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By

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Abstract

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This study was conducted to expand the field's understanding of how various preschool teacher practices can foster emergent literacy growth as needed to prevent widespread reading difficulties and how teachers' educational backgrounds can influence the use of such practices. Utilizing a national dataset from the Preschool Curriculum Evaluation Research project, hierarchical linear modeling was employed to examine the relationship between 259 teachers' practices and 1,723 students' oral language, phonological awareness, and print knowledge growth from fall to spring of the preschool year. Data was collected at 18 geographical sites across the country. A number of statistically significant relationships were observed between children's development in critical emergent literacy domains and teachers' language and literacy instructional practices (i.e., book reading practices, oral language use, phonological awareness instruction, and print and letter knowledge instruction), differentiated instruction planning, and teacher–child social interactions. The effects of teachers' practices were specific to each emergent literacy outcome, and a few findings suggest that the quality, rather than the quantity, of instruction may be more important for certain child outcomes. Some significant Child × Instruction effects were also found. Optimal book reading practices were found to be exceptionally beneficial for children who start the year with far below average (below the 5^{th} percentile) oral language skills, and children with below average (below the 10^{th} percentile) print knowledge skills at preschool entry benefitted more considerably when their teachers adeptly planned differentiated instruction. Furthermore, differentiated instruction planning and less permissiveness were both observed to moderate the effect that book reading practices had on children's print knowledge gains. Despite the evidence that a comprehensive repertoire of teacher practices is needed to alter children's emergent literacy developmental trajectories toward greater reading success, average national teacher practices were less than ideal. Although teachers' educational backgrounds were generally found to have no substantial relationship with teachers' practices, a positive relationship between specific coursework in early childhood education and aspects of teachers' language and literacy instruction was observed. Possible reasons for teachers' current implementation of practices are explored, and implications for future research, practice, and policy are discussed.

Dedication

I dedicate this dissertation to my husband, our baby girl Lydia, my parents, and the loved ones I have lost. Zach, I could never have done this without you. Your love and unending support have allowed me to make it through graduate school and finish the final stretch. You always believed in my strength when I doubted myself, and I will forever be thankful for having you as my partner in life each and every day. Lydia, the timing of your birth gave me the motivation to ensure I finished this endeavor, and feeling you grow inside me reminded me of my hopes and dreams and all that can be accomplished by women. I want you to know that I will always be by your side as you work toward whatever makes you happy. Mom and Dad, your unconditional love and support coupled with your acceptance of whatever I wanted to do to make me happy, have helped in all that I have achieved. I am so grateful that I was born to such wonderful parents. For my loved ones who are in heaven, thank you for always watching over me and giving me the drive to live each day to its fullest. You will never be forgotten.

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Preschool Teacher Practices and the Prevention of Reading Difficulties

In today's society, skillful reading is essential for both academic and lifelong success. It is unacceptable in our democratic nation that large numbers of children from low socioeconomic status (SES) backgrounds struggle to acquire proficient reading skills compared with their more privileged peers (Institution of Education Sciences, 2007b; National Assessment of Educational Progress, 2005). On the most recent National Assessment of Education Progress (NAEP) in reading, fourth-grade children eligible for free or reduced-price lunch had an average scale score that fell into the "below basic" category, the lowest category on the test (Institute of Education Sciences, 2007a). In fact, for the last 20 years, children from families with a socioeconomic disadvantage have scored consistently and significantly lower on national reading assessments than middle- and upper-SES children at all points of testing (Institute of Education Sciences, 2007b). Preventing reading failure for children from low-SES backgrounds and narrowing the achievement gap are clear imperatives for educators and policy-makers alike.

Although school-age interventions remain essential, many researchers believe the risks for reading failure should be tackled prior to school entry when socioeconomic differences in emergent literacy already exist (e.g., Hart & Risley, 1995; Lonigan, Burgess, Anthony, & Barker, 1998; Smith & Dixon, 1995). Moreover, given that children's prospects for reading achievement are most amendable prior to kindergarten, attempts to attenuate the risk associated with low SES will likely be most successful during these early years (Dickinson & McCabe, 2001; Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Lonigan et al., 1998). Preschool classrooms provide an opportunity to assuage low-SES children's risk for reading difficulties on a broad scale. That is, if children are able to experience optimal preschool classroom practices that foster dramatic early literacy growth, reading failure could potentially be more widely prevented and school success more widely experienced. Therefore, the current study sought to identify and clarify preschool teacher factors that contribute to the dramatic emergent literacy growth necessary for accomplishing more equitable educational outcomes.

The Significance of the Preschool Period and Emergent Literacy Development

The level of reading proficiency achieved by a child early in elementary school heavily influences their achievement throughout schooling. For example, in their longitudinal study from kindergarten through first grade, Curby, Rimm-Kaufman, and Ponitz (2009) discovered that children's skill levels at kindergarten entry predicted children's two-year growth in both phonological awareness and word reading, which are needed to accomplish fluency and, in turn, reading for meaning. Juel (1988), in her longitudinal work, found that a child who is a poor reader by the end of first grade has a .88 probability of remaining a poor reader by the end of fourth grade; conversely, if a child is a good reader at the end of first grade, there is only a .12 probability of subsequent reading difficulties. Additionally, in an extensive longitudinal study, Cunningham and Stanovich (1997) determined that first grade reading ability (i.e., word identification skills, including decoding) is a stable predictor of eleventh grade reading comprehension, vocabulary, and general knowledge, even after controlling for the effect of cognitive ability. Given the rather stark stability of reading achievement over time, it is clear that the early years of children's lives should be targeted to dramatically alter their potential for academic success.

Emergent Literacy: A Developmental Framework

Traditional maturationist views of preschool education, which have historically pervaded the educational landscape, pay little attention to children's literacy-related understandings and environments during the years prior to conventional reading acquisition (Teale & Sulzby, 1986). By evading such a focus, opportunities for cultivating children's development and preventing future reading failure have been lost. Building upon research from a number of theoretical frameworks, the theory of emergent literacy was proposed in order to address the lack of a developmental lens on literacy acquisition. Through this theoretical lens, researchers designated particular value and legitimacy to active engagement and environmental inputs during the early years of a child's life (Teale & Sulzby, 1986). By focusing on these years prior to formal school entry, emergent literacy theory provides a powerful framework for understanding how to increase the future reading success of children from low-SES backgrounds.

Emergent literacy is consistently viewed as the reading and writing concepts, behaviors, and attitudes that precede and develop into conventional literacy (e.g., Sulzby & Teale, 1991; Whitehurst & Lonigan, 1998). In this framework, skills are seen as developing concurrently and interrelatedly, rather than sequentially, and empirical research has substantiated this aspect of the theory (e.g., Burgess & Lonigan, 1998; Dickinson et al., 2003; Lonigan, Burgess, & Anthony, 2000). Most models of emergent literacy incorporate (a) skills that will eventually support children in word recognition, or breaking the code, and (b) skills that are necessary to generate meaning from text (e.g., Dickinson, et al. 2003; Lonigan et al., 2000; Storch & Whitehurst, 2002; Whitehurst & Lonigan, 1998, 2001).

Researchers have found that code-based skills, including phonological awareness and print knowledge, are critical for children's future success with reading (e.g., Lonigan, Schatschneider, & Westberg, 2008a; Storch & Whitehurst, 2002). *Phonological awareness* (PA, also referred to as phonological sensitivity or metalinguistic awareness in the literature) comprises children's sensitivity to and ability to manipulate the sound structure of language, including skills such as rhyming, alliteration, blending, segmenting, and elision. At an early age, PA is the strongest predictor of a child's later reading achievement (Burgess, 2006; Dickinson, et al., 2003; Lonigan, Schatschneider, et al., 2008a; Stanovich, Cunningham, & Cramer, 1984; Storch & Whitehurst, 2002) and more importantly plays a causal role in the child's ability to learn how to read (Bradley & Bryant, 1983; Bus & van Ijzendoom, 1999; Byrne, Fielding-Barnsley, & Ashley, 2000; Byrne & Fielding-Barnsley, 1995, 1993, 1991; Cunningham, 1990; Foorman, Francis, Fletcher, Schastschneider, & Mehta, 1998; Hatcher, Hulme, & Ellis, 1994; Lundberg, Frost, & Peterson, 1988; National Reading Panel [NRP], 2000). Beyond having a direct effect on children's future reading success, PA growth simultaneously affects growth in print knowledge, another meaningful code-based skill (Burgess & Lonigan, 1998; Dickinson et al., 2003; Lonigan et al., 2000).

Print knowledge refers to a combination of alphabet knowledge (i.e., knowledge of letter names and associated sounds), concepts about print (i.e., knowledge of print conventions such as left–right, front–back; concepts such as book cover, author, text), and early decoding skills. Print knowledge is also highly predictive of reading acquisition and achievement (Adams, 1990; Bowey, 2005; Stevensen & Newman, 1986; Wagner, Torgesen, & Rashottte; 1994), with alphabet knowledge having the most substantive predictive power (Lonigan, Schatschneider, et al., 2008a). Additionally, the interrelated nature of emergent literacy development is also apparent in the positive effect print knowledge growth has on PA development (Burgess &

Lonigan, 1998; Dickinson et al., 2003; Lonigan et al., 2000). Together, code-based skills in preschool account for the majority of the variance in kindergarten code-based skills, which in turn account for the majority of the variance in first and second grade reading skills (Storch & Whitehurst, 2002). Subsequently, second grade reading skills have been found to play a significant role in children's third and fourth grade reading accuracy and comprehension. Overall, these findings demonstrate the critical role of preschool code-based skills in setting the stage for a child's trajectory towards reading success, and thus it is vital that preschool teachers utilize practices which foster the optimal development of such skills.

Additionally, researchers have identified oral language as a key meaning-focused emergent literacy skill. *Oral language* involves producing or comprehending spoken language, including vocabulary, syntax (i.e., grammar), narrative, and discourse. Oral language, in part, affects reading achievement via its meaningful and direct effect on early code-based skills (Storch & Whitehurst, 2002). As posited by the lexical restructuring hypothesis (Metsala & Walley, 1998; Metsala, 1999) and empirical research (Cooper, Roth, Speece, & Schatschneider, 2002; De Cara & Goswami, 2003), oral language can contribute to the development of PA since a young child's vocabulary growth demands increasingly complex neural organization of factors like phonological similarity. While preschool oral language has this important indirect relationship with children's reading acquisition (Whitehurst & Lonigan, 2001), it also appears to reemerge as a direct predictor of third and fourth grade reading comprehension (Storch & Whitehurst, 2002). Given the value of preschool oral language in supporting critical code-based skills early in a child's reading acquisition and later in cultivating comprehension skills, it is evident that preschool teachers' practices must also provide enriching opportunities for their young students to develop oral language.

Although the predictive power of code-based skills and oral language provides a substantive rationale for optimizing preschool teachers' practices to foster skills in both areas, the developmental nature of these skills also warrant a focus on teacher practices prior to school entry. Both code-based skills and oral language show strong continuity from preschool through fourth grade, meaning that although individual growth is occurring, little change in how children's performances are ordered or spaced relative to one another takes place (Burgess & Lonigan, 1998; Lonigan et al., 1998; Lonigan et al., 2000; Storch & Whitehurst, 2002; Wagner et al., 1997; Whitehurst & Lonigan, 1998). Despite the developmental stability in such skills during the late-preschool period and beyond, it is interesting to note that Lonigan et al. (2000) found that there is much more variability in one code-based skill, namely PA, between the early and late-preschool periods, such that the ordering and spacing of individuals' skills could actually change over the preschool year. Given the interrelationships between emergent literacy skills (e.g., Burgess & Lonigan, 1998; Dickinson et al., 2003), it is likely that such variability is found in the development of other emergent literacy skills during the preschool period as well. Overall, this developmental variability suggests that the benefits of intervention will be most readily engendered during the early- to late-preschool period.

Socioeconomic disparities. All children, regardless of SES, experience some literacy-related activity in their home during the preschool years (Purcell-Gates, 1996; Teale, 1986). As mentioned above, however, developmental disparities already evident across socioeconomic lines during preschool pose yet another substantial rationale to optimize interventions during this period of time in children's lives. SES is a complex construct that has been most commonly operationalized via indicators including parents' income, occupational status, and/or educational attainment (Ensminger & Fothergill, 2003; Entwisle & Astone, 1994). Although each indicator

has been linked to various child outcomes (e.g., Kohn, 1986; West, Denton, & Reaney, 2000; Yeung, Linver, & Brooks-Gunn, 2002), the mechanisms through which they affect development vary. Family income levels likely affect children's development through the amount of cognitive stimulation that is available in the home (Blau, 1999; Yeung et al., 2002), whereas parental beliefs may be at play when considering the effect of occupational status on developmental outcomes (Kohn, 1986). Education levels, possibly the most commonly used indicator in the early childhood literature (Ensminger & Fothergill, 2003), are related to the quality of and cognitive engagement provided in the home environment (Klebanov, Brooks-Gunn, & Duncan, 1994) and maternal teaching styles (Hess & McDevitt, 1984), which in turn may influence children's development.

Given the limited consensus in how SES should be most effectively captured (Bradley & Corwyn, 2002), it is not surprising that emergent literacy researchers who have examined socioeconomic disparities have not used consistent SES indicators in their work as well. Nonetheless, research that has operationalized SES using varied indicators has consistently demonstrated that because children from low-SES backgrounds are typically exposed to environments less abundant in enriched language and literacy than their middle- and upper-SES peers (Hart & Risley, 1995; Phillips & Lonigan, 2005; Vernon-Feagans, Scheffner Hammer, Miccio, & Manlove, 2001), they often arrive at kindergarten with less developed emergent literacy skills than their more privileged peers. Further, the research has provided more specific clarity on how SES affects children's reading achievement through its influence on both meaning-based and code-focused emergent literacy skills in children.

With typically limited exposure to regular rich language and storybook experiences, low-SES children have smaller vocabularies (Hart & Risley, 1995; Senechal, LeFevre, Hudson, & Lawson, 1996; Walker, Greenwood, Hart, & Carta, 1994). Furthermore, children from low-SES backgrounds typically have less experience with narrative and explanatory talk in conversations with their parents and others (Dickinson & Tabors, 1991). As a result, they generally develop less decontextualized language (i.e., concepts and notions removed from the immediate context of printed stories that are required to understand the meaning of print) than their more affluent peers.

Studies which have employed sensitive methodological approaches have demonstrated early PA differences related to levels of SES as well. Smith and Dixon (1995) reported that as early as age four, children from low-SES homes are at a significant disadvantage on PA tasks involving blending of phonemes, after adjusting for floor effects. MacLean, Bryant, and Bradley (1987) found that SES significantly affected three-year-olds' identification of rhyme and alliteration. Bowey (1995) similarly reported significant SES differences on rhyme and final phoneme matching for five-year-old preschoolers, even after controlling for IQ and language. A study by Lonigan et al. (1998) examining numerous PA tasks in two- to five-year-old children revealed SES differences as early as age three, depending on the complexity of the task. Children from low-SES backgrounds have also been found to score lower than their middle- and high-SES peers on print knowledge tasks, such as letter naming (Chaney, 1994; Smith & Dixon, 1995). Overall, it is evident that the reading achievement gap in K–12 has its roots, at least in part, in the emergent literacy disparities that already exist in the early years of children's lives.

Although disparities in literacy-related skills may be small when children are young, the impact of the differences is likely exacerbated without timely intervention. This phenomenon is referred to as the "Matthew Effect," where cumulative and enduring advantages or disadvantages resulting from early literacy skills lead to an increasingly widening gap between good readers

and poor readers, such that the rich get richer while the poor get poorer (Stanovich, 1986). Essentially, through reciprocal causation of reading achievement and various cognitive skills involved in reading, initially good readers will quickly and increasingly improve their reading skills, while poor readers will continually fall farther and farther behind. This theoretical account of reading development and the corresponding empirical literature provides another strong rationale for early intervention. Opportunely, as was mentioned previously, the developmental variability that exists in emergent literacy during the early- to late-preschool period suggests that there is an increased capacity for dramatic growth relative to same age-peers during the majority of the preschool year. Thus, the capacity for significant growth during this time period should be capitalized upon for children from low-SES backgrounds originally on a trajectory toward enduring reading difficulties and disparities, as this could result in a potentially redirected trajectory toward reading success and equitable achievement. Given such powerful possibilities, educators should direct optimal teaching practices at children from low-SES backgrounds as early as possible in the preschool period while the ability to foster growth is most probable. Moreover, it will be advantageous to the field of early childhood education and the low-SES children it serves if the most favorable amalgamation of preschool teacher practices is identified. This is indeed the primary goal of the current study. To guide this endeavor, I employed a theoretical model of the preschool classroom which entails multiple dimensions of teaching.

A Multi-dimensional Theoretical Model of Teacher Practices in the Preschool Classroom

The ecological contexts in which children are found include an array of influences on many aspects of their development (Brofenbrenner, 1986). As a result, individual differences (e.g., due to factors such as socioeconomic differences, incoming language and literacy skills, and self-regulation) already exist in children when they arrive at preschool. Given that the focus of this study is how myriad teacher practices within the classroom ecology subsequently influence children's emergent literacy development, Connor, Morrison, et al.'s (2009) theoretical model of the classroom ecology as multi-dimensional will be utilized. As viewed through this multi-dimensional lens, several instructional and foundational dimensions are considered critical aspects of the classroom learning environment. That is, it is presumed that focusing on multiple dimensions of the classroom will prove more fruitful for understanding effective teaching than solely examining a unitary teacher practice.

In this model, instructional dimensions include complex and dynamic conceptual aspects of early language and literacy instruction. By attempting to explicate these dimensions, Connor, Morrison, et al. (2009) posit that effective teaching can be more fully understood. It should be noted that the precise variables which Connor, Morrison, et al. evaluate to capture the complex aspects of early literacy instruction are unique to the observational protocol they employ in their research. Although the current study does not lend itself to replicating an examination of the exact instructional dimensions proposed by Connor, Morrison, et al., the dataset that will be employed allows for an investigation of some constructs that are conceptually similar to the dimensions they propose. That is, given the available variables in the dataset that will be employed in this study, the instructional dimensions in the theoretical model that will be investigated include content (e.g., oral language versus print knowledge) and duration (i.e., quantity in this study) of the language and literacy instruction provided to children. An evaluation of other instructional dimensions in the originally proposed theoretical model (i.e.,

grouping context and management of instructional activity by teacher–child, child, or peer) is beyond the scope of this study given the dataset, yet the quality of instruction will be an additional dimension that is examined.

Beyond these language and literacy instructional dimensions, a tenet of the multi-dimensional model holds that the effects of instructional dimensions are likely shaped by other proximal processes, including foundational dimensions. Foundational dimensions, as proposed by this model, include other teacher characteristics which have the potential to influence student outcomes, although perhaps not as directly as instructional dimensions (Connor, Morrison, et al., 2009). The theory posits that teachers who know how to interact with students most appropriately and understand their students' skills and instructional needs (i.e., they have a strong base in foundational practices) will be best able to create learning opportunities and foster emergent literacy growth. Although Connor, Morrison, et al.'s (2009) research largely focuses on understanding the relationships between instructional dimensions and student outcomes, their theoretical model, and the body of literature on which it is founded, aptly suggests that foundational dimensions should be additionally examined to clarify the teaching repertoire needed to affect the most change in children's emergent literacy growth. Given that the dataset utilized in this study provides an opportunity to investigate the relationship between children's growth and some of the proposed foundational dimensions in the multi-dimensional model, such an examination will be another key aspect of this study. Therefore, beyond instructional factors, foundational dimensions in the theoretical model which will be investigated in this study include teachers' capacity to utilize assessment results to determine students' unique instructional needs (i.e., planning of differentiated instruction) and teachers' warmth/responsiveness and control/discipline (i.e., teacher–child social interactions).

To inform the research hypotheses, the empirical literature on the relationships between the proposed instructional and foundational dimensions noted above and emergent literacy development was reviewed. Subsequent to this review, the research questions and hypotheses guiding the current study will be delineated more explicitly.

Relationships between Teacher Practices and Emergent Literacy Development

Language and Literacy Instructional Practices

Numerous investigators have utilized what is known about emergent literacy development to create interventions and instructional principles that have successfully increased children's rates of oral language and code-related literacy development, especially when implemented under high-quality research constraints (e.g., Byrne, Fielding-Barnsley, & Ashley, 2000; Whitehurst, Zevenbergen, Crone, Schultz, Velting, & Fischel, 1999). The National Early Literacy Panel (NELP; 2008) conducted a meta-analysis of numerous early childhood studies to identify effective instructional strategies for building skills important for later reading success. Findings revealed that book-sharing interventions have had significant and large effects on children's print knowledge and oral language (Lonigan, Shanahan, & Cunningham, 2008). Language-enhancement interventions have had a significant and large effect on children's oral language, a significant effect on print knowledge, and an effect on PA which was less than .01% away from reaching significance (Fischel & Landry, 2008). Moreover, code-focused instructional practices, which generally included PA-focused instruction and occasionally also included instruction designed to teach aspects of print and letter knowledge, consistently have had a significant, positive, and moderate effect on a wide range of emergent literacy skills

(Lonigan, Schatschneider, & Westberg, 2008b). Code-focused interventions have had effects on children's PA, alphabet and print knowledge, and oral language, with the effect on PA being the largest.

Overall, high-quality language- and literacy-focused instructional practices are likely to foster optimal reading outcomes for children due to their effects on emergent literacy development. The specificity of the NELP (2008) findings is valuable in that it has supplied more nuanced guidance to educators and policymakers as they seek to create preschool classrooms that provide the most optimal support to children. Other studies have also provided information on the specificity of the effects of teachers' practices. Howes et al. (2008) observed that children tend to develop literacy skills in the areas in which teachers facilitate instruction. Connor and colleagues (e.g., Connor, Morrison, et al., 2009; Connor, Morrison, & Slominski, 2006) have also begun to delineate quite specific instructional dimensions (e.g., teacher managed, teacher–child managed, or child managed; classroom- versus student-level instruction) that need to be considered in order to facilitate the most positive responsive pedagogy to meet students' varied needs. Early childhood educators could likely benefit from more research examining instructional factors at such a refined level to assist them in understanding more specific relationships between their practices and children's development. Therefore, one aspect of the current study is to further examine the relationships between specific language and literacy instructional practices and children's emergent literacy growth. It is expected that relationships between such instructional practices and children's growth across the different emergent literacy domains will generally align with prior research, and further that some variability will emerge regarding more distinct instructional dimensions, such as the quantity and quality of instruction.

Beyond the positive main effects that evidence-based language and literacy instructional practices may have for all children, such practices may be particularly meaningful for children at significant risk for reading difficulties. Foorman et al. (1998) found that instructional effects on word recognition were moderated by second- and third-grade children's phonological processing skills at the start of the year, such that the effects were stronger for children with poorer initial skills. Similarly, Juel and Minden-Cupp (2000) observed that children starting first grade with poor literacy skills benefited more from certain instruction, and that once they achieved a sufficient skill level, other instruction became more beneficial. Furthermore, although Connor and colleagues have observed significant Child $\times$ Instruction interactions across various pedagogical dimensions at the first and third grades (Connor, Morrison, & Petrella, 2004; Connor, Piasta, et al., 2009), a number of interactions at the preschool level have been found as well (Connor et al., 2006). For example, the effects of teacher–child managed, code-focused, classroom-level activities on children's alphabet knowledge and letter-word recognition (i.e., early decoding) were stronger for students who entered preschool with weaker alphabet knowledge and letter-word recognition respectively. Similarly, according to Lonigan, Schatschneider, et al. (2008b), the effect of code-focused instruction was larger for children with little or no prior alphabet knowledge than for those children who entered the preschool year with well developed alphabet knowledge. However, while Connor et al. (2006) found that children with poor vocabulary scores at preschool entry exhibited fewer vocabulary gains when they spent more time in teacher–child managed, code-focused, classroom-level activities, Lonigan, Schatschneider, et al. (2008b) reported that the effect of evidence-based code-focused instruction on preschool children's oral language or PA growth was consistent regardless of initial skill.

Overall, the literature thus far suggests that children who start the school year behind their peers may experience the effects of instruction differently. As this research is relatively

new at the preschool level, additional investigations are needed to further establish whether preschool-age children who are at risk for reading difficulties will be affected differently by their teachers' language and literacy instructional practices when compared to peers whose developmental trajectories are already likely to result in successful reading achievement. Therefore, as part of the current study, I will also examine if Child × Instruction interactions can be replicated (e.g., Connor et al., 2006; Lonigan, Schatschneider, et al., 2008b). Given the prior research, it is suspected that optimal and evidence-based instruction will have a particularly significant relationship with children's emergent literacy development if they enter preschool with especially limited emergent literacy skills.

