word recognition, and sentence imitation emergent tasks, measured during the spring. Interestingly, during fall testing, there was a strong positive relationship between children's vocabulary skills and use of African American English. However, in the spring, these differences were no longer significant (Connor & Craig, 2006).

While the study did not assess what might have caused the change in relationship between African American English and vocabulary during the school year, it seems that socialization of preschool children to the language used in the classroom might have influenced spring scores. An earlier study found that use of African American English is related to lower socioeconomic resources and male sex (Washington & Craig, 1994). In

this study of preschoolers with lower socioeconomic resources, African American English use was related to male sex, age, and lower Standard American English vocabulary skills. These authors suggest that the use of African American English is more strongly related to environment, socioeconomic resources, and male status, than racial status alone.

Preschoolers in the Connor and Craig (2006) study tended to use, on average, a range of 2.9-3.8% African American English language on tasks eliciting use of Standard American English language (Connor & Craig, 2006). Of note, 27% of children sampled used African American English on the sentence imitation task that asked children to repeat verbatim a sentence in Standard American English. Eighty-seven percent of children used African American English on a free-response task requiring children to invent a story using a sequence of pictures from a wordless storybook (Connor & Craig, 2006). Most children used African American English on the free response story-telling task, but avoided using African American English on the imitation task, where the expectation of Standard American English was explicit.

When the expectation for a response in Standard American English is implied, not explicit, some children are likely to perform lower than their actual abilities due to an inability to discriminate when to use Standard American English or African American English. However, expressive language measures typically imply that Standard American English is necessary and often require children to provide a verbal answer that fits standardized criteria for a correct response.

The Expressive Vocabulary Test and the rapid picture-naming test are two popular types of expressive language measures that imply use of Standard American English. The Expressive Vocabulary Test is an expressive language measure that was developed, normed, and correlated with the Peabody-Picture Vocabulary Test (PPVT-III), which is a measure of receptive vocabulary (Thomas-Tate, Washington, Craig, & Packard, 2006). The Expressive Vocabulary Test requires that correct responses be produced as verbal expression of words, as very young children are unable to spell, read, or write. Children providing the expected, standardized response are presumed to have the targeted skill or knowledge. Children who have an understanding of the target concept or are able to perform the targeted skill might not be credited for their response if they fail to produce the desired, standardized response.

A study evaluating the validity of the PPVT-III and the Expressive Vocabulary Test for African American children found that African American children scored an average of eight points lower than Caucasian children scored on the Expressive Vocabulary Test (Restrepo et al., 2006). However, neither differences in ethnicity, nor differences in maternal education, predicted children's scores on the measure. The score differential is presumed to be related to true differences in language. The Expressive Vocabulary Test has demonstrated adequate sampling of skills across children of different ethnicities, sexes, neighborhoods (rural vs. urban), and socioeconomic statuses (Thomas-Tate et al., 2006). In sum, research suggests that the Expressive Vocabulary Test represents an appropriate measure for adequately assessing expressive language among African American children.

The rapid picture-naming task is another popular expressive language measure. On this task, children verbalize the name of pictures being presented sequentially over a specified amount of time. Little research has evaluated validity of this task among African Americans. However, similar concerns exist regarding the susceptibility of African American English responses, though Standard American English responses are desired. Given that the specific items on rapid picture-naming tasks are different from the Expressive Vocabulary Test, and from one another, these measures should be evaluated with intended populations before they are selected for research or classroom evaluation.

Investigations of African American English provide relevant considerations for understanding the validity of expressive language tasks among African American children. Depending on the goal of measurement, investigators and educators should consider whether it is most informative include or exclude information pertaining to children's abilities with African American English language skill.

Measurement of receptive language among African American children. The Peabody Picture Vocabulary Test, Third Edition [(PPVT-III), Dunn & Dunn, 1997] is a measure of receptive vocabulary skills that has received widespread usage in the literacy and language field because it is easy to administer and minimizes the influence of expressive vocabulary and oral language by requiring children to point, not verbalize, their responses. This section will discuss research evaluating the use of this well-investigated measure to illustrate challenges and considerations for assessing receptive language among African Americans using nationally standardized measures.

Studies have found that means for African American children tend to fall consistently below the standardization mean (Thomas-Tate et al., 2006; Washington & Craig, 1999). The use of supportive narrative language instead of standardized instruction increases these scores (Washington, 2001) and suggests a culturally relevant test-taking style that could adversely affect African American students. Similar to studies of expressive language, research identifying mean differences in scores on the PPVT-III suggests that performance may be better accounted for by children's environment and the type of language available in the child's environment than by children's racial status (Padilla, Boardman, & Hummer, 2002).

One study sampling 482 African American preschoolers found that maternal education, marital status, and number of children in the family uniquely contributed to variability in PPVT-III scores, with maternal education being the strongest contributor (Qi et al., 2006). The study authors attributed differences in performance on the various language tests in the study to possible deficiency in knowledge-related vocabulary rather than a difference in ability (to learn language). However, 29% of their sample was classified with language delay, as defined by receptive vocabulary performance two standard deviations below the standardization sample mean (Qi et al., 2006). Given the sample population, it is difficult to assess whether this attribution is accurate. The authors credited differences in scores to poverty effects rather than race or culture (Qi et al., 2006).

Padilla and colleagues (2002) also suggested that race differences in mean scores from other studies might be better accounted for by income level, parent education level,

neighborhood, school district, and the availability of a language-rich environment, among other factors. Unfortunately, comprehensive validation studies and investigations of within group differences are yet to be found. Most studies evaluating validity or bias tend to utilize small, geographically limited samples of African American children, which may offer skewed results of true variation in national scores and restrict equitable comparison to the original standardization sample.

For example, one study attempted to identify the unique influences of neighborhood, socioeconomic status, gender, and race. Study investigators assessed receptive vocabulary of 165 three- to five- year old African American children from low and middle socioeconomic status using the PPVT-III. They found a mean score of 96.2, which is four points lower than the standardization mean of 100. Given that the standard deviation of scores was 11.45 and the scores were not normally distributed (77% of scores fell within one standard deviation of the mean), it is difficult to know how the distribution might spread if the sample size were larger (Thomas-Tate et al., 2006).

Despite having a small, restricted sample, Thomas-Tate and colleagues (2006) found a neighborhood-income interaction with children from neighborhoods with more educated parents and higher income performing better than children from other environments performed. This finding was relevant for males and females. Kindergarten girls performed better than preschool girls did; however, kindergarten and preschool males yielded similar scores (Thomas-Tate et al., 2006). This study suggests that neighborhood, family income, and sex might be more predictive of early literacy scores than race or ethnicity.

Another study evaluating the validity of the PPVT-III in an African American sample recruited 59 African American preschool children from a metropolitan area and obtained a normal distribution of scores (Washington & Craig, 1999). The mean standard score for the PPVT-III was 92 (SD = 11). Disproportionate scores of a single group's performance on a measure is not sufficient evidence to determine test bias because this method does not rule-out other possible explanations for the disproportion. Accordingly, further examination of language scores and social status variables suggested that performance on the PPVT-III was related to maternal education (Washington & Craig, 1999). Based on evidence from this study, the authors concluded that the PPVT-III is not biased and recommended that it be used as part of a larger assessment battery used to evaluate language in African American children (Washington & Craig, 1999). The study's small sample size, again, complicates interpretation.

The mean PPVT-III score for African American children in another study was 84, which was significantly lower than the mean of 102 for Caucasian children (Restrepo et al., 2006). Mother's educational level predicted score differences on the PPVT-III and yielded a 26-point difference between scores of children with mothers who did not complete high school and mothers who completed college. Importantly, the interaction between ethnicity and maternal education was not significant, which, once more suggests a greater influence of socio-environmental characteristics over race or culture alone (Restrepo et al., 2006).

Restrepo and colleagues (2006) also completed an item analysis, which revealed ten items on the PPVT-III with differential functioning between the two groups. Of these

ten items, three items favored Caucasian students and ten items favored African American students (Restrepo et al., 2006). In this study, item bias on the PPVT-III seemed to affect adversely both groups.

These studies illustrate some of the challenges in isolating the role of race, culture, and language differences among African American children. They demonstrate why the role of these factors remains inconclusive, even in areas with prolific research. In order to better assess the validity of the PPVT-III for use in African American samples, there is a need for studies evaluating within group differences among African American children. Factors such as parent education, socioeconomic status, family income, literacy environment, strategies in book reading, mother-child interactions, frequency of library visits, parent print exposure, and number of children in the family may better account for differences previously attributed to race and may offer more information about the true factors influencing performance.

Differences in language development and differences in literacy practices at home play a significant role in literacy development. These differences seem to complicate accurate measurement of early literacy skills among children who are not socialized to school culture, particularly when assessment involves oral language.

Family Differences in Early Literacy

Much of the conceptual research on early literacy is conducted with Caucasian children from middle-income backgrounds. This presents a challenge in understanding emergent literacy among children from other backgrounds because differences in language, home environment, values, traditions, and culture are often not weighed.

Literacy learning, being a socio-environmental process, might unfold differently among children from various social environments. Therefore, it is important to view early literacy research through a framework that recognizes this possibility. It is for this reason that many researchers use a socio-constructivist and/or ecological framework to explain literacy skill development. These perspectives will be discussed later in this review. This section will discuss empirical findings in early literacy research as it pertains to differences in family background.

Literacy and language skills develop as a function of proximal environmental influences and cognitive capabilities (Lonigan, Bloomfield, Anthony, Bacon, Phillips, & Samwel, 1999). Children with fewer literacy or language resources in their environment, such as modeling of literacy-related behaviors, access to a variety of printed materials, and experiences with diverse vocabulary, tend to have a difficult time acquiring language and using print (Burgess, Hecht, & Lonigan, 2002; van Steensel, 2006).

While children from families with low income are more likely to attend substandard schools (CPRDYC, 1998), they often enter school with less developed language skills and fewer experiences with books than do other children (Washington, 2001). Early exposure to words, print, and sounds are critical for literacy and language skill development (North Central Regional Educational Lab, 2002; Lonigan et al., 1999). Children entering kindergarten without adequate emergent literacy and language experiences tend to have delays and difficulties in reading and in other areas of academic functioning throughout their primary school education.

Children from families with low income tend to have parents with lower levels of education than those with middle or high incomes (CPRDYC, 1998). Families in which parents have not attained post-secondary educational training tend to use fewer printed materials and less complex language in their daily lives than families with parents having high levels of education (CPRDYC, 1998; van Steensel, 2006). In the Netherlands, one study asked parents to describe the use of literacy, language, and print by family members living in the home (van Steensel, 2006). Children with high exposure to print, via interaction with print and observation of family members' use of print, performed highest on study-specific literacy measures of oral language, metalinguistic awareness, and print concepts. They also tended to live with mothers having higher educational degrees (van Steensel, 2006).

Children with exposure to fewer parent/sibling literacy behaviors scored significantly lower on all early literacy measures and tended to come from families with mothers who have vocational training or junior secondary educational level (van Steensel, 2006). Children from families with low financial, educational, or social resources that have difficulty offering time, experiences, and resources necessary for literacy and language development are often deprived of these important skill-building activities (van Steensel, 2006). However, studies such as the one reviewed here often fail to quantify environmental print, which are more commonly used by African American families and families of lower income (Washington, 2001).

Maternal education and income have been longtime indicators of the quality of children's literacy background. The implied environmental characteristics, which were

lack of educational and financial resources, were believed previously to be the source of difference in children's preparation for literacy experiences in school. Further refinement and understanding of varying income and education levels have led researchers to question assumptions about this seemingly direct relationship between status and educational outcomes. It is now evident that there is variability within income levels and education levels that reflect differences in use and type of printed materials, literacy-related values, and reading style. These differences, among others, better discriminate contextual contributors to emergent literacy development than do social groupings. Literacy experiences are now better quantified, at school and at home, by evaluating factors relating more directly to literacy.

