READING INSTRUCTION AND ASIAN LANGUAGE-MINORITY LEARNERS’ AND
NATIVE-ENGLISH-SPEAKING STUDENTS’ ENGLISH READING ABILITY GROWTH

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ABSTRACT

MELODY KUNG: Reading Instruction and Asian Language-Minority Learners’ and Native-English-Speaking Students’ English Reading Ability Growth
(Under the direction of Jill Fitzgerald)

There is a lack of knowledge regarding reading development and predictors of reading development for Language Minority students (LMs) such as Asians. In particular, the research base is limited regarding the effectiveness of different reading instructional emphases for Asian LMs. The purpose of the present study was to examine whether language status (Asian LMs versus Native-English-speakers [NE-speakers]) moderated the relationship between early reading instructional emphasis/amount and reading growth from kindergarten through eighth grade. The sample consisted of 6,715 NE-speakers and 242 Asian LMs from the Early Childhood Longitudinal Study-Kindergarten Class of 1998-1999. Hierarchical Linear Modeling growth curve analyses were conducted.

The main conclusions were that (1) Students' language status did not moderate the relationship between two aspects of instructional emphasis, the degree to which meaning was emphasized or the overall amount of reading instruction, with reading ability growth—neither in kindergarten nor in first grade. (2) However, by first grade, students’ language status did moderate to some extent the relationship between the degree to which teachers emphasized sounds/letters during the first grade year with reading ability growth. The most salient differences in the growth patterns were at initial takeoff rate at the end of first grade and in the pattern of deceleration through the middle grades. (3) Turning to the pattern of reading ability growth for the two language groups as a whole, regardless of degree of reading instructional
emphasis on sounds/letters, the most salient differences in the two growth patterns were at initial reading ability at the end of first grade and in the pattern of deceleration through the middle grades. (4) Lastly, only in first grade (that is, not in kindergarten), on the whole, regardless of language status, students who were exposed to sounds/letters to a lesser degree than their peers in first grade displayed slightly higher reading ability by the spring of first grade. Practical implications and future research directions are discussed.
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CHAPTER 1
INTRODUCTION

For the present study, the research question was: What is the relationship between kindergarten and first grade reading instructional emphases/amount and Asian language-minority (LM) students’ reading ability growth from kindergarten through eighth grade, as compared to that of native English-(NE)-speakers? Reading instructional emphases/amount (in both kindergarten and first grade, but measured separately by grade) were defined (and measured) three separate ways as (1) degree of emphasis on sounds and letter-sound relationships, (2) degree of emphasis on meaning construction, and (3) overall amount of reading instruction. Socioeconomic status was controlled. The study sample was drawn from the United States nationally-representative data from the Early Childhood Longitudinal Study–Kindergarten Class of 1998-1999 (ECLS-K).

Rationale

Academic performance of LM learners has become an important topic in the last few decades since an increasing number of students in the United States primarily speak a non-English language in their homes. According to the Department of Education (2011), from 1980 to 2009, the number of school-aged children who speak a language other than English at home increased from 4.7 to 11.2 million. Within the population of LMs, there are growing numbers of LMs of different language backgrounds, with those from Asian backgrounds, including Chinese and Korean, comprising almost 20% of the LM population (Goldenberg, 2008).

LM Difficulties in English Reading
With the rise in the number of LMs, it becomes increasingly important to examine topics related to these students’ literacy development, particularly because on the whole, in the United States, LMs are experiencing difficulties in reading, in comparison to their NE-speaking peers. For instance, on the National Assessment of Educational Progress (NAEP) in 2013, while there were no breakout percentages for Asian LMs or other subgroups of LMs, only 7% of LMs attained a proficient or advanced reading level in fourth grade, leaving 93% reading at a basic or below basic level. There is a clear gap in reading achievement between the majority of fourth-grade LMs and their NE-speaking peers, and the gap does not close by eighth grade (NAEP, 2013). There is some evidence that the LM-White achievement gap may widen with grade levels through eighth grade (Fry, 2007). The statistics are concerning, since they depict a trajectory that does not favor the LMs.