Lastly, some preliminary evidence suggests that evidence-based emergent literacy instructional practices have not necessarily navigated their way into many of the preschool classrooms serving children from low-SES backgrounds (e.g., Justice, Mashburn, Hamre, & Pianta, 2008; McGill-Franzen, Lanford, & Adams, 2002). Therefore, it is also the intent of this study to expand our understanding of how teachers across the country are utilizing these practices. Although some variability is expected, it is likely that many preschool teachers still have not incorporated research-driven principles, especially those that also challenge K–3 teachers' knowledge bases (e.g., PA instruction; Cunningham, Perry, Stanovich, & Stanovich, 2004; Mather, Bos, & Babur, 2001; Moats, 1994), into their instructional repertoire.

Differentiated Instruction

Differentiated instruction planning, for the purposes of this study, will be conceptualized as planning of responsive instruction as informed by assessment data to meet the diverse needs of students. Because of the potential for practices to affect children in different ways, it is common to hear educators discussing the benefit of responsive and differentiated instruction. Indeed, differentiation is at the crux of Response to Intervention (RTI) models which are aimed at preventing school difficulties and which have recently been advocated in preschools (e.g., Gettinger & Stoiber, 2008). The minimal research that has been conducted to examine the relationship between differentiated instruction planning and child outcomes during the preschool years suggests that this is an important line of inquiry. For instance, it has been found that teachers who are able to modify classroom activities to the individual needs of young students are more likely to foster optimal child outcomes (Lambert, Abbott-Shim, & McCarty, 1999). Further, for preschool children who do not possess rudimentary skills at the start of the year, teachers' use of ongoing progress monitoring and complementary classwide literacy interventions appears to accelerate the children's early literacy growth (VanDerHeyden, Snyder, Broussard, & Ramsdell, 2008). Individualizing instruction using derived algorithms (i.e., the amounts and types of instruction are based on assessment results of children's early literacy and language skills) has been meaningful for children's emergent literacy development as well (Connor et al., 2009).

Despite some preliminary significant findings, too few investigations have been carried out to corroborate the theoretical notions underpinning a model of differentiated instruction, such as RTI, during the early childhood period. Therefore, it is important to advance this line of inquiry by adding to the current empirical evidence base about the significance of responsive instruction. Given the theoretical notions involved in differentiated instruction planning that responds to children's unique needs, it is thought that children with teachers who plan for differentiated instruction will be more likely to make significant gains in emergent literacy over the year. This may be particularly relevant for children who enter their preschool year below

average in emergent literacy, as their teacher's capacity to analyze assessment data, reflect on the greater need for support for such students, and in turn plan systematic and responsive instruction seems theoretically linked to alleviating such children's risk for future reading failure. It is unfortunate that so little research exists in this area, and it is my aim that this study can provide further direction for the field.

Teacher–child Social Interactions

Theory and research suggest that teacher–child social interactions and emotional support are also related to children's early literacy or academic success. Teacher–child social interactions, for the purpose of this study, will be conceptualized in terms of the following constructs: teachers' sensitivity (e.g., positive, warm, and attentive; engages child in reasoning), harshness (e.g., critical and punitive), detachment (e.g., low interest and supervision), and permissiveness (e.g., not reprimanding when children misbehave). A couple of theoretical rationales can explain the potential link between teacher–child social interactions and more optimal child outcomes. Attachment theory provides one possible explanation, such that sensitive caregiver-child interactions are predictive of child outcomes related to attachment security (Howes, Phillips, & Whitebook, 1992; Ritchie & Howes, 2003). That is, a caregiver's style in relating to a child during social interactions has the potential to affect the sense of security that a child develops. In turn, sensitive teacher–child relationships that provide children with a sense of security can facilitate children's active engagement with instructional opportunities made available by the teacher (Stuhlman & Pianta, 2002). In contrast, when a caregiver or teacher is harsh or detached, a child's development of attachment security is not as likely, hence limiting engagement in classroom activities which could have lead to enhanced developmental outcomes.

The parenting style literature (Baumrind, 1967, 1973; Maccoby & Martin, 1983) provides some possible reasons for the link between teacher–child social interactions and child outcomes as well. Through this theoretical lens, authoritative parenting (i.e., sensitive and warm, while also providing reasoning for firm expectations) is predictive of the most optimal social and academic outcomes in children. Although an authoritarian approach to parenting (i.e., harsh, demanding, and rigid in expectations) can be related to adequate academic performance in children, socio-emotional developmental outcomes are less favorable. Similarly, permissive (i.e., overly responsive, with very few demands or expectations) or neglectful caregiving (i.e., detached or uninvolved) contribute to less competence in socio-emotional and academic skills in children.

In addition to the theoretical underpinnings of various teacher–child social interaction styles (i.e., sensitive, harsh, detached, permissive), there is empirical evidence to suggest that these interactions play a specific role in the development of children's early language and literacy skills. At the first grade level, children with warm and responsive teachers have demonstrated stronger vocabulary and decoding skills at the end of the year than children whose teachers were detached and intrusive (Connor, Son, Hindman, & Morrison, 2005), and children whose teachers have provided strong emotional support have exhibited greater gains in PA (Curby, Rimm-Kaufman, et al., 2009). Similarly, when studying preschool programs, Loeb, Fuller, Kagan, and Carrol (2004) observed that children who experienced more optimal (i.e., sensitive and responsive) teacher–child social interactions were more likely to exhibit reading readiness, as measured by various aspects of print knowledge.

Although teacher–child social interactions and emotional support appear to have important main effects on children's development, the effects may differ according to children's

early literacy risk status. That is, Hamre and Bridges (2005) reported that first-grade classroom emotional support (i.e., as measured by a construct including a teacher sensitivity/responsivity scale) did not have a main effect on children's academic achievement (i.e., which included measures of letter and word identification and decoding), but that children identified as being at high risk in kindergarten exhibited worse scores than low-risk children if they were in classrooms with only low or moderate emotional support (Hamre & Bridges, 2005). The reviewed research suggests a promising role for teacher–child social interactions in preschool children's emergent literacy development; this study will expand on this line of research by examining whether such a relationship exists in a different sample. Moreover, the current, albeit limited, research, suggests that sensitive and warm teacher–child social interactions may be particularly important for children at risk for reading failure (Hamre & Bridges, 2005).

The Interaction of Multiple Classroom Dimensions

Although the empirical body of literature reviewed thus far suggests that differentiated instruction planning (e.g., Lambert et al., 1999) and teacher–child social interactions (e.g., Loeb et al., 2004) have important relationships with children's emergent literacy growth, a review of the literature suggests that empirical examinations of how such foundational processes *interact* with instructional dimensions are limited. That is, research on preschool classrooms has thus far only included investigations of the interaction between certain instructional dimensions (e.g., Connor et al., 2006), but has not been extended to examinations of the interaction between instructional and foundational dimensions. Utilizing the multi-dimensional theoretical lens of the classroom environment (Connor, Morrison, et al., 2009), one component of this study therefore involves a preliminary exploration of these additional and potentially significant Instruction $\times$ Foundational Practices interactions. Understanding how differentiated instruction and/or teacher–child social interactions can moderate teachers' language and literacy instructional practices will be yet another valuable step toward preventing reading difficulties in young children.

The Potential Role of Teacher Education

Given that teacher education has been posited as an important aspect of teacher quality, an additional objective of this study is to examine how preschool teachers' educational backgrounds can affect those classroom practices that have the potential to prevent reading difficulties. The empirical research regarding the link between teacher education and teacher practices has been mixed. A number of reviews in the last decade have claimed that preschool teachers with a Bachelor's degree and post-secondary training are more effective educators (Barnett, 2003; Bowman, Donovan, & Burns, 2001). However, studies examined in these reviews often did not adequately control for factors such as the teacher's background or the socioeconomic backgrounds of children in the class; as a result, it is unclear if differences in teacher behavior were in fact attributable to attaining a Bachelor's degree (Fuller, Livas, & Bridges, 2006). For example, Early et al. (2006) considered various conceptualizations of education and found few relationships between any of the measures of education (i.e., years of education, highest degree, and Bachelor's versus no Bachelor's), major, or credentials and classroom quality or children's outcomes across numerous large-scale studies. Further, they discovered that having a Bachelor's degree had no effect on most aspects of classroom quality or children's outcomes. These results appear more robust, given that they controlled for a number

of potential confounds that were left out of earlier studies. Overall, recent studies continue to find few, null, or contradictory associations between the educational attainment and major of preschool teachers and classroom quality and children's academic outcomes (Early et al., 2007; Justice et al., 2008).

Nonetheless, on the basis of other reviews of the literature, some argue that teacher education *specific* to early childhood education (which will be referred to as *ECE-specific education*) contributes to greater quality in the classroom or that education level may contribute to other aspects of teachers' practices (Hamre & Bridges, 2004). Indeed, Early et al. (2006) found a couple of relationships that are potentially relevant to this study: having a Child Development Associate (CDA) credential had a moderate effect on gains in PA and alphabet knowledge (rhyming and identifying letters), and teachers with more than a Bachelor's degree had significantly higher teaching and interaction scores than those with an Associate's degree. Similarly, Arnett (1989) found that as teachers' educational level in their early childhood education program increased (i.e., moved from no training to taking courses in early childhood to obtaining a 4-year college degree in early childhood education), their interactions with children became more positive. Further, Howes et al. (1992) found that teachers with a Bachelor's degree, or teachers without a Bachelor's degree but who had early childhood training, are more sensitive and less harsh with children than teachers with less general and ECE-specific education training. Fuller et al. (2006) also reported on a NICHD analysis revealing that the education level of varied caregivers, ranging from those who had not finished high school to graduate-level training, were positively related to more sensitive, warm, and stimulating caregiver-child interactions and more structured learning tasks.

Overall, the research suggests that ECE-specific education is likely to be related to literacy instructional strategies, although this may not be inclusive of PA instruction, due to the limited incorporation of PA research in most pre-service teacher education programs and textbooks (Joshi, Binks, Graham, et al., 2009; Joshi, Binks, Hougen, et al., 2009). Further, the research suggests that although general education level may be related in some way to more positive interactions with children, ECE-specific education may be sufficient in affecting these interactions. Additional research is clearly needed to illuminate whether general education and/or ECE-specific education do in fact relate to certain aspects of teachers' practices during the early childhood years, and the current study will contribute to this line of inquiry. It is suspected that, similar to prior research, ECE-specific education, but not educational background in general, will have a meaningful relationship with the practices that teachers employ in their classrooms.

The Current Study

It is well established that certain developmental domains in emergent literacy are critical for preschool children's future reading success. Furthermore, the field has begun to establish that language and literacy instructional practices are likely to have a meaningful effect on the development of these critical skills, and that other foundational teacher practices, including differentiated instruction planning and teacher–child social interactions, may play additional roles in emergent literacy development. Moreover, research has now begun to delineate the specificity of effects according to various instructional dimensions, and educators will continue to benefit from more nuanced research on this specificity. Despite the body of literature on evidence-based practices, it is surprisingly unclear how well teachers across the nation are

actually implementing what we know has the potential to alter children's reading trajectories. Additionally, as discussed above, only a small body of research has investigated how teachers' practices may differentially affect children with varying degrees of risk for reading difficulties or failure. Lastly, in spite of the growing knowledge that certain teacher practices play an important role in the preschool classroom, an extensive review of the literature suggests that there have been no empirical investigations regarding how these practices may *interact* to support optimal development during early childhood. Thus, this is another important line of inquiry which is investigated in this study. Overall, in the current study, I intend to replicate and extend the findings from the literature reviewed above on relationships between preschool teacher practices and growth in critical emergent literacy domains over the preschool year. To understand the amount and type of support teachers need in order to make evidence-based practices become a reality, to provide the most refined guidance to teachers as possible, and to maximize the support given to young children at risk for reading difficulties and failure, many aspects of the current study are imperative and have important implications.

The first primary research question is *What do teachers' practices (i.e., with regard to language- and literacy-focused instruction, planning of differentiated instruction, and social interactions with children) look like throughout the country, and how are they related to children's emergent literacy development?* All hypotheses, which are described below, were informed by the current body of empirical literature or have been developed to align with current theory. It is hypothesized that preschool teachers' practices will have a significant main effect on children's emergent literacy growth over the preschool year, above and beyond all control variables (control variables for all research questions will be discussed later). Given previous research in the literature, this hypothesis has been split into more explicit predictions about the effects of specific practices. It is thought that (a) book reading practices will have a positive and significant relationship with students' oral language and print knowledge growth (Lonigan, Shanahan, et al., 2008; Whitehurst et al., 1999), (b) oral language practices will have a positive and significant relationship with students' oral language and PA growth (Metsala & Walley, 1998; Fischel & Landry, 2008), (c) PA instruction will have a positive and significant relationship with students' PA and print knowledge (Lonigan et al., 2000; Lonigan, Schatschneider, et al., 2008b), and (d) print knowledge activities (i.e., print and letter knowledge instruction) will have a positive and significant relationship with students' growth in print knowledge and PA (Lonigan et al., 2000; Lonigan, Schatschneider, et al., 2008b). Beyond instructional practices, it is hypothesized that teachers' differentiated instruction will have a positive and significant relationship with low-SES children's growth in oral language, PA, and print knowledge over the preschool year (Lambert et al., 1999). Further, it is thought that more sensitive (e.g., more positive and less harsh) social interactions between teachers and children will have a significant and positive relationship with all areas of children's emergent literacy growth over the preschool year (Loeb et al., 2004).

The second research question asks *How are teacher practices differentially related to emergent literacy growth in children at particular risk for reading failure, due to low emergent literacy skills upon preschool entry?* It is thought that certain preschool teacher practices will moderate children's emergent literacy growth depending on risk status for future reading failure (i.e., due to varying degrees of below average emergent literacy skills at the start of the preschool year), above and beyond all control variables. More specifically, it is hypothesized that children at risk for reading failure at the beginning of the preschool year will experience even more positive benefits in emergent literacy development than children not at risk if their teacher (a)

employs optimal language and literacy instructional practices (e.g., Connor et al., 2006; Lonigan, Schatschneider, et al., 2008b), (b) skillfully plans differentiated instruction (Gettinger & Stoiber, 2008), or (c) practices positive teacher–child social interactions (Loeb et al., 2004). It should be noted that a child's emergent literacy risk status will be considered according to each outcome in a given analysis (i.e., if the outcome is PA, then risk status will be determined according to below average PA skills at the start of the preschool year).

A third research question of interest in the current study is *How do teachers' practices interact with each other to predict children's emergent literacy development?* Although the current body of research is not able to inform this research question extensively, theory suggests that certain preschool teacher practices will moderate the effect of teachers' literacy instructional practices on children's emergent literacy growth, above and beyond all control variables (Connor et al., 2009). More specifically, it is predicted that the effect of preschool teachers' literacy instructional practices on children's emergent literacy growth will be positively moderated by (a) the planning of differentiated instruction (VanDerHeyden et al., 2008) and (b) teacher–child social interactions (Loeb et al., 2004).

In order to provide direction to those who generate the curriculum and policy for preschool teacher education, an additional purpose of this study will be to examine the relationship between teachers' educational backgrounds and classroom practices. Therefore, I will also investigate the following research question: *How are teachers' general and ECE-specific educational backgrounds related to their language- and literacy-focused instructional practices, planning of differentiated instruction, and social interactions with children?* It is hypothesized that certain aspects of teacher education will have a significant main effect on meaningful preschool teachers' practices, above and beyond all control variables. That is, it is predicted that preschool teachers' ECE-specific educational backgrounds (i.e., a major in early childhood education or child development, or specific coursework in early childhood education) will have a positive and significant relationship with oral language instruction, book reading practices, print knowledge instruction, differentiated instruction planning, and positive teacher–child social interactions (Arnett, 1989; Early et al., 2006; Fuller et al., 2006; Howes et al., 1992). However, it is thought that preschool teachers' general educational backgrounds (i.e., highest degree obtained, and having a Bachelor's degree or not) will not have a relationship with any aspects of teachers' practices, given the large body of research demonstrating that these are not related (Early et al., 2006, 2007; Justice et al., 2008).

Method

Participants

The participants for this study were part of a large national research project, the Preschool Curriculum Evaluation Research (PCER) funded by the Institute of Education Sciences (IES). At 18 different geographical sites within 14 research programs around the nation, preschool classrooms or entire preschool sites were randomly assigned to one of a variety of treatment curricula under investigation or a control group. In the current study, the treatment group to which children were assigned is irrelevant, especially as the majority of treatments did not have significant effects on outcomes (PCER Consortium, 2008). Only students (N = 1,723) and teachers (N = 259) for whom there was complete data at all relevant time points were included in the sample and used for analyses. Within the 18 geographical sites, there were an average of 14.3 teacher participants per site (Range = 3–36). Within the 259 classrooms, there were an average of 6.7 child participants per classroom in this study (Range = 1–17).

At the time of baseline data collection, the average age of participating children was 4 years, 7 months (SD = 3.6 months). At the follow-up data collection in the spring of the preschool year, the average age of the children was 5 years, 2 months (SD = 3.6 months). Approximately half (49.2%) of the children were female. The ethnic representation of the students was 33.1 percent white non-Hispanic, 44.8 percent African American, 14.1 percent Hispanic, 1.2 percent Asian or Pacific Islander, 0.4 percent American Indian or Alaskan, and 6.4 percent other. The majority of the children's (91.0%) primary language was English.

The majority of the preschool teachers were female (97.7%). The average age of the teachers was 41.1 years old (SD = 10.7, Range = 21–69). The ethnic representation of the teachers was 52.9 percent White, 33.5 percent African-American, 6.6 percent Hispanic, 2.3 percent Asian or Pacific Islander, and 4.7 percent other. Sixty-six percent of the teachers had a college degree or higher. Teachers had an average of 13.0 years teaching experience overall (SD = 8.8, Range = 0–40) and 8.4 years of teaching experience specific to preschool settings (SD = 6.8, Range = 0–32). The majority (59.1%) of the teachers taught in public pre-kindergarten, whereas 28.6 percent taught in Head Start programs and 12.4 percent were child care teachers. Most (88.4%) of the preschool programs the students attended were full-day. The average class size was 15.7 students (SD = 5.4), with a mean child-staff ratio of 7.7 (SD = 3.4).

Procedure

Mathematica Policy Research, Inc. and RTI International were employed as evaluation contractors to collect all of the evaluation data across the 14 grantee sites. Baseline data was collected over 6 to 8 weeks in the fall of the preschool year (between September and November 2003). Follow-up data was collected over a 6 to 8 week period in the spring (between April and June 2004). Pre- and post-data across all sites included individually administered child assessments, teacher interviews, and classroom observations. For the current study, a license to analyze the compiled data was retrieved from the National Center for Education Statistics Data Security Office with the U.S. Department of Education.

Measures

An array of standardized and commonly used measures was employed to assess children's oral language, PA, and print knowledge in this study. Other child factors were captured via a parent interview. To evaluate teacher factors, standardized classroom observation

protocols were employed to evaluate literacy instructional practices, differentiated instruction planning, and teacher–child social interactions. Additionally, teachers were interviewed to determine their educational backgrounds. Given that an expert panel for the PCER study, assembled by IES with the Department of Education, determined the measures that were utilized in this national study, it can be assumed that they were the most theoretically and empirically sound in the field at the time and thus captured reliable and valid estimates of the child and teacher factors under investigation. Reliabilities have been calculated to substantiate the strength of these measures for the purpose of testing the hypotheses in the present study. For all measures employed in this study, internal consistencies are reported below and were determined to be strong enough to warrant drawing conclusions from the data. Tables 1 and 2 respectively provide information about the measures that were used to capture the child and teacher constructs in this study.

Children's oral language. Two measures were employed to evaluate children's oral language. To assess children's receptive vocabulary levels, the Peabody Picture Vocabulary Test, Third Edition (PPVT-III; Dunn & Dunn, 1997) was administered in the fall and spring of the preschool year. The child is presented with a set of four pictures, told a stimulus word, and asked to choose which picture best represents the word. The test has a standardized mean of 100 and a standard deviation of 15. The PPVT-III is a well-established and widely used standardized measure, with internal consistencies ranging from 0.86–0.98 and test-retest reliabilities ranging from 0.91–0.93 (Dunn & Dunn, 1997). For the PCER study, the PPVT-III had a strong internal consistency of 0.96 across all times of administration.

Children's receptive syntax was assessed with the Grammatic Understanding subtest from the Test of Language Development-Primary, Third Edition (TOLD-P:3; Newcomer & Hammill, 1997) in the fall and spring of the preschool year. A child is presented with a set of three pictures and asked to choose the picture that best represents the stimulus sentence provided by the examiner. This subtest has 25 items, a standardized mean of 10, and a standard deviation of 3. The TOLD-P:3 is standardized and widely used, with moderately strong internal consistencies ranging from 0.75–0.86 across the subtests and a test-retest reliability of 0.81 (Newcomer & Hammill, 1997). For the PCER study, Grammatic Understanding had moderately strong internal consistency reliabilities, ranging from 0.79–0.86.

Given that vocabulary and grammar both fall into the meaning-focused aspect of emergent literacy skills (Storch & Whitehurst, 2002; Whitehurst & Lonigan, 1998), examining children's overall skill in oral language was theoretically warranted. Thus, a composite variable incorporating the two oral language measures was generated to more powerfully capture the global construct. The correlation between these theoretically linked constructs was examined to determine if the data confirmed at least a reasonably high relationship (i.e., correlation greater than 0.5). The correlations between these constructs in both the fall and spring were moderate and reasonably high enough to warrant the creation of a composite (r's = 0.52, 0.54 respectively; $p < .001$ for both); this moderate correlation also demonstrated the external validity of the oral language measures and provided additional evidence for the interrelatedness of emergent literacy strands. Since only two variables made up this composite at each data collection point, it was generated by summing the standardized scores of each oral language variable, and in turn, standardizing the result. Therefore, all findings of effects on children's oral language will reflect analyses that include the Oral Language Composite (Fall: M = 0, SD = 1, range = -3.0–3.5; Spring: M = 0, SD = 1, range = -3.7–3.3).

Children's phonological awareness. The Elision subtest of Preschool Comprehensive

Test of Phonologic and Print Processing (Pre-CTOPPP; Lonigan, Wagner, Torgesen, & Rashotte, 2002) was administered to assess children's PA in the fall and spring of the preschool year. This subtest assesses children's ability to omit, or elide, a specified unit of language from a whole word. For example, the examiner may state, "Say *toothbrush*. [Child says *toothbrush.*] If you take away *brush* from the word *toothbrush*, what word do you have?" The items range from compound words with word elision to one-syllable words with phoneme-final elision. Word props and picture plates were provided to children on the first 9 items to support them in understanding the task. The remaining nine items do not provide picture support. This measure had not been standardized at the time of administration, and thus raw scores were used on a scale of 0–18. For the PCER study, the Elision subtest had strong internal consistency reliabilities, ranging from 0.83–0.88. Moreover, since the time of administration, this measure has been standardized and published as the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, & Torgesen, 2007). It is now widely used and has strong internal consistency and test-retest reliability estimates. Raw scores have been converted into standardized scores, which will be used for all analyses of children's PA growth (Fall: M = 0, SD = 1, range = -2.0–2.8; Spring: M = 0, SD = 1, range = -2.3–1.9).

Children's print knowledge. To assess children's print knowledge, three subtests across two measures will be utilized. The Test of Early Reading Ability, Third Edition (TERA–3; Reid, Hresko, & Hammill, 2001) is one of the standardized measures that was used to evaluate print knowledge and was administered in the fall and spring of the preschool year. The Alphabet subtest was administered to assess children's alphabetic knowledge, including knowledge of the alphabet, letter names, and letter-sound correspondences. The Conventions subtest was administered to examine children's concepts of print, including knowledge of book handling, orientation of print, and writing conventions such as punctuation. Both subtests have been standardized to have a mean of 10 and a standard deviation of 3. Internal consistency and test-retest reliability estimates for both subtests have been reported as high (Reid et al., 2001). For the PCER study, the Reading Composite, which includes these subtests, had strong internal consistency reliabilities, ranging from 0.90–0.94.

The Woodcock-Johnson Tests of Achievement, Third Edition (WJ-III; Woodcock, McGrew, & Mather, 2001) is a widely used standardized measure of various areas of achievement. The Letter-Word Identification (Letter-Word ID) subtest was employed to assess children's knowledge of letters and early decoding of words in the fall and spring of the preschool year. This subtest has a standardized mean of 100 and standard deviation of 15. Test-retest reliabilities for this subtest have been strong, ranging from 0.87–0.96 (McGrew & Woodcock, 2001). For the PCER study, Letter-Word ID had strong internal consistency reliabilities, ranging from 0.86–0.90.

As with the oral language variables, constructing a theoretically-driven global composite for print knowledge seemed warranted for this study (Whitehurst & Lonigan, 1998). Further, the empirical relationships between the three theoretically linked print knowledge constructs were found to be reasonably high and all statistically significant across fall and spring (range of r's = 0.40–0.72, 0.57–0.76 respectively; $p < .001$ for all); these correlations also provided additional support for the external validity of the print knowledge variables and once again evidence of the interrelated nature of emergent literacy constructs. Given that three variables made up the composite for print knowledge, a factor analytic, or Structural Equation Modeling (SEM) technique, was most advantageous in generating the composite values. SEM draws on each of the contributing print knowledge variables to the extent that they share commonality with the

other ones (i.e., they do not all contribute equally to the composite variable, but rather contribute more or less strongly to the extent that they share variance in common with the other variables going into the composite), and a latent outcome variable was generated to represent the construct. Scores on the Print Knowledge Composite (Fall: M = 0, SD = 1, range = -2.4–5.4; Spring: M = 0, SD = 1, range = -3.3–4.6) will be used for all analyses of children's growth in print knowledge.