Home Literacy Environment (HLE). HLE refers to the level of exposure to literature in the home (Burgess et al., 2002). In lieu of socially constructed or broadly defined group demographic labels, many investigators have begun to assess how the quality of a child's home environment influences literacy skill development. For example, evaluation of the home environment can take into account the role of parent's education, reading beliefs, and literacy practices (Roberts et al., 2005), as well as many other parent, sibling, family, or neighborhood nuances that might influence children's literacy development.

HLE incorporates all family and environmental factors evidenced to facilitate or hinder literacy skill development into a single socio-environmental indicator. It consists of behaviors and environmental characteristics, which tend to be more amenable to

intervention than family demographics, such as income level. This section will review conceptualizations of the HLE and examine trends in HLE research and assessment.

Conceptualization of the HLE. The level of exposure to literature in the home can be evaluated with respect to known literacy-related behaviors associated with positive literacy outcomes or atypical literacy outcomes. It can also be an assessment of all interactions with print and an evaluation of their relations to early or emergent literacy. The aspects of the home environment that are assessed vary based on the information the investigator would like to obtain, operationalization of HLE, and measurement of the HLE. Findings of associations between the home literacy environment and emergent literacy skills have been inconsistent because of the different ways that the HLE is being defined and measured.

Due to lack of consistency in HLE classification in the literature, there are few dominant terms, measures, or aspects of the home environment. Burgess and colleagues (2002) attempted to better classify HLE and identified four possible conceptualizations of HLE; they conceded that HLE can be defined several ways and should be acknowledged specifically in research. They also indicated that the four conceptualizations-- active, passive, limiting, and interactive HLE-- could be combined to capture the varying influences on the HLE. *Overall HLE*, a fifth conceptualization, incorporates measurement of each of the four environments. A *limiting home literacy environment* is defined as being compromised by the parents' ability to provide a literacy and language rich environment. An *active home literacy environment* consisted of an environment including child participation in literacy activities. A *passive home literacy environment*

included literacy activities observed by the child. An *interactive HLE* combined active and passive HLEs.

Using Burgess and others' (2002) conceptualizations of HLE, different language and literacy indicators are necessary to examine the many varied aspects of the HLE. Each conceptualization will yield outcomes emphasizing the influence of the cluster of factors examined. It is critical to recognize this limitation in interpretation of findings to avoid having outcomes that are biased or misconstrued. For example, using an interactive conceptualization of HLE, Foy and Mann (2003) found that parent education did not directly affect language skills in small sample of parents with high school degrees or higher. When examining language and literacy skills by differences in home environment, they found that active aspects of HLE were related to phoneme awareness, rhyme awareness, vocabulary, letter knowledge, and speech discrimination, whereas passive aspects were related to phoneme awareness skills and rhyme awareness skills, but were only indirectly associated with vocabulary and letter knowledge. Most studies do not evaluate HLE from more than a single perspective. However, this study illustrates the divergent conclusions that can be made about the relationship of study variables, based on different conceptualizations of the HLE.

Building on the work of Burgess and others (2002), the aforementioned study by van Steensel (2006) hoped to better account for the variability of HLEs existing within different ethnic groups and groups of different levels of socioeconomic status. Similar to the Burgess study, factors were separated by parent literacy activities and child literacy activities. Factors reflecting functional use of language and print and factors reflecting

personal use also emerged. Two child factors emerged reflecting activities that parents perceive as highly important or less important for their child's academic development. Two additional factors, which were family factors, reflected parent and sibling use of literacy for pleasure and for daily living. An enriched HLE was classified as containing activities from all four environment-types (van Steensel, 2006).

Families providing an enriched HLE displayed a high frequency of behaviors from all four factors. In the child-directed HLE, there was a high frequency of literacy behaviors involving the children and a lower frequency of adult/sibling literacy behaviors. The author concluded that these families value literacy for their children, but not for themselves. Finally, an impoverished HLE reflected few literacy behaviors in any of the four factors (van Steensel, 2006). HLE type differed significantly by ethnicity and mother's educational level. While the child-directed HLE was comparable across parent education levels, the enriched and impoverished HLEs were dominated by ethnic majority families and ethnic minority families, respectively (van Steensel, 2006). Despite this covariance, the author concluded that the HLE types were able to identify socio-cultural differences in home literacy behaviors.

While van Steensel's findings fit with those in the literature, his aim was to identify behaviors and patterns not typically examined in the literature. The types of literacy behaviors examined were no different from those studied in previous studies (e.g., shared reading, making shopping lists, library visits). While it is possible that the findings reflect true differences among the samples under study, there were no manipulation checks to support this conclusion and to rule out alternatives.

Van Steensel's conceptualizations provide useful information about HLE differences in education and ethnicity. However, as these two characteristics vary so strongly with his measurement of HLE, Burgess and cohort (2002) might have captured more variability because they did not force groupings. Rather, there is room to account for positive and limiting aspects, not just an absence of positive behaviors, and these can be facilitated by anyone, not just siblings and parents. Inclusion of important figures outside of the traditional nuclear family is important with non-dominantly represented ethnic groups that may have non-traditional family structures.

Measurement of the HLE. Some of the common indicators used to quantify the HLE are exposure to print and printed materials, recognition of book titles or popular authors, frequency of literacy teaching behaviors, preference for various teaching methods, parent's reading activities, exposure to reading-related media, and number/type of literacy resources found in the home. Given the number and type of varied methods for evaluating HLE, several studies might evaluate different aspects of the HLE and rate the quality of a single family's HLE quite differently from one study to another.

Roberts, Jurgens, and Burchinal (2005) used an active conceptualization to evaluate HLE annually among African American children from families with low-income. Most mothers had completed high school; half of the mothers had education beyond high school. For this group, results indicated that the volume of books available or used in the home was less important than the parent's responsiveness to children during reading and their use of varied reading strategies. Findings showed that reading frequency, child enjoyment of reading, and quality and responsiveness of home

environment were not related to child's language and literacy development, whereas maternal sensitivity during reading was related to child's level of receptive vocabulary. Mothers who used more book reading strategies had children with higher vocabulary scores over time. Regardless of variability of reading frequency, these reading techniques may have assisted children in assimilating the new information gained from reading exposure.

Another study measured an active HLE using frequency indicators, such as frequency of storybook reading at bedtime and at other times, number of books in the home, and frequency of parent teaching of alphabet, reading words, and printing words (Sénéchal & LeFevre, 2002). These were split into measures of exposure to books, as measured by book reading frequency, and parent teaching. Parent teaching in kindergarten predicted alphabet knowledge and grade 4 reading fluency. Book exposure directly predicted kindergarten oral language and reading for pleasure in grade four. Frequent parent teaching was uniquely related to emergent literacy skills despite the influence of oral language skills, metalinguistic skills, and family background factors, whereas storybook exposure was no longer a significant predictor of emergent literacy after controlling for these influences (Sénéchal & LeFevre, 2002). Book exposure has been better uniquely related to grade 1 reading and receptive language, after controlling for age, parent print exposure, receptive language, and emergent literacy (Sénéchal & LeFevre, 2002). In the study, book exposure and parent teaching, which are two common measures of HLE, were unrelated to each other and were each associated with two

different pathways to emergent literacy, oral language, and phoneme awareness and two differential relations with child outcomes.

Given the important role of parent teaching in later reading ability, the authors of these studies proposed that researchers seek to understand better why and how some parents teach their children and how parents can continue to provide support for word reading. It is unclear why parent teaching in kindergarten has such long-term literacy benefits. Studies examining this relationship further would be of value to teachers who often suggest helpful strategies to parents. Additionally, the moderating effects of socioeconomic status warrant further investigation to examine whether there are differences in the significance of parent teaching for different groups.

With different methods of measurement, it is difficult to identify which aspects of the home environment are most critical. Continued comprehensive assessment of the HLE focusing specifically on the family and environmental aspects associated with literacy development will expand our understanding of literacy-related influences among different groups and different household types. Further research in these areas will soon enhance the efficacy of our interventions.

The Book Title Checklist. The above-mentioned study found that book exposure better accounts for language development (Sénéchal & LeFevre, 2002), than parent literacy teaching, which is more directly related to literacy skills. When parents spend time with children's books, they tend to become familiar with the titles of the books they read to their children. Parent's storybook knowledge provides information about the parent's familiarity with children's books as well as the child's exposure to books outside

of the classroom. The book title checklist was first used to measure print exposure in adults (Stanovich & West, 1989). The Title Recognition Task, as a measure of print exposure, has been linked to reading ability and has strong evidence of reliability (Cunningham & Stanovich, 1997). In 1996, Sénéchal, LeFevre, Hudson, & Lawson adapted the measure for use with younger children in order to assess emergent literacy. This section will review the development of the Child Title Checklist as a measure of HLE.

Sénéchal et al. (1996) have demonstrated that knowledge of storybooks is a reliable predictor of young children's vocabulary skills through a series of development and validation studies using middle class children from a large Canadian city. They evaluated the relationship between parent's knowledge of book titles and popular children's authors and found that the two were highly correlated. They combined the two measures as a single indicator of book knowledge. This indicator accounted for unique variance in child vocabulary, independent of parent education/literacy level and child intelligence and better-predicted child vocabulary than parent reports of frequency of reading.

In their study, child interest in reading, frequency of book reading, number of children's books available, and questions pertaining to library usage were also related to vocabulary knowledge. However, number of children's books in the home failed to explain significant variance in vocabulary scores after controlling for parent's storybook knowledge. Reading onset, number of stories read per week, and frequency of solitary

reading were also unrelated. The checklists were stronger predictors of language skills than frequency measures.

Spearman-Brown reliability coefficients for the Child Title Checklist and Child Author Checklist were .86 and .88, respectively. Children's interest in books and frequency of library visits explained an additional 5% and 4% of variance, respectively. This offers evidence of construct validity as the measures account for the influence of resources in the home environment, but do not mediate emergent literacy and language skills influenced by factors relatively independent of the home environment, such as library visits and child interest in books. This is also a drawback of using the storybook knowledge as a proxy for frequency of book reading (also called print exposure), as library visits can possibly be a part of a child's home literacy experience.

In a study by LeFevre and Sénéchal (1999), parent's storybook knowledge was related to children's oral language. Amount of teaching about reading and writing were related to children's acquisition of writing skills. Reliability indicators suggest stability of these two relationships. Results provide further support for a distinction between two aspects of home literacy experiences based upon differential influences upon oral and written language, implying that home literacy experience is not a unitary construct. Storybook knowledge and parent teaching may be independent experiences with different links to different skills and to reading acquisition.

Consistent conceptualizations and accurate measurement of the home literacy environment are necessary to maximize application of findings. Studies that articulate a

clear conceptualization and select valid measurement tools provide the most useful information for those who develop these critical skills in children.

Individual Differences in Emergent Literacy Development

Apart from the environmental differences that influence diversity in development of emergent literacy and language skills, each child brings his or her unique social, temperamental, cognitive, affective, and other individual characteristics to these environments. Children's phenotypic features influence how they absorb and respond to literacy in their environments. Some characteristics, such as information processing skills, prime children for interest or engagement in literacy activities. Other characteristics, such as inattentiveness, make it challenging to benefit fully from guidance and instruction in literacy-rich activities.

Few studies have examined the influence of individual differences among young children in school settings because, until now, these differences were less likely to have meaningful consequences before kindergarten entry. With more group activities for reading and increased structure in preschools, there are now greater demands for inhibition among young children and greater consequences for behavior, temperament, and maladaptive emotionality that are not conducive to the preschool learning environment. This section will provide an overview of research on key areas of individual difference associated with classroom behavior, classroom performance, and emergent literacy.

In general, individual characteristics found to be beneficial in dealing with adjustment and overcoming challenges include good intellectual functioning, being

sociable, having self-efficacy, having high self-esteem, and possessing talented abilities (Werner & Smith, 1992). Many of these characteristics were brought to light by Emmy Werner who found that certain dispositional attributes, such as activity level, sociability, competence, and internal locus of control were protective for children with significant life stressors before age two (Werner & Smith, 1992). In the classroom, these resources promote healthy social, emotional, and cognitive development that prime children for taking in new lessons at school and allow them to deal well with the challenges of novel tasks, new rules, and different settings. Emergent literacy investigators have evaluated the relevance of these characteristics for the acquisition of literacy skills and learning in the classroom.