The gap in reading scores for LMs may not be surprising, since texts read at higher grades become increasingly demanding, by requiring more integrated comprehension, involving more abstract topics, and including more difficult vocabulary (Gamson, Lu, & Eckert, 2013). In addition to the increased text difficulty at higher grade levels, reading comprehension may be especially challenging for LMs as they approach middle and high school due to the potential for underdeveloped oral language and prior knowledge (Lesaux, Rupp, & Siegel, 2007). While there is some evidence that LMs’ reading performance lags behind that of their native-English-speaking peers, little is known about Asian LM students’ performance in particular.

**Research Gaps**

There is a growing interest and body of research regarding reading development for LMs over time (Kieffer, 2011), but there is still a lack of knowledge regarding reading development and predictors of reading development specifically for various subgroups of LMs such as Asians.
Studying early predictors of growth trajectories for students from specific LM ethnicities may help to further the research base by allowing researchers and educators to identify areas where LM subgroups are lagging behind their native-English-speaking peers, with associated implications for how to more effectively address LMs’ needs. In addition, the research base is limited regarding the effectiveness of different reading instructional emphases for LMs (Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004). The study is a first step toward addressing one of the research gaps.

**Prior Research and Theory: The Importance of Early Word Reading for Later Reading Development, Growth Trajectories, and the Impact of Early Reading Instructional Emphases on Reading Growth**

The next sections briefly summarize the importance of early word reading on later reading development for Asian LMs and NE-speaking students and the general patterns of NE-student and Asian LM reading growth. Also, what is known about the impact of early reading instructional emphases on NE-speaking student and Asian LM reading growth will be briefly presented.

**Why is Early Success in Reading Ability Important for Students in General and Asian Students in Particular?**

For NE-speaking students. Theoretically, early word reading ability is related to long-term reading development. Ehri’s (1999) phases of word development, automaticity theory (LaBerge & Samuels, 1974), and the Simple View of Reading support the importance of early word reading development. First, Ehri’s phases delineate the general process for learning to read, with phonological awareness and letter sounds being acquired initially, followed by word recognition, and use of graphic and syntax cues in context for deciphering unfamiliar words. The
implication is that the acquisition of word reading development provides a foundation for later reading growth. Second, automaticity theory focuses on the automatic word reading and reading comprehension relationship, where students who are able to read words automatically do not expend much attention in deciphering words but rather, are able to devote their attention to comprehension. In contrast, those who cannot quickly recognize and read words are unable to pay attention to comprehension. Third, the Simple View of Reading posits that both decoding and language comprehension predict reading comprehension.

Empirically, for monolingual NE-speakers, early reading ability or achievement is highly correlated with later reading performance (Catts, Bridges, Little, & Tomblin, 2008; Cutuli et al., 2013; Fien, Park, Baker, Smith, Stoolmiller, & Kame’enui, 2010; Foster & Miller, 2007; Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Herbers, Cutuli, Supkoff, Heistad, Chan, Hinz, & Masten, 2012; Kieffer, 2011; Roberts, Mohammed, & Vaughan, 2010; Sparks, Patton, & Murdoch, 2014), supporting the notion that later reading development builds on acquisition of earlier skills (Foster & Miller, 2007).

In particular, a body of research supports the contention that NE-students who are skilled at word reading early on are more able to progress to reading more difficult texts than students who are less skilled early on (RAND Reading Study Group, 2002; Fien, Park, Baker, Smith, Stoolmiller, & Kame’enui, 2010; Roberts, Mohammed, & Vaughan, 2010).

**Asian LMs.** No formal theoretical position has been posited about the relation between early word reading and long-term reading development for LMs or for Asian LMs in particular. However, due to the large linguistic distance between English and Asian languages, (August & Shanahan, 2006), acquiring English word reading ability may be especially challenging for Asian LMs in particular, and that challenge may be related to long-term reading development.
Word reading ability (also called decoding, word recognition, or word analysis) involves internalized knowledge of sound-symbol relationships (Koda, 2007; Lesaux, Koda, Siegel, Shanahan, 2006). Fluent word reading skills allow efficient retrieval of previously stored linguistic knowledge. Languages, however, differ in the manners in which information is visually encoded (Koda, 2007). Whereas for English and other alphabetic languages such as Spanish, letters are the symbols that represent sounds in systematic ways, for Asian languages such as Chinese, glyphs are used to represent words or morphemes.