Children's emergent literacy risk status. To investigate the second research question, children's emergent literacy risk status was determined according to the particular outcome being examined in the model (e.g., if print knowledge was the emergent literacy outcome in question, then a child's risk was determined according to his/her composite print knowledge skills at the start of the preschool year). More specifically, given the heterogeneity of emergent literacy profiles within at-risk populations (Cabell, Justice, Konold, & McGinty, in press), students' emergent literacy risk status was operationalized via three different variables: students grouped according to scores which were in the low average range (e.g., below the 25th percentile, which is greater than ⅔ standard deviations below the mean), within the below average range (e.g., below the 10th percentile, which is greater than approximately 1 ¼ standard deviations below the mean), and in the far below average range (e.g., below the 5th percentile, which is about 1 ⅔ standard deviations below the mean). Using statistical software, precise cut points in the composite fall scores were then determined to generate three categorical variables, which included an above average range (above the 75th percentile), one or more of the three risk variables, and a mid-level range (which depended on the range of the below average variables for each analysis). In turn, dummy variables were used for all analyses, with the above average range as the reference group.

Children's SES. In this study, children's SES was captured through a parent interview administered in the fall of the preschool year. Although researchers asked respondents about their educational attainment and income, the indicator felt to most effectively capture SES in the dataset was maternal education. First, as would be expected by typical response rates in research inquiring about various SES indicators (Entwisle & Astone, 1994), the response rates for maternal education were much higher than for income, hence enhancing the sample size. Further, maternal education levels provided a more stable estimate of children's SES (Gottfried, Gottfried, Bathurst, Guerin, & Parramore, 2003); moreover, income in this dataset was based entirely on subjective respondent estimates, was not adjusted for size of household or geographical cost of living, and could easily fluctuate. Perhaps most importantly, previous research suggests that the effects of income do not seem to be as strong when also controlling for other factors, such as ethnicity, gender, and parental education level (Blau, 1999). Overall, given the evident benefits of using educational attainment as a proxy for SES in this dataset, children's SES was operationalized via a four-level maternal education variable: 17.0 percent of primary caregivers did not complete high school, 32.3 percent had a high school diploma or GED, 34.8 percent attended some college, and 15.9 percent graduated from college.

Emergent literacy instructional practices. The Teacher Behavior Rating Scale (TBRS: Landry, Crawford, Gunnewig, & Swank, 2002) was designed by the Center for Improving the Readiness of Children for Learning and Education (CIRCLE) program at the University of Texas Health Sciences Center to assess early childhood instructional principles. This observational protocol was only administered in the spring of the preschool year, and thus spring scores will serve as a proxy for teachers' emergent literacy instructional practices throughout the preschool year. Items on most of the subscales were rated according to either a 3-point quantity scale (e.g.,

rarely, sometimes, often) and a 4-point quantity or quality scale (e.g., low, medium low, medium high, high). However, some variations existed according to the subscale in question. Ratings were based on a trained observer's two-hour visit; however, additional visits were occasionally required to observe a specific situation if not observed during the preliminary visit (Assel, Landry, & Swank, 2008). In the PCER study, the TBRS was found to have an inter-rater reliability of 0.73 in a subset of six classrooms taking part in the study. For use in the current study, the PCER-generated composite scales were occasionally modified to better align with the theoretical conceptualizations of the given constructs and the child skills which were measured on the given assessments. For those scales that were created according to theoretically plausible links, the items that were included were determined via consultations with an items panel, which included Professor Anne Cunningham, Ph.D., and doctoral students in her research group. Similar to the PCER-made composites, alphas were estimated to ensure that the use of these theoretically driven composites was in fact supported by the data. Modifications to the original PCER-made composites are subsequently described when applicable.

Meaning-based emergent literacy instructional practices. There are two meaning-based instructional scales on the TBRS. The Book Reading composite used in the current study included 14 items, comprising measures of both the quantity and quality of teachers' Book Reading Behaviors. Sample items include "Encourages some discussion about one or more print concept features," "Vocabulary words are discussed when preparing to read and/or reading books aloud," and "Asks open-ended questions (e.g., 'what if,' 'where have you seen,' 'how would') to encourage discussion of facts in the book (nonfiction), details, plot, and/or characters (fiction), or topic and/or rhyming (poetry)." Because the quantity and quality items did not always have consistent scales (i.e., 4- vs. 3-point scales), the composite was generated by averaging the scores on the quantity scale, averaging the scores on the quality scale, and then summing these averages. Possible composite scores could range from 0–6, whereas possible quantity and quality scores could range from 0–3. The internal consistencies were strong: the coefficient alpha was 0.93 for the composite, .85 for the quantity scale, and .87 for the quality scale.

The other meaning-based scale is the Oral Language Use composite, which included 14 items tapping quantity and quality of oral language instructional strategies. Sample items are "Models for children how to express ideas in complete sentences," "Relates previously learned words/concepts to an activity," and "Encourages children's use of language throughout the observation period irrespective of type of activities." The composite was generated by averaging the scores on the quantity scale, averaging the scores on the quality scale, and then summing these averages. Possible composite scores could range from 0–6, whereas possible quantity and quality scores could range from 0–3. The internal consistencies were strong: the coefficient alpha was 0.94 for the composite, .87 for the quantity scale, and .89 for the quality scale.

Code-focused emergent literacy instructional practices. Two of the code-based instructional scales on the TBRS were utilized in this study. The TBRS Phonological Awareness composite in this study included 6 items, including one item that taps the quantity of integration of PA activities into learning situations, one item that taps the quality of such integration, and four items that tap teachers' use of blending and segmenting activities along the PA developmental continuum. For example, "Did the observer see a specific activity (e.g., sentence segmenting; onset rime blending and segmenting)?" Given that the scale being used to assess children's PA over the year only evaluates children's capacity to *manipulate* (i.e., blend and segment) sound (Pre-CTOPPP; Lonigan et al., 2002), and that instruction targeting children's

manipulation of sound has been most effective (Lonigan, Schatschneider, et al., 2008b), the three items which assessed teachers' use of PA activities only involving children's perception of sound, including listening, rhyming, and alliteration, were excluded from analyses. The composite was created by summing teachers' scores on all remaining items. Possible composite scores could range from 0–10. It should be noted that this scale differs from the other TBRS scales. Rather than having the multiple items that make up the scale each be evaluated for quantity and quality, the PA instruction scale primarily focused on the mere presence of certain types of activities in the classroom with only one item that captured the overall quantity of the activities and one item capturing the overall quality. Although the internal consistency was only moderate for the PA instruction scale (the coefficient alpha was 0.63), including all of the original survey items did not significantly enhance the reliability (alpha of .65), and thus, the use of a theoretically refined scale, despite the item reduction, seemed prudent.

The TBRS Print and Letter Knowledge composite in this study included 8 items tapping the quantity and quality of teachers' instructional practices. Sample items include "Engages children in name and theme/topic related activities that promote letter/word knowledge, help learn to associate names of letters with shapes and/or begin to make sound-letter matches," "Provides opportunities for children to compare and discuss same/different in letters, names, and words," and "Discusses concepts about print (text contains letters, words, sentences, reading progresses left to right, top to bottom, etc.)." It should be noted that two original items were deleted from the scale, since they tapped the environmental print construct, which has not been found to be highly predictive of children's future reading success (Lonigan, Schatschneider, et al., 2008a). With the remaining 8 items, the composite was generated by averaging the scores on the quantity scale, averaging the scores on the quality scale, and then summing these averages. Possible composite scores could range from 0–6, whereas possible quantity and quality scores could range from 0–3. The internal consistencies were moderate to strong: the coefficient alpha was .85 for the composite, .66 for the quantity scale, and .73 for the quality scale. Further, excluding the environmental print items did not dramatically lower the reliabilities (.84 for the composite, .71 for the quantity scale, and .71 for the quality scale), hence corroborating the theoretically driven composite construction.

Differentiated instruction planning. One subscale from the Assessment Profile (Abbott-Shim & Sibley, 1987), which was administered via observational protocol in the fall and spring of the preschool year, provides information regarding how teachers plan their instruction to meet the diverse needs of their students. Using 5 items from the Individualizing Subscale of the Assessment Profile, a composite scale was created to investigate a teacher's differentiated instruction planning on the basis of assessment data. Examples of items include whether or not a teacher used a system for summarizing children's abilities, whether information from this system was used to group children by needs, and whether the system and assessment information were used to plan specific activities. The composites for fall and spring were created by averaging teachers' scores on the scale items at the respective times of administration. Possible composite scores ranged continuously from 1–2. The coefficient alpha for the composite scales ranged from 0.86–0.88 across fall and spring. According to paired-samples *t*-tests, significant differences were found between teachers' differentiated instruction planning in the fall and spring ($t = 13.017$, $p < .001$). As a result of these differences, it was felt that year-average values for the scale would better and more consistently approximate teachers' planning of differentiated instruction *across* the preschool year. Therefore, calculated averages were used to represent teachers' differentiated instruction planning in analyses.

Teacher–child social interactions. The Arnett Caregiver Interaction Scale (CIS; Arnett, 1989) was administered to measure the quality of the teacher's (or caregiver's) social interactions with a preschool child in the fall and spring of the preschool year. The CIS included 26 items measuring four subscales: Positive Interaction (also referred to in some of the literature as Sensitivity; e.g., speaks warmly to children), Harshness (e.g., seems critical of the children), Detachment (e.g., doesn't seem interested in the children's activities), and Permissive (e.g., doesn't reprimand children when they misbehave). Items are rated on a 4-point scale, whereby a trained observer indicates how characteristic they are of the teacher, from not at all true (1) to very much true (4). Higher scores on the Positive Interaction subscale items are considered more optimal, whereas lower scores on items from the other three subscales are considered optimal. Each subscale composite was created by averaging teachers' scores on the given subscale items. For the PCER study, inter-rater reliability was 0.80. Internal consistencies across all subscales were moderate to strong. The coefficient alphas for the first three subscales ranged from 0.87–0.95 across the observations, and ranged from 0.69–0.74 for the permissive subscale. Given that paired-samples *t*-tests revealed significant difference between teachers' fall and spring Positive Interaction ($t = 4.562$, $p < .001$) and Harshness ($t = -5.699$, $p < .001$) subscale scores, averages were calculated to best represent all of the teacher–child social interaction subscales across the year and were used in analyses.

Teacher education. A teacher interview, which captured a number of teacher factors, was administered in the fall and spring of the preschool year. Many items from the Head Start's Family and Child Experiences Survey (Administration for Children and Families, 2002a, 2002b) and the National Center for Education Statistics' Early Childhood Longitudinal Study-Kindergarten Cohort (West, Denton, & Germino-Hausken, 2000) were utilized in this interview. With regard to teacher quality, preschool teachers were asked questions about background information such as demographics, education, and specialized qualifications. Due to the varying degree to which teachers chose to increase their education levels over the preschool year, only teachers' educational levels at the start of the year were considered for the purposes of this study.

General education was operationalized via a variable with the following four levels: (1) 20.1 percent of teachers had a High school degree, general education diploma, or less (GED), (2) 12.0 percent had an Associate's degree, (3) 47.9 percent had a Bachelor's degree, and (4) 20.1 percent had a Master's degree or higher. A two-level variable was also included: (1) no Bachelor's, and (2) Bachelor's, which includes those with a Bachelor's degree or higher. Approximately 68 percent of teachers reported having a Bachelor's degree or higher. ECE-specific education was operationalized with a five-level variable according to teachers' major field of study: (1) 5.4 percent of teachers had studied child development or developmental psychology, (2) 25.5 percent had studied early childhood education, (3) 18.9 percent had studied elementary education, (4) 29.3 percent had studied some other non-education field, and (5) 20.9 percent did not have a major due to having no college education. ECE-specific education was also investigated by including a variable comparing teachers who had completed 6 or more college courses in early childhood education or child development (69.9%) or not.

Results

Analysis

Excluding missing data. The data from a number of participants who were in the original PCER sample were excluded in analyses for the current study due to missing observations from child assessments, parent interviews, and teacher assessments and interviews at the time of baseline and/or follow-up data collection. Missing child assessment data was generally due to children being too young to be assessed on certain measures at baseline, children exiting a program for a variety of reasons, and/or children being absent for one or more measures at a given time of testing. Some child demographic data, collected via parent interview, was also missing likely due to the fact that parents could not be reached or may have been unwilling to provide the requested information (e.g., maternal education level). Missing teacher assessment data was generally due to occasional changes in the assigned teacher for a classroom. Even with missing data excluded, the sample size was sufficiently large to inform the research questions.

Nonetheless, because of the large amount of missing data, independent samples *t*-tests were preliminarily conducted to determine if there were significant differences between those participants who were included in analyses and those who were dropped because their data were incomplete (i.e., potential differences in child outcomes and control variables were evaluated, as were potential differences in teacher outcomes). There was a significant difference found in age between the children who were included in analyses and excluded due to missing data (t = -1.9904, $p < .05$). Given that the significant difference was rather small (i.e., considering the descriptive statistics of age for the combined sample, the difference was only about 1/20 of a standard deviation), it is likely that the results of the analyses were not dramatically different from what they would have been if missing data had not been a problem with the original PCER sample. However, to be cautious and to ensure that the results could be more effectively generalized for the purposes of practice and policy, age was controlled for in all analyses where the child was the primary unit of analysis. Additionally, a significant difference was found between the fall early decoding scores (i.e., WJ-III Letter-Word ID) of children included in analyses and of those excluded for missing data (t = -1.9801, $p < .05$). This difference was also quite small in magnitude (i.e., considering the descriptive statistics of early decoding scores for the combined sample, the difference was only about 1/20 of a standard deviation). Moreover, due to the design of this study, children's baseline scores were already going to be controlled for in all analyses in order to capture children's emergent literacy growth over the preschool year. Overall, while patterns of missingness may not be random (i.e., the younger children and those with low fall scores would probably have lower average outcomes), the practical differences between the groups were small; thus, it is felt that the results continue to provide information from which valuable conclusions about the research questions can be made. Of course, future research which replicates this study across varied samples will likely strengthen the generalizability of the findings.

Analytic strategies. In this study, participants were not selected randomly. Rather, the data was of a nested nature, such that children were clustered within classrooms, which were occasionally clustered within schools (i.e., some sites had one classroom only and some had multiple classrooms), which were then clustered within geographical sites. When participants are not drawn randomly from the population, it is considered likely that units (e.g., students) within a given cluster (e.g., preschool classroom) share more in common than those in other

clusters. For example, students' PA scores in the same classroom might be more similar to each other than to students in other classrooms because they share the same learning environment; that is, PA may be similarly affected by classroom characteristics such as curriculum, mean level of achievement, and parental involvement leading to a correlation of the units within the same cluster. With such data, the independence assumption that underlies ordinary regression is violated. When this violation is ignored, ordinary regression leads to biased statistical inference: incorrect (i.e., too low) standard errors and, in turn, a large Type I error rate (Bryk & Raudenbush, 1992; Singer & Willett, 2005). Therefore, multilevel modeling, specifically hierarchical linear modeling (HLM) (Intercooled Stata Version 9.1; Rabe-Hesketh & Skrondal, 2005; StataCorp, 2005) was utilized to account for the possible nested nature of the data.

To begin, for the first three research questions, unconditional hierarchical linear models (without covariates) were specified (using maximum likelihood estimation) and compared (using likelihood ratio tests) to ordinary regression models to determine if students' scores from the same classrooms, schools, or sites were correlated. Likelihood ratio tests indicated that models with random intercepts for classrooms and sites were significantly better than ordinary regression models ($p < .05$). Further, likelihood ratio tests were used to compare two- and three-level models (i.e. level–1 students nested in level–2 classrooms, with classrooms nested in level-3 sites). In all analyses, two-level models, with random intercepts for classrooms, were found to be most parsimonious (i.e., the three-level models were not significantly better) and were thus used in all further analyses to determine if key variables were independently predictive of emergent literacy growth (i.e., spring score controlling for fall score) at the end of the preschool year. For the fourth research question, similar steps were taken to evaluate the need for HLM. Unconditional models again revealed that more parsimonious two-level models (i.e., with teachers nested in sites in this case) should be used to investigate the relationships between teachers' educational backgrounds and practices. Note that because the nested nature of the data was considered a "nuisance" and not a "phenomenon of interest," variance parameter estimates will not be emphasized in the results.

Prior to all HLM analyses, all continuous variables were standardized by converting them to *z*-scores. In turn, this simplified the interpretation of the results, as effects are now reported as standardized coefficients. For analyses in which moderation effects were investigated, interaction terms were created using Stata. A sample HLM model with children's print knowledge as the outcome and additional information regarding the interpretation of the results are provided in the Appendix.

Controlling for possible confounds. Theory suggests an array of demographic and environmental factors which likely had an effect on the outcomes and which had to be controlled for in analyses. To establish which control variables were to be included in each analysis, zero-order correlations were first conducted to determine whether significant relationships were present between outcomes and theoretically driven control variables. When a significant relationship was found between a proposed control variable and outcome, it was further explored in the regression analyses. If a control variable accounted for significant variance in the outcomes, it was retained in subsequent analyses. Occasionally, a given control variable was not significant for a particular outcome when a model included a particular predictor. Nonetheless, set control variable blocks were decided upon a priori to allow for consistency and the greatest parsimony across all analyses.

As a result of these preliminary steps, it was determined that the following variables needed to be controlled for in analyses involving the child as the primary unit of analysis: the

child's socioeconomic status (as determined by maternal education), the child's ethnicity, the child's age, the child's gender, and the child's fall scores on the emergent literacy outcome. For those models where the teacher was the primary unit of analysis, it was concluded that only program type needed to be controlled for in analyses; it is likely that controlling for program type was in part controlling for the overall socioeconomic status of children from the class, which is an important extraneous factor to partial out of analyses given the possibility of altering teachers' behavior (Fuller et al., 2006). It should be noted that across all analyses, the effect of treatment group never approached significance (in all models, $p > .20$). Thus, to maintain the focus on generating the most parsimonious models, treatment group was trimmed from all models.

Assumptions of HLM. Given the use of random-intercept models to inform the major research questions, it was important to ensure that all statistical assumptions of hierarchical linear regression were met. As discussed above, it was determined that all variables under investigation were measured reliably. Although the lack-of-measurement error assumption is almost always violated to some extent, the high reliabilities of the majority of the measures suggest that this assumption was met as well. In the two instances where measures had slightly weaker, albeit adequate, reliabilities (i.e., TBRS PA, Arnett Permissive subscale), results should be interpreted with somewhat more caution.

After initially screening for miscoded values and outliers throughout the dataset, all continuous variables were also tested for normality. By examining histograms and box plots, it was determined that most variables, especially the spring child outcome variables, were clearly normally distributed. However, a few variables appeared slightly skewed. Children's fall scores on the Alphabet measure were slightly positively skewed; this was likely due to a floor effect at the start of the preschool year, when children would be expected to have more limited alphabetic knowledge. Teachers' PA practices were positively skewed as well; this is not surprising given the slow pace at which research-based literacy practices, especially involving PA, have generally reached educational settings (Foorman & Moats, 2004). The Arnett Harshness and Detachment subscales were also slightly positively skewed; however, this is what would be ideally expected in preschool classrooms throughout the country, such that teachers would minimize their use of harsh and detached practices. Overall, due to the occasional instances of skew, skewness and kurtosis statistics were examined to further evaluate the normal distributions of the variables under investigation (see Tables 3 and 6 for skew and kurtosis values of child and teacher variables respectively). All of the skew and kurtosis values were well within acceptable limits, suggesting that the multivariate normality assumption held well for all of the variables that were analyzed in this study (Kline, 2005).

Beyond traditional multiple regression assumptions, the additional HLM-specific assumptions were also met. By inspecting the coefficient variances and distribution of the residuals for all models, it was concluded that the group random effects at level 2 were independent and distributed across groups in the same manner. Additionally, by examining the residuals for level–1 and level–2 variables, it was determined that the random variables across the levels were normally distributed.

Descriptive Statistics

Children's emergent literacy. Descriptive statistics for children's emergent literacy scores in the fall and spring can be found in Table 3. On average in this study, children's oral language developed at an age-appropriate pace (Dunn & Dunn, 1997; Newcomer & Hammill, 1997). When compared to national norms, participating children exhibited receptive vocabulary

skills which were in the low average range (just below the 25th percentile) in the fall and at the lower end of the average range in the spring (PPVT-III Fall: M = 89.3, SD = 15.5, range = 40–135; Spring: M = 93.8, SD = 14.8, range = 40–134). Similarly, children's receptive grammar skills ranged from the low average range to the lower end of the average range from fall to spring, when compared to national averages (TOLD-P:3 Grammatic Understanding Fall: M = 8.6, SD = 2.6, range = 3–17; Spring: M = 9.3, SD = 2.6, range = 2–19).

Similar to oral language scores across the year, children's alphabet knowledge (TERA–3 Alphabet subtest Fall: M = 7.8, SD = 2.9, range = 3–20; Spring: M = 9.4, SD = 3.4, range = 1–20) and concepts of print (TERA–3 Conventions subtest Fall: M = 7.9, SD = 2.1, range = 3–19; Spring: M = 8.1, SD = 2.5, range = 2–20) started in the low average range in the fall but moved into the average range by the end of the year. Given the socioeconomic disparities in children's emergent literacy development, the slightly lower overall averages in children's oral language and print knowledge skills likely reflect the large percentage of low-SES children in the sample (e.g., Dickinson & Tabors, 1991; Hart & Risley, 1995; Lonigan et al., 1998; Smith & Dixon, 1995). Nonetheless, in contrast to the other child measures, children in this study were found to have early decoding skills which were comparable to the national norm on average (WJ-III Letter-Word Identification Fall: M = 99.7, SD = 16.2, range = 65–185; Spring: M = 103.9, SD = 13.5, range = 51–172). Overall, regardless of skill level at the start of the preschool year, children generally exhibited age-appropriate gains across the three print knowledge measures. Given that the Pre-CTOPPP did not have standardized norms at the time of the study, it was impossible to compare children's scores to national averages, but the growth in raw scores across points of administration suggests that children made some age-appropriate growth in their PA as well (Pre-CTOPPP Fall: M = 7.5, SD = 3.7, range = 0–18; Spring: M = 9.9, SD = 4.3, range = 0–18).

The relationships between the child outcomes were also evaluated. See Table 4 for correlations between the child outcomes across data collection points. Children's scores on all of the emergent literacy measures, both meaning- and code-focused, were positively and significantly correlated across fall and spring (all *p*'s < .001). Such evidence of concurrent and interrelated development is aligned well with current theoretical conceptualizations of emergent literacy (Burgess & Lonigan, 1998; Dickinson et al., 2003). Moreover, children's emergent literacy skills at the end of the preschool year were highly correlated with children's SES (see Table 5 for correlations between child outcomes and all control variables). This was true for oral language (r = .29, p < .001), PA (r = .21, p < .001), and print knowledge (r = .26, p < .001), such that as children's socioeconomic status increased, their emergent literacy proficiency increased as well, which was to be expected from the research on socioeconomic disparities (Dickinson & Tabors, 1991; Hart & Risley, 1995; Lonigan et al., 1998; Smith & Dixon, 1995). Additionally, children's oral language (r = .21, p < .001) and PA (r = .21, p < .001) were both significantly related to children's ethnicity in this study. That is, children from an ethnic minority tended to have less well developed oral language and PA skills at the end of the preschool year than their white peers.

Teachers' practices. Descriptive statistics for teachers' practices across all participating teachers can be found in Table 6. There was a wide range of instructional and foundational practices observed throughout the country, with some children experiencing very limited exposure to optimal practices and others experiencing enrichment opportunities on a more regular basis. Nonetheless, the current picture also suggests that, on average, teachers have strengths and weaknesses in how they implement best practices.

Based on averages across the entire sample, teachers in this study could be characterized as having less than ideal book reading behaviors (Composite M = 2.2, SD = 1.5, range = .3–6), with quality of instruction (M = 1.0, SD = .8, range = 0–3) being slightly worse than quantity of instruction (M = 1.2, SD = .7, range = .3–3). Oral language use in the classroom appeared to be an area of relative strength for teachers in this study, but remained at a level below that which theory would suggest is needed for optimal emergent literacy growth in children (M = 3.6, SD = 1.5, range = .3–6). In contrast to book reading, the quantity (M = 1.8, SD = .8, range = .1-3) and quality (M = 1.8, SD = .8, range = .1–3) of teacher's oral language use was comparable. PA instruction was teachers' greatest weakness in this study (M = 3.0, SD = 2.2, range = 1–10), which is not surprising given the limited training teachers receive in this instructional domain (Joshi, Binks, Graham, et al., 2009; Joshi, Binks, Hougen, et al., 2009). Print and letter knowledge instruction in the classroom was also less than optimal (M = 2.3, SD = 1.3, range = .8–6). However, the quantity (M = 1.3, SD = .6, range = .8–3) of teachers' print and letter knowledge instruction was better than the quality (M = 1.0, SD = .7, range = 0–3) of such instruction. Teachers' planning for differentiated instruction across the year seemed to fall into the mid-range of possible scores (M = 1.6, SD = .3, range = 1–2).