Empirical findings suggest that cognitive skills (Vellutino & Scanlon, 2001) and temperament (Coplan, Barber, & Legacé-Séguin, 1999) are associated with early literacy achievement. Consistent with earlier studies, one study found sex, parent education level, and children's intelligence were strong predictors of preschool achievement and early literacy (Coplan et al., 1999). However, the study found that the relationship between temperament and preschool achievement did not vary based on sex, parent education level, or vocabulary skills and that temperament contributed uniquely to early literacy skills greater than parent education level, vocabulary, and sex differences (Coplan et al., 1999).

Aspects of temperament, such as emotionality, activity level, and attention have a strong conceptual and empirical connection to early school success (Coplan et al., 1999). Attentiveness and task-persistence, which can include such behaviors as constructive

approaches to learning, self-control, and productive interpersonal skills, are prosocial behaviors found to be associated with higher early literacy skills (Ready et al., 2005). Task-focused behavior is also predictive of later word decoding skills in older children (Stephesson, Parrila, Georgiou, & Kirby, 2008). However, in one study, the collective influence of family literacy behaviors, parents' reading beliefs, children's cognitive skills, and children's language skills outweighed the influence of utilizing task-focused behavior (Stephesson et al., 2008). While a constellation of academically supportive behaviors may make it easier to benefit from quality instruction and a literacy-rich environment, no single child-driven behavior is uniquely critical to literacy development.

Since the preschool environment is a social environment, one study explored the role of social behaviors in the classroom to evaluate relationships into later elementary school achievement and behavior. Prosocial behaviors were defined as helping others, offering comfort, being empathetic, and displaying caring were rated through child observation (Spira, Bracken, & Fischel, 2005). The investigators found that prosocial behavior in kindergarten correlated with literacy achievement in grade 3, but this relationship became less predictive of literacy achievement over time. Grade 1 prosocial behaviors predicted grade 3 literacy achievement, but were unrelated to grade 5 literacy achievement.

The study authors also explored the influence of literacy achievement on later aggression. Some researchers theorize that behavior regulation issues bring about difficulties in reading because they impede the learning process in the classroom. Spira and colleagues (2005) believe that children with reading difficulties develop certain

behaviors subsequent to frustration with difficulties in learning to read (Spira et al., 2005). They found that grade 1 literacy achievement predicted grade 3 aggression, but could not significantly predict aggressive behavior in grade 5 (Spira et al., 2005). Still the authors acknowledge that the comorbidity between reading and behavior difficulties warrants consideration of a shared underlying cause (Spira et al., 2005).

Overall, the study found that classroom behavior, along with emergent literacy, receptive vocabulary, and expressive vocabulary/language in kindergarten predicted grade 2 reading skills better than grade 1 reading and, together, continued to be a strong predictor of reading skills in grade 3 and grade 4 (Spira et al., 2005). Their results suggest that literacy skills, prosocial behaviors, and aggressive behaviors directly predict future achievement and behaviors for a few years, but since children's temperament is still plastic, the relationship to those early behaviors diminishes for most children, even for the prosocial behaviors.

Behavior problems are disruptive to the classroom environment. Children with behavior regulation difficulties not only disrupt classroom activities for others, they also miss important information during classroom instruction. There is often a correlation between children's behavior difficulties and academic performance. The underlying mechanisms of the relationship remain relatively unknown.

Spira et al. (2005) reviewed the literature on the role of inattention, hyperactivity, and impulsivity in social and academic development among preschoolers. They found no clear consensus of the relationship between these three characteristics and children's learning. They explained that researchers are beginning to examine how learning and

behavior might develop synergistically. Few studies have investigated their relationship through this lens.

Behavior problems predict lower academic success and academic productivity, even after considering the role of cognitive abilities (Clay, 1998; Graziano, Reavis, Keane, & Calkins, 2007). Children with lower reading achievement tend to avoid sedentary or structured activities (Clay, 1998) and are more behaviorally active. One group of researchers measured children's behavior regulation through direct observation (McClelland, Cameron, Connor, Farris, Jewkes, & Morrison, 2007). They hoped that the outcomes from direct observation would be a stronger indicator of the relationship between behavior and academic performance than parent report measures.

They found that behavior regulation predicted emergent literacy skills, vocabulary, and preschool math (i.e., counting; McClelland et al., 2007). Behavior regulation was also related to growth in emergent literacy skills, vocabulary, and preschool math over the preschool year. This contribution to growth accounted for the influences of sex, age, childcare type and duration, as well as ethnicity, which represent potential differences in socio-environmental, group differences to some degree (McClelland et al., 2007). Results indicate that improvement in behavior regulation predicts children's growth in emergent literacy skills and vocabulary better than it predicts the potential differences in socio-environmental, group differences (McClelland et al., 2007).

Still, there is evidence that behavior regulation might differ between the sexes, Boys' lower emergent literacy skills have been related to increased aggression,

misbehavior, solitary play, negative affect, as well as fewer prosocial interactions (Doctoroff et al., 2006). For girls, decreased emergent literacy skills were not related to any of the behaviors under study. That is, lower emergent literacy skills were not related to aggression, misbehavior, negative affect, solitary play, or prosocial interactions. For girls, negative affect and solitary play negatively correlated with emergent literacy skills. In sum, when aggression and negative affect are high, boys' emergent literacy skills are lower, but for girls, these behavioral and affective difficulties do not get in the way (Doctoroff et al., 2006).

Other researchers have examined how positive behaviors might influence academic performance in young children. One study found that attentiveness and task-persistence, which can include such behaviors as 1) constructive approaches to learning, 2) self-control/behavior inhibition, and 3) productive interpersonal skills, are supportive of early literacy learning (Ready et al., 2005). They found that the aforementioned prosocial behaviors more influential of early literacy skills than externalizing and internalizing behaviors, such as aggression, bullying, teasing, sadness, and loneliness (Ready et al., 2005).

Graziano, Reavis, Keane, and Calkins (2007) examined the role of emotion regulation. Emotion regulation, which they defined as the level of negativity and lability of children's emotion, was related negatively to behavior problems, as reported by parents. High emotion regulation predicts academic success and productivity, even after controlling for intelligence, behavior problems, and quality of relationship with teachers

(Graziano et al., 2007). Emotion regulation affects students' social success and social adjustment in school (Graziano et al., 2007).

The authors also found that children with better emotion regulation had better relationships with their teachers, which is an important social contributor to academic success and productivity (Graziano et al., 2007). Other research has found that support from teachers is an important key to high academic performance in elementary school (Goodenow, 1993). Social experiences during children's initial acclimation to the classroom environment might affect later involvement in the classroom setting, which becomes relevant when children need teacher assistance.

The investigators also found that children's relationship with teachers mediates the emotion regulation relationship with early literacy, after controlling for behavior problems and cognitive scores (Graziano et al., 2007). The study did not measure the role of student-teacher ethnicity or neighborhood differences. This can influence student's relationships with teachers (Steele, 1992), which can influence other areas of children's functioning, such as emotion regulation in the classroom.

The role of attachment is another important social factor for young children. One study found that children with higher attachment had a lower need for discipline (Bus & van Ijzendorn, 1988). These children also displayed lower distractibility than children with insecure or anxious attachment displayed in the classroom (Bus & van Ijzendorn, 1988). Children with secure attachment not only displayed low distractibility, but also demonstrated increased attention and engagement during reading instruction activities. In the study, children who received more reading instruction had higher emergent literacy

scores (Bus & van Ijzendorn, 1988). Attention, along with behavioral inhibition and working memory are predictive of emergent literacy skills and vocabulary (McClelland et al., 2007).

Vellutino and Scanlon (2001) attributed kindergartener's reading difficulties to individual differences in child characteristics and early literacy instruction. In a five-year study of reading development, they provided daily one-to-one tutoring to kindergarten participants who were identified as having reading difficulty. By fourth grade, the majority of the tutored students developed competent reading abilities, whereas one-third of the sample with difficulties continued to struggle. Many of those who continued to struggle evidenced lower cognitive functioning than those who improved. These students represent individuals with true reading difficulties due to cognitive deficits or dysfunction, whereas over 60% of the children identified demonstrated difficulties due to substandard or under-individualized emergent literacy instruction in kindergarten and grade 1. This study found that the incidence of reading disability is likely far lower than estimated, as demonstrated by improvement of reading skills concurrent with improvement of reading instruction.

One study evaluated whether an early literacy intervention might improve social skills of children while developing literacy skills. The study found that the intervention improved early literacy skills, but made no significant improvements in overall child competence, emotional regulation, or behavior inhibition (Nelson, Stage, Epstein, and Pierce, 2005).

Theoretical Foundations: Sociocultural constructivist theory and ecological theory

Sociocultural constructivist theory and ecological theory provide a conceptual framework for understanding children's development and learning in context. Lev Vygotsky (Kozulin, 2004) proposed that learning is activity that results from environment, or sociocultural context. According to Vygotsky, the educational process is a sociocultural context that develops cognitive and learning skills. It is not solely an isolated system for absorbing the context of curriculum and acquiring knowledge. As such, while learning and cognitive skills facilitate one's education, educational context fosters learning and cognitive development.

Similarly, Vygotsky posited that bidirectional interactions between individuals and the environment are also present in the development of language skills (Gustafsson & Mellgren, 2002). Spoken and written language, which is acquired in sociocultural contexts, stimulates learning and development of cognitive skills. Learning and cognitive skills foster spoken and written language (Gustafsson & Mellgren, 2002). When examining learning processes, culture and context should be considered for what they bring to the learning experience (Steinberg, Dornbusch, & Brown, 1992). Culture has shaped the ways that we learn and the methods chosen to educate others. As such, learning, cognition, and language are processes synthesized within contextual experiences and sociocultural interactions. To educate adequately students of varied sociocultural contexts, inclusion of varied types of instruction is required.

Urie Bronfenbrenner provides ample elaboration of the term context. His ecological theory (1979; Wachs, 2000) is a transactional model of human development

founded on the premise that bidirectional interactions between individuals and the environment are responsible for variance in human development. The most influential context in human development is the context in which one interacts directly with other individuals. For most, this context is the family (Bronfenfrenner, 1986). Child temperament and behavior are moderated by parenting behaviors, such as parental control and parental monitoring (Bronfenbrenner, 1986). Interactions in peer groups, school, neighborhood, church, and health services (particularly if there is impairment) are also significant. Medical and mental characteristics of family members are also proximal influences, which can have a reciprocal influence on individual development as well.

These proximal contexts interact with greater social systems, such as the legal system and social services, which in turn intermingle with a culture, traditions, beliefs, values, and collective human experiences that each interrelate continuously with the individual and factors in his or her environment to shape individual development, cognition, and behavior. Since learning, development, and human experience exist within multiple contexts, it is important to be aware that a single intervention or instruction will produce variable responses based on differences among any of these numerous contextual factors. Such a perspective is valuable in terms of examining how society or institutions can improve individual outcomes (Becker & Luthar, 2002).

Rationale and Hypotheses

This study seeks to expand upon previous research, which has established a link between family background factors, such as family income and family education, and early literacy outcomes, by exploring whether families' home literacy environment

support early literacy outcomes. In addition, this study will first evaluate the relevance of Sénéchal and cohort's (2001) model of early literacy for this sample to provide a framework for understanding this study's results. Specifically, this study will examine whether high levels of certain pro-social child characteristics (e.g., initiative, self-control, and attachment) are related to positive change in early literacy skills, and whether family literacy behaviors contribute to positive change in early literacy skills. This study will evaluate age and sex differences among study results.