Virtually no studies have been conducted on the relationship between early word reading and reading growth for Asian LMs, so no conclusive statement can be derived from empirical research about whether an alphabetic home language may facilitate the development of English word recognition skills or on the contrary, whether a non-alphabetic home language may hinder the development of English word recognition skills.

What is Known About Reading Trajectories for NE-Students and LMs

In the following sections, what is known about reading trajectories for NE-speaking students, LM students, and subgroups of LM students will be briefly summarized.

For NE-speaking students. On average, NE-students’ reading development growth follows a quadratic curve, accelerating at the start of the elementary grades, decelerating during the middle grades, and flattening out by the end of high school (Boscardin, Francis, & Baker, 2008; Kieffer, 2012; Nakamoto, Lindsey, & Manis, 2007). The curvilinear trend has held for NE-speaking students from highly varied backgrounds and abilities: typically developing preschool, elementary, and middle school students (Catts, Bridges, Little, & Tomblin, 2008; Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Herbers, Cutuli, Supkoff, Heistad, Chan, Hinz, & Masten, 2012; Kieffer, 2008, 2011; Nese et al., 2013; Pianta, Belsky, Vandergrift,
Houts, & Morrison, 2008; Roberts, Mohammed, & Vaughn, 2010) as well as those with reading disabilities (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996) and those from low SES or highly mobile family backgrounds (Cutuli et al., 2013; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Voight, Shinn, & Nation, 2012).

**For LM students compared to NE-speaking students.** Few researchers to date have compared the growth trajectory patterns of LMs with those of NE-speakers. Thus, it is difficult to state any firm conclusions. From the existing studies, some researchers reported similar growth (Mancilla-Martinez & Lesaux, 2010; Manis, Lindsey, & Bailey, 2004; Nakamoto, Lindsey, & Manis, 2007; Roberts, Mohammed, & Vaughn, 2010) while others reported different patterns (Fitzgerald, Amendum, & Guthrie, 2008; Kieffer, 2008, 2010, 2012; Kieffer & Vukovic, 2013). The difference could be due to different measures used and different control variables examined.

However, three tentative statements can be asserted. First, socioeconomic status (SES) may be a factor that impacts LMs’ reading growth. In a few studies, low SES was associated with a lag between LMs’ and NEs’ reading growth (Kieffer, 2008, 2010, 2012; Kieffer & Vukovic, 2013, Roberts, Mohammed, & Vaughn, 2010). But when SES was taken into account or controlled in statistical analyses, reading growth between LMs and NE-speakers were similar (Kieffer, 2008, 2010, 2012; Kieffer & Vukovic, 2012; Roberts, Mohammed, & Vaughn, 2010).

Second, oral English ability may be another factor that impacts LMs’ reading growth. In one study, LMs who were not initially fluent in oral English in kindergarten demonstrated a reading lag as compared to NE-speakers through eighth grade (Kieffer, 2011). But LMs who were initially fluent in oral English in kindergarten were able to catch up in reading ability and maintain similar reading ability levels through eighth grade (Kieffer, 2011).
Third, in a few studies, LMs displayed similar lower level (e.g., word recognition) English reading growth from kindergarten to second grade when compared to NE-speakers (Mancilla-Martinez & Lesaux, 2010; Manis, Lindsey, & Bailey, 2004; Nakamoto, Lindsey, & Manis, 2007; Roberts, Mohammed, & Vaughn, 2010).

**Asians.** More research is needed to draw an overall conclusion about the reading growth patterns for Asian LMs since only one study investigated Asian LM reading growth (Roberts, Mohammed, & Vaughn, 2010). From the one study, kindergarten to fifth grade Asian LM reading growth was similar to that of native-English-speakers but Asian LMs started out slightly higher on initial reading. It is important to note that all the Asian LMs had passed an oral-English proficiency test by the end of kindergarten. While the study is indicative, more studies are needed to determine the replicability of the finding across different samples with extension into the middle grades (and high school).