Teachers' social interactions with their children appeared to be more aligned with early childhood education standards than instructional practices were. Teachers generally engaged in sensitive and positive social interactions with their students (M = 2.9, SD = .7, range = 1.3–4), while exhibiting harshness (M = 1.6, SD = .6, range = 1–3.8) and detachment (M = 1.7, SD = .7, range = 1–4) to a lesser degree. These results were generally promising, yet teachers' were more permissive (M = 2.3, SD = .8, range = 1–3.8) with their students than would be preferable.

In addition to examining teachers' practices across the country in general, the need for program type as a control variable in the HLM analyses for the fourth research question suggested that a more comprehensive look at descriptive statistics of teachers' practices by program type was warranted[1]. These statistics can be found in Table 7. According to independent samples t-tests, whereby Head Start and child care teachers' practices were compared to public pre-K teachers' practices, many significant differences were observed. Overall, teachers' practices in public pre-Ks were much more congruent with theoretically optimal practices than those in Head Start or child care programs. The differences between public pre-K teachers and teachers from the other programs were particularly notable for book reading behaviors, oral language use, and PA instruction (all p's < .001). The difference between public pre-K and child care teachers' print and letter knowledge instruction was also concerning ($p < .001$), as was the difference in differentiated instruction planning ($p < .01$). Although Head Start teachers practiced a similar amount of print and letter knowledge instruction as public pre-K teachers, the quality of the instruction was significantly lower ($p < .01$).

With regards to teacher–child social interactions, teachers' use of harshness was comparable across program types. However, teachers utilized slightly less positive interactions in Head Start and child care programs than in public pre-Ks ($p < .01$). Although Head Start teachers in this sample were also more detached than public pre-K teachers ($p < .001$), they were not as permissive ($p < .01$). Child care teachers were observed to be more permissive than state pre-K teachers ($p < .05$), though equivalent levels of detachment were observed.

Overall, teacher practices, on average, throughout the country were less than optimal, and this was more evident in Head Start and child care programs. Given the relationship between children's socioeconomic status and program type, it is thus unfortunate that the many low-SES

children who attend Head Start and child care programs do not often have access to the most favorable classroom environments. Nonetheless, it should be noted that the less ideal profile of practices observed in Head Start and child care programs does not indicate that attending those programs is worse than attending no preschool at all (Administration for Children and Families, 2010), but rather that, on average, public and state pre-Ks appear to be more on track to generating substantial gains in children's emergent literacy as needed to prevent future reading difficulties.

Hierarchical Linear Model Results

Because of the large number of tests conducted across the hypotheses, and the associated increase in likelihood of committing a Type I error, a smaller alpha (.01) was utilized to determine significance in HLM analyses of main effects, rather than the traditionally used .05. However, in those cases in which a significance value of .05 was observed, the results will be described as a trend. There is a possibility that these findings may be due to a Type I error, yet most of them may in fact still provide meaningful information, especially when aligned with the theoretically- and empirically-driven hypotheses. In contrast to this more stringent requirement for analyses of main effects, the traditional significance value was considered more appropriate when examining interaction effects. Such effects are more difficult to detect, because a significant amount of co-variation is needed between three variables instead of two to generate an adequate picture of any phenomena. Therefore, the .05 significance value was utilized for analyses including interaction effects.

Main effects of teachers' practices on children's emergent literacy development. A primary goal of this study was to replicate and extend the empirical base on relationships between specific preschool teacher practices and growth in the critical emergent literacy domains over the preschool year. It should be noted that beta coefficients in HLM can be interpreted the same way that they can be interpreted for fixed-effects regression models. The standardized coefficient on β can be interpreted as the effect of a given teacher practice on the emergent literacy outcome in question.

Effects on children's oral language development. Some interesting variations were found in the relationships between teachers' practices and children's oral language growth (see Table 8). The strongest support was found for the hypothesis that teachers' oral language use is positively and significantly predictive of children's oral language development. Above and beyond the effects of the control variables, children who were in classrooms with better oral language use on the part of the teacher exhibited stronger oral language growth than children whose teachers' oral language use was not optimal ($\beta = .06$, $p = .001$). While this main effect was found for teachers' composite oral language use, interesting differences across the *quantity* and *quality* of such instruction emerged. First, the size of the effect of teacher oral language use quality ($\beta = .07$, $p < .001$) on children's overall oral language growth was slightly larger (albeit not significantly different) than the size of the effect of oral language use quantity ($\beta = .05$, $p = .007$). More stark differences were observed when examining the effects of teachers' oral language use on children's growth according to the individual oral language measures. The quality of teacher oral language use was significantly predictive of children's growth in receptive vocabulary ($\beta = .06$, $p = .001$) and receptive syntax ($\beta = .06$, $p = .007$). However, the effect of oral language use quantity was not significantly related to children's receptive syntax and was only related to children's receptive vocabulary at the trend level.

Children who experienced better book reading practices in their classrooms also

exhibited stronger oral language growth than children who had limited access to effective book reading practices, after partialling out the control variable block; however, this association only met criteria for a trend (β = .04, p = .043). While the trend in the association with children's oral language growth was observed at the composite level of teachers' literacy book reading practices, differences across the quantity and quality of book reading were discovered here as well. On average, the quality of teachers' book reading appeared more important for children's oral language development than the quantity of teachers' instruction. Whereas the quality of teachers' book reading behaviors was positively related with children's development in this area at the trend level (β = .04, p = .027), the quantity of book reading was not statistically significant at all.

In addition to literacy instructional practices, children whose teachers were positive and sensitive in their interactions with them experienced more oral language growth than children whose teachers were less positive and sensitive (β = .08, p = .015). Although the relationship between positive teacher–child social interactions and children's oral language growth was only observed at the trend level, it was within .5% of meeting criteria for significance at the .01 level. Differentiation of instruction was not significantly predictive of children's oral language.

To further understand the main effects of the teacher practices above, they were also entered into an HLM model simultaneously. The results again suggested that teachers' oral language use may have the most robust relationship with children's oral language growth. That is, only teachers' oral language use continued to be a significant predictor of children's oral language growth, above and beyond the control variables and other teacher practice predictors (β = .10, p < .001). The high correlation between oral language use and book reading behaviors (r = .52, p < .001) suggest that the mere trend in the relationship between book reading and children's oral language, and the way in which book reading dropped out of significance entirely when in the same model as oral language use, may be due to issues of collinearity rather than evidence that book reading instruction is not relevant for children's oral language development in the classroom (Bowey, 2005).

Collinearity occurs when two variables share covariance with one another and share overlapping covariance with the outcome in question, such that they explain some of the same variance in the outcome. The relationship found between book reading behaviors and children's growth in oral language suggests that book reading may have in fact predicted variance in oral language growth; however, it did not do so uniquely when oral language was also in the model. This may be because oral language use and book reading behaviors represented very similar underlying processes (i.e., as reflected by the high and significant bivariate correlation between the two measures). Overall, the results across the simple and complex models suggest that both oral language use and book reading behaviors were likely meaningful for children's oral language development, but the inclusion of multiple practices in analyses did not necessarily add to our understanding of the variance in the outcome. Potential issues with collinearity between positive teacher–child social interactions and oral language use (r = .67, p < .001) may also be to blame for the facts that only a trend was found in the relationship between positive interactions and oral language growth, and that positive teacher–child interactions were no longer associated with children's oral language once the model accounted for variance due to teachers' oral language use.

In sum, teachers' oral language use appears to play the most significantly positive role in children's oral language development over the preschool year, such that for every one standard deviation increase in teachers' overall oral language use, children's oral language was likely to

increase by .06 standard deviation. Moreover, the quality of oral language use, rather than the quantity, may have the most potent effect on children's oral language growth. Although not uniquely predictive of oral language growth once teachers' oral language use has been accounted for, book reading behaviors and positive social interactions with children appear to explain some of the variance in children's oral language development as well. Moreover, as was observed with oral language use, the quality of book reading appears to be more important for children's growth than the sheer quantity of such practices.

Effects on children's phonological awareness development. Results from the HLM analyses of the effects on children's growth in PA can be found in Table 9. As originally predicted, results indicated that teachers' oral language use was significantly and positively predictive of children's PA growth over the preschool year, above and beyond the effects of the control variables (β = .06, p = .007). That is, children who were instructed by teachers with better oral language use exhibited stronger PA growth than children whose teachers utilized poor oral language use in the classroom. Similar to the effects on children's oral language development, the quality of oral language instruction once again seemed to have a more robust relationship with children's PA growth than did the quantity of oral language use. Oral language use quality was significantly related to children's PA growth (β = .07, p = .004), whereas only a trend in the association was observed with oral language use quantity.

There was also a positive relationship between teachers' book reading behaviors and children's PA growth, after partialling out the variance accounted for by the control variables (β = .07, p = .005). Thus, children were more likely to experience meaningful PA growth if in a classroom where more optimal book reading practices were taking place. This was the case regardless of whether or not book reading was examined at the composite, quantity, or quality levels. Although it was not hypothesized that teachers' book reading behaviors would be predictive of children's PA development, it is interesting that this effect was nonetheless observed. It is possible that because teachers' greatest weakness was in their PA instruction, perhaps the majority of children's exposure to PA principles was actually via the book reading practices facilitated by their teachers.

When another model was run with both oral language and book reading practices entered as predictors of children's PA growth, both dropped out of significance. Nonetheless, given the above mentioned significant correlation between teachers' book reading behaviors and oral language use (r = .52), the issue of collinearity may come into play in this instance as well and may overshadow effects that are in fact substantial. In sum, while teachers' book reading and oral language use may have a meaningful, albeit complicated, relationship with children's PA growth, no other predicted practices had an effect on children's PA growth during their final year of preschool. The limited effects of code-focused instruction on PA were particularly surprising, given the generally large effects on PA that have been reported in previous research (Lonigan, Schatschneider, et al., 2008b).

Effects on children's print knowledge development. All of the hypothesized effects on children's growth in print knowledge were confirmed to some degree (see Table 10). Teachers' book reading behaviors exhibited a significant main effect on children's growth in print knowledge, above and beyond the control variable block (β = .09, p < .001). That is, children who were exposed to better book reading practices throughout the year demonstrated stronger print knowledge gains than children whose teachers did not employ optimal book reading techniques in the classroom. Code-based instructional practices appeared to have some meaningful effects on children's print knowledge growth as well. Children whose teachers'

utilized better print and letter knowledge instruction also exhibited more print knowledge gains relative to children whose teachers' print and letter knowledge instruction was not optimal (β = .10, $p < .001$). Additionally, more print knowledge development took place for children who experienced enhanced PA instruction than those who did not (β = .08, p = .001). Contrary to some of the findings for children's oral language and PA development, no differences were observed between the effects of the quantity and quality of literacy-focused instructional practices when print knowledge growth was the outcome under investigation.

As hypothesized, the association between teachers' differentiated instruction planning and children's print knowledge growth seems to be somewhat meaningful as well, with the effect reaching the trend level above and beyond the control variables (β = .06, p = .019). As teachers more skillfully planned responsive instruction, their children were more likely to demonstrate gains in their print knowledge skills. It was predicted that teacher–child social interactions would also have an effect on children's print knowledge development, yet the way in which this was manifested was slightly different than expected. That is, it was permissive, rather than positive, teacher–child social interactions which were found to be a significant predictor of children's print knowledge (β = -.09, p = .001). Children whose teachers were more permissive in what they allowed their students to do exhibited less print knowledge growth on average than children whose teachers were not so permissive.

A subsequent, more complex HLM analysis was conducted to better understand the effects of the various teacher practices. When all of these significant predictors were entered into a model together, print and letter knowledge instruction (β = .08, p = .009) and permissive teacher–child social interactions (β = -.07, p = .008) were the only teacher practices which continued to account for a significant amount of the variance in children's print knowledge growth. Although the effect of teachers' book reading practices was no longer significant at the stringent .01 level, a trend in the relationship between such practices and children's print knowledge was maintained (β = .06, p = .019). However, teachers' PA instruction and differentiated instruction planning both dropped out of significance.

As was mentioned previously, this does not mean that book reading, PA instruction, and differentiated instruction planning are not meaningful for children's print knowledge growth, but simply that due to more complex relationships between the predictors, adding them to a model with other meaningful predictors did not necessarily add to our understanding of variance in children's print knowledge. Indeed, the high correlation between print knowledge instruction and PA instruction (r = .70, $p < .001$) suggests that collinearity was again at play and contributed to PA instruction dropping out of the more complex HLM model. Possible reasons for differentiated instruction planning dropping out of significance will be discussed when the results of the second research question are presented. Teachers' permissiveness and print and letter knowledge instruction were not significantly correlated; therefore, without the potential for collinearity to be an issue, it is logical that these two practices remained significant predictors of the outcome when in a model together.

In sum, a number of teacher practices, including book reading behaviors, print and letter knowledge instruction, PA instruction, differentiated instruction planning, and less permissiveness, have an important relationship with children's print knowledge growth. However, it appears that teachers' print and letter knowledge instruction and permissiveness in the classroom may be the most consequential for altering the development of print knowledge. An increase of one standard deviation in teachers' print and letter knowledge instruction corresponds to a .08 standard deviation increase in children's print knowledge on average, above

and beyond the variance accounted for by teachers' permissiveness and the control variables. In turn, a one standard deviation increase in teachers' permissiveness is related to a .07 standard deviation decrease for children's skill in this area, after partialling out the variance accounted for by teachers' print knowledge instruction and the control variables.

Differential effects of teachers' practices according to children's emergent literacy risk status at preschool entry. Another major goal of this study was to understand if teachers' practices play a particularly important role for those children who arrive at preschool already at risk for reading failure due to below average emergent literacy skills. As predicted, there was evidence of a couple of cross-level interactions (i.e., a given teacher practice at the classroom level, with child's emergent literacy risk status at the student level), such that effects of some teacher practices varied according to children's emergent literacy skill level at the start of the year. First, when children's oral language growth was examined, a significant interaction between teachers' book reading behaviors and children's emergent literacy risk status was observed (β = .19, p = .029). This Child × Instruction interaction is best illustrated in Figure 1. When exposed to good book reading behaviors in the classroom, children at risk for future reading failure (i.e., due to arriving at preschool with far below average oral language, such that their skills were below the 5th percentile) experienced greater oral language growth than children who were not at risk for reading failure (i.e., due to above average oral language skills at preschool entry). On the other hand, the effect of poor book reading practices did not have as negative an impact on children who entered preschool with strong oral language skills relative to those who started the year behind. It should also be noted that the main effect of book reading practices on children's oral language growth may have not been as substantial as the effect of teachers' oral language use, because of the fact that book reading practices appear to have played a differential role in children's oral language development according to children's initial skill level at preschool entry.

A significant interaction between teachers' differentiated instruction planning and children's emergent literacy risk status was also found when print knowledge growth was the outcome of interest (β = .20, p = .010). Refer to Figure 2 to best understand this Child × Foundational Practice interaction effect. In this case, children at risk for future reading failure (i.e., due to print knowledge skills that were below average, or rather below the 10th percentile, in the fall) exhibited stronger gains in print knowledge throughout the year if their teacher skillfully planned differentiated instruction than children who were not at risk for reading failure (i.e., due to starting the year with above average print knowledge skills). Moreover, low-quality differentiated instruction planning had more negative repercussions on the potential for print knowledge growth if children arrived at preschool without already well developed print knowledge skills. The finding that the effects of differentiated instruction planning on children's print knowledge growth varied according to children's beginning-of-year risk status may help to explain why the main effect of differentiated instruction planning on children's print knowledge was not shown to be as robust as the main effects of some other teacher practices.

In sum, some teacher practices were particularly meaningful for children who entered preschool at a disadvantage due to less developed emergent literacy skills. Children whose oral language skills were not as developed as their peers benefitted tremendously from exposure to optimal book reading practices and were more negatively affected by poor book reading practices. Furthermore, children who arrived at preschool without well-developed print knowledge concepts were more likely to experience benefits if their teacher was able to skillfully plan differentiated instruction and negative developmental consequences when their teacher was

unable to successfully plan responsive instruction.

How teachers' practices may interact to predict children's emergent literacy development. Beyond examining main effects of teachers' practices, models were also run to determine how teachers' language and literacy instructional practices might be moderated by differentiated instruction planning or teacher–child social interactions. Only a couple of Instruction × Foundational Practice interaction effects were found to be of interest across all analyses. First, the interaction between teachers' book reading practices and differentiated instruction planning was significantly predictive of children's print knowledge (β = .05, p = .047). While teachers' book reading behaviors exhibited a significant and positive main effect on print knowledge development in children, the quality of differentiated instruction planning positively moderated this effect. This interaction is best illustrated by Figure 3. It was not simply the case that children receiving better book reading instruction differed in their print knowledge growth from children receiving poor book reading instruction, or that print knowledge growth differed for children whose teachers' differentiated instruction planning was of a high quality or not. Instead, the data reflect the idea that while poor book reading behaviors negatively affected the likelihood of growth in print knowledge regardless of how a teacher planned their differentiated instruction, the use of high-quality differentiated instruction planning essentially facilitated a *boost* in the positive effect that good book reading had on children's print knowledge development.

Beyond the moderating effect of differentiated instruction, the interaction between teachers' book reading practices and permissive teacher–child social interactions was also significant for children's growth in print knowledge (β = -.05, p = .048). In contrast to the hypothesis that positive teacher–child social interactions would positively moderate the effect of book reading practices, the data suggests, rather, that permissiveness negatively moderates the effect of such instruction. This interaction can be best understood by referring to Figure 4. On average, it appears that children in classrooms with good book reading practices and less permissiveness experienced more growth in print knowledge than children in classrooms with good book reading practices and more permissiveness. However, there was no difference in print knowledge growth between children whose teachers were less permissive while implementing poor book reading practices and those whose teachers were more permissive while using poor book reading practices.

In sum, the positive effects of optimal book reading practices were enhanced when teachers also utilized high-quality foundational practices, namely differentiated instruction planning or less permissiveness. However, the effects of multi-dimensional teacher practices were limited to children's growth in print knowledge in this study. Although not as many interactions between practices were observed as had been hypothesized, these preliminary findings nonetheless suggest that emergent literacy development may be affected by multiple pedagogical dimensions within the classroom.

Effects of educational backgrounds on preschool teachers' practices. Given the significant relationship between many preschool teachers' practices and children's emergent literacy development observed in the data, it was important to further consider how teachers' educational backgrounds may have shaped the practices that they employed in their classrooms, if at all. As hypothesized, general educational background was by and large insignificant for how teachers practiced in their classrooms. Teachers who had a Bachelor's degree or higher were no more likely to utilize optimal literacy-focused instructional practices, differentiated instruction planning, or teacher–child social interactions than those who had not received a

Bachelor's degree. Moreover, only trends emerged when examining the relationship between teachers' practices and highest degree obtained (see Table 11). Teachers' oral language use was better if they had a Bachelor's degree rather than merely a high school diploma (β = .41, p = .025) or if they had a Master's degree or higher rather than a high school diploma (β = .46, p = .048). However, these were only trends; further, having a Bachelor's degree or Master's degree or higher were both not significantly better than having an Associate's degree when it came to predicting teachers' oral language use. Additionally, having a Master's degree rather than a high school diploma was meaningful for improving teachers' positive social interactions with their children, but only at the trend level (β = .47, p = .040). Having a Master's degree did not support positive teacher–child social interactions any more than having an Associate's or Bachelor's degree. Furthermore, no other statistically significant relationships were found between teachers' generalized educational backgrounds and classroom practices of interest.

As anticipated, ECE-specific education played a slightly more important role in teachers' practices than general education (see Tables 12 and 13). Units in early childhood education had a significant main effect on teachers' oral language use, above and beyond the control variables (β = .47, p = .001). That is, preschool teachers who had taken six or more courses in early childhood education or child development demonstrated significantly better oral language use in their classrooms than those who had not taken the ECE-specific coursework. Teachers who had received this ECE-specific coursework also practiced better book reading behaviors in their classrooms, although only observed at the trend level (β = .32, p = .017). Although only a trend as well, the effect of early childhood coursework on teachers' book reading quality was closer to achieving significance (β = .33, p = .012) and greater than the effect on book reading quantity (β = .29, p = .029).

Having a major degree of study in early childhood education was found to be related to teachers' overall oral language use as well (β = .48, p = .011). This result also only met criteria at the trend level, yet the p-value was particularly close to achieving the more stringent significance level. Furthermore, having an early childhood major was a significant predictor of the quality of oral language use (β = .51, p = .006). Teachers who had chosen to major in early childhood education had better oral language use in their preschools classrooms than those who had not selected a major degree of study. However, teachers who had chosen to study elementary education (β = .45, p = .031), or some other major all together (β = .41, p = .030), also practiced better oral language use in their classrooms than teachers without a major degree of study, though the effect for having a major in early childhood education was closer to achieving significance.

Given the significant effect of early childhood education units described above, this may have been simply due to those majoring in early childhood education taking a greater number of ECE-specific courses relative to those who had another major. Therefore, it is interesting to note that majoring in child development or developmental psychology had no effect whatsoever on teachers' practices. Perhaps taking six courses in child development or early childhood education alone was meaningful for affecting teachers' practices, but the additional requirements unique to a child development or developmental psychology major did nothing to alter classroom practices, whereas the additional requirements of an early childhood major did facilitate changes in participants' teaching repertoire. Overall, having an ECE-specific education major thought to be relevant for preschool teaching was not as predictive of teachers' classroom practices as had been expected. In fact, there were no other statistically significant relationships between teachers' practices and the ECE-specific education they had received; findings were limited

regardless of which major was used as the reference group in analyses.

In sum, the results from the final research question suggest that, as predicted from the current body of research (Early et al., 2006, 2007), general educational background did not have much of an effect on how teachers practices in their preschool classrooms. ECE-specific education, when conceptualized as teachers' major degree of study, was not particularly relevant either, with the exception of the observed relationship between an early childhood education major and some aspects of teachers' oral language use. It seems that having at least six courses in early childhood education may have had the most meaningful relationship with teachers' practices, but the effect of such coursework was not widespread, in that it was constrained to teachers' oral language use and book reading practices. When teachers' educational backgrounds were predictive of practices, it was advantageous that greater effects were found for the quality, rather than the quantity, of some of teachers' practices, since the quality of instruction was occasionally found to be more meaningful for affecting change in children's emergent literacy development.

Discussion

This study was conducted to better understand how an array of preschool teachers' practices influence the development of emergent literacy skills essential for children's future reading success. Viewing the preschool classroom ecology from a multi-dimensional theoretical model (Connor, Morrison, et al., 2009), other major goals of the study were to understand how initial individual differences in children's emergent literacy skills interact with instruction to predict emergent literacy growth, and how other foundational teacher practices may interact with the effects of language and literacy instruction to influence growth. Finally, understanding how and if current practices around the country are aligned with the evidence base, as well as how teacher education may contribute to teachers' use of meaningful practices in their classrooms were also investigated as part of the study. Utilizing a large national dataset, hierarchical linear modeling was employed to examine the relationships between teachers' practices and children's growth, Child × Instruction interactions, Child × Foundational Practice interactions, Instruction × Foundational Practices interactions, and relationships between teachers' education and practices. Overall, the results of the study demonstrate that teachers are in need of a comprehensive repertoire of pedagogical strategies to most effectively contribute to all areas of students' emergent literacy development and to alter the trajectory of children at risk toward greater reading success in the future. Furthermore, although it is evident that there is a need for improving teachers' practices around the nation, teachers' educational backgrounds do not have consistently substantial effects on most practices.

Contributions to Research on the Prevention of Reading Difficulties

Summary of the specificity of the effects of language and literacy instructional dimensions. A number of statistically significant and meaningful relationships were observed between language and literacy instruction and growth in children's oral language, PA, and print knowledge, with the effects of teachers' instructional practices being specific to each child outcome. The results of this study are notable because they build upon and extend the body of research intent on uncovering specificity in how language and literacy instructional practices can prevent reading difficulties and narrow the socioeconomic divide in emergent literacy. Before moving to a discussion explicating possible reasons for the findings in this study, it should be noted that the majority of the observed effects were much smaller than reported in previous research (NELP, 2008). Although the smaller effect sizes suggest a need for greater caution in making conclusions, the general convergence with previous investigations (e.g., Connor et al., 2006; Fischel & Landry, 2008; Howes et al., 2008; Lonigan, Schatschneider, et al., 2008b; Lonigan, Shanahan, et al., 2008; Whitehurst et al., 1999) suggests that this study provides a beneficial addition to the body of research on early language and literacy instructional practices. Further, because HLM accounted for the shared variance at the clustering levels in this study, the smaller effects may simply reflect a more accurate picture of the effect of instructional practices, beyond other sources of cluster-level variance (e.g., at the classroom level). A larger corpus of research which utilizes refined analytic strategies such as HLM will be requisite before making this conclusion.