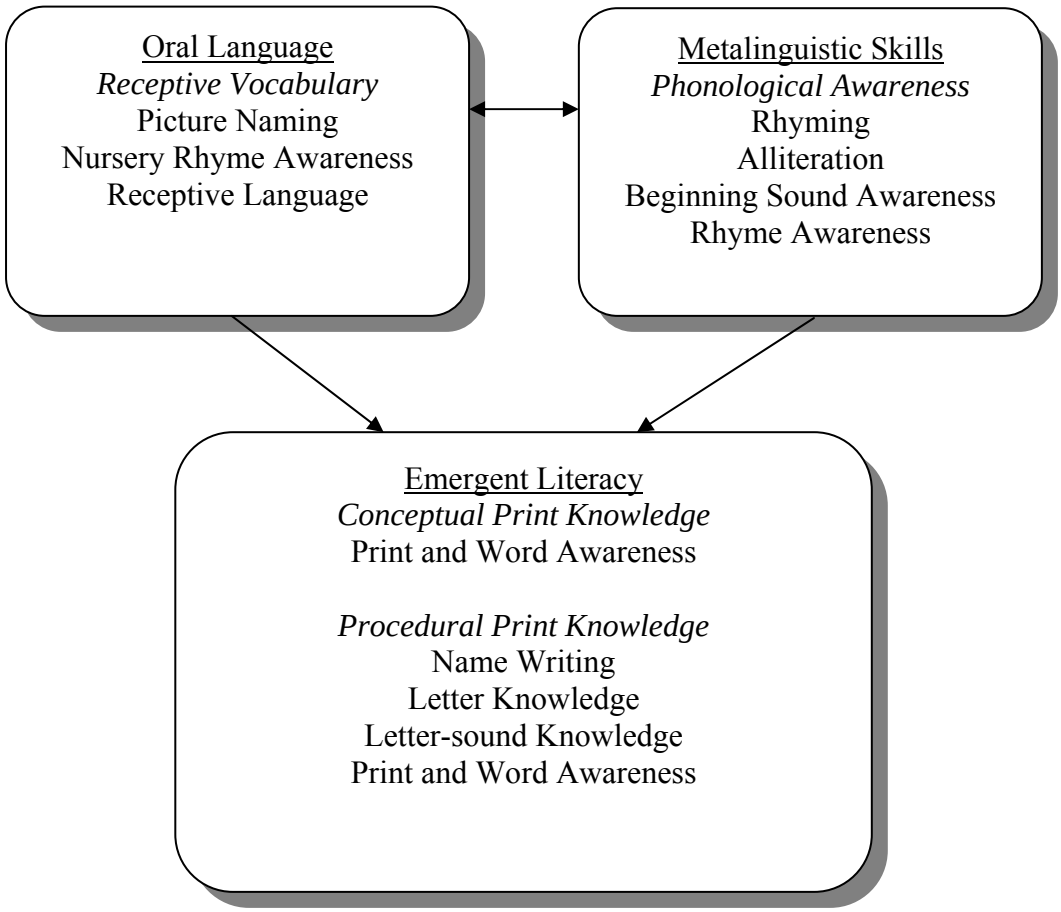

Figure 3. Proposed factor structure, based on the model proposed by Sénéchal et al. (2001).

Hypothesis 1. There will be a three-factor structure representing Sénéchal and cohort's (2001) model of early literacy that includes metalinguistic skills, oral language, and emergent literacy skills (see figure 3). This model will account for a significant proportion of the variance in the data.

Hypothesis 2. Family literacy behaviors will moderate the relationship between pro-social child characteristics (e.g., initiative, self-control, and attachment) and change in early literacy skills (Figure 4). Specifically, higher levels of pro-social child characteristics will be associated with positive changes in early literacy skills when family literacy behaviors improve, after controlling for the effects of family income, sex, and age.

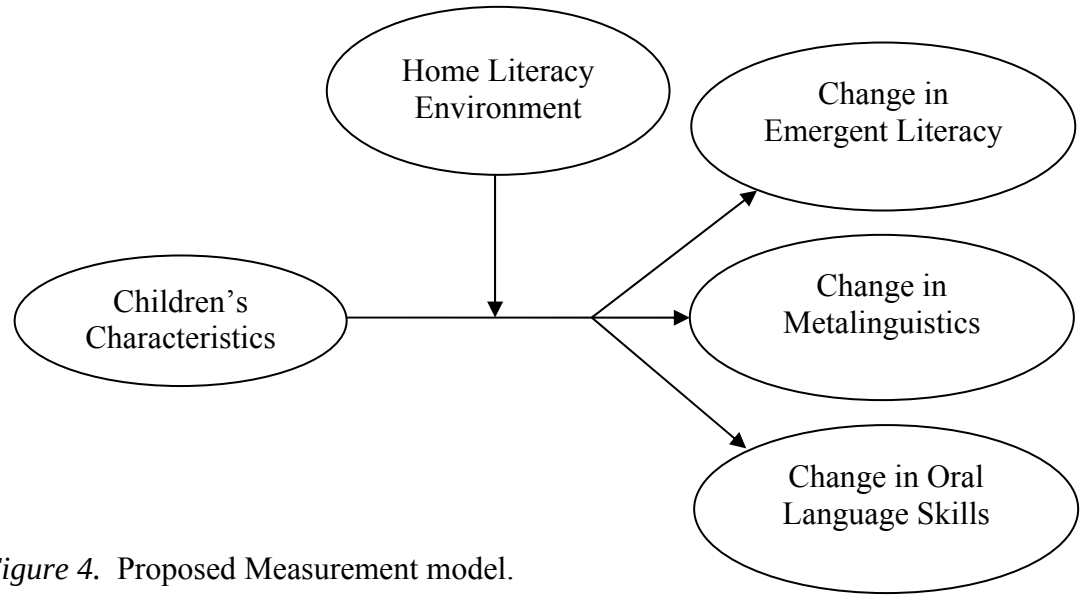

Figure 4. Proposed Measurement model.

Hypothesis 2a. Child characteristics (e.g., initiative, self-control, and attachment) will contribute positively to early literacy skills, after controlling for family income, sex, and age.

Hypothesis 2b. Higher positive family literacy behaviors will predict higher early literacy skills, after controlling for the effects of family income, sex, and age.

Hypothesis 2c. When combined, child characteristics (e.g., initiative, self-control, and attachment) along with higher positive family literacy behaviors will contribute significantly to positive change in early literacy skills, after controlling for income, sex, and age.

Method

This study used a subset of data from a larger dataset to explore the role of family factors and individual differences in predicting gains in early literacy development. The data were collected for a grant funded by the Department of Education to evaluate the efficacy of an intensive, community-based, early literacy intervention offered daily, for two years, to urban-dwelling preschool children. The intervention was a culturally enhanced, early literacy program implemented as a supplement to Head Start services being provided at ten private preschool centers located in a Mid-Atlantic urban city. This chapter provides an overview of the present study's research plan and statistical analyses.

Study Design

The current investigation is a quasi-experimental, one-group pretest-posttest study that evaluated the influence of child characteristics and family literacy behaviors on early

literacy skills developed subsequent to participation in an intervention targeting early literacy instruction and kindergarten readiness. The present study also evaluated Sénéchal and colleagues' (2001) model for understanding the latent factorial structure of early literacy skills, using baseline data from the intervention.

Early literacy skills, family support or home literacy environment, and child characteristics were evaluated twice yearly. Children were evaluated during the fall and spring of each school year. Children who enrolled at the preschool center later in the school year were admitted into the study. Their spring score was used as a baseline score, or Timepoint 1 score. For the present study, second year spring scores were considered outcome scores, or Timepoint 2 scores.

Over the course of four years, ten private preschool centers were recruited for participation in an early literacy program that would be offered as an adjunct to existing Head Start services. Head Start is a federally funded child development program that works with families earning low wages to provide social services and resources that help prepare young children for kindergarten entry. Head Start services focus on family and community partnerships, education and early childhood development, mental health and disabilities, and health and nutrition. For example, Head Start offers free preschool education, bus service to and from early childcare centers, school supplies, meals while at school, and health screenings, among other resources supplemental to early childcare education. Head Start services aim to support development of socioemotional, physical, creative, linguistic, and lexical skills.

Preschool centers were selected based on participation in Head Start programming for more than five years and proximity to city public housing residences (e.g., they were located either in or near a public housing development) to increase likelihood of the sustainability and feasibility of family participation. All preschool teachers at the participating preschool centers were required to implement the program in their classroom. Each year of the early reading intervention, families were recruited from about six Head Start preschool centers. For reasons unrelated to the study, a few preschool centers were unable to continue participating in the program the following year. In many cases, the students were moved to a center that was able to join or continue with the program. All children attending participating preschool centers received the early literacy intervention. However, only children whose families consented to participate in the study were evaluated. Participating families were offered a choice of a $10 gift card for a grocery store or for a large, discount retail department store chain in exchange for time spent completing study questionnaires.

Participants

Participants were enrolled, from 2005 to 2008, based on age, current enrollment in Head Start, residence within city limits, which is a requirement for enrollment in Head Start, and parent/guardian consent to participate in the intervention. Each year, families of newly enrolled three- and four- year olds were offered the opportunity to place their child in the research study after enrolling in Head Start at the participating preschool centers. For the present study, preschoolers from each cohort were combined into a single sample.

There were 477 three- to five-year-old preschool children, whose family self-identified them as African American/Black. Fifty-one of these 477 children did not complete the study, as twenty-seven children were not present at post-test and twenty-four children were repeatedly absent throughout pre- and post-testing time points. In general, these fifty-one cases represent children who enrolled later in the school year, left school early in the academic year, were frequently absent, or experienced a combination of these factors. The remaining 426 preschool children included in the current study.

Although the intervention was not geared solely towards African American or Black participants, the intervention included culturally sensitive materials and information. Those not identifying as African American/Black were excluded from the analyses due to the large proportion (approximately 95%) of participants in Head Start who identified as African American/Black. Inclusion of participants from other ethnic backgrounds would not increase generalizability to individuals of other ethnicities but would reduce generalizability of this study's findings.

Measures

Measures were selected by the intervention developers, who were university faculty with early literacy, early childhood education, and psychology backgrounds. They convened to identify empirically supported assessments that demonstrated adequate reliability and validity, particularly among lower income, urban, or African American samples. Measures selected for the present investigation assessed (a) early literacy skills, (b) child characteristics, (c) and family/home environment characteristics. Measures are included in Appendix A.

Measures of Early Literacy Skills. Emergent literacy skills and metalinguistic skills were evaluated using the Phonological Awareness Literacy Screening for Pre-kindergarten (PALS). The PALS measures children's knowledge of pre-literacy fundamentals necessary for literacy development (Invernizzi, Sullivan, Meier, & Swank, 2004). These fundamentals are represented by six domains. Four of these domains assess emergent literacy skills, including name-writing skills, alphabet knowledge, narrative knowledge, and print and word awareness. Two domains measure metalinguistic skills, beginning-sound and rhyme awareness. These tasks are described below.

The Name-Writing domain measures printing skills through evaluation of child's accuracy in writing. The subtest asks children to write their name and draw a picture on a blank page. Using a scale ranging from zero to seven, children are given points for use of correct letters, correct script, correct order of letters, and for writing the word separately from the picture. This domain is scored subjectively by the test administrator.

The other PALS scales do not require examiner scoring. Rather, children are awarded one point for correct answers and zero points for incorrect responses. Scores on the other scales carry a range from zero to 26 for the alphabet-related scales, from zero to seven for the name writing scale, and from zero to ten for all other scales. For example, the Alphabet Knowledge domain measures alphabet familiarity and phonological awareness by having children to identify alphabet letter names and sounds displayed in random order. The child is first presented with a page of upper-case alphabets. If 16 of 26 upper-case alphabets are correctly named, the child is presented with a page of lower-

case alphabets followed by a page of 26 sounds, if 9 of 26 lower-case alphabets are correctly identified. Children receive one point for each correct letter or sound and can score between 0 and 26 on each of the three pages. The Nursery Rhyme Awareness domain measures a child's literacy skill acquisition via assessment of memory for words. The task evaluates level of exposure to eight popular nursery rhymes.