**Early Grades Reading Instructional Emphasis May Impact Reading Growth in General and Asian LMs’ Reading Growth in Particular**

There has been a history of disagreement about the most effective reading instructional emphases in general for teaching students to read (Fitzgerald, Elmore, Relyea-Kim, Hiebert, & Stenner, 2016; Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004). The debates revolve around two instructional emphases: instruction that focuses on sounds and letter-sound relationships and instruction that focuses on meaning construction (Xue & Meisels, 2004).

The sounds and letter-sound relationships reading instructional emphasis focuses on lower-level reading skills such as learning the names of letters, writing the letters, phonics, and matching letters to sounds (cf. Sonnenschein, Stapleton, & Benson, 2010). The meaning construction reading instructional emphasis focuses on the construction of meaning from the text.
through authentic reading and writing activities. Exemplative activities include retelling stories, identifying the main idea and parts of a story, making predictions based on text, using context cues for comprehension, and learning vocabulary (cf. Sonnenschein, Stapleton, & Benson, 2010).

It is important to note that though reading instruction may focus on a particular aspect of reading, it is generally not to the exclusion of other aspects. For instance, instruction that emphasizes meaning may incorporate letter-sound relationship instruction as well but in an implicit manner, using whole words and words-in-context to teach phonics. In a similar way, instruction that emphasizes letter-sounds relationships may be characterized by a more direct approach for teaching letter-sounds but still include meaning construction.

For NE-speakers. It is difficult to make a blanket statement about whether a greater amount of early grades sounds and letter-sound relationships instructional emphasis or a greater amount of early grades meaning construction instructional emphasis is more effective for NE-speakers’ reading growth. The difficulty may be due to an insufficient number of studies and contradictory findings in the existing research. While in one study (Connor, Morrison, & Petrella, 2004), greater amounts of third-grade meaning construction instruction was effective for reading growth, in another study (Sonnenschein, Stapleton, & Benson, 2010), greater amounts of third-grade meaning construction instruction was not effective. Reasons for the differences in results were not apparent.

However, two tentative statements from the existing research can be asserted. First, reading ability may moderate the emphasis that supports NE-speakers’ growth. (Connor, Morrison, & Katch, 2004; Foorman, Francis, Fletcher, & Schatchneider, 1998; Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004).
Second, a greater overall amount of kindergarten and first grade reading instruction may positively impact reading growth for kindergarten (Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004) through third graders (Sonnenschein, Stapleton, & Benson, 2010).

**LMs as a heterogeneous group.** To date, only one study (Vadasy & Sanders, 2012) has been conducted on the impact of early instructional emphases on reading growth for LMs as a heterogeneous (by native language) group. The researchers concluded that the benefits of an increased amount of a particular emphasis depended on students’ grade level. While a greater amount of *first grade* sounds and letter-sounds instruction was beneficial for reading growth, a greater amount of *second grade* meaning instruction was beneficial for reading growth.

**Asian LMs.** To my knowledge, no studies have specifically investigated the impact of different early grades reading instructional emphasis on Asian LMs’ reading growth.

**Summary.** In sum, for NE-speakers, from empirical findings, it is unclear whether teaching early-grades readers using frequent systematic, sounds and letter-sounds correspondences or meaning-based instruction is more effective for reading growth. From a very limited number of studies, on the whole, the impact of an increased amount of a sounds and letter sounds emphasis was moderated by students’ initial reading ability. Also, perhaps an increase in overall amount of reading instruction may benefit students’ reading ability.

Only one study examined early reading instructional emphasis on general LM reading growth, so it is not feasible to provide a summary statement about the impact of instructional emphases.

For Asian LMs, the influence of early reading instructional emphasis for Asian LMs’ reading development has not been studied.

**Summary**
The number of LMs in the U.S. is growing, and on the whole, they are not performing well in reading.

A focus on “cracking the code” is not only theoretically important during the early phases of learning to read, but it has also been empirically supported. From prior theory for NE-speakers, early reading ability sets the stage for later reading development. But there are no parallel theories that have been specifically applied to Asian LM English reading development.

Native English-speakers experience a curvilinear reading growth trend, where rapid growth occurs in the early elementary grades but decelerates in the late elementary grades. But more research is needed to draw an overall conclusion about the reading growth patterns for Asian LMs.