Meaning-focused instructional practices. In this study, positive relationships between book reading and children's growth in print knowledge and oral language were observed, as were positive relationships between teachers' use of oral language and children's oral language development. Overall, these results supported the current empirical evidence that meaning-

focused instructional practices are associated with growth in children's oral language and print knowledge (Connor et al., 2006; Fischel & Landry, 2008; Lonigan, Shanahan, et al., 2008). Adding to this line of inquiry, it is interesting to note that the quality of book reading had a more meaningful relationship with children's oral language than the quantity of instruction. Although quality and quantity have not been evaluated in the literature in the same way they were in this study, different approaches to shared-reading could serve as a proxy for quality, for comparison purposes. As part of Lonigan, Shanahan, et al.'s (2008) evaluation, they considered how interventions differed by whether or not they transformed the participants' roles to create an interactive literacy experience. Dialogic reading interventions involve teachers engaging children with questions that require responses, which are then evaluated and expanded, after which the child repeats the expanded notion. Considered as one of the highest quality book reading approaches, dialogic reading was compared to non-dialogic approaches and was found to have a higher, albeit not significantly different, effect size. This, together with the better effect of quality in this study, suggest that teachers need to give particular attention to how well, rather than simply how much, they implement book reading in their classrooms.

In contrast to some converging evidence regarding the value of book reading quality, it remains unclear as to whether the quality or quantity of oral language use will most greatly impact children's emergent literacy development. That is, the greater effects of oral language use quality over quantity observed in this study were not necessarily supported by the literature. Comparing language-enhancement interventions that were play-based versus contextualized in other learning settings revealed no consistent advantages of the play-based approaches (Fischel & Landry, 2008). Further, a recent investigation of differences between teachers' literal and inferential questions (inferential questions considered of higher quality) revealed few relationships between characteristics of question quality and children's vocabulary growth (Zucker, Justice, Piasta, & Kaderavek, 2010). Lastly, Hart and Risley (1995) found that the quantity of parents' talk with their children was more important than the quality in supporting oral language development. While it is uncertain why oral language use quality emerged as superior for multiple child outcomes in this study, the results nonetheless suggest that further attention to the quality versus quantity debate is warranted.

Additional discrepancies between the study's results and past research can also help to extend the field's understanding of how meaning-focused instructional practices may affect emergent literacy development. The positive relationship between book reading behaviors and children's PA growth appears to contradict most prior research (Lonigan, Shanahan, et al., 2008). However, given that there have been too few studies that have examined the impact of shared-reading interventions on children's PA skills to estimate a truly reliable effect (Lonigan, Shanahan, et al., 2008), it cannot necessarily be concluded that book reading is irrelevant for PA growth. First, the effect that emerged in this study may be in part due to the nature of the book reading behaviors measure, such that a few items on the scale incorporated a focus on code-based elements of emergent literacy, whereas typical measures of instruction used in the past have tended to avoid a focus on print (Dickinson, 2002). The relevance of book reading for the purposes of fostering PA may only surface if book reading is viewed more broadly to include such code-focused instructional elements. In fact, Murray, Stahl, and Ivey (1996) investigated the relationship between book reading conditions and emergent literacy in low-SES preschool classrooms, and found significant differences in the PA gains produced across conditions. Children whose teachers read traditional alphabet books with examples that provided letter-sound associations because of the pictures and text made significantly larger gains than children

receiving the other book reading conditions with a limited concentration on the code. It is possible that books of this nature facilitate increased sensitivity to the sounds in language, a fundamental requirement of strong PA.

Theory suggested an important relationship between oral language and PA, and the meaningful effect of oral language use on children's gains in PA found in this study also helps to extend the empirical body of research. From the results of their meta-analysis, Fischel and Landry (2008) reported that the effect of language-enhancement interventions on PA was insignificant. However, not only was the coefficient close to reaching significance, but Fischel and Landry noted that their lack of findings may have been due to the limited number of studies that have ever examined such a relationship. Only two studies that were included in their analysis investigated whether oral language interventions impact children's PA, and both studies found significant effects. Thus, the results of the current study, when paired with these prior findings, provide evidence that preschool teachers' use of oral language in their classrooms may in fact be significant for children's PA. Further, the probable link between oral language interventions and children's PA makes sense in light of the lexical restructuring hypothesis, which purports that greater exposure to oral language requires increasing neural reorganization of similar phonological units, hence improving PA (Metsala & Walley, 1998; Metsala, 1999), and other prior empirical evidence linking oral language proficiency with PA skills (Cooper et al., 2002; De Cara & Goswami, 2003).

Due to the limited amount of optimal PA instruction that most teachers use in their classrooms, as evidenced by this study and prior research (Justice et al., 2008), it may actually be quite advantageous for the field to broaden its examination of how other practices, such as book reading and oral language, can impact PA growth (Justice & Sofka, 2010). Indeed, the potent role PA plays in children's reading acquisition (Stanovich, 2000) suggests that any and all efforts which can expand our understanding of how to foster PA are warranted. At the very least, this should be a consideration until enhanced PA instruction becomes more mainstream in preschool classrooms around the country. Given how teachers may tend to overwhelmingly focus their attention on meaning- rather than code-focused information while engaging in book reading with their students (Hindman, Connor, Jewkes, & Morrison, 2008), it should be noted that researchers must be careful to utilize assessment tools which can also capture code-specific aspects of book reading practice when investigating their influence on PA development.

Code-focused instructional practices. Taken as a whole, the observed relationships between both code-focused instructional practices and children's print knowledge growth supports the theory and empirical evidence that receiving more code-focused instruction can influence aspects of children's print knowledge development, including alphabet knowledge (Burgess & Lonigan, 1998; Connor et al., 2006; Dickinson et al., 2003; Lonigan, Schatschneider, et al., 2008b). However, as was mentioned previously, the lack of relationship between PA instruction and children's PA growth was especially unforeseen. The body of research demonstrating a causal link between PA instruction and PA growth is vast (for a review, see Blachman, 2000; Bradley & Bryant, 1983; Byrne et al., 2000; Cunningham, 1990; Lundberg et al., 1988; Stanovich, 1986), with effects generally found to be quite large (Lonigan, Schatschneider, et al., 2008b). Therefore, it is questionable why the typically strong effect of PA instruction on PA growth was not observed in the current study.

The problem may hinge on issues with how PA instruction was captured via the observational protocol employed in this study. It should first be noted that although the scale was altered to align with the cognitive task involved in the PA outcome measure as well as past

research, post-hoc analyses revealed that utilizing the original scale, or only using any of the individual items in the scale, did not alter the results. Thus, it can be assumed that the changes in how the scale was used are not to blame for the unanticipated findings. More complex issues with the measure may have led to the results.

As described previously, PA was the only instructional scale which did not broadly delineate between quantity and quality of instruction. That is, the other instructional scales had more congruency in the number of items capturing the quantity and quality of instruction and thus quantity and quality scales could be generated in addition to the composite. In contrast, the PA scale centered on the presence of particular PA activities in the classroom with only one item that captured the overall quantity of the activities and one item capturing the overall quality; as a result, only a composite scale could be created. Therefore, it is possible that teachers who implemented many PA activities of a low quality could have scored higher on the composite scale than teachers who implemented few activities but of a higher quality. In turn, the scale may have inaccurately assessed the level of PA instruction that children in the study received. Since the quality of instruction was found to be more relevant than quantity in other aspects of this study, the inability for the PA scale to effectively capture differences in the quality and quantity of instruction may have led to masking of potential effects on children's PA. Regardless of the reasons for the unanticipated findings in this study, the vast prior research on the relationship between PA interventions and PA growth (Blachman, 2000; Bradley & Bryant, 1983; Byrne et al., 2000; Cunningham, 1990; Lonigan, Schatschneider, et al., 2008b; Lundberg et al., 1988; Stanovich, 1986) suggests that these findings should likely be considered an anomaly rather than evidence that preschool PA instruction is irrelevant for preventing reading difficulties.

The established benefits of adding alphabet knowledge or phonics training to PA instruction for the purpose of fostering PA in children (Lonigan, Schatschneider, et al., 2008b), and the interrelationship between print knowledge and PA development (Burgess & Lonigan, 1998; Dickinson et al., 2003) suggested that print and letter knowledge instruction might prove beneficial for children's PA in this study as well. On the contrary, no relationship between print and letter knowledge instruction and children's PA growth was discovered. Although print and letter knowledge instruction in this study was operationalized via a measure that included broad indicators of print and letter knowledge (including phonics-type instructional features, alphabet knowledge, and concepts of print), the results were actually more in line with Lonigan, Schatschneider, et al.'s (2008b) finding that alphabet knowledge instruction alone did not have a substantial effect on PA growth.

Overall, the discrepancies between the code-focused instruction results and prior research may also be due to other extraneous instructional dimensions that were beyond the scope of the study. As proposed by the multi-dimensional classroom environment model (Connor, Morrison, et al., 2009), grouping context may be another dimension that was not incorporated into the observational protocol employed in this study but that which may have factored into to the results. That is, the fact that the TBRS did not intentionally assess whether or not instruction was delivered at the whole class, small group, or individual level may have influenced the weaker than expected effects of PA instruction and print and letter knowledge instruction. As noted by Lonigan, Schatschneider, et al., 2008b, the conclusions made from their meta-analysis were primarily based on code-focused interventions implemented using individual or small-group instruction, and that given the body of research that exists, it is impossible to determine the effectiveness of code-focused instruction that has been delivered at the whole class level with

young children. Additionally, Connor et al.'s (2006) study of the effects of language and literacy instruction included an examination of grouping context and found that the effect of small group code-focused instruction was 10 times greater than such instruction when delivered to the whole class. Regrettably, the coding of the data for this study did not allow for an analysis of grouping context. Because it is likely that teachers' scores on the code-focused instructional scales did not in fact reflect grouping context, the power to find more comprehensive effects was limited.

Language and literacy instruction for children at risk. This study also substantiates the theory that certain aspects of instruction can have exceptionally meaningful effects for children at risk for reading difficulties at preschool entry. Connor et al. (2006) observed that for preschool children who start the year with weaker vocabulary scores, meaning-focused activities are particularly valuable for fostering vocabulary development. Convergent with many of the Child × Instruction interactions that have been reported in this line of inquiry (Connor et al., 2004, 2006; Connor, Piasta, et al., 2009), this study also revealed that children who enter preschool with poorly developed oral language skills, when compared to children who enter with strong oral language, experience accelerated benefits when their teachers utilize optimal book reading behaviors. On the other hand, children at risk endure more negative repercussions if their teachers do an inadequate job of book reading. It is thus important to consider strategically placing children with less developed oral language with teachers who can and will facilitate optimal book reading practices.

Although there was a lack of Child × Code-focused Instruction interactions observed in this study, previous research suggests that children at risk for reading difficulties are still in need of especially optimal code-focused in instruction as well (Connor et al., 2006; Foorman et al., 1998; Juel & Minden-Cupp, 2000; Lonigan, Schatschneider, et al., 2008b). The exclusion of factors such as grouping context on the code-focused instructional scales utilized in this study may be to blame for this study's findings. Therefore, despite not finding as many Child ×Instruction interactions as hypothesized, ensuring that certain instructional practices are implemented optimally in classrooms serving children at risk should still be considered imperative, if we are ever to narrow the achievement gap before children arrive at elementary school.

The additional role of foundational dimensions. While the majority of the research that has examined how to foster emergent literacy growth has centered on language and literacy instructional dimensions of the classroom ecology, theory suggested that other foundational dimensions have the potential to influence children's development in this area as well (Connor, Morrison, et al., 2009). The study results supply some evidence to warrant such a theoretical claim.

The added benefits of differentiated instruction. First, the results of this study extend our understanding of the value of teachers' differentiated instruction to respond to students' unique needs. Lambert et al. (1999) previously demonstrated that the systematic use of assessment to guide the planning of differentiated instruction had a small effect on children's growth on a global developmental checklist, which included language development. That is, children who were developmentally less advanced than their peers were able to make more dramatic growth and move closer to the class average when their teachers skillfully individualized instruction to meet their needs. Similarly, VanDerHeyden et al. (2008) reported that teachers' use of progress monitoring tools to inform their literacy intervention decisions resulted in amplified growth toward expected levels of PA proficiency for children who initially exhibited poor PA skills.

Whereas previous research suggests that differentiated instruction planning is relevant for children's growth in oral language (Lambert et al., 1999) and PA (VanDerHeyden et al., 2008), the results of the current study extend this premise to children's print knowledge development. There was a consistent benefit for all children, regardless of initial print knowledge skills, if teachers successfully planned differentiated instruction. Moreover and perhaps more importantly for the purpose of preventing reading difficulties and narrowing the achievement gap, the benefit was more evident for children whose print knowledge skills in the fall suggested that they would have difficulty acquiring reading skills in the future. That is, teachers who adeptly planned differentiated instruction were better able to alter these children's developmental trajectories and increase their likelihood of future reading success. Therefore, children with less developed print knowledge should ideally be placed in a classroom where the teacher is particularly capable of planning differentiated instruction.

As the theoretical premises of a multi-dimensional classroom model would suggest (Connor, Morrison, et al., 2009), the foundational dimensions involved in differentiated instruction also interacted with an area of teachers' instructional practices. Differentiated instruction exerted some influence on children's print knowledge by moderating the effect teachers' book reading practices had on print knowledge growth. Although it had been hypothesized that differentiated instruction planning would moderate the effects of more teachers' practices, the sole finding here may be due to the generalized nature of the measure that captured differentiated instruction. That is, the measure did not assess the specific instructional domains for which teachers were planning to differentiate instruction (e.g., book reading practices versus print and letter knowledge instruction, etc.), but rather assessed whether or not teachers engaged in some differentiated instruction planning at all, regardless of the instructional objectives. Therefore, it is possible that teachers could have received a high score on differentiated instruction planning, even if they planned for responsive teaching in only one emergent literacy instructional domain. In this case, the sole finding may be due to the fact that most of the variance in the differentiated instruction planning construct was attributable to the variability in how teachers planned to modify their book reading practices in order to address children's differing print knowledge needs. Of course, more research, which employs a more nuanced differentiated instruction measure that better specifies how instructional domains and features are incorporated into planning will be needed to warrant these ideas.

Nonetheless, the results of the current study, when paired with past research, demonstrate that when an early childhood educator understands a child's developmental needs, she or he can respond with specificity in the instructional approach that is used to positively affect change in each area of emergent literacy development. On the other hand, without these skills, teachers may be limited in the magnitude to which they can prevent reading difficulties. Given the power of differentiated instruction to alter children's developmental trajectories toward greater reading success, it is vital that teachers be given a great deal of support in how to implement responsive instruction. Recent efforts to enhance the usability of an RTI model in the preschool classroom (Gettinger & Stoiber, 2008; VanDerHeyden & Snyder, 2006), including the creation and improvement of progress monitoring tools (VanDerHeyden et al., 2008; Walker, Carta, Greenwood, & Buzhardt, 2008), algorithm-based instructional decision models (Connor, Morrison, et al., 2009), and web-based tools to guide instructional decisions (Buzhardt et al., 2010), are all steps in the right direction.

The value of teachers' social interactions with their students. The theory that teacher–child interactions have the potential to affect change in children's emergent literacy development

(Connor, Morrison, et al., 2009) was also provided some validation by the study's results. In previous research, it was established that warm and responsive teachers have a positive effect on children's vocabulary and decoding skills in first grade (Connor et al., 2005). This study extended the evidence to the preschool level, in that positive teacher–child social interactions had a somewhat meaningful relationship with children's oral language growth. The existing body of research also suggests that warm and sensitive teachers can influence students' code-focused early literacy skills (Connor et al., 2005; Curby, Rimm-Kaufman, et al., 2009; Loeb et al., 2004), but this study did not corroborate these findings.

Whereas much of the empirical evidence on teacher–child social interactions suggests that sensitive and positive interactions are most meaningful for children (Connor et al., 2005; Loeb et al., 2004; NICHHD, 2002), the study suggested that the permissiveness construct may require more of the field's attention. Indeed, the observed relationship between teachers' permissiveness and a decrease in print knowledge gains can potentially lead to new insights for the field. In the parenting literature, Baumrind (1967, 1973) has demonstrated that parents' permissiveness with their children is likely to lead to less optimal developmental outcomes. The processes that underlie these problematic parent-child interactions may somehow be at play in the negative relationship between teachers' permissiveness and children's literacy development as well. Additionally, teachers' beliefs may somehow lie behind this finding. In some ways, being less permissive, or rather being directive in how one instructs young children, is more aligned with adult-centered beliefs, whereas being more permissive is more aligned with child-centered beliefs of early childhood. Justice et al. (2008) found that teachers who held more adult-centered ideas about children received higher ratings for the quality of their literacy instruction. Therefore, it is possible that there is something about being less permissive, perhaps due to holding beliefs more aligned with adult-centered principles, that influences the literacy instruction teachers employ, which in turn can affect children's print knowledge growth. Indeed, the fact that permissiveness was found to moderate the relationship between teachers' book reading practices and children's print knowledge growth in some ways warrants this claim. Regardless of the reasons for these unexpected findings, the potential relationship between teachers' permissiveness and children's print knowledge, especially for those at risk, suggests that future research on the issue is needed.

Overall, the discrepancies in the literature may simply be due to the use of different measures to capture the constructs in question across research studies, or perhaps because teacher–child interactions more commonly exert their influence on children's social skills rather than emergent literacy skills (Curby, LoCasale-Crouch, et al., 2009; Mashburn et al., 2008; Owen, Klausli, Mata-Otero, & Caughy, 2008). Of course, the potential for children's socio-emotional skills to in turn impact emergent literacy skills (Spira & Fischel, 2005) suggest that teacher–child interactions may also be indirectly significant in preventing reading difficulties. Given that teachers in this study were most skilled at creating warm and sensitive classroom climates, we can be hopeful that, in addition to some direct effects on children's emergent literacy development, the positive consequences that may have resulted could have also had more far reaching indirect effects on children's future reading success.

Contributions to Research on Teacher Quality

Beyond teacher education: A more complex array of factors affecting teacher quality. Despite the clear need for children to be afforded enriching instructional opportunities and classroom environments during the early years of their lives, previous research has suggested

that best practices have often not been incorporated into the general landscape of preschool classrooms, especially those which serve children at risk for future difficulties and in need of the greatest support (Justice et al., 2008; McGill-Franzen et al., 2002; Pentimonti & Justice, 2010). The current study confirms that although some of the practices implemented in preschool classrooms around the country are aligned with what we know is best for children, many teachers are still in need of much support before it will be possible to prevent reading difficulties and narrow the achievement gap on a broad scale (NICCHD, 2002). In order to inform efforts to improve teacher quality, it is important to consider all probable factors that could have accounted for the strengths and weaknesses which were observed in teachers' practices around the nation.

First, given that preschools have historically focused primarily on socio-emotional development (Dickinson, 2002) and given more recent guidelines about developmentally appropriate practice (Bredekamp & Copple, 1997; Copple & Bredekamp, 2009), it is not surprising that teachers were generally found to be sensitive rather than harsh and detached in their social interactions with their students. In fact, the evaluation tools that are used in most preschools to determine accreditation and quality ratings of a program concentrate heavily on fostering optimal socio-emotional development and would likely lead teachers to direct their major attention to creating warm classroom climates (Dickinson, 2002). This is not to say that practices which are focused on socio-emotional development should not remain a central goal for early childhood educators, but that attaining this goal should not done in a way that diverts attention away from implementing comprehensive language and literacy instruction that can also fundamentally alter children's lives for the better.

With regards to such instruction, oral language use in the classroom was generally found to be teachers' relative strength (i.e., while much improvement is still desirable for teachers' oral language use, teachers were more skilled in this area than in the other instructional domains examined). There are a number of possible reasons for this finding. First, in this study, teachers' oral language use was the only practice that had some consistent relationship with teachers' educational backgrounds, with ECE-specific coursework appearing to be the most relevant. Since many teachers around the country are required to take such coursework to acquire employment, it makes sense that oral language practices in the field are more aligned with evidence-based practices.

Second, once teachers get out into the field, the messages they likely receive continue to be more conducive to optimal oral language practices rather than other language and literacy instructional domains. For example, the initial release of Developmentally Appropriate Practice for Early Childhood Programs (Bredekamp & Copple, 1986), which has generally provided the professional guidelines to most preschool classrooms nationwide, suggested that teachers should be adamant to avoid over-emphasizing "narrowly defined academic skills" (p. 51). Although many in the early childhood field still strongly endorse avoiding an academic focus, oral language use, when compared to the other components of instruction in question, could most readily be viewed as not narrowly academic. Furthermore, while the evaluation tools utilized to determine program quality have a heavy emphasis on socio-emotional development, an additional area that receives an adequate amount of attention on the tools is that of practices focused on improving children's oral language (Dickinson, 2002). Overall, belief structures, which have been institutionalized into the early childhood profession via prior professional guidelines and ongoing program evaluation tools, may have contributed to teachers' relative strength in oral language use.

Additionally, since preschool teachers' pedagogical content knowledge (i.e., knowledge

of the subject matter for the purposes of teaching) may be strongest in the area of oral language, teachers' knowledge base may have played a role in the oral language use patterns observed throughout the country. Utilizing a survey with Head Start teachers, Raher (2010) observed that most teachers were aware of rationales for best practices in oral language instruction and developmental issues that affect children's oral language, and were able to identify effective versus ineffective instructional strategies that could develop children's vocabulary and reading comprehension skills. Given that the research demonstrates a link between teachers' knowledge and practices (Foorman & Moats, 2004; McCutchen, Abbott, et al., 2002a; McCutchen, Harry, et al., 2002; Spear-Swerling, & Brucker, 2004), it is reasonable that, in this study, teachers' relative instructional strength was detected in the area of oral language use.

Educational background, institutionalized recommendations, and teacher knowledge are also possible reasons for the weaknesses that were found in teachers' practices. In contrast to the consistent, albeit small, effects of educational background on teachers' oral language use in this study, the teacher education connection to book reading practices, PA instruction, and print and letter knowledge instruction was by and large lacking entirely. In essence, while teachers may have invested their time and money into acquiring either general and/or ECE-specific education that they and policy-makers had hoped would improve their practices, teachers on average continue to evade the use of best practices in book reading, PA, and print and letter knowledge instruction. In order for teacher education to have a meaningful effect on these practices as well, current issues with college textbooks and instructors will need to be addressed first.

By examining textbooks used in college education courses, Joshi, Binks, Graham, et al. (2009) found that most do not adequately cover recommendations for best practices of literacy instruction, and that some even provide inaccurate information. Given the lack of optimal information in textbooks, it can be assumed that teacher educators either do not provide enough attention to optimal literacy instruction or potentially even deliver faulty information. Additionally, by surveying and interviewing college instructors, Joshi, Binks, Hougen, et al. (2009) discovered that most teacher educators were limited in their knowledge of linguistic concepts needed for optimal literacy instruction, did not have an accurate understanding of the building blocks of literacy, and were unaware of certain evidence-based instructional strategies that could strengthen literacy development in children, especially those at risk. Overall, not finding a relationship between teachers' educational backgrounds and most instructional practices in this study was expected given the opportunities, or rather lack of opportunities, to learn about best instructional practices in most current college education courses.

Of course, once teachers are out in the field, the institutionalized messages that they receive may further weaken their use of optimal book reading, PA instruction, and print and letter knowledge instructional practices. Although more recent releases of the professional guidelines on developmentally appropriate practices have incorporated a more appropriate lens on literacy instruction, these new messages have not necessarily reached teachers (Dickinson, 2002). Indeed, beliefs aligned with the early recommendations, focused on a de-emphasis of academic skills, seem to continually permeate the field. Analyses of preschool teachers' beliefs have suggested a dominant view whereby focusing on other areas of development, particularly in the socio-emotional domain, is considered primary over a focus on supporting literacy development, with only some teachers holding the perspective that simultaneous attention to development in literacy and other areas is best (Powell, Diamond, Bojczyk, & Gerde, 2008). The predominant beliefs held in the field can possibly explain why, on average, most areas of teachers' literacy instruction in this study were not parallel with what research suggests is best

for children's emergent literacy development. Moreover, teachers' most significant weakness in this study, namely in PA instruction, may be reflected in research demonstrating that teachers' thoughts on early literacy largely emphasizes alphabet knowledge with limited attention to PA (Powell et al., 2008).

Accreditation procedures and evaluation tools may again be to blame for the institutionalization of these dominant beliefs. The tools used to evaluate programs have very limited items and indicators devoted to code- or print-focused literacy instructional elements, with limited guidance on specific elements that would be considered research-based, and no guidance provided on how many activities in these areas are optimal or how to determine the quality of those that are observed. Therefore, despite early childhood professional organizations dramatically changing their position on the significance of direct literacy instruction (Bredekamp & Copple, 1997; Copple & Bredekamp, 2009), programs and classrooms can still receive superior ratings even if they are not providing evidence-based language and literacy instruction to the children they serve (Dickinson, 2002). In fact, teachers in the current study could have thought their classrooms were on target to support optimal emergent literacy development if teaching in programs or classrooms with high ratings, while the current findings suggest otherwise.