The PALS reports good content and construct validity. Each domain is evaluated by a task empirically demonstrated to measure the target construct. Through factor analysis, the test developers found that the items in the assessment yield a single factor, which they label emergent literacy (Invernizzi et al., 2004). Finally, there is evidence of acceptable concurrent criterion-related validity with the Test of Awareness and Language Segments (Sawyer, 1987), $r = .41$, and the Test of Early Reading Ability – 3 (2001), $r = .67$. Evidence of predictive criterion-related validity is good. Longitudinal studies found correlations from .53 to .77 with scores from PALS-Kindergarten assessment and PALS 1-3 assessment administered in kindergarten and first grade, respectively (Invernizzi et al., 2004). Reliability of scores was not evaluated by the test authors. Internal consistency reliability of baseline scores in the current study is good, $\alpha = .79$.

The Preschool Individual Growth and Development Indicators (IGDI; Early Childhood Research Institute on Measuring Growth and Development, 2000) is included to measure expressive oral language and phonological analysis skills as indicators of language and metalinguistic skill (Missall & McConnell, 2004). Three subtests assess lexical knowledge, alliteration skills, and rhyming skills. For each task, children are prompted to respond to large flashcards displayed by the examiner. For the Picture

Naming subtest, which measures lexical knowledge, children are asked to give the name of the pictured items that are found in preschoolers' natural environments. Scores represent the sum of items correctly named after one minute. For the Alliteration and Rhyming subtests, they are asked to choose the picture item that starts the same or rhymes with the target picture item after all possible options have been verbally introduced. Scores are the sum of correctly identified picture items over a two-minute timed period.

In a technical report of the scale's psychometrics, Missall and McConnell (2004) reported one-month alternate form reliability of the Picture Naming subscale to range from r = .44 to .78. Temporal stability reliability across three weeks was estimated to be r = .67. The Picture Naming subscale correlated positively with Peabody Picture Vocabulary Test – Third Edition (PPVT-III, Dunn & Dunn, 1997; r = .56 to .75) and with the Preschool Language Scale – 3 (Zimmerman, Steiner, & Pond, 1992). Temporal stability of Rhyming scores is good, r = .83 to .89. It is positively correlated with PPVT – III (r = .56 to .62), Test of Phonological Awareness (TOPA; Torgeson & Bryant, 1994; r = .44 to .62), and Concepts about Print (CAP; Clay, 1985; r = .54 to .64). Concurrent validity for the Rhyming subscale was evaluated using the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) Letter Naming Fluency (r = .44 to .68) and the DIBELS Onset Recognition Fluency (r = .44 to .68; Kaminski & Good, 1996). The Alliteration subscale has moderate to good temporal stability (r = .46 to .80) and concurrent validity, as evaluated with the DIBELS Letter Naming Fluency (r = .39 to .71). The subscale is

also correlated moderately with the PPVT - III (r = .40 to .57), TOPA (r = .44 to .62) and CAP (r = .34 to .55).

The PPVT-III (Dunn & Dunn, 1997) was used to assess children's receptive language. Children are required to select the best of four pictures to represent a word prompted orally by a test administrator. Children must give two correct answers within a set of items to produce a valid score for assessment of their abilities. The test concludes after providing eight incorrect responses in a set. Psychometrics for the PPVT-III indicate good reliability and validity (Dunn & Dunn, 1997). Studies have found that this edition of the PPVT-III is appropriate for use among racial and economically diverse groups (Thomas-Tate et al., 2006).

A composite early literacy score was computed for use in the regression analyses. Fewer than half of the participants were able to complete the IGDI Alliteration and IGDI Rhyming subtest due to development and ability levels, even among four- and five-year-olds. These two subtasks were removed from the scale. Cronbach's alpha coefficient was computed for the final eight-item Early Literacy Composite Scale, which evidenced good internal consistency reliability, α = .82 with standardized items, and α = .61 without standardization.

Measures of Child Characteristics. The Devereux Early Childhood Assessment (DECA; LeBuffe & Naglieri, 1999) is a brief 37-item questionnaire that asks parents and teachers to rate the frequency with which their child engages in particular behaviors. The measure was designed to quantify pro-social child characteristics empirically shown to support resilience. Ratings range from never to very frequently. The items represent four

scales, Initiative, Self-control, Attachment, and Problem Behaviors. The Initiative scale assesses ability to use independent thought and action. The Self-Control scale measures ability to experience a range of emotions and to express them in a socially appropriate way. The Attachment scale identifies the mutual, strong relationship between a child and significant adults in his/her life. The scale also provides a Total Protective Factors score, which offers an overall picture of the child's individual socio-emotional resources.

Criterion-related validity was evaluated by using MANOVA to identify significant contrasts in scores for an identified sample of children with behavioral and/or emotional problems and a community sample. Independent samples T-test indicated significant differences in scores between the two groups' mean scores. The reliability of DECA scales (Table 1.) is moderate to high among teachers and parents. However, differences in child behavior at school and at home, as well as teacher and parent perceptions of children vary. Inter-rater reliability between parents and teachers is low to moderate for the DECA subscales. As such, this study will use the data collected from teachers, as there is greater evidence for the reliability of their responses.

Measures of Family Literacy Characteristics. Leading investigators from the present study developed the Book Title Checklist (BTC) based on Sénéchal, LeFevre, Hudson, and Lawson's (1996) checklist, which is designed to evaluate parent involvement in storybook reading at home. On the BTC, parents are asked to identify the titles of children's books that are familiar to them. The list contains the title of 60 children's books. Some of the book titles were popular children's books that were selected from sources such as bestseller lists. Others were reported by local librarians or

children's booksellers as popular or frequently purchased / borrowed by parents. Parents' reports of their child's favorite books were also considered for inclusion list of popular titles. Of the identified books, forty book titles that were frequently named by these sources, available locally, cost less than five dollars, and were not fairytales, movies, or television titles were selected for the measure. The final twenty titles in the measure were false titles that were listed to provide a validity check for random or speculative responding. The curriculum titles, popular titles, and false titles were ordered randomly on the page.

Table 1.

Reliability of the Devereux Early Childhood Assessment (DECA)

	Parents		Teachers		Parent-Teacher
Scale	Internal Consistency	Temporal Stability	Internal Consistency	Temporal Stability	Inter-rater Reliability
Initiative	.84	.80	.90	.91	.34*
Self-Control	.86	.64	.90	.91	.23*
Attachment	.76	.55	.85	.87	.19
Protective Factors	.91	.74	.94	.94	.29*
Behavioral Concerns	.71	.55	.80	.68	.23

* Parent and teacher score is significantly related, $p < .05$.

The scale is scored by subtracting the proportion of false titles selected from the proportion of accurate (curriculum and popular) titles. Sénéchal and colleague's (1996) checklist was developed using a similar methodology. In a study by LeFevre and

Sénéchal (1999), the BTC evidenced good initial validity, as it was positively associated with oral language skills.

Faculty investigators from the present study developed the eight-item Experiences with Books at Home (BH) questionnaire (Appendix A) to identify the frequency and types of book-related literacy activities in which families engage. The questionnaire asks about family's frequency of storybook reading, child library visits, and parent teaching to read or write in a typical week. The questionnaire also asks for age of reading onset, number of books in the home, and frequency of child's requests to be read to within a typical week. As an example, one item asks parents to rate the statement, "I teach my child how to print words." Parents are asked to rate the statement according to how often they engage in the behavior in a typical week.

Ratings for the BH questionnaire range from never to very often, using a scale of one to five. Frequency of bedtime reading and frequency of reading at times other than bedtime were rated on a nine-point scale, and age of reading onset used a free response format. Each of these was re-coded to a scale of one to five. Age of reading onset was categorized by age in years. Reliability analysis was used to evaluate BH items and optimal response format for items in the BH scale. The five-point frequency of bedtime reading and frequency of reading at times other than bedtime items were retained. Number of books at home and age of reading onset were excluded from the final analysis. The final six-tem scale evidenced good reliability. Cronbach's alpha is .78.

Family Background. Due to sample size and the dearth of missing data for family background items, parent/guardian age, parent/guardian education level, and household

structure were omitted from the analysis. Family background items from the CTPQ, PPVT, or DECA identified children's racial or ethnic background.

Procedure

The early reading intervention targeted children's early literacy development through provision of classroom materials, an early literacy curriculum, teacher professional development activities, family programming, and in-classroom technical assistance. Each classroom in the study was given books, instructional display items (i.e., posters), computer software, didactic games, curriculum materials, assessment materials, classroom furniture (e.g., a rug and soft chairs) to create a reading area, and other learning materials as needed.

In addition to receiving Head Start services, children whose parents consent to participation in the early reading intervention received resources to support attainment of early literacy developmental milestones, such as free books and literacy activities. The families received a monthly newsletter from a family literacy specialist who kept parents informed of topics explored in the classroom (i.e., farm life, aquarium, and garden) and encouraged parent participation in related literacy activities at home. Families also were asked to participate in classroom activities and to join school and intervention staff in literacy related programming.

Each classroom was led by two teachers. Depending on the preschool's teaching model, the two teachers worked as co-teachers, sharing equal responsibilities for day-to-day classroom curriculum and activities, or as lead and assistant teachers. A lead teacher is primarily responsible for classroom operations and the assistant teacher provides

support. As part of professional development, both teachers in the classroom received coaching from a mentor, an early childhood special educator, and a certified reading specialist who provided in-class instructional support and technical assistance to the teachers. These literacy coaches helped to tailor the early literacy curriculum and provided scaffolding to support teachers in use of best practices in early literacy intervention, as well as other relevant technical skills in the classroom. Additional professional development programming included monthly workshops and summer instructional institutes, which enhanced fidelity of implementation through demonstrations of evidence-based practices in early childhood education and detailed information about the monthly curriculum.

Throughout the school year, data were collected to assess emergent literacy, metalinguistic, and language skills, individual child characteristics (e.g., child attachment, initiative, self-control, temperament, personality, and behavior), and family characteristics (e.g., family literacy behaviors at home, parent familiarity with books, and family background information).

Graduate assistants, classroom teachers, and literacy coaches were trained to conduct early literacy assessments. Children were evaluated early fall (pretest baseline), winter (midpoint), and spring (posttest). Children's baseline scores were collected during the fall of their first year in the program. The midpoint scores were not used in this study. Children's first-year spring scores were used as post-test scores for the current study, as attrition rates and data collection rates preclude use of data from children's second year of participation in the program. Assessments from the first project year were

conducted by graduate assistants and intervention staff. Teachers were increasingly involved in assessment after completing training and observation sessions over the course of the project. Teacher-specific questionnaires were completed with research staff. Parents' questionnaires were completed with a family literacy specialist.

Over a three-year period, approximately 210 preschool children were enrolled in the early reading project annually. Children who were ineligible to attend kindergarten in the fall following completion of a one-year cycle (e.g., four year olds and some five year olds) were invited to return in the fall for a second year. (Kindergarten ineligibility is determined by the public school system, which requires children to turn six years old by September 30 of the year in which they enroll in kindergarten). This project was approved by Virginia Commonwealth University Institutional Review Board. Parent consent was obtained for the assessments.

Data Analyses

Descriptive Statistics. Descriptive statistics, including mean, standard deviation, minimum value, maximum value, skewness, and kurtosis, were calculated for all study variables. Frequency statistics were computed to examine the data for missing scores.

Power Analysis. Given the study's design and variables, alpha was set at .05 to control for Type I error. Statistical power was set at .95 to minimize Type II error. Following a review of research involving the early literacy variables under investigation for this study, an effect of .40 was selected to compute a priori power analysis using G-Power computer software program (Faul & Erdfelder, 1992). The results of the analysis

indicate that a sample size of at least 272 is recommended for robust findings, critical t (270) = 1.65, delta = 3.30, Cohen's *d* = .40, power = .95.

Psychometric Evaluation of Instrumentation. Tests of normality were computed for the Early Literacy Composite variable and the two family literacy variables, BTC and BH, to evaluate their psychometric properties. Cronbach's alpha was calculated and items were deleted, as needed, to improve reliability of scales.