No firm statement can be made regarding whether teaching early-grades readers using frequent sounds and letter-sound relationships or teaching that is focused on meaning construction is more effective for NE-speakers. Two very tentative statements are that (1) students’ initial reading ability may moderate the benefit of early reading instructional emphasis and (2) an increase in overall amount of reading instruction may benefit students’ reading ability.

No summary statement can be made about the impact of early instructional emphases on reading growth for LMs in general due to the lack of research.

Also, no summary statement can be made about the influence of early reading instructional emphasis on Asian LMs’ reading growth.

**Significance of the Study**

In US schools, on the whole, LMs’ reading ability levels do not approach their monolingual peers’ levels. So improving LMs’ reading ability becomes an important topic. Though more research related to LMs’ reading has been conducted in the past few decades, there
are still gaps in the knowledge base regarding the development of reading for LMs, specifically for Asian LMs. The study is one of the first studies to examine Asian LM reading growth, one of the first large-scale studies, and the first to examine that growth beyond fifth grade. Moreover, little is known about the impact of different early reading instructional emphases on Asian LM students’ reading ability growth. To my knowledge, the present research is the first to examine different reading instructional emphases impact on Asian LM students’ versus native-English-speaking students’ reading growth.

**Research Question and Hypotheses**

For the present study, the research question was: What is the relationship between kindergarten and first grade reading instructional emphases/amount and Asian LMs’ reading ability growth from kindergarten through eighth grade, as compared to that of NE-speakers? Reading instructional emphasis/amount (in both kindergarten and first grade but measured separately by grade) was defined (and measured) three separate ways as (1) degree of emphasis on sounds and letter-sound relationships, (2) degree of emphasis on meaning construction, and (3) overall amount of reading instruction. Socioeconomic status was controlled.

**Hypothesis**

A clear hypothesis statement cannot be made due to the lack of research on the impact of early instructional emphases on Asian LMs’ reading growth. While theoretically, there is a large linguistic distance between English and Asian languages and it may appear that Asian LMs would benefit from an increased emphasis on sounds and letter-sounds relationships, the deduction contradicts one empirical finding regarding Asian LM reading growth (Roberts, Mohammed, & Vaughn, 2010). In the study when kindergarten Asian LMs started out slightly higher on initial reading ability, as compared to their NE-speaking peers, their growth pattern
was similar to NEs through fifth grade. However, it is difficult to resolve the theoretical position with the single finding from a single study.

**Definition of Terms**

In the present study, Language-Minority (LM) learners referred to students who primarily spoke a language other than English in the home setting (Kieffer, 2008). Native-English, monolingual students referred to students who only spoke English in the home.

The Sounds and Letter-Sound Relationships reading instructional emphasis focused on learning the names of letters, writing the letters, phonics, conventions of print, alphabet and letter recognition, matching letters to sounds, writing one’s own name, and rhyming words and word families (cf. Sonnenschein, Stapleton, & Benson, 2010).

The Meaning Construction reading instructional emphasis focused on the construction of meaning from the text through authentic reading and writing activities. Activities were retelling stories, identifying the main idea and parts of a story, making predictions based on text, using context cues for comprehension, and learning vocabulary (cf. Sonnenschein, Stapleton, & Benson, 2010).

Reading Ability referred to a multidimensional cognitive ability, where during reading, readers brought to bear a variety of reading and reading-related skills, such as identifying letters and sounds and making meaning out of a string of words (Kieffer, 2011).
CHAPTER 2
REVIEW OF THE LITERATURE

The present study examined the relationship between early reading instruction and reading growth for Asian LM students and NE-speaking students. The research question was: What is the relationship between kindergarten and first grade reading instructional emphases/amount and Asian LMs’ reading ability growth from kindergarten through eighth grade, as compared to that of NE-speakers? Reading instructional emphasis/amount (in both kindergarten and first grade but measured separately by grade) was defined (and measured) three separate ways as (1) degree of emphasis on sounds and letter-sound relationships, (2) degree of emphasis on meaning construction, and (3) overall amount of reading instruction. Socioeconomic status was controlled.