Additionally, teachers' knowledge base may be a factor in the weaknesses that were observed in teachers' literacy instruction. Results from Raher's (2010) survey of teachers' pedagogical content knowledge revealed that most preschool teachers were unaware of how code-based emergent literacy developed or related to children's future reading success and were unable to consistently identify effective versus ineffective instructional strategies that could develop children's PA skills. Similarly, Cunningham, Davidson, and Zibulsky (2007) found that preschool teachers are limited in their knowledge of important emergent literacy concepts. It is not surprising that preschool teachers' knowledge is lacking in these areas, as much research has demonstrated that K–3 teachers also understand very little about the code-based components of beginning reading instruction (Cunningham, Perry, Stanovich, & Stanovich, 2004; Mather et al., 2001; McCutchen, Harry, et al., 2002; Moats, 1994). Overall, given the body of literature on teachers' knowledge in these areas, it is not surprising that code-based instruction was an area in need of considerable improvement in most teachers' classrooms in this study.

Considerations of teacher quality across preschool programs. Although the focus thus far has been on issues at play in teachers' practices at large in this study, the discussion will now turn to the dramatic differences in teachers' practices across program types. In their examination of numerous public school pre-K and center-based child care programs, Winsler et al. (2008) found that while children across programs demonstrated meaningful growth in many areas of school readiness, larger gains in cognitive and language development were typically observed by children attending the public school pre-K programs. These greater gains suggest that public school pre-K teachers' practices were more aligned with research-based principles than were the child care teachers' practices. The results of the current study, namely that more optimal practices were observed in public pre-Ks relative to child care, converge with Winsler et al.'s findings.

Although public pre-K programs may be of a higher quality than center-based child care programs, center-based child care may in turn be of a higher quality than home-based child care settings. Through an evaluation of numerous quality indicators, Fuller, Kagan, Loeb, and Chang (2004) discovered that the intensity of structured learning activities was of a better quality in center-based child care, but that differences were not necessarily observed in positive teacher–

child interactions. Interestingly enough, whereas scores on instructional factors varied significantly across program types in the current study, not as many differences were found in teacher–child interactions. This may again be due to the more dominant and consistent emphasis on factors that can contribute to children's socio-emotional rather than literacy or academic growth (Dickinson, 2002; Powell et al., 2008).

The differences in practices seen across program types may be related to opportunities for professional development and ongoing monitoring, such that public preschools have been found to have greater mandates for professional development and more consistency in the amount of monitoring that takes place relative to family-based child cares or private preschools (Fuligni, Howes, Lara-Cinisomo, & Karoly, 2009). Although the results of Fuligni et al. (2009) provide a reason for public pre-K programs utilizing more optimal practices than child care programs, they do not explain the differences between public pre-K programs and Head Start programs. There is a possibility that a more complex relationship between program type, practices, educational background, and professional training or support exists. Similar to the limited relationship found between general educational background and teachers' practices in the current study and previous research (e.g., Early et al., 2007), Vu, Jeon, and Howes (2008) recently demonstrated that having a Bachelor's degree was unrelated to classroom quality in district- and state-sponsored public pre-Ks. However, having a Bachelor's degree was in fact found to be predictive of teaching quality in Head Start and other child care programs. Vu et al. posited that the variability in their findings may be due to the amount of support provided to teachers across the programs. That is, it is likely that less support is provided to teachers in Head Start and child care, making the Bachelor's degree a more relevant indicator of quality, whereas the support provided to public pre-K teachers may be sufficient to eliminate the role of prior teacher education.

Implications

Due to typically less developed emergent literacy skills compared to more affluent peers (Dickinson & Tabors, 1991; Hart & Risley, 1995; Lonigan et al., 1998; Smith & Dixon, 1995), children from low-SES backgrounds are likely to enter kindergarten already at a disadvantage in terms of quickly acquiring the proficient reading skills, which in turn can lead to Matthew effects and fewer opportunities to experience long-term reading and academic success (Stanovich, 1986). This study was fundamentally guided by the fact that preschool is an opportune time period during which to intervene in order to narrow socioeconomic differences and generate more widespread reading success for all children (NELP, 2008; Skibbe, Connor, Morrison, Frederick, & Jewkes, in press). Because the results of this study can provide guidelines on the specificity of practices needed to support meaningful growth in children according to individual needs, there are considerable implications for policy-makers and teacher educators, for whose efforts will likely need to be multipronged.

Given the current variability of evidence-based practices in preschool classrooms around the nation, increasing access to programs and teachers who can and will utilize a comprehensive set of best practices is central to achieving more equitable educational outcomes for children. To begin, children from low-SES backgrounds and any children at risk for reading difficulties should be given priority for attendance at state pre-Ks which are currently providing the most optimal opportunities for emergent literacy growth. Simultaneously, policy-makers should increase quality improvement efforts throughout preschool programs nationwide so that, regardless of where a child attends preschool, he or she has the potential to experience the most

favorable classroom environment. As part of these efforts, support should be given to preschool governing boards and professional associations so that the messages communicated to teachers and administrators about best practices are more consistently received (Dickinson, 2002).

Second, teacher education should be given increased attention. Although pre-service teacher education is largely insufficient in supporting teachers' use of best practices, requiring advanced coursework in early childhood education could foster enhanced oral language use and book reading practices. The positive effects of meaning-focused instructional practices on children's development suggest that this may be an important requirement. Furthermore, to increase the prospect of effects of teacher education on teachers' future use of classroom practices, teacher education courses and textbooks must be updated to be aligned with current research, and instructors themselves must receive training so that their knowledge base better reflects the research (Joshi, Binks, Graham, et al., 2009; Joshi, Binks, Hougen, et al., 2009). This will be difficult with the academic freedom given to most college educators, yet policy-makers must creatively consider how to make these much needed changes become a reality.

Other factors, beyond educational background, must also be considered when trying to enhance the whole corpus of teachers' practices. Professional development for in-service teachers is one notable consideration which can support teachers in understanding how to improve the quantity and quality of their instruction and other foundational aspects of their classroom ecologies. For instance, while current investigators are expanding the tools that can aid teachers in utilizing instruction that matches the specific developmental needs of every child in their classroom (Buzhardt et al., 2010; Connor, Morrison, et al., 2009; VanDerHeyden et al., 2008; Walker et al., 2008), teachers will need professional development to support them in effectively utilizing these tools to inform pedagogical decisions. Further, professional development efforts must consider how to improve teacher knowledge and alter teacher beliefs given their role in how teachers practice in their classrooms (Cunningham et al., 2007; Foorman & Moats, 2004; Powell et al., 2008; Raher, 2010; Spear-Swerling & Brucker, 2004). Overall, it will be vital to consider the approach to professional development in order to facilitate needed changes in teachers' practices. Although professional development efforts have not always proven successful in the past (NELP, 2008), a number of recently developed models have been quite effective in supporting teachers' growth and in turn increasing children's access to the type of instructional opportunities they deserve (Cunningham et al., 2007; Dickinson & Caswell, 2007; Fuligni et al., 2009; Hsieh, Hemmeter, McCollum, & Ostrosky, 2009; Landry, Swank, Smith, Assel, & Gunnewig, 2006; Neuman & Cunningham, 2009; Powell, Diamond, Burchinal, & Koehler, 2010). Lastly, adequate funding will be necessary to implement professional development of this quality.

Limitations and Future Research

A number of limitations should be considered when interpreting the generalizability of the study's results. First, some issues exist with the child outcomes. For instance, the nature of the PA outcome measure may have influenced the limited and unexpected findings regarding effects on children's PA growth. That is, the Pre-CTOPPP, the assessment that measured PA, only captured children's elision, a PA skill which is one of the, if not the, most developmentally complicated to achieve (Anthony & Francis, 2005; Phillips, Clancy-Menchetti, & Lonigan, 2008). Had the measure also allowed children to demonstrate their proficiency via an easier PA task, such as blending, different results may have emerged, such that more nuanced growth could have been captured. Although the standardized PA assessment which was built off of the Pre-

CTOPPP (i.e., PA subtest of the TOPEL; Lonigan, Wagner, & Torgesen, 2007) does in fact include blending, this measure was not available at the time of data collection. Thus, the use of the Pre-CTOPPP, which was the premier PA tool for young children at the time, may have been inadequate for capturing the full range of children's growth in this critical emergent literacy skill. In turn, by not necessarily being able to depict nuanced amounts of growth due to only capturing skills at the upper end of the developmental continuum, some effects on PA were perhaps underestimated or missed entirely. Advantageously, future research will benefit from the revised and now published measure which better integrates the entire PA developmental continuum.

By virtue of the fact that they were composites, there were potential flaws with the oral language and print knowledge child outcomes as well. When one creates a composite using either the conventional method or structural equation modeling and in turn uses the composite in a regression, the measurement error of the composite is ignored. Thus, the variable is treated as if the dataset had all participants' "true values" of the composite, which is a tenuous assumption. However, without access to the original items (given that the national dataset only includes standardized scores), even the most careful generation of composites would not necessarily remedy the measurement error issue. Although researchers commonly and regrettably ignore this issue and should in fact take caution in interpreting the coefficients, the degree of caution needed in this study is not entirely substantial given the strength of the internal consistencies of the measures that made up the composites. Moreover, analyses at the individual outcome level (e.g., vocabulary rather than the oral language composite; early decoding rather than the print knowledge composite) did not lead to different results, and thus the more straightforward examination of effects on children's oral language and print knowledge growth at the composite level seemed justified.

Second, there were limitations to the measures that assessed teachers' practices. Given that all of the scales selected for use in this study were accepted by experts in the literature, as reflected by the selection of these tools by the PCER study expert panel, the measures could be considered as the best the field had to offer at the time of the study. Notwithstanding, the low reliability coefficients of the PA instruction and permissive teacher–child social interaction scales suggest that findings involving these constructs should be interpreted with caution, in that the estimated coefficients may have been slightly lower than they should have been for these variables. In addition, as discussed above, the exclusive examination of the classroom at the global level, and the exclusion of certain instructional dimensions (e.g., grouping context) make the conclusions that can be drawn from the study results more limited. Similarly, the fact that observations took place over a brief window of time may have been another limiting factor.

Overall, due to the limitations of the current observational protocols, and the need for in depth assessment of teacher practices to advance the field, future research efforts should be directed at honing measures of this nature. In fact, the team that developed the TBRS is already engaging in such research (A. Crawford, Personal Communication, August 12, 2009), and other researchers are similarly working to develop and refine additional measures to better capture instructional and foundational dimensions in the classroom (Connor, Morrison, et al., 2009). Given the different results that emerged when examining language and literacy in terms of quantity and quality dimensions, it may be important to also consider how to better capture such dimensions via creative measurement techniques. For example, Wilson's (2005) four building block approach, which entails item-analysis and examinations of item response modeling fit, could prove to be a fruitful tool as investigators seek to more accurately measure the immense complexities and dimensions involved in language and literacy instruction in preschools. Indeed,

with enhanced classroom observation tools, the dynamics of a multi-dimensional classroom environment and its effects on emergent literacy development can be better understood, as can differences in classroom environments as a function of program type. Furthermore, as more precise tools are produced and then used to evaluate and provide accreditation for programs, preschool teachers will be better informed about the best practices that they should actually be implementing in their classrooms, regardless of program type.

Nonetheless, research design is yet another limitation of this study that should be considered in interpreting the study results and in formulating future research projects. Because the dataset only included instructional practice scores for spring of the preschool year, these scores had to be used as a proxy for the entire year. Since spring scores were not always representative of other teacher practices that could be examined at both fall and spring (and thus needed to be averaged to better account for the norms in teachers' classrooms across the year), the use of spring instructional scores alone may have led to an under- or over-estimation of the effects of instructional practices. It is unfortunate that the original design of the PCER study did not incorporate an evaluation of language and literacy instructional practices at the start of the year. Future research should take heed and always incorporate assessment of teachers' practices at multiple points throughout the year in order to capture a more realistic picture of children's experiences. In fact, it may be beneficial to also assess the instruction that children receive over two years of preschool to understand the potential for more powerful effects. Given that interventions delivered earlier in children's lives and for a longer duration have been found to generate more meaningful effects (NELP, 2008; Skibbe et al., in press), such longitudinal research efforts seem worthy of researchers' time.

Lastly, as discussed above, collinearity was a factor that limited the study's results. Due to high correlations among most of the teacher practice variables, it was difficult to fully explicate unique relationships with growth in the child outcomes, when practices were examined simultaneously. Of course, this is likely a limitation that is pervasive in most studies of this nature. Overall, while the unique effects of every teacher practice may be difficult to disentangle due to issues of collinearity in statistical models, it is evident that every teacher practice in this study was in some way meaningful for children's emergent literacy development. Therefore, it can be concluded that having a repertoire that includes all of the relevant teacher practices is optimal for preventing young children's reading difficulties.

Conclusion

Although preschool teachers have the opportunity and responsibility to support optimal emergent literacy development in the children whom they serve, it is critical that preschool teachers receive the support and guidance needed to meet this consequential demand. This study has provided direction for those assigned with this undertaking and has advanced our understanding of a multi-dimensional theoretical model of the classroom environment (Connor, Morrison, et al., 2009). The results build upon and extend the current body of research by providing a more nuanced understanding of how language and literacy instructional practices specifically relate to children's emergent literacy development, how such practices and other proximal processes of the classroom ecology can meet children' needs differentially, and how instructional and foundational practices operate concurrently to cultivate gains for children.

Work remains to clarify the specific effects of more precise instructional dimensions on children with varying skill profiles, and further research will also be needed to replicate and extend the empirical examination of a multi-dimensional classroom. Nonetheless, the results of

this study, especially given the use of a rigorous analytic approach (i.e., HLM), contribute substantially to the research on early childhood teacher practices and teacher quality. Overall, the study confirms that a number of practices in the preschool classroom can foster growth in multiple emergent literacy skills. Furthermore, it is evident that the most effective teachers will need to be able to respond to children's individual needs via systematic assessment and thoughtful instructional decisions.

Additionally, this study has added to the field's awareness that best practices are not yet widely infused into the national early childhood landscape and demonstrates a clear need for dramatic reform. By understanding the limitations of educational backgrounds' effect on teachers' use of best practices, policy-makers will need to be more creative as they take steps to improve the classroom environment for every young child. Indeed, in order to accomplish the immeasurably significant goal of preventing widespread reading difficulties as needed to create more equitable educational and societal outcomes, the enhancement of early childhood classrooms which serve low-SES children is of the essence.

References

Abbott-Shim, M., & Sibley, A. (1987). *Assessment Profile for Early Childhood Programs.* Atlanta, GA: Quality Assist.

Adams, M. (1990). *Beginning to read: Thinking and learning about print*. Cambridge: Massachusetts Institute of Technology.

Administration for Children and Families (2010, January). *Head Start Impact Study: Final report executive summary.* Washington, DC: U.S. Department of Health and Human Services.

Administration for Children and Families (2002a). *A descriptive study of Head Start families: FACES technical report I.* Washington, DC: U.S. Department of Health and Human Services.

Administration for Children and Families (2002b). *Head Start FACES 2000: A whole–child perspective on program performance.* Washington, DC: U.S. Department of Health and Human Services.

Anthony, J. L., & Francis, D. J. (2005). Development of phonological awareness. *Current Directions in Psychological Science, 14,* 255–259.

Arnett, J. (1989). Caregivers in day-care centers: Does training matter? *Journal of Applied Developmental Psychology, 10*, 541–552.

Assel, M. A., Landry, S. H., & Swank, P. R. (2008). Are early childhood classrooms preparing children to be school ready?: The CIRCLE Teacher Behavior Rating Scale. In L. M. Justice, & C. Vukelich (Eds.) *Achieving excellence in preschool literacy instruction* (pp. 120–135). New York: Guilford Press.

Barnett, W. S. (2003). Better teachers, better preschools: Student achievement linked to teacher qualifications. *Preschool Policy Matters Issue 2*. New Jersey: National Institute for Early Education Research (NIEER).

Baumrind, D. (1967). Child care practices anteceding three patterns of preschool behavior. *Genetic Psychology Monographs, 75,* 43–88.

Baumrind, D. (1973). Will a day care center be a child development center? *Young Children, 28,* 154–169.

Blachman, B. A. (2000). Phonological awareness. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research: Volume III* (pp. 483–502). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Blau, D. M. (1999). The effects of income on child development. *The Review of Economics and Statistics, 81*, 261-276.

Bowey, J. A. (1995). Socioeconomic status differences in preschool phonological sensitivity and first-grade reading achievement. *Journal of Educational Psychology, 87*, 476–487.

Bowey, J. A. (2005). Predicting individual differences in learning to read. In M. J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 155–172). Malden, MA: Blackwell.

Bowman, B. T., Donovan, M. S., & Burns, M. S. (Eds.). (2001). *Eager to learn: Educating our preschoolers.* Washington, DC: National Academy Press.

Bradley, L., & Bryant, P. E. (1983). Categorizing sounds and learning to read: A causal connection. *Nature, 301*, 419–421.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*, 371-399.

Bredekamp, S., & Copple, C. (Eds.). (1986). *Developmentally appropriate practice for early*

childhood programs. Washington, DC: National Association for the Education of Young Children.

Bredekamp, S., & Copple, C. (Eds.). (1997). *Developmentally appropriate practice for early childhood programs* (Rev. Ed.). Washington, DC: National Association for the Education of Young Children.

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology, 22*, 723–742.

Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models: Applications and data analysis methods.* Newbury Park, CA: Sage Publications.

Burgess, S. R. (2006). The development of phonological sensitivity. In D. K. Dickinson & S. B. Neuman (Eds.), *Handbook of early literacy research: Volume II* (pp. 90–100). New York: Guilford Press.

Burgess, S. R., & Lonigan, C. J. (1998). Bidirectional relations of phonological sensitivity and prereading abilities: Evidence from a preschool sample. *Journal of Experimental Child Psychology, 70*, 117–141.

Bus, A. G., & van IJzendoorn, M. H. (1999). Phonological awareness and early reading: A meta-analysis of experimental training studies. *Journal of Educational Psychology, 91*, 403–414.

Buzhardt, J., Greenwood, C., Walker, D., Carta, J., Terry, B., & Garrett, M. (2010). A web-based tool to support data-based early intervention decision making. *Topics in Early Childhood Special Education, 29,* 201–213.

Byrne, B., & Fielding-Barnsley, R. (1991). Evaluation of a program to teach phonemic awareness to young children. *Journal of Educational Psychology, 83*, 451–455.

Byrne, B., & Fielding-Barnsley, R. (1993). Evaluation of a program to teach phonemic awareness to young children: A 1-year follow-up. *Journal of Educational Psychology, 85*, 104–111.

Byrne, B., & Fielding-Barnsley, R. (1995). Evaluation of a program to teach phonemic awareness to young children: A 2- and 3-year follow-up and a new preschool trial. *Journal of Educational Psychology, 87*, 488–503.

Byrne, B., Fielding-Barnsley, R., & Ashley, L. (2000). Effects of preschool phoneme identity training after six years: Outcome level distinguished from rate of response. *Journal of Educational Psychology, 92*, 659–667.

Cabell, S. Q., Justice, L. M., Konold, T. R., McGinty, A. S. (in press). Profiles of emergent literacy skills among preschool children who are at risk for academic difficulties. *Early Childhood Research Quarterly*.

Chaney, C. (1994). Language development, metalinguistic awareness, and emergent literacy skills of 3-year-old children in relation to social class. *Applied Psycholinguistics, 15*, 371–394.

Connor, C. M., Morrison, F. J., Fishman, B. J., Ponitz, C. C., Glasney, S., Underwood, P. S., … Schatschneider, C. (2009). The ISI Classroom Observation System: Examining the literacy instruction provided to individual students. *Educational Researcher, 38*, 85–99.

Connor, C. M., Morrison, F. J., & Petrella, J. N. (2004). Effective reading comprehension instruction: Examining child by instruction interactions. *Journal of Educational Psychology, 96,* 682–698.

Connor, C. M., Morrison, F. J., & Slominski, L. (2006). Preschool instruction and children's emergent literacy growth. *Journal of Educational Psychology, 98,* 665–689.

Connor, C. M., Piasta, S. B., Fishman, B., Glasney, S., Schatschneider, C., Crowe, E., … Morrison, F. J. (2009). Individualizing student instruction precisely: Effects of child by instruction interactions on first graders' literacy development. *Child Development, 80,* 77–100.

Connor, C. M., Son, S., Hindman, A. H., & Morrison, F. J. (2005). Teacher qualifications, classroom practices, family characteristics, and preschool experience: Complex effects on first graders' vocabulary and early reading outcomes. *Journal of School Psychology, 43,* 343–375.

Cooper, D. H., Roth, F. P., Speece, D. L., & Schatschneider, C. (2002). The contribution of oral language skills to the development of phonological awareness. *Applied Psycholinguistics, 23,* 399–416.

Copple, C., & Bredekamp, S. (Eds.). (2009). *Developmentally appropriate practice for early childhood programs serving children from birth through age 8* (Third Ed.). Washington, DC: National Association for the Education of Young Children.

Cunningham, A. E. (1990). Explicit versus implicit instruction in phonemic awareness. *Journal of Experimental Child Psychology, 50,* 429–444.

Cunningham, A. E., Davidson, M., & Zibulsky, J. (2007, March). *Teacher study groups as a mechanism of change in professional development in preschool literacy curricula: Developing teacher knowledge.* Paper presented at the bi–annual meeting of the Society for Research in Child Development, Boston, MA.

Cunningham, A.E., Perry, K.E., Stanovich, K.E., & Stanovich, P.J. (2004). Disciplinary knowledge of K-3 teachers and their knowledge calibration in the domain of early literacy. *Annals of Dyslexia, 54,* 139–167.

Cunningham, A. E., & Stanovich, K. E. (1997). Early reading acquisition and its relation to reading experience and ability 10 years later. *Developmental Psychology, 33,* 934–945.

Curby, T. W., LoCasale-Crouch, J., Konold, T. R., Pianta, R. C., Howes, C., Burchinal, M., … Barbarin, O. (2009). The relations of observed pre-K classroom quality profiles to children's achievement and social competence. *Early Education and Development, 20,* 346–372.

Curby, T. W., Rimm-Kaufman, S. E., & Ponitz, C. C. (2009). Teacher–child interactions and children's achievement trajectories across kindergarten and first grade. *Journal of Educational Psychology, 101,* 912–925.

De Cara, B., & Goswami, U. (2003). Phonological neighbourhood density: Effects in a rhyme awareness task in five-year-old children. *Journal of Child Language, 30,* 695–710.

Dickinson, D. K. (2002). Shifting images of developmentally appropriate practice as seen through different lenses. *Educational Researcher, 31,* 26–32.

Dickinson, D. K., & Caswell, L. (2007). Building support for language and early literacy in preschool classrooms through in-service professional development: Effects of the Literacy Environment Enrichment Program (LEEP). *Early Childhood Research Quarterly, 22,* 243–260.

Dickinson, D. K., & McCabe, A. (2001). Bringing it all together: The multiple origins, skills, and environmental supports of early literacy. *Learning Disabilities Research and Practice, 16,* 186–202.

Dickinson, D. K., McCabe, A., Anastasopoulos, L., Peisner-Feinberg, E. S., & Poe, M. D. (2003). The comprehensive language approach to early literacy: The interrelationships among vocabulary, phonological sensitivity, and print knowledge among preschool-aged

children. *Journal of Educational Psychology, 95*, 465–481.

Dickinson, D. K., & Tabors, P. O. (1991). Early literacy: Linkages between home, school and literacy achievement at age five. *Journal of Research in Childhood Education, 6*, 30–46.

Dunn, L., & Dunn, L. (1997). *Peabody Picture Vocabulary Test, Third Edition (PPVT-III).* Circle Pines, MN: American Guidance Service.

Early, D. M., Bryant, D. M., Pianta, R. C., Clifford, R. M., Burchinal, M. R., Ritchie, S., … Barbarin, O. (2006). Are teachers' education, major, and credentials related to classroom quality and children's academic gains in pre-kindergarten? *Early Childhood Research Quarterly, 21*, 174–195.

Early, D, M., Maxwell, K. L.' Burchinal, M., Bender, R. H., Ebanks, C. Henry, G. T., … Zill, N. (2007). Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. *Child Development, 78,* 558–580.

Ensminger, M. E., & Fothergill, K. E. (2003). A decade of measuring SES: What it tells us and where to go from here. In M. H. Bornstein & R. H. Bradley (Eds.), *Socioeconomic status, parenting, and child development* (pp. 13-27). Mahwah, NJ: Lawrence Erlbaum Associates.

Entwisle, D. R., & Astone, N. M. (1994). Some practical guidelines for measuring youth's race/ethnicity and socioeconomic status. *Child Development, 65,* 1521-1540.

Fischel, J., & Landry, S. (2008). Impact of language-enhancement interventions on young children's early literacy skills. In *Developing Early Literacy: Report of the National Early Literacy Panel* (pp. 211–231). Washington, DC: National Institute for Literacy.