Hypothesis Testing. For Hypothesis 1, principal components factor analysis with an oblique promax rotation was used to force Sénéchal's three-factor structure for early literacy, using data from the study's initial post-intervention data time point, which was the second time point. Each pre-intervention baseline score for the Phonological Awareness Literacy Screening (PALS), Preschool Individual Growth and Development Indicators (IGDI) subtests, and well as the Peabody Picture Vocabulary Test – III (PPVT), were entered into the model. Factor eigenvalues and variance were examined to evaluate the strength of the factor loadings and their accountability of the data. The rotated component matrix, scree plot, and communalities were also reviewed to evaluate expected loading, data fit, and high accountability for variance. Items were excluded from the final factor model based on their influence on eigenvalues, factor loadings, communality statistics, scree plot, factor structure, and accountability for variance. Cronbach's alpha was computed for the remaining six items.

For Hypothesis 2a and 2b, age was included in the regression analyses to control for its effects on variance in post-intervention early literacy scores. The predictor variable was entered in the second step. Family income was experimentally controlled by

study eligibility criteria, which excluded from Head Start families with income above the poverty level. For Hypothesis 2a, which examined the influence of children's strengths on post-test early literacy skills, the baseline protective factor score, as measured by the DECA, was entered in the second step. For Hypothesis 2b, post-intervention scores on the moderator variable, family literacy behavior, which was measured by BTC and BH, was entered in the second step of two additional analyses. The family literacy measure, BH was excluded from further analysis due to its poor relationship with the outcome variable.

In the final study analysis, age and baseline Early Literacy Composite scores were entered in the first step to control for the effects of age and to remove the influence of children's baseline early literacy scores from post-intervention early literacy scores. The predictor variable, baseline DECA total protective factor score, was entered in the second step. Post-intervention scores on the moderator variables, BTC and BH, were entered in the third step. In the final step, the product of the predictor (e.g., DECA) and each moderator (e.g., BTC and BH) was computed and added to the model.

Results

Data Analytic Strategy

Descriptive statistics were calculated for all variables. Means, standard deviations, and ranges were also computed for sex and age. Frequency statistics were computed to examine the data for missing scores. Mean substitution was used to impute

data for variables with less than 5% missing data. Predictor variables were centered in the regression analyses to minimize the effects of multicollinearity and enhance interpretability of the statistics. Factor analysis evaluated the latent factorial structure of early literacy skills. Hierarchical regression analyses assessed whether changes in early literacy scores, from baseline to post-test, are predicted by child temperament characteristics, and whether family literacy behaviors moderate this relationship, when family income, age, and sex are controlled.

Specifically, principal components factor analysis first evaluated whether Sénéchal's hypothesized three-factor structure represents the latent factorial structure of early literacy (Figure 3). Then, hierarchical regression analyses assessed whether positive change in early literacy scores at post-test are predicted by child individual baseline characteristics, and whether family literacy behaviors reported at post-test moderate this relationship (Figure 4). Correlations among predictor and outcome variables were computed. Multivariate analysis of variance was used to evaluate whether to control for age and sex differences, which were controlled in the regression analyses.

Missing Data

Early literacy scores were unable to be obtained for many of the participants under study, as some early literacy subtests in the study were too advanced to capture this sample's emerging skills. In addition, the transient nature of children's enrollment at the preschool centers restricted completion of data collection for many children. For example, 46 parents never completed family literacy questionnaires during two year of participation in the study. These children were retained in the study because they have

complete scores on other study variables and were rated by their teachers to have significantly fewer psychological resources than did their classmates, as measured by an independent samples t-test of DECA total protective factor scores, t (284) = -3.02, $p <$ .01.

Study variables with less than 5% of data missing include Age at Initial Testing session (missing 8 cases or 1.9%), Baseline PPVT-III Standard Score (missing 10 cases or 2.4%), Baseline PALS alphabet knowledge, and PALS Print and Word Awareness subtests (each missing 15 cases, or 3.6%), and Baseline IGDI Picture Naming (missing 17 cases or 4%). Missing cases from these four study variables were imputed by mean substitution. Items for the Early Literacy Composite, BH, and BTC scales were standardized by Z-score conversion to adjust for bias created by varying range of possible responses among items within each scale. A total score was computed for each scale. The Early Literacy Composite was re-evaluated for reliability, $\alpha = .80$.

Descriptive Statistics.

Descriptive statistics were calculated for all predictor and criterion variables (Table 2). Participants included 221 females and 205 males ages 35 - 60 months (M = 47.46, SD = 6.44) at initial testing. At the second data collection time-point, the average post-test age was 56.44 months (5.75 SD). The median and mode statistics reflect a similar age change. The median age was 47 months at baseline and 57 months at post-test. The mode was 48 months at baseline and 58 months at post-test. Children from the study seem to have received an average 10 months of instruction. Post-test age data were

available for 369 of the 426 children. Two hundred seven participants of the 426 children were 48 months or older at baseline.

Table 2.

Descriptive Statistics for Predictor and Outcome Variables

Measure	Mean (SD)	N	Min	Max
Age in months	47.46 (6.44)	426	35	60
Sex[a]	.52 (.50)	426	0	1
DECA Protective Factors, T1	46.16 (9.52)	355	28	72
Early Literacy Composite, T1	120.02 (24.01)	267	65	179
Early Literacy Composite, T2	147.65 (21.28)	286	82	197
Book Title Checklist, T2	7.76 (9.64)	126	-17.5	32.5
Experiences with Books at Home, T2	14.44 (4.16)	170	3	24

[a] Males were coded as 0. Females were coded as 1.

The sample's mean score on the DECA (see Table 2) is below the DECA's norm-referenced mean of 50. According to the user manual (LeBuffe & Naglieri, 1999), scores from 41 to 59 represent an average level of attachment, self-control, and initiative among children this age. Scores of 40 or below represent areas of concern and targets for intervention. In standardization of the DECA for clinical populations, a group mean T-score of at least five-points on each DECA scale successfully differentiated 74% of the clinical sample from the non-referred, community sample of participants (LeBuffe & Naglieri, n.d.). Taken together, these data suggest that the current sample represents a

unique subset of the national three-to-five year-old population. Descriptive statistics for the remaining study measures are presented in Table 3.

Table 3.

Descriptive Statistics for Study Measures at Baseline (T1)

Measure	Mean (SD)	N	Min	Max
PPVT	83.95 (13.59)	426	40	126
PALS Name Writing	3.22 (1.92)	271	0	7
PALS Alphabet Knowledge	5.36 (7.24)	426	0	26
PALS Beginning Sound	2.80 (3.15)	268	0	10
PALS Print and Word	3.22 (2.24)	426	0	10
PALS Rhyme	3.68 (2.08)	267	0	10
PALS Nursery Rhyme	3.23 (1.98)	269	0	9
IGDI Picture Naming	14.10 (5.98)	426	0	34
IGDI Rhyming	3.17 (2.89)	240	0	17
IGDI Alliteration	1.47 (2.07)	240	0	9

Descriptive statistics demonstrate that means for the study's two norm-referenced, standardized measures, DECA and PPVT, are below the standardization norm. On the PPVT, participants obtained a mean score of 83.95 (SD = 13.59), which is classified as below average. The PPVT has a norm-referenced mean of 100 (SD = 15), where 85 – 115 is the average range of scores for most children (Dunn & Dunn, 1997). Scores below 85 occur in less than 14% of the population.

Descriptive statistics also revealed that early and family literacy scores were restricted by floor effects of study measures. Sample size for the IGDI Alliteration and Rhyming measures reflect the large number of children unable to qualify for administration of the measure because they could not successfully answer the qualifying questions. Of those who qualified for administration of these two metalinguistic measures, as well as PALS Beginning Sound Awareness and family literacy items on the BH, many students yielded low scores resulting in a range of scores strongly skewed in a positive direction for these measures. Rhyming and alliteration are more advanced metalinguistic skills that children tend to develop after reaching proficiency in basic metalinguistic skills. However, the family literacy items represent activities in which study parents did not seem to engage on a regular basis.

Bivariate Analyses

Bivariate correlations for predictor and outcome variables were computed (Table 4). Age and sex were significantly related to the early literacy composite scores at baseline and post-test. Accordingly, they will be controlled in the regression analyses. Interestingly, the two family literacy variables are not significantly correlated. In fact, family literacy behavior as measured by the BH was not related to any study variables. These differences are likely due to their different response formats. The BH is a self-report measure of the home literacy environment, whereas the BTC measures parent familiarity with books indirectly via their knowledge and awareness of well-known children's books.

Table 4.

Intercorrelations among Study Variables Included in the Regression Analyses

Variable	1	2	3	4	5	6	7
1. Age	--						
2. Sex	-.05	--					
3. DECA T1	.10	.26**	--				
4. ELC T1	.36**	.10	.29**	--			
5. ELC T2	.24**	.15*	.31**	.72**	--		
6. BTC T2	-.03	.13	.12	.23*	.26*	--	
7. BH T2	.01	.15*	-.02	.15	.15	.13	--

Note. DECA – Devereux Early Childhood Assessment, ELC – Early Literacy Composite score, T1 – baseline score, T2 – post-test score, BTC – Book Title Checklist, BH – Experiences with Books at Home. * $p < .05$. ** $p < .01$.

Hypothesis Testing

Hypothesis 1. The first hypothesis predicted that early literacy skills would yield a three-factor structure comprised of oral language, metalinguistic skills, and emergent literacy skills. Principal components factor analysis adjusted by oblique promax rotation estimated the underlying factorial structure of early literacy skills for the current sample. Results demonstrated that IGDI Alliteration, PALS Beginning Sound, Nursery Rhyme, and Print and Word Awareness subtests loaded poorly or loaded evenly onto two or more

components. When these subtests were excluded from the analyses, a stronger three-factor structure was found to explain a greater amount of variance in the data (Table 5).

Table 5.

Three-factor Structure of Early Literacy

Measure	Factor 1	Factor 2	Factor 3	Communality
PALS Rhyme Awareness	.920*	.034	-.069	1.000
IGDI Rhyming	.862*	.026	.080	1.000
PALS Name Writing	060	.901*	-.094	1.000
PALS Upper Case Alphabet Knowledge	.001	.821*	.113	1.000
PPVT	.182	-.140	.830*	1.000
IGDI Picture Naming	-.171	.148	.816*	1.000
Eigenvalue	1.98	1.96	1.74	
Variance	43.7%	18.6%	14.9%	

* Corresponding variable within factor

Results from the factor analyses indicate a good fit of the data to the three-factor model. The remaining six items yielded three factors accounting for 77.1% of total variance in the data. Factor 1 (eigenvalue = 1.98) consisted of PALS Rhyme Awareness and IGDI Rhyming tasks, which measure metalinguistic skills, and account for 43.7% of variance in the model. Factor 2 (eigenvalue = 1.96) represented emerging literacy skills

with PALS Name Writing and Alphabet Knowledge subtests. Emerging literacy skills accounted for 18.6% additional variance. Finally, Factor 3 (eigenvalue = 1.74) is comprised of oral language tasks, including PPVT and IGDI Picture Naming scales, which explained 14.9% of the total variance. Cronbach's alpha is .72, evidencing moderate reliability for the total structure.

Hypothesis 2. Hypothesis 2 predicted that family literacy behaviors would moderate the relationship between pro-social child characteristics (e.g., higher initiative, self-control, and attachment) and change in early literacy skills, after controlling for age, sex, and family income. The composite baseline early literacy score that combines the six early literacy skills representing Sénéchal and colleague's (2001) model for this sample (e.g., PPVT, IGDI Picture Naming and Rhyming, and PALS Rhyme Awareness, Name Writing, and Upper Case Alphabet Knowledge) was entered in the first step to control for the influence of baseline early literacy ability. Age and sex were controlled statistically in the regression analyses, due to their effect on study variables. Family income was controlled experimentally due to exclusion criteria limiting variability in income. For all regression analyses, cases were excluded pairwise.