Foorman, B. R., Francis, D. J., Fletcher, J. M., Schatschneider, C., & Mehta, P. (1998). The role of instruction in learning to read: Preventing reading failure in at-risk children. *Journal of Educational Psychology, 90,* 37–55.

Foorman, B. R., & Moats, L. C. (2004). Conditions for sustaining research–based practices in early reading instruction. *Remedial and Special Education, 25,* 51–60.

Fuligni, A. S., Howes, C. Lara-Cinisomo, S., & Karoly, L. (2009). Diverse pathways in early childhood professional development: An exploration of early educators in public preschools, private preschools, and family child care homes. *Early Education and Development, 20*, 507–526.

Fuller, B., Kagan, S. L., Loeb, S., & Chang, Y. (2004). Child care quality: Centers and home settings that serve poor families. *Early Childhood Research Quarterly, 19*, 505–527.

Fuller, B., Livas, A., & Bridges, M. (2006). How to expand and improve preschool in California: Ideals, evidence, and policy options. *Policy Analysis for California Education (PACE),* Working Paper 05–1.

Gettinger, M., & Stoiber, K. (2008). Applying a response-to-intervention model for early literacy development in low-income children. *Topics in Early Childhood Special Education, 27,* 198–213.

Gottfried, A. W., Gottfried, A. E., Bathurst, K., Guerin, D. W., & Parramore, M. M. (2003). Socioeconomic status in children's development and family environment: Infancy through adolescence. In M. H. Bornstein & R. H. Bradley (Eds.), *Socioeconomic status, parenting, and child development* (pp. 189-207). Mahwah, NJ: Lawrence Erlbaum Associates.

Hamre, B. K., & Bridges, M. (2004). Early care and education staff preparation, quality, and child development: A review of the literature. Manuscript submitted for publication, University of California at Berkeley.

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Baltimore, MD: Paul H. Brooks.

Hatcher, P. J., Hulme, C., & Ellis, A. W. (1994). Ameliorating early reading failure by integrating the teaching of reading and phonological skills: The phonological linkage hypothesis. *Child Development, 65,* 41–57.

Hess, R. D., & McDevitt, T. M. (1984). Some cognitive consequences of maternal intervention techniques: A longitudinal study. *Child Development, 55*, 2017-2030.

Hindman, A. H., Connor, C. M., Jewkes, A. M., & Morrison, F. J. (2008). Untangling the effects of shared book reading: Multiple factors and their associations with preschool literacy outcomes. *Early Childhood Research Quarterly, 23*, 330–350.

Howes, C., Burchinal, M., Pianta, R., Bryant, D., Diane, E., Clifford, R., … Barbarin, O. (2008). "Ready to learn? Children's pre-academic achievement in pre-kindergarten programs." *Early Childhood Research Quarterly, 23*, 27–50.

Howes, C., Phillips, D. A., & Whitebook, M. (1992). Thresholds of quality: Implications for the social development of children in center-based child care. *Child Development, 63,* 449–460.

Hsieh, W., Hemmeter, M. L., McCollum, J. A., Ostrosky, M. M. (2009). Using coaching to increase preschool teachers' use of emergent literacy teaching strategies. *Early Childhood Research Quarterly, 24,* 229–247.

Institution of Education Sciences. (2007a). *The nation's report card: Reading 2007*. Retrieved October 28, 2007, from http://nces.ed.gov/nationsreportcard/pdf/main2007/2007496_2.pdf

Institution of Education Sciences. (2007b). *The nation's report card: Trends in student groups*. Retrieved October 28, 2007, from http://nces.ed.gov/nationsreportcard/ltt/results2004/natsubgroups.asp

Joshi, R. M., Binks, E., Graham, L., Ocker-Dean, E., Smith, D. L., & Boulware-Gooden, R. (2009). Do textbooks used in university reading education courses conform to the instructional recommendations of the National Reading Panel? *Journal of Learning Disabilities, 42,* 458–463.

Joshi, R. M., Binks, E., Hougen, M., Dahlgren, M. E., Ocker-Dean, E., & Smith, D. L. (2009). Why elementary teachers might be inadequately prepared to teach reading. *Journal of Learning Disabilities, 42,* 392–402.

Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology, 80,* 437–447.

Juel, C., & Minden-Cupp, C. (2000). Learning to read words: Linguistic units and instructional strategies. *Reading Research Quarterly, 35*, 458–492.

Justice, L. M., Mashburn, A. J., Hamre, B. K., & Pianta, R. C. (2008). Quality of language and literacy instruction in preschool classrooms serving at-risk pupils. *Early Childhood Research Quarterly, 23*, 51–68.

Justice, L. M., & Sofka, A. E. (2010). *Engaging children with print: Building early literacy skills through quality read-alouds.* New York: Guilford Publications.

Klebanov, P. K., Brooks-Gunn, J., & Duncan, G. J. (1994). Does neighborhood and family poverty affect mother's parenting, mental health, and social support? *Journal of Marriage and the Family, 56,* 441-455.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (Second Ed.). New York: Guilford Publications.

Kohn, M. L. (1986). Social stratification and the transmission of values in the family: A cross-national assessment. *Sociological Forum, 1*, 73-102.

Lambert, R., Abbott-Shim, M., & McCarty, F. (1999). The influence of teacher individualizing practices on child developmental progress. *NHSA Dialog, 2*, 75–88.

Landry, S. H., Crawford, A., Gunnewig, S., & Swank, P. R. (2002). *Teacher Behavior Rating Scale.* Unpublished Research Instrument, Center for Improving the Readiness of Children for Learning and Education: University of Texas Health Science Center at Houston.

Landry, S. H., Swank, P. R., Smith, K. E., Assel, M. A., & Gunnewig, S. B. (2006). Enhancing early literacy skills for preschool children: Bringing a professional development model to scale. *Journal of Learning Disabilities, 39*, 306–324.

Loeb, S., Fuller, B., Kagan, S. L., & Carrol, B. (2004). Child care in poor communities: Early learning effects of type, quality, and stability. *Child Development, 75*, 47–65.

Lonigan, C. J., Burgess, S. R., & Anthony, J. L. (2000). Development of emergent literacy and early reading skills in preschool children: Evidence from a latent-variable longitudinal study. *Developmental Psychology, 36*, 596–613.

Lonigan, C. J., Burgess, S. R., Anthony, J. L., & Barker, T. A. (1998). Development of phonological sensitivity in 2- to 5-year-old children. *Journal of Educational Psychology, 90*, 294–311.

Lonigan, C. J., Schatschneider, C., & Westberg, L. (2008a). Identification of children's skills and abilities linked to later outcomes in reading, writing, and spelling. In *Developing early literacy: Report of the National Early Literacy Panel* (pp. 55–106). Washington, DC: National Institute for Literacy.

Lonigan, C. J., Schatschneider, C., & Westberg, L. (2008b). Impact of code-focused interventions on young children's early literacy skills. In *Developing early literacy: Report of the National Early Literacy Panel* (pp. 107–151). Washington, DC: National Institute for Literacy.

Lonigan, C. J., Shanahan, T., & Cunningham, A. (2008). Impact of shared-reading interventions on young children's early literacy skills. In *Developing early literacy: Report of the National Early Literacy Panel* (pp. 153–171). Washington, DC: National Institute for Literacy.

Lonigan, C. J., Wagner, R. K., & Torgesen, J. K. (2007). *The Test of Preschool Early Literacy (TOPEL).* Austin, Texas: PRO-ED.

Lonigan, C. J., Wagner, R. K., Torgesen, J. K., & Rashotte, C. A. (2002). *The Preschool Comprehensive Test of Phonological and Print Processing (Pre-CTOPPP).* Tallahassee: Florida State University.

Lundberg, I., Frost, J., & Peterson, O. (1988). Effects of an extensive program for stimulating phonological awareness in preschool children. *Reading Research Quarterly, 23*, 263–284.

Maclean, M., Bryant, P., & Bradley, L. (1987). Rhymes, nursery rhymes, and reading in early childhood. *Merrill-Palmer Quarterly, 33*, 255–281.

Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent–child interaction. In P. H. Mussen & E. M. Hetherington (Eds.), *Handbook of child psychology, volume 4: Socialization, personality, and social development* (pp. 1-101). New York: Wiley.

Mashburn, A. J., Pianta, R. J., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., … Howes, C. (2008). Measures of classroom quality in Pre-Kindergarten and children's

development of academic, language, and social skills. *Child Development, 79,* 732–749.
Mather, N., Bos, C., & Babur, N. (2001). Perceptions and knowledge of preservice and inservice teachers about early literacy instruction. *Journal of Learning Disabilities, 34,* 472–482.
McCutchen, D., Abbott, R. D., Green, L. B., Beretvas, S. N., Cox S., Potter, N. S., Quiroga, T., & Gray, A. L. (2002) Beginning literacy: Links among knowledge, teacher practice, and student learning. *Journal of Learning Disabilities, 35,* 69–87.
McCutchen, D., Harry, D. R., Cunningham, A. E., Cox, S., Sidman, S., Covill, A. E. (2002). Reading teachers' knowledge of children's literature and English phonology. *Annals of Dyslexia, 52,* 207–228.
McGill-Franzen, A., Lanford, C., & Adams, E. (2002). Learning to be literate: A comparison of five urban early childhood programs. *Journal of Educational Psychology, 94,* 443–464.
McGrew, K. S., & Woodcock, R. W. (2001). *Woodcock Johnson Achievement Test – Third Edition (WJ-III). Technical Manual*. Itasca, IL: Riverside.
Metsala, J. L. (1999). Young children's phonological awareness and nonword repetition as a function of vocabulary development. *Journal of Educational Psychology, 91,* 3–19.
Metsala, J. L., & Walley, A. C. (1998). Spoken vocabulary growth and the segmental restructuring of lexical representations: Precursors to phonemic awareness and early reading ability. In J. L. Metsala, & L. C. Ehri (Eds.), *Word recognition in beginning literacy.* (pp. 89–120). Mahwah, NJ: Lawrence Erlbaum Associates.
Moats, L. C. (1994). The missing foundation in teacher education: Knowledge of the structure of spoken and written language. *Annals of Dyslexia, 44,* 81–104.
Murray, B. A., Stahl, S. A., & Ivey, M. G. (1996). Developing phoneme awareness through alphabet books. *Reading and Writing, 8,* 307–322.
National Assessment of Educational Progress (NAEP). (2005). *The nation's teport card, 2005.* Retrieved April 10, 2006, from http://nces.ed.gov/nationsreportcard/
National Early Literacy Panel (NELP). (2008). *Developing early literacy: Report of the National Early Literacy Panel.* Washington, DC: National Institute for Literacy.
National Institute of Child Health and Human Development Early Child Care Research Network. (2002). The relation of global first grade classroom environment to structural classroom features and teacher and student behaviors. *Elementary School Journal, 102,* 367–387.
National Reading Panel (NRP). (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its iImplications for reading instruction.* Washington, DC: National Institute of Child Health and Human Development.
Neuman, S. B., & Cunningham, L. (2009). The impact of professional development and coaching on early language and literacy instructional practices. *American Educational Research Journal, 46,* 532–566.
Newcomer, P. L., & Hammill, D. D. (1997). *Test of Language Development—Primary: Third Edition (TOLD-P:3).* Austin, Texas: PRO-ED, Inc.
Owen, M. T., Klausli, J. F., Mata-Otero, A., & Caughy, M. O. (2008). Relationship-focused child care practices: Quality of care and child outcomes for children in poverty. *Early Education and Development, 19,* 302–329.
Pentimonti, J. M., & Justice, L. M. (2010). Teachers' use of scaffolding strategies during read alouds in the preschool classroom. *Early Childhood Education Journal, 37,* 241–248.
Phillips, B. M., Clancy-Menchetti, J., & Lonigan, C. J. (2008). Successful phonological awareness instruction with preschool children: Lessons from the classroom.

Topics in Early Childhood Special Education, 28, 3–17.

Phillips, B. M., & Lonigan, C. L. (2005). Social correlates of emergent literacy. In M. J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 155–172). Malden, MA: Blackwell.

Powell, D. R., Diamond, K. E., Bojczyk, K. E., & Gerde, H. K. (2008). Head Start teachers' perspectives on early literacy. *Journal of Literacy Research, 40,* 422–460.

Powell, D. R., Diamond, K. E., Burchinal, M. R., Koehler, M. J. (2010). Effects of an early literacy professional development intervention on Head Start teachers and children. *Journal of Educational Psychology, 102,* 299–312.

Preschool Curriculum Evaluation Research Consortium (2008). *Effects of Preschool Curriculum Programs on School Readiness* (NCER 2008-2009). Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education. Washington, DC: U.S. Government Printing Office.

Purcell-Gates, V. (1996). Stories, coupons, and the TV guide: Relationships between home literacy experiences and emergent literacy knowledge. *Reading Research Quarterly, 31,* 406–428.

Rabe-Hesketh, S., & Skrondal, A. (2005). *Multilevel and longitudinal modeling using Stata.* College Station, TX: Stata Press.

Raher, K. Schmidt. (2010, June). *Head Start teachers' pedagogical content knowledge in emergent literacy.* Poster presented at the biennial national research conference for Head Start, Washington, DC.

Reid, D. K., Hresko, W. P., & Hammill, D. D. (2001). *Test of Early Reading Ability, Third Edition (TERA–3).* San Antonio, TX: Pearson Education.

Ritchie, S., & Howes, C. (2003). Program practices, caregiver stability, and child–caregiver relationships. *Journal of Applied Developmental Psychology, 24,* 497–516.

Sénéchal, M., LeFevre, J., Hudson, E., & Lawson, E. P. (1996). Knowledge of storybooks as a predictor of young children's vocabulary. *Journal of Educational Psychology, 88,* 520–536.

Singer, J. D., & Willett, J. B. (2005). Growth curve modeling. In B. Everrit &.D. Howell (Eds.), *Encyclopedia of statistics in behavioral science* (pp. 772–779). Chichester, England: John Wiley & Sons.

Skibbe, L. E., Connor, C. M., Morrison, F. J., & Jewkes, A. M. (in press). Schooling effects on preschoolers' self-regulation, early literacy, and language growth. *Early Childhood Research Quarterly.*

Smith, S. S., & Dixon, R. G. (1995). Literacy concepts of low- and middle-class four-year-olds entering preschool. *Journal of Educational Research, 88,* 243–253.

Spear-Swerling, L., & Brucker, P. O. (2004). Preparing novice teachers to develop basic reading and spelling skills in children. *Annals of Dyslexia, 54,* 332–364.

Spira, E. G., & Fischel, J. E. (2005). The impact of preschool inattention, hyperactivity, and impulsivity on social and academic development: A review. *Journal of Child Psychology and Psychiatry, 46,* 755–773.

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21*, 360–407.

Stanovich, K. E. (2000). *Progress in understanding reading: Scientific foundations and new frontiers.* New York: The Guilford Press.

Stanovich, K. E., Cunningham, A. E., & Cramer, B. (1984). Assessing phonological awareness

in kindergarten children: Issues of task and comparability. *Journal of Experimental Psychology, 38,* 175–190.

StataCorp. (2005). *Stata Statistical Software: Release 9.* College Station, TX: StataCorp LP.

Stevenson, H. W., & Newman, R. S. (1986). Long-term prediction of achievement and attitudes in mathematics and reading. *Child Development, 57,* 646–659.

Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence from a longitudinal structural model. *Developmental Psychology, 38,* 934–947.

Stuhlman, M., & Pianta, R. C. (2002). Teachers' narratives about their relationships with children: Associations with behavior in classrooms. *School Psychology Review, 31,* 148–163.

Sulzby, E., & Teale, W. H. (1991). Emergent literacy. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.) *Handbook of reading research: Volume II* (pp. 727–758). Mahwah, NJ, US: Lawrence Erlbaum Associates.

Teale, W. H. (1986). Home background and young children's literacy development. In W. H. Teale & E. Sulzby (Eds.), *Emergent literacy: Writing and reading* (pp. 173–206). Norwood, NJ: Albex.

Teale, W. H., & Sulzby, E. (1986). Introduction: Emergent Literacy as a Perspective for Examining How Young Children Become Writers and Readers. In W. H. Teale & E. Sulzby (Eds.), *Emergent literacy: Writing and reading* (pp. vii–xxv). Norwood, NJ: Albex.

VanDerHeyden, A. M., & Snyder, P. A. (2006). Integrating frameworks from early childhood intervention and school psychology to accelerate growth for all young children. *School Psychology Review, 35,* 519–534.

VanDerHeyden, A. M., Snyder, P. A., Broussard, C., & Ramsdell, K. (2008). Measuring response to early literacy intervention with preschoolers at risk. *Topics in Early Childhood Special Education, 27,* 232–249.

Vernon-Feagans, L., Scheffner Hammer, C., Miccio, A., & Manlove, E. (2001). Early language and literacy skills in low-income African American and Hispanic children. In S. B. Neuman & D. K. Dickinson (Eds.), *Handbook of early literacy research* (pp. 192–210). New York: Guilford Press.

Vu, J. A., Jeon, H., & Howes, C. (2008). Formal education, credential, or both: Early childhood program classroom practices. *Early Education and Development, 19,* 479–504.

Wagner, R. K., & Torgesen, J. K., & Rashotte, C. A. (1994). Development of reading-related phonological processing abilities: New evidence of bidirectional causality from a latent variable longitudinal study. *Developmental Psychology, 30,* 73–87.

Wagner, R. K., Torgesen, J. K., Rashotte, C. A., Hecht, S. A., Barker, T. A., Burgess, S. R., … Garon, T. (1997). Changing relations between phonological processing abilities and word-level reading as children develop from beginning to skilled readers: A 5-year longitudinal study. *Developmental Psychology, 33,* 468–479.

Walker, D., Carta, J. J., Greenwood, C. R., & Buzhardt, J. F. (2008). The use of individual growth and developmental indicators for progress monitoring and intervention decision making in early education. *Exceptionality, 16,* 33–47.

Walker, D., Greenwood, C., Hart, B., & Carta, J. (1994). Prediction of school outcomes based on early language production and socioeconomic factors. *Child Development, 65,* 606–621.

West, J., Denton, K., & Germino-Hausken, E., (2000). America's Kindergartners: Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99. *Education*

Statistics Quarterly, 2, 7–13.

West, J., Denton, K., & Reaney, L. M. (2000). *The kindergarten year: Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99* (NCES 2001-023). Washington, DC: U.S. Department of Education, National Center for Educational Statistics.

Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child Development, 69*, 848–872.

Whitehurst, G. J., & Lonigan, C. J. (2001). Emergent literacy: Development from pre-readers to readers. In S. B. Neuman & D. K. Dickinson (Eds.), *Handbook of early literacy research* (pp. 11–29). New York: Guilford Press.

Whitehurst, G. J., Zevenbergen, A. A., Crone, D. A., Schultz, M. D., Velting, O. N., & Fischel, J. E. (1999). Outcomes of an emergent literacy intervention from Head Start through second grade. *Journal of Educational Psychology, 91*, 261–272.

Wilson, M. (2005). *Constructing measures: An item response modeling approach.* Mahwah, NJ: Erlbaum.

Winsler, A., Tran, H., Hartman, S. C., Madigan, A. L., Manfra, L., & Bleiker, C. (2008). School readiness gains made by ethnically diverse children in poverty attending center-based childcare and public school pre-kindergarten programs. *Early Childhood Research Quarterly, 23*, 314–329.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock Johnson Achievement Test – Third Edition (WJ-III).* Itasca, IL: Riverside.

Yeung, W. J., Linver, M. R., & Brooks-Gunn, J. (2002). How money matters for young children's development: Parental investment and family processes. *Child Development, 73*, 1861-1879.

Zucker, T. A., Justice, L. M., Piasta, S. B., & Kaderavek, J. N. (2010). Preschool teachers' literal and inferential questions and children's responses during whole-class shared reading. *Early Childhood Research Quarterly, 25*, 65–83.

Footnotes

[1] Although significant differences were found in teachers' practices across program type, it should be noted that program type did not need to be controlled for in analyses where the child was the primary unit of analysis. That is, because the variance accounted for by being in the same classroom (i.e., which was likely a function of program type) was taken care of via HLM, models were actually more parsimonious when program type was not partialled out for the first three research questions.

Table 1
Child Outcomes and Measures Entering into Composites

Outcome	Measures	Times Collected	PCER Study Reliabilities
Oral Language (receptive vocabulary and syntax)	PPVT-III Receptive Vocabulary	Pre-K Fall/Spring	0.96
	TOLD-P:3 Grammatic Understanding	Pre-K Fall/Spring	0.79–0.86
Phonological Awareness (elision)	Pre-CTOPPP Elision	Pre-K Fall/Spring	0.83–0.88
Print Knowledge (alphabet knowledge, concepts of print, early decoding)	TERA–3 Alphabet	Pre-K Fall/Spring	0.90–0.94
	TERA–3 Conventions	Pre-K Fall/Spring	0.90–0.94
	WJ-III Letter-Word Identification	Pre-K Fall/Spring	0.86–0.90

Table 2
Teacher Constructs and Measures

Construct	Measures	Times Collected	Reliabilities
Book Reading Behaviors	TBRS Book Reading	Pre-K Spring	.93
Book Reading Quantity			
Book Reading Quality			.85
			.87
Oral Language Use	TBRS Oral Language Use	Pre-K Spring	.94
Oral Language Use Quantity			
Oral Language Use Quality			.87
			.89
Phonological Awareness Instruction	TBRS Phonological Awareness	Pre-K Spring	.63
Print Knowledge Instruction	TBRS Print and Letter Knowledge	Pre-K Spring	.85
Print Knowledge Use Quantity			.66
Print Knowledge Use Quality			.73
Differentiated Instruction Planning	Assessment Profile Individualizing Scale	Pre-K Fall/Spring	.86–.88
Teacher–child Social Interactions	Arnett CIS	Pre-K Fall/Spring	
Positive			.94–.95
Harsh			.91–.93
Permissive			.69–.74
Detached			.87–.89

Table 3

Descriptive Statistics of Child Outcome Measures (N=1,723)

	Fall				
Measures	Mean	SD	Range	Skew	Kurtosis
Oral Language Composite	0.0	1.0	-3.0–3.5	0.0	3.0
PPVT-III Receptive Vocabulary	89.3	15.5	40–135	-.3	3.3
TOLD-P:3 Grammatic Understanding	8.6	2.6	3–17	.1	2.6
Phonological Awareness Standardized	0.0	1.0	-2.0–2.8	.5	3.2
Pre-CTOPPP Elision	7.5	3.7	0–18	.5	3.2
Print Knowledge Composite	0.0	1.0	-2.4–5.4	.7	3.9
TERA–3 Alphabet	7.8	2.9	3–20	1.0	3.8
TERA–3 Conventions	7.9	2.1	3–19	.6	3.3
WJ-III Letter-Word Identification	99.7	16.2	65–185	.2	3.7
	Spring				
	Mean	SD	Range	Skew	Kurtosis
Oral Language Composite	0.0	1.0	-3.7–3.3	-.2	3.1
PPVT-III Receptive Vocabulary	93.8	14.8	40–134	-.5	3.5
TOLD-P:3 Grammatic Understanding	9.3	2.6	2–19	-.1	3.2
Phonological Awareness Standardized	0.0	1.0	-2.3–1.9	.1	2.2
Pre-CTOPPP Elision	9.9	4.3	0–18	.1	2.2
Print Knowledge Composite	0.0	1.0	-3.3–4.6	.4	3.6
TERA–3 Alphabet	9.4	3.4	1–20	.3	2.3
TERA–3 Conventions	8.1	2.5	2–20	.7	4.3
WJ-III Letter-Word Identification	103.9	13.5	51–172	-.1	4.6

Table 4

Correlations Between Child Emergent Literacy Measures

	1	2	3	4	5	6	7	8	9	10	11	12
1. Fall Receptive Vocabulary	---	.52	.52	.36	.50	.37	.77	.51	.51	.41	.51	.33
2. Fall Receptive Grammar		---	.39	.32	.40	.31	.48	.45	.33	.32	.40	.28
3. Fall Phonological Awareness			---	.31	.39	.31	.46	.36	.55	.33	.37	.26
4. Fall Alphabet Knowledge				---	.45	.72	.33	.30	.32	.63	.49	.60
5. Fall Print Concepts					---	.40	.46	.36	.38	.43	.50	.38
6. Fall Early Decoding						---	.34	.28	.30	.64	.48	.68
7. Spring Receptive Vocabulary							---	.54	.51	.45	.52	.38
8. Spring Receptive Grammar								---	.42	.40	.46	.32
9. Spring Phonological Awareness									---	.42	.42	.33
10. Spring Alphabet Knowledge										---	.60	.76
11. Spring Print Concepts											---	.57
12. Spring Early Decoding												---

Note. All correlations are significant at $p<.001$.