Regression analysis assessed Hypothesis 2a, exploring whether high pro-social child characteristics were related to high early literacy skills, while controlling for the influences of age, sex, and family income. This hypothesis was supported, B = .60 t(230) = 4.21, p = .00. Presented in Table 6, the results of the analyses suggest that pre-intervention initiative, attachment, and self-control characteristics are predictive of post-intervention early literacy skills, after an average of about 10 months of intervention.

Table 6.

Summary of Hierarchical Regression Analysis for Predicting T2 Early Literacy Skills

Pro-social Child Characteristics (n = 231)	B	SE B	B	R^2	ΔR^2
*Step 1***				*.09*	*.09*
Age**	.74	.20	.22		
Sex	4.02	2.70	.09		
*Step 2***				*.15*	*.07*
Protective Factors**	.60	.14	.27		
Family Literacy Behaviors (n = 90)	B	SE B	B	R^2	ΔR^2
*Step 1**				*.09*	*.09*
Age*	.85	.33	.26		
Sex	5.68	4.28	.13		
*Step 2**				*.15*	*.06*
Book Title Checklist*	.54	.22	.25		

** $p < .01$; * $p < .05$

Next, regression analysis evaluated Hypothesis 2b, which posited that higher family literacy behaviors would predict higher early literacy skills, after controlling for the influence of age, sex, and family income. Higher family literacy scores on the BTC predicted higher post-intervention early literacy skills, B = .54; t(89) = 2.44, p = .02, controlling for age, sex, and family income.

Finally, Hypothesis 2c further predicted that higher levels of pro-social child characteristics would be associated with positive changes in early literacy skills when the level of family literacy behaviors is high and the effects of sex, age, and family income are controlled. This hypothesis was not supported, B = .01; t(67) = .33, p = .74, but the overall model predicted improvement in early literacy skills, $F(6, 67) = 12.32$, $p < .01$. After controlling for the effects of sex, age, and family income, children's pro-social psychological strengths no longer remained predictive of early literacy skill development,

despite age, sex, family income, and family's participation in literacy-related behaviors, B = .23; t(67) = 1.12, p = .27, (Table 7). Family literacy behaviors were no longer predictive of positive changes in early literacy skills, once children's baseline abilities were taken into account, B = .19; t(67) = .95, p = .34.

Table 7.

Summary of Hierarchical Regression Analysis for Predicting T2 Early Literacy Skills

Variable (n = 75)	B	SE B	B	R^2	ΔR^2
*Step 1***				*.52*	*.52*
Age	-00	.31	-.00		
Sex	1.81	3.82	.04		
Pre-intervention Early Literacy Skills**	.59	.09	.66		
Step 2				*.52*	*.01*
Child Characteristics	.23	.21	.10		
Step 3				*.54*	*.01*
Family Literacy Behaviors	.19	.20	.09		
Step 4 (Interactions)				*.54*	*.00*
Child Characteristics x Family Literacy	.01	.02	.03		

** p < .01; * p < .05

Additional Analyses

Given the significant statistical and developmental influence of age on children's early literacy skills, the regression analyses were repeated among the older half of the sample, which included ages 48- 60 months old. It was speculated that some of the measurement challenges would be minimized if the sample were limited to children who might have more developmentally advanced early literacy skills that were more amenable to measurement and less susceptible to floor effects.

Table 8.

Descriptive Statistics for Predictor and Outcome Variables among Older Preschoolers

Measure	Mean (SD)	N	Min	Max
Age in months	52.97 (3.65)	207	48	60
Sex_a	.50 (.50)	207	0	1
DECA Protective Factors, T1	46.74 (9.35)	184	28	72
Early Literacy Composite, T1	124.08 (23.96)	194	65	179
Early Literacy Composite, T2	150.36 (20.01)	169	98	196
Book Title Checklist, T2	7.16 (9.64)	59	-7.5	32.5
Experiences with Books at Home, T2	14.62 (3.98)	100	6	22

[a]Males were coded as 0. Females were coded as 1.

Descriptive statistics were computed for the older children (Table 8). Although the mean scores were not much higher than the means scores of the full sample, correlations in Table 4 demonstrate that age is a correlate of study predictor and outcome variables (e.g., early literacy baseline scores, early literacy post-test scores, and family literacy, as measured by the BTC). Table 9, which displays correlations among study variables for the older age group, demonstrates that the relationship between age and literacy-related variables is significant among the four and five year old children as well. This relationship suggests that developments in children's literacy skills are significant, even from just age four to age five. Therefore, age was controlled in the regression analyses for the older preschoolers, as well.

Table 9.

Intercorrelations among Study Variables Included in the Regression Analyses for the Older Preschoolers

Variable	1	2	3	4	5	6	7
1. Age	--						
2. Sex	.08	--					
3. DECA T1	.04	.25**	--				
4. ELC T1	.23**	.14*	.27**	--			
5. ELC T2	.28**	.17*	.30**	.77**	--		
6. BTC T2	.37**	.18	.21	.28*	.37**	--	
7. BH T2	.05	.10	.03	.16	.20	.12	--

Note. DECA – Devereux Early Childhood Assessment, ELC – Early Literacy Composite score, T1 – baseline score, T2 – post-test score, BTC – Book Title Checklist, BH – Experiences with Books at Home. * $p < .05$. ** $p < .01$.

Hierarchical regression analyses found that four- and five-year-olds' prosocial strengths were significantly predictive of early literacy skills at post-test, B = .58; t(149) = 3.49, p = .00, and at pre-intervention baseline B = .63; t(171) = 3.30, p = .00, after controlling for age, sex, and family income. This finding was replicated with the full sample, B = .60; t(229) = 3.83, p = .00. Family literacy behaviors were less predictive of early literacy skills for this group, once variability due to age, sex, and family income were taken into account, B = .59; t(49) = 1.95, p = .06, (Table 10).

Table 10.

Summary of Hierarchical Regression Analysis for Predicting T2 Early Literacy Skills among Older Preschoolers

Pro-social Child Characteristics (n = 150)	B	SE B	B	R^2	ΔR^2
Step 1 **				*.10*	*.10*
Age**	1.45	.41	.27		
Sex	3.16	3.12	.08		
*Step 2***				*.17*	*.07*
DECA Total Protective Factors**	.58	.17	.27		
Family Literacy Behaviors (n = 50)	B	SE B	β	R^2	ΔR^2
Step 1				*.10*	*.10*
Age	.93	.79	.17		
Sex	4.12	5.46	.10		
*Step 2**				*.17*	*.07*
Book Title Checklist	.59	.30	.29		

** $p < .01$; * $p < .05$

Among four- and five-year-old children in the study, hierarchical regression analyses were computed to estimate whether positive change in early literacy scores are predicted by child characteristics, and whether family literacy behaviors moderate this relationship. The proposed model for predicting improvement in early literacy skills was supported in the older sample, $F(6, 44) = 10.61$, $p = .00$. Family literacy behaviors did not moderate the influence of child characteristics on positive change in early literacy skills, after controlling for the effects of age, sex, and family income, B = -.01; t(44) = -.34, $p = .73$ (Table 11). In fact, most of the predictive value in the model remained with children's initial early literacy scores, B = .58; t(44) = 6.42, $p = .00$.

Table 11.

Summary of Hierarchical Regression Analysis Predicting T2 Early Literacy among Older Preschoolers

Variable (n = 53)	B	SE B	B	R^2	ΔR^2
*Step 1***				*.60*	*.60*
Age	.39	.59	.07		
Sex	.94	4.16	.02		
Pre-intervention Early Literacy Skills*	.58	.09	.69		
Step 2				*.61*	*.01*
Child Characteristics	.18	.23	.09		
Step 3				*.63*	*.01*
Family Literacy Behaviors	.29	.24	.14		
Step 4 (Interactions)				*.63*	*.00*
Child Characteristics x Family Literacy	-.01	.03	-.04		

** $p < .01$; * $p < .05$

Discussion

This investigation explored the latent factorial structure of early literacy, and examined whether family's support of literacy development, when combined with children's psychological strengths, helps expand development of early literacy skills, when combined with a year of literacy development intervention. Findings from this study indicate that Sénéchal and colleagues' (2001) model of emergent literacy, which separates early literacy from oral language and metalinguistic skills, is relevant for an urban, low-income, African American sample of preschool children. Study results did not demonstrate that family's literacy behaviors enhance development of early literacy skills, beyond improvements attributable to school instruction and typical development.

This chapter will discuss study findings, outline implications and limitations of the study, and provide considerations for future research.

Latent Factorial Structure of Early Literacy

This study hypothesized that the structure of Sénéchal and colleagues' (2001) model of emergent literacy would adequately fit the data collected in this study. This hypothesis was supported, as a three-factor structure of early literacy represented by emergent literacy, oral language, and metalinguistic skills explained 77% of variance in the data collected. Factor analysis suggests that each factor represented as a distinct skill set contained within construct of emergent literacy.

IGDI Alliteration, PALS Beginning Sound, Nursery Rhyme, and Print and Word Awareness were excluded from the final three factor structure to enhance the strength of each factor and the model overall. It should be noted that several developmentally advanced early literacy skill sets expressed within Sénéchal's model, such as those considered conceptual print knowledge skills, were not measured in this study. Additionally, similar subtests, representing more advanced emerging literacy skills, such as narrative, print, and metalinguistic knowledge, were excluded from the analyses.

Results of the factor analysis represent emergent literacy skills relevant among developmentally younger children who have not yet acquired some of the more advanced skills included in the Sénéchal model. Factor 1 is comprised of metalinguistic skills represented by IGDI and PALS rhyming subtests. Of the three early literacy domains, emergent literacy, oral language, and metalinguistic skills, metalinguistic and emergent literacy skills are the final two to emerge. For many children, oral language is developed

first and metalinguistic skills are the last to emerge (CPRDYC, 1998). Of these, phoneme and letter-sound awareness seem to be two of the earliest metalinguistic skills, as they typically develop between ages two and five, and often after children have learned a letter in their name or how one uses language (CPRDYC, 1998). As such, it is not surprising that this factor has the highest discriminatory value, accounting for almost half of the variance in scores.

The second factor retained PALS letter knowledge and name writing subtests, which represent only two of the eight skills associated with early literacy. According to DeBruin-Parecki and colleagues (2008), these are two of the earliest literacy skills that children acquire, with most children competent in identifying letters in their own name by age two or three (DeBruin-Parecki et al., 2008; CPRDYC, 1998). Word knowledge, as measured by PALS Nursery Rhyme task and understanding of print concepts (e.g., understanding that print has purpose, meaning, and rules), as measured by PALS Print and Word Awareness task, begin to develop during this time as well. However, word knowledge and print concepts might emerge between two- and five-years old (CPRDYC, 1998). Given this sample's reportedly low level of print exposure, it is comprehensible that print concepts might not be proficient knowledge among many children at this age.

The final factor includes PPVT and IGDI Picture Naming tests. PPVT is a receptive language measure, while IGDI Picture Naming is an expressive language measure. Both are able to quantify early oral language skills in children as young as age two. Oral language is the earliest pre-literacy skill that children acquire. Still, factor analysis demonstrated that oral language is distinct from metalinguistic and early literacy

skills, though oral language supports metalinguistic and early language ability. Evolutionarily, researchers (Geary, 1995; Hemphill & Snow, 1996; Sénéchal et al., 2001) have explained oral language as a primary skill, where as its interaction with written language (e.g., reading) represents a more recently evolved secondary skill. As such, oral language develops firstly and distinctly from metalinguistic and emergent literacy skills, which are each dependent upon the development of oral language.

Individual Characteristics and Early Literacy

The second major hypothesis predicted that children's psychological strengths and family's involvement in literacy-related behaviors support positive change in early literacy scores. First, children's psychological strengths (e.g., initiative, self-control, and attachment) were expected to predict post-intervention early literacy skills, after controlling for family income, sex, and age. Regression analyses found that children's psychological strengths were indeed predictive of early literacy scores, after receiving a an average of ten months of literacy skill instruction, regardless of children's age, sex, or family income. A similar pattern was found among the older children in the study.

Although many studies have examined the relationship between child characteristics and language development, few studies have examined the influence of these specific child characteristics (e.g., initiative, self-control, and attachment) in early literacy development. However, a similar study found that children's temperament, which was measured as emotionality, activity level, and attention, predicted early literacy skills, regardless of sex of parent education (Coplan et al., 1999). Other studies have found attention and task-persistent behavior, which involve such skills as utilizing

constructive approaches to learning, self-control, initiative, and productive interpersonal skills, among other strengths, were associated with high early literacy skills and predictive of future reading ability (Ready et al., 2005; Stephesson et al., 2008). Consistent with previous research, the present study found that pro-social, adaptive behaviors predict children's early literacy skills.

Despite little research directly examining the combined influences of children's psychological strengths and family household income on their early literacy skills, this study's finding indicates there is considerable variability in children's psychological strengths among children from low-income households. Results showed that psychological strengths contribute significantly to early literacy skill level among children from low-income households.

Family Literacy and Early Literacy

Family literacy behaviors were expected to predict children's post-intervention early literacy skills, after controlling for family income, child sex, and child age. However, family literacy behaviors proved difficult to quantify, as the two measures of this construct, Book Title Checklist and Experiences with Books at Home, were not significantly correlated with one another. Despite this challenge, higher family literacy scores, as measured by the Book Title Checklist, was predictive of higher post-intervention early literacy skills, despite variance in family income, child sex, and child age. However, when exploring these influences among the older children, this finding disappeared. Due to the small sample size of the regression analyses with the older sample, it is difficult to draw conclusions from this distinction. It cannot be assumed that

the true relationship decreases with age. It is conceivable that this study's sample size of 50 was not large or powerful enough to detect the true relationship.

The poor relationship between the Book Title Checklist and Experiences with Books at Home questionnaire may be related to differences in measurement method and fundamental differences in the underlying constructs they seem to measure. The Book Title Checklist measures parent book knowledge as a proxy for assessing children and parents' joint involvement in literacy-related activities at home. The Experiences with Books at Home measure is a list of questions about specific behaviors that have shown a relationship with early literacy development. The measure was not developed psychometrically for use as a single assessment, nor was it developed for measurement of a specific aspect of the home literacy environment, such as parent book knowledge or parent teaching. LeFevre and Sénéchal (1999) found that these two home literacy constructs alone, parent book knowledge and parent teaching, are related to two different aspects of early literacy—oral language and writing skills. Burgess and colleagues (2002) have noted that there are at least four different ways to conceptualize the home literacy environment. Their research demonstrated that using two or more measurement methods to evaluate the same home environment would yield distinctly different findings, solely due to the method of measurement. Therefore, Book Title Checklist and Experiences with Books at Home questionnaire, using two different measurement methods to assess different aspects of the literacy environment, based on different conceptualizations of the home environment would potentially yield divergent results.

Family literacy behavior, as measured by the Experiences with Books at Home questionnaire, was not correlated with variables in the study and was not included in the analyses. The Experience with Books at Home measure is a self-report measure of the home literacy environment. The measure's susceptibility to social desirability, combined with its mixed response formats and an under-evaluated psychometrics, to yield a fairly unreliable measure of family literacy. The individual items were not intended for consolidation into a single composite score, yet there were also under-evaluated, single indicators of specific early literacy behaviors. It is conjectured that these reasons might explain the measure's poor performance in this study. Further psychometric development might improve the measure for future research.

Despite difficulties with data collection and measurement of family literacy variables, the Book Title Checklist predicted post-test early literacy scores. Because the Book Title Checklist is not a norm-referenced measure, it is difficult to ascertain whether parents in this study show relatively high or low levels of family literacy characteristics on this measure. However, it is evident that familiarity with children's book titles implies high exposure to children's books, presumably through engaging in reading-relating activities (i.e., visiting library or reading stories) with a child. This finding is consistent with previous research reporting that children with high exposure to print, via self and family member interaction with print, tend to demonstrate higher oral language, metalinguistic awareness, and print concept skills (van Steensel, 2006). They also tended to live with mothers having higher educational degrees (van Steensel, 2006). However,

this study provides evidence that the relationship continues to exist among families with low income, who possibly have lower corresponding education levels.

While research reports that children from families with low income often enter school with less developed language skills, fewer experiences with books, and lower exposure to important literacy skill-building activities than do other children (van Steensel, 2006; Washington, 2001), the children in the present study demonstrate that, despite these challenges, participation in family literacy behaviors predicts higher early literacy skills. This finding suggests that family background should not restrict encouragement of family literacy behaviors and that children from low-income households do benefit from increased family interaction with print.

Individual Characteristics, Family Characteristics, and Change in Early Literacy

It was expected that children's psychological strengths, when combined with high family's literacy behaviors, would contribute significantly to positive change in early literacy skills at post-test, after controlling for income, sex, and age. Hierarchical regression analyses did not support this assertion. Children's pro-social characteristics were predictive early literacy skills, despite the effects of age, sex, and family income; however, these characteristics did not significantly account for positive changes in early literacy skills beyond the influence of unmeasured literacy instruction and typical child development, even when combined with high family literacy behavior. Similar results were found among the four- and five-year-old sample. These findings suggest that children's pro-social characteristics seem to provide a strong foundation for supporting initial effort and performance in the acquisition of early literacy skills, but might not be

sufficient for maintaining developmental gains. Study results also suggest that the relationship between children's pro-social characteristics and early literacy skills is likely an indirect connection that is mediated by other factors.

Several researchers have reported findings consistent with the results of the present study. One study reported that the collective influence of family literacy behaviors, parents' reading beliefs, children's cognitive skills, and children's language skills outweigh the influence of certain pro-social skills, such as utilizing task-focused behavior (Stephesson et al., 2008). As such, children's individual strengths seem to be a powerful predictor of improvement of early literacy skills, however, they do not outweigh the influence of children's age, sex, family income, and early literacy skills at the time of school initiation.

Implications

Researcher's inconsistent use of terms and constructs related to early literacy have slowed progress and confused findings in the field. Sénéchal and colleagues' (2001) three-factor model is unique in that it distinguishes oral language and metalinguistic skills as facilitators of emergent literacy skills. For this study, evaluating the model was necessary to determine the appropriateness of the language in Sénéchal and colleagues' (2001) three-factor model for the current sample to have a way to describe the study and its findings. The model has relevance for a low-income, urban sample. The model also provides a useful framework for communicating, investigating, and building upon early literacy outcomes. With emergent literacy conceptualized as distinct from oral language and metalinguistic skills, researchers can evaluate emergent literacy more precisely and

accurately. Research using this model might be able to identify factors that contribute uniquely to the development of emergent literacy skills. The model includes less commonly researched constructs that might be investigated further, as part of a larger, well-accepted framework of early literacy. To continue advancing our understanding of early literacy, it seems necessary to identify a common language for explaining outcomes and interpreting findings.

This study found that family literacy behaviors encourage positive early literacy skill development, but children's own personal strengths seem to play a greater role in their growth. Children's pro-social, psychological strengths, such as initiative, healthy attachment, and self-control, are important intrapersonal resources for support of early literacy skill development, regardless of family income, child sex, and child age. Although this relationship is likely indirect and could possibly reflect a more global social or school-related construct, it is important to note that it remains an important sustenance for early literacy skills.

Although some parents from low-income households might not decisively expose their children to literacy before preschool, their support of healthy attachment, initiative, and self-control seems to provide a foundation for literacy instruction that could help children perform as well as their peers by the end of the school year. Interventions encouraging healthy development and supportive parenting could go along way to support early literacy skills, particularly among children not exposed to literacy and parents not exposed to early literacy interventions. Additionally, existing teacher and classroom interventions supporting children's initiative, healthy attachment, and self-

control, among other characteristics seem to support early literacy development and, perhaps, preschool achievement, overall.

Children from low-income backgrounds represent a unique subset of the national population. On both norm-referenced, standardized measures, participants scored below the national average. These children typically have fewer resources than many other children have. As such, interventions targeting families with low-income should be developed with the intended community, as social, political, economic, and other factors could have a unique impact upon various aspects of laboratory-developed interventions. Factors such as teacher buy-in and burnout, transportation, participation, and engagement could each differ by community.

Limitations

This investigation's findings should be interpreted with caution due to several limitations of the study. For example, without a comparison group it is difficult to know the true degree to which the early literacy intervention contributed to study results. Similarly, measurement of intervention-specific factors, such as teacher experience, teacher skill, classroom management, and classroom organization, among other factors, could have provided relevant information about the influence and strength of the intervention.

Additionally, the study did not measure effects on specific skills, such as decoding, phonetic skills, and oral language. The composite indicator of early literacy minimizes the influence of each individual aspect of early literacy and limits the ability to

identify relationships with specific emergent literacy, metalinguistic or oral language variables.

The statistical methodology selected for evaluation of the data precipitated a need to consolidate variables into composite measures, thus limiting variability within the data and restricting the ability to identify specific relationships. Some methods, such as MANOVA would have required equally problematic statistical manipulations that would have also resulted in some loss of information from the data collected. Still, other methods of analysis, such as structural equation modeling, would have better accounted for variability and relationships in the data. Moreover, this research did not complete confirmatory factor analyses to support findings from the initial factor analysis and rule out other possible explanations for gains. Without computation of a goodness-of-fit statistic, such as chi squared, it is difficult to assess whether the three-factor structure of early literacy was, indeed, a good fit of the data. More sophisticated modeling techniques and statistical software could better account for error variance and missing data problems.

Sample size and statistical power could be enhanced by a larger sample size, selection of different statistical methods, or management of missing data. Use of missing data techniques or software, or selection of measures with a lower floor could have reduced the amount of missing data in this study.

This study did not measure the intervention directly. Classroom factors, school/site factors, teacher factors, and curriculum factors each influence classroom learning conditions, children's individual performance, and parent involvement in the study. While the study can draw conclusions about what could improve literacy scores,

this study cannot make assertions regarding aspects of the program that could be enhanced to improve individual or family outcomes.

Future Research

Future research focusing on measurement of family literacy behavior and components of early literacy would improve the strength of research findings. If the home literacy environment can be measured from four different perspectives, as proposed by Burgess and colleagues (2001), then there is a need to determine which of these best captures the richness of literacy environments in African American homes. Our study measured parent book knowledge, library frequency, reading frequency, and number of books at home, among other family literacy factors. However, Roberts and cohort (2005) found that African American mother's reading style and responsiveness to their children while reading better-predicted vocabulary than reading frequency or exposure to books. It seems conceivable that, if explored further, these behaviors, and possible others, might yield stronger connections to oral language and early literacy skills in this population.

Highly sensitive, socio-culturally relevant instruments are needed to better capture the variability of family's literacy behaviors in order to better evaluate their role in early literacy development, as challenges in the measurement of this construct might have affected the present study's outcomes. Additionally, measures that are able to quantify the earliest of literacy skills would improve researchers' ability to identify interventions useful during this phase of development. Further psychometric development of the measures in this study might improve their utility for future research.

Further investigation of specific child psychological and/or pro-social strengths could be important in unveiling ways to prepare children for early literacy instruction, despite their home literacy environment.

Conclusion

The current study found a three-factor structure of early literacy, consisting of early literacy, metalinguistic skills, and oral language. The study also found that family literacy and children's pro-social, psychological strengths predict children's early literacy skills, despite family income and variance in child sex and child age. Finally, it was found that children's pro-social psychological strengths are predictive of improvements in early literacy skills, more so than family income, child age, and child sex, but that these skills are not further enhanced by family's literacy behaviors.

Study findings should be interpreted with attention to the limitations of quantifying study variables. Family literacy was difficult to quantify and individual early literacy skills were consolidated, thus reducing their variability. Additionally, the absence of a control group, measurement of intervention variables, and the use of statistical methods that were unable to fully account for and measure alternative sources of variance in the data could affect the interpretation of study results. Still, this research illustrates a need for improved measurement of early literacy and family literacy variables, particularly among unique populations. This research also demonstrates the relevance of exploring children's pro-social and/or psychological strengths as resources for supporting early literacy instruction in classroom interventions.

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