Table 5

Correlations Between Child Composite Outcomes and Control Variables

	Oral Language	Phonological Awareness	Print Knowledge
Maternal Education	.29***	.21***	.26***
Ethnic Minority	-.14***	-.09***	.00
Child's Age	-.01	.17***	-.15***
Child's Gender	.11***	.13***	.15***

*** $p<.001$.

Table 6

Descriptive Statistics and Normality of Teacher Practice Measures (N=259)

Measures	Mean	SD	Range	Skew	Kurtosis
Book Reading Behaviors Composite	2.2	1.5	.3–6	.2	2.2
Book Reading Quantity	1.2	.7	.3–3	.1	2.1
Book Reading Quality	1.0	.8	0–3	.3	2.3
Oral Language Use Composite	3.6	1.5	.3–6	-.1	2.1
Oral Language Use Quantity	1.8	.8	.1–3	-.2	2.1
Oral Language Use Quality	1.8	.8	.1–3	-.1	2.0
Phonological Awareness Instruction Composite	3.0	2.2	1–10	1.0	3.1
Print and Letter Knowledge Instruction Composite	2.3	1.3	.8–6	.7	2.8
Print and Letter Knowledge Instruction Quantity	1.3	.6	.8–3	.9	3.1
Print and Letter Knowledge Instruction Quality	1.0	.7	0–3	.6	2.6
Differentiated Instruction Planning	1.6	.3	1–2	-.3	1.8
Positive Teacher–child Social Interactions	2.9	.7	1.3–4	-.4	2.2
Harsh Teacher–child Social Interactions	1.6	.6	1–3.8	1.7	5.2
Permissive Teacher–child Social Interactions	2.3	.8	1–3.8	0.1	1.6
Detached Teacher–child Social Interactions	1.7	.7	1–4	1.1	3.6

Table 7

Differences in Descriptive Statistics of Teacher Practice Variables, by Program Type

	Public Pre-K (*N*=152)		Head Start (*N*=74)		Child Care (*N*=32)	
Measures	Mean	SD	Mean	SD	Mean	SD
Book Reading Behaviors	2.7	1.4	1.5***	1.2	1.1***	1.2
Book Reading Quantity	1.4	.7	.9***	.6	.7***	.5
Book Reading Quality	1.3	.8	.6***	.6	.4***	.6
Oral Language Use	3.9	1.3	3.1***	1.6	2.6***	1.4
Oral Language Use Quantity	2.0	.7	1.6***	.8	1.4***	.7
Oral Language Use Quality	1.9	.7	1.5***	.8	1.2***	.7
Phonological Awareness Instruction	3.6	2.4	2.5***	1.9	1.6***	1.2
Print and Alphabet Knowledge Instruction	2.6	1.4	2.1**	1.1	1.5***	.7
Print and Alphabet Knowledge Quantity	1.4	.6	1.3	.5	1.0***	.3
Print and Alphabet Knowledge Quality	1.2	.8	.8**	.7	.5***	.5
Differentiated Instruction Planning	1.6	.4	1.6	.3	1.8**	.3
Positive Teacher–child Social Interactions	3.0	.6	2.8**	.7	2.7**	.6
Harsh Teacher–child Social Interactions	1.5	.5	1.7	.6	1.5	.6
Permissive Teacher–child Social Interactions	2.3	.8	2.0**	.7	2.7*	.8
Detached Teacher–child Social Interactions	1.5	.6	1.9***	.9	1.5	.7

Note. For Head Start and Child Care, the independent samples t-tests were ran in relation to Public Pre-K teacher practices.

*p<.05. **p<.01. ***p<.001.

Table 8
Parameter Estimates and Standard Errors for Hierarchical Linear Models: Teacher Practices as Significant Predictors of Children's Oral Language Growth

Predictor	**Oral Language Use**	**Book Reading Behaviors**	**Positive Teacher–child Social Interactions**
Fixed Effects	*β* (*SE*)	*β* (*SE*)	*β* (*SE*)
(Constant)	.48 (.29)	.45 (.29)	.48 (.02)
Level–1			
Maternal Education Level			
H. S. Graduate	.02 (.05)	.03 (.05)	.04 (.05)
Some College	.16 (.05)**	.17 (.05)**	.17 (.05)**
College Graduate	.24 (.06)***	.25 (.06)***	.25 (.06)***
Child's Ethnicity			
African American	-.19 (.04)***	-.19 (.04)***	-.20 (.04)***
Asian or Pacific Islander	-.19 (.16)	-.18 (.16)	-.21 (.16)
Hispanic	-.13 (.06)*	-.14 (.06)*	-.15 (.06)**
American Indian or Alaskan	-.40 (.26)	-.40 (.26)	-.37 (.26)
Other Ethnicity	-.11 (.07)	-.12 (.07)	-.12 (.07)
Child's Gender	.09 (.03)**	.09 (.03)**	.09 (.03)**
Child's Age	-.01 (.00)*	-.01 (.00)*	-.01 (.00)*
Child's Fall Oral Language Score	.66 (.02)***	.66 (.02)***	.66 (.02)***
Level–2			
Teacher Practice	.06 (.02)**	.04 (.02)*	.08 (.03)*
Random Effects	*β* (*SE*)	*β* (*SE*)	*β* (*SE*)
Between Classroom Variance	.14 (.03)	.15 (.03)	.15 (.03)
Within Classroom Variance	.66 (.01)	.66 (.01)	.66 (.01)

Note. The reference group for Maternal Education Level was Less than H.S. Graduate. The reference group for Child's Ethnicity was White. When the teacher practice predictor was positive teacher–child social interactions, the other three teacher–child social interaction subscales were controlled for in the model as well.
*p<.05. **p<.01. ***p<.001.

Table 9

Parameter Estimates and Standard Errors for Hierarchical Linear Models: Teacher Practices as Significant Predictors of Children's Phonological Awareness Growth

Predictor	**Oral Language Use**	**Book Reading Behaviors**
Fixed Effects	*β* (*SE*)	*β* (*SE*)
(Constant)	-1.50 (.36)***	-1.59 (.36)***
Level–1		
Maternal Education Level		
H. S. Graduate	.04 (.06)	.05 (.06)
Some College	.15 (.06)*	.15 (.06)*
College Graduate	.31 (.07)***	.32 (.07)***
Child's Ethnicity		
African American	-.24 (.05)***	-.25 (.05)***
Asian or Pacific Islander	-.02 (.19)	.00 (.19)
Hispanic	-.18 (.07)**	-.18 (.07)**
American Indian or Alaskan	-.22 (.31)	-.23 (.31)
Other Ethnicity	-.03 (.09)	-.04 (.09)
Child's Gender	.18 (.04)***	.18 (.04)***
Child's Age	.02 (.01)***	.02 (.01)***
Child's Fall Phonological Awareness Score	.48 (.02)***	.48 (.02)***
Level–2		
Teacher Practice	.06 (.02)**	.07 (.02)**
Random Effects	*β* (*SE*)	*β* (*SE*)
Between Classroom Variance	.21 (.03)	.21 (.03)
Within Classroom Variance	.78 (.02)	.78 (.01)

Note. The reference group for Maternal Education Level was Less than H.S. Graduate. The reference group for Child's Ethnicity was White.

*p<.05. **p<.01. ***p<.001.

Table 10

Parameter Estimates and Standard Errors for Hierarchical Linear Models: Teacher Practices as Significant Predictors of Children's Print Knowledge Growth

Predictor	Book Reading Behaviors	Print and Letter Knowledge Instruction	Phonological Awareness Instruction
Fixed Effects	*β* (*SE*)	*β* (*SE*)	*β* (*SE*)
(Constant)	1.84 (.26)***	1.92 (.26)***	1.88 (.26)***
Level–1			
Maternal Education Level			
H. S. Graduate	.15 (.04)**	.15 (.04)**	.15 (.04)**
Some College	.19 (.04)***	.18 (.04)***	.18 (.04)***
College Graduate	.27 (.06)***	.27 (.06)***	.27 (.06)***
Child's Ethnicity			
African American	.03 (.04)	.01 (.04)	.02 (.04)
Asian or Pacific Islander	.14 (.15)	.12 (.15)	.13 (.15)
Hispanic	.00 (.05)	-.01 (.05)	.00 (.05)
American Indian or Alaskan	.05 (.23)	.07 (.23)	.06 (.23)
Other Ethnicity	.08 (.06)	.08 (.06)	.09 (.06)
Child's Gender	.11 (.03)***	.11 (.03)***	.11 (.03)***
Child's Age	-.04 (.00)***	-.04 (.00)***	-.04 (.00)***
Child's Fall Print Knowledge Score	.68 (.02)***	.67 (.02)***	.69 (.02)***
Level–2			
Teacher Practice	.09 (.02)***	.10 (.02)***	.08 (.02)**
Random Effects	*β* (*SE*)	*β* (*SE*)	*β* (*SE*)
Between Classroom Variance	.30 (.02)	.29 (.02)	.30 (.02)
Within Classroom Variance	.57 (.01)	.57 (.01)	.57 (.01)

Predictor	Differentiated Instruction Planning	Permissive Teacher–child Social Interactions
Fixed Effects	*β* (*SE*)	*β* (*SE*)
(Constant)	1.86 (.26)	1.91 (.26)
Level–1		
Maternal Education Level		
H. S. Graduate	.16 (.04)***	.16 (.04)***
Some College	.19 (.04)***	.19 (.04)***
College Graduate	.27 (.06)***	.28 (.06)***
Child's Ethnicity		
African American	.02 (.04)	.00 (.04)
Asian or Pacific Islander	.13 (.15)	.09 (.15)
Hispanic	-.01 (.05)	-.02 (.05)
American Indian or Alaskan	.07 (.23)	.07 (.23)
Other Ethnicity	.07 (.07)	.06 (.07)
Child's Gender	.11 (.03)***	.10 (.03)***
Child's Age	-.04 (.00)***	-.04 (.00)***
Child's Fall Print Knowledge Score	.68 (.02)***	.68 (.02)***
Level–2		
Teacher Practice	.06 (.02)*	-.09 (.03)**
Random Effects	*β* (*SE*)	*β* (*SE*)
Between Site Variance	.30 (.02)	.29 (.02)
Within Site Variance	.57 (.01)	.57 (.01)

Note. The reference group for Maternal Education Level was Less than H.S. Graduate. The reference group for Child's Ethnicity was White. When the teacher practice predictor was permissive teacher–child social interactions, the other three teacher–child social interaction subscales were controlled for in the model as well.
*p<.05. **p<.01. ***p<.001.

Table 11

Parameter Estimates and Standard Errors for Hierarchical Linear Models: Highest Degree as a Significant Predictor of Teachers' Practices

Outcome	Oral Language Use	Positive Teacher–child Social Interactions
Fixed Effects	*β* (*SE*)	*β* (*SE*)
(Constant)	-.16 (.21)	-.30 (.24)
Level–1		
Highest Degree		
Associate's	.37 (.22)	.16 (.21)
Bachelor's	.41 (.18)*	.26 (.18)
Master's or more	.46 (.23)*	.47 (.23)*
Level–2		
Program Type		
Head Start	-.39 (.28)*	-.06 (.18)
Child Care	-.47 (.28)	.24 (.32)
Random Effects	*β* (*SE*)	*β* (*SE*)
Between Site Variance	.28 (.09)	.55 (.12)
Within Site Variance	.89 (.04)	.85 (.10)

Note. The reference group for Program Type was State Public Pre-K. The reference group for Highest Degree was High School Graduate or Less.

*$p<.05$.

Table 12

Parameter Estimates and Standard Errors for Hierarchical Linear Models: Early Childhood Education Coursework as a Significant Predictor of Teachers' Practices

Outcome	Oral Language Use	Book Reading Behaviors
Fixed Effects	*β* (*SE*)	*β* (*SE*)
(Constant)	-.15 (.16)	.05 (.16)
Level–1		
Has Early Childhood Education Units	.47 (.14)**	.32 (.13)*
Level–2		
Program Type		
Head Start	-.44 (.15)**	-.67 (.15)***
Child Care	-.49 (.25)	-.63 (.26)*
Random Effects	*β* (*SE*)	*β* (*SE*)
Between Site Variance	.26 (.09)	.32 (.09)
Within Site Variance	.88 (.04)	.82 (.04)

Note. The reference group for Program Type was State Public Pre-K.

*$p<.05$. **$p<.01$. ***$p<.001$.

Table 13
Parameter Estimates and Standard Errors for Hierarchical Linear Models: Major Degree of Study as a Significant Predictor of Teachers' Practices

Outcome	Oral Language Use
Fixed Effects	β (*SE*)
(Constant)	-.17 (.19)
Level–1	
Major	
Child Development or Developmental Psychology	.12 (.28)
Early Childhood Education	.48 (.19)*
Elementary Education	.45 (.21)*
Other	.41 (.19)*
Level–2	
Program Type	
Head Start	-.38 (.16)*
Child Care	-.47 (.27)
Random Effects	β (*SE*)
Between Site Variance	.27 (.09)
Within Site Variance	.89 (.04)

Note. The reference group for Program Type was State Public Pre-K. The reference group for Major was No Specific Major Degree of Study.
*$p<.05$.

Figure 1

Differential Effect of Book Reading Behaviors for At-Risk Children's Oral Language

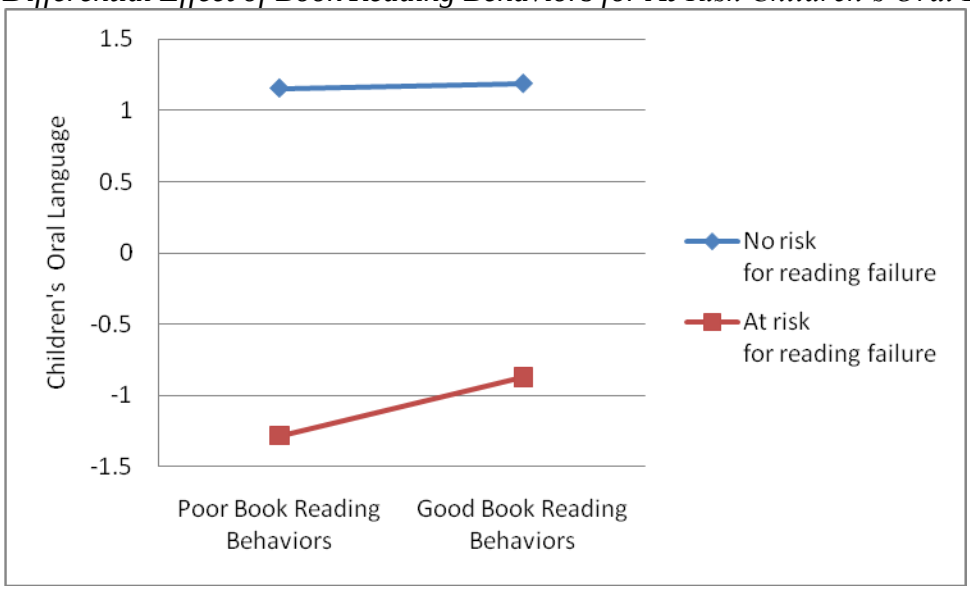


Figure 2

Differential Effect of Differentiated Instruction Planning for At-Risk Children's Print Knowledge

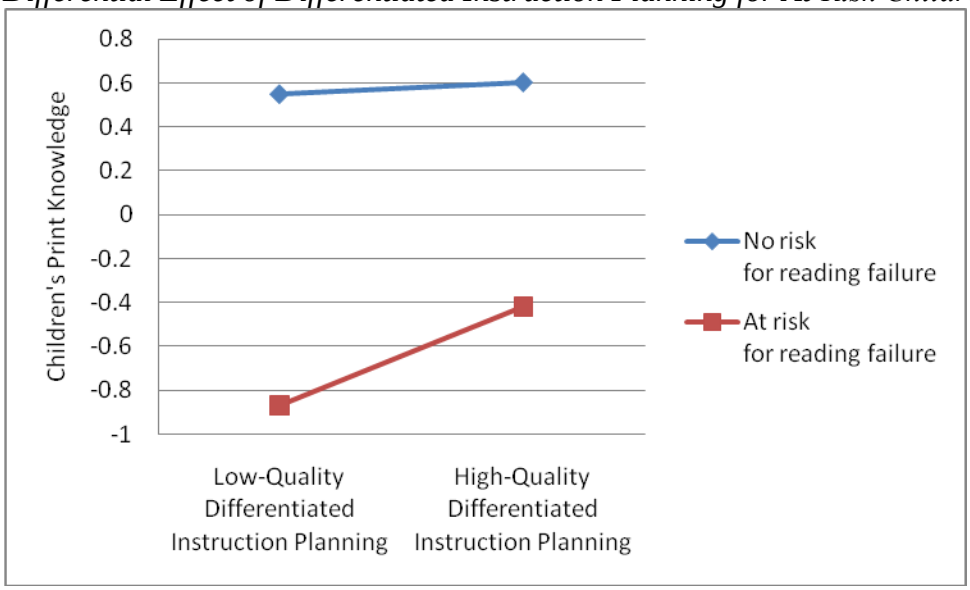


Figure 3

Effect of Book Reading Behaviors on Children's Print Knowledge Moderated by Differentiated Instruction Planning

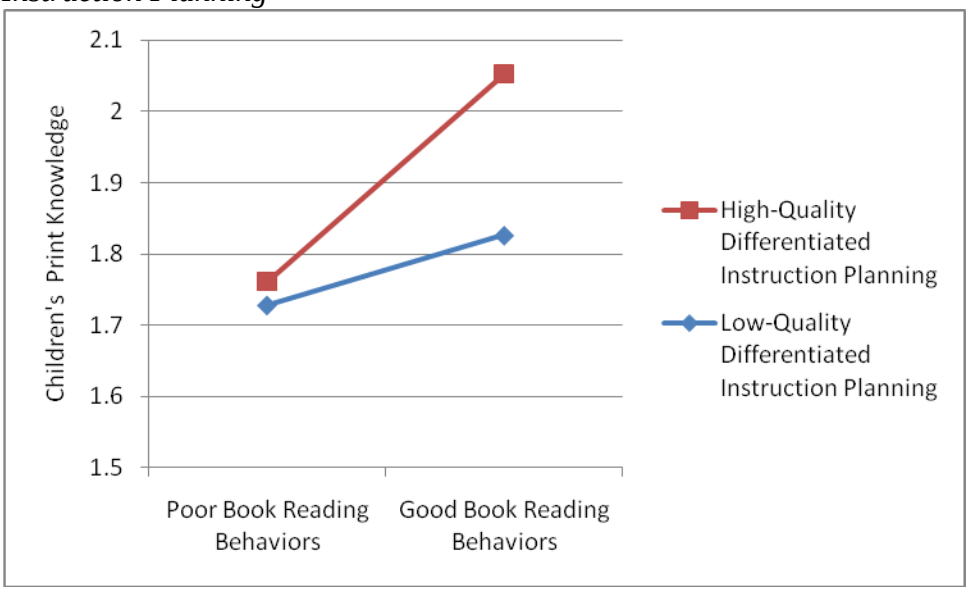
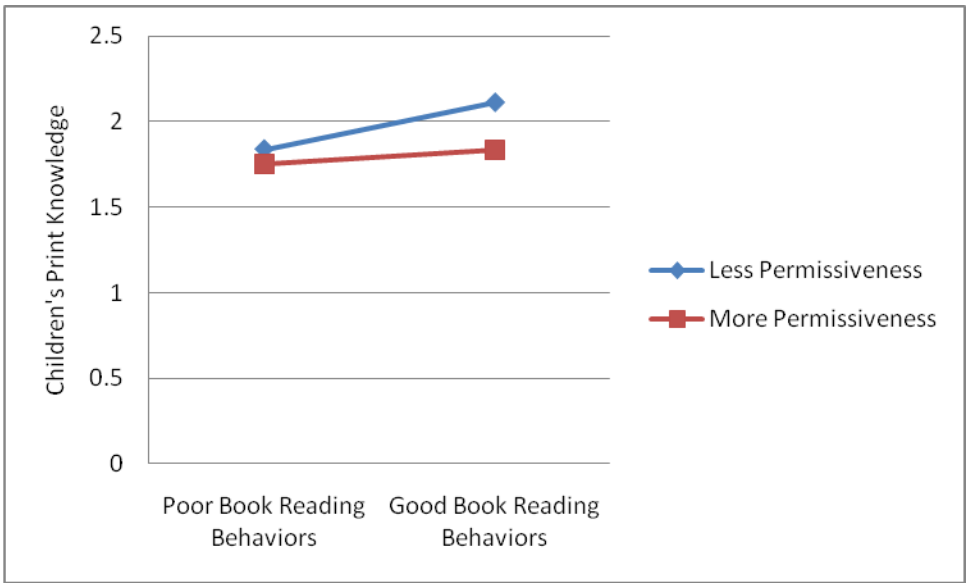


Figure 4

Effect of Book Reading Behaviors on Children's Print Knowledge, as Moderated by Teachers' Permissiveness



Appendix

Sample of HLM Models and Information About Interpretation

Main Effect Model Predicting Children's Print Knowledge Growth

$$Y_{ij} = \beta_0 + \beta_1(\text{SES}_{\text{H.S. Graduate}})_{ij} + \beta_2(\text{SES}_{\text{Some College}})_{ij} + \beta_3(\text{SES}_{\text{College Graduate}})_{ij} + \beta_4(\text{Ethnicity}_{\text{African American}})_{ij} + \beta_5(\text{Ethnicity}_{\text{Asian/Pacific Islander}})_{ij} + \beta_6(\text{Ethnicity}_{\text{Hispanic}})_{ij} + \beta_7(\text{Ethnicity}_{\text{American Indian/Alaskan}})_{ij} + \beta_8(\text{Ethnicity}_{\text{Other}})_{ij} + \beta_9(\text{Gender}_{\text{Girl}})_{ij} + \beta_{10}(\text{Age})_{ij} + \beta_{11}(\text{Fall Y})_{ij} + \beta_{12}(\text{Print and Letter Knowledge Instruction})_j + \zeta_{0j} + \epsilon ij$$

where Y_{ij} is the growth in print knowledge for the i^{th} student in the j^{th} school and $\zeta_j|x_{ij} \sim N(0, \psi)$ and $\varepsilon_{ij}|\, x_{ij}, \zeta_j \sim N(0,\theta)$.

Interaction Predicting Children's Print Knowledge Growth

$$Y_{ij} = \beta_0 + \beta_1(\text{SES}_{\text{H.S. Graduate}})_{ij} + \beta_2(\text{SES}_{\text{Some College}})_{ij} + \beta_3(\text{SES}_{\text{College Graduate}})_{ij} + \beta_4(\text{Ethnicity}_{\text{African American}})_{ij} + \beta_5(\text{Ethnicity}_{\text{Asian/Pacific Islander}})_{ij} + \beta_6(\text{Ethnicity}_{\text{Hispanic}})_{ij} + \beta_7(\text{Ethnicity}_{\text{American Indian/Alaskan}})_{ij} + \beta_8(\text{Ethnicity}_{\text{Other}})_{ij} + \beta_9(\text{Gender}_{\text{Girl}})_{ij} + \beta_{10}(\text{Age})_{ij} + \beta_{11}(\text{Fall Y})_{ij} + \beta_{12}(\text{Book Reading Behaviors})_j + \beta_{13}(\text{Differentiated Instruction Planning})_j + \beta_{14}(\text{Book Reading Behaviors x Differentiated Instruction Planning})_j + \zeta_{0j} + \epsilon ij$$

where Y_{ij} is the growth in print knowledge for the i^{th} student in the j^{th} school and $\zeta_j|x_{ij} \sim N(0, \psi)$ and $\varepsilon_{ij}|\, x_{ij}, \zeta_j \sim N(0,\theta)$.

Y_{ij} is the print knowledge composite score for child i in classroom j, as a function of the constant or overall mean (β_0), standardized fixed regression coefficients (β) for the control variables (SES dummy variables with less than H.S. graduate as the reference group, ethnicity dummy variables with white as the reference group, gender, and age) and teacher practice predictor variable (print and letter knowledge instruction), a random intercept for classroom j (ζ_j), and measurement error (ϵij). In the case of the model with a two-way interaction, the major difference is that Y_{ij} is a function of the standardized coefficient (β) for the interaction term in addition to the other fixed regression coefficients, random intercept, and residuals. It should be noted that the random intercepts for classrooms are assumed to have normal distributions with a mean of zero, estimated variances (which are reported in the HLM results tables), and an estimated correlation with each another.

HLM results should be interpreted in a similar manner as ordinary fixed-effects regression models. The standardized coefficient on β_x can be interpreted as the effect of a given variable on Y_{ij}; however, it should be noted that this is associational (i.e., correlational) and does not necessarily mean that the predictor variable itself was the reason for the change in the outcome. For example, by referring to Table 10, the standardized coefficient for print and letter knowledge instruction as a predictor (.10) indicates that for every unit improvement in a child's teacher's print and letter knowledge instructional practices, the child's print knowledge score will be .10 standard deviations higher on average. The *p*-value for this coefficient signifies that there is less than a .1% (i.e., $p < .001$) possibility that this finding is due to chance alone. To best understand interaction coefficients, one should refer to the figures in the manuscript. With regards to the random effects in this case, they can be interpreted as the variance between classrooms' true scores and the variance within classrooms' true scores.