In the present chapter, theoretical perspectives supporting the importance of early word reading for NE-speaking students’ later reading growth and the implications of the theoretical perspectives for Asian LMs will be presented first. Next, a summary is provided of extant empirical findings that support the theoretical positions. Finally, research support will be presented for why particular early grades reading instructional emphases matter for NE-speakers and Asian LMs.

Selection of Material for the Research Review

To locate studies for the research reviewed in the sections following the discussion of theoretical perspectives, first the PsycInfo, Education Full Text, and ERIC databases were searched using the following search terms in various combinations: “reading growth,” “reading
development,” “reading ability,” “early reading ability,” “early word reading,” “reading instruction,” “language minority,” “English language learners,” “English-as-a-second-language,” “native-English-speakers,” “Asian,” “alphabetic languages,” and “non-alphabetic languages.” Additionally, reference lists of the selected articles were examined to locate other pieces.

The research review included published, peer-reviewed, empirical research conducted in the US. No date restriction was imposed. Studies were included if participants were followed from preschool to elementary school or from elementary school into the secondary grades. Studies that were focused exclusively on preschoolers or on college or adult students were excluded. Studies on reading growth were further limited to quantitative studies that used statistical growth modeling.

Theoretically, Why is Early Word Reading Important for NE-Speakers’ and LMs’ Reading Growth?

Currently, there are no comprehensive theoretical models of LMs’ early reading developmental phases or of the relationship between LMs’ early English reading ability and later English reading growth. However, several theories derived generally for NE-speaking students may be applicable for Asian LMs’ English reading growth.

Native-English Speakers in General

Word reading automaticity is at the heart of the early phases of learning to read (e.g. Ehri, 1999). Automaticity theory (LaBerge & Samuels, 1974), the Simple View of Reading (Gough & Tunmer, 1986), and Ehri’s (1999) phases of word development all provide support for the notion that early word reading is the foundation for later reading growth.

According to automaticity theory (LaBerge & Samuels, 1974), students can only devote a limited amount of attention to any given cognitive task. Thus, if students are unable to decode
and recognize words quickly, they are unlikely to be able to pay attention to comprehension. On the contrary, as students become more proficient at decoding and learn more sight words, they become more fluent in word reading and do not need to spend as much attention to figure out the words. The accumulation of words that students can look at and quickly pronounce leads to interconnection formation in the brain. Automaticity enables quicker access to networks of word meanings and text engagement (Stahl & Nagy, 2006). In short, automatic word recognition allows students to pay more attention to higher-order processes such as comprehension, which in turn can impact later reading achievement (LaBerge & Samuels, 1974).

Additionally, Gough and Tunmer’s (1986) Simple View of Reading is another theoretical position developed for monolingual learners supporting the importance of an early instructional emphasis on word reading skills for later reading comprehension for NE-speakers. According to the Simple View of Reading, decoding and language comprehension predict reading comprehension. Difficulties in either decoding or language comprehension will lead to difficulties in reading comprehension. Strengths in one skill will not compensate for weaknesses in the other. Even if students are able to make sense of a string of words, if they are unable to decipher words in a text, they will not be able to comprehend the complete text.

Finally, Ehri’s (1999) phases of word development are often used to describe the process of learning to read for NE-speaking children. Ehri points to the importance of early word reading within the developmental process. According to Ehri, NE-speaking children develop reading sub-skills in a sequential manner. The early phases of learning to read focus heavily on sounds, letters, and words. In the first phase, young children develop phonological awareness, that is, the ability to hear, segment, and manipulate phonemes within words. In the second phase, children begin to acquire grapheme awareness and awareness of morphological and orthographic word
patterns. They use graphic and syntax cues in the context to decipher unfamiliar words. And in the third stage, children build on what they have learned in the previous stages, becoming fluent in reading words and being able to internalize strategies for reading unfamiliar words. The heavy focus on word reading in the first phases of learning to read points to its importance for later reading growth. Overall, the implication of the theoretical positions is that students should receive an emphasis on word reading early on.

**Asian LMs**

Although no formal theoretical position exists for LM reading development in general or Asian LM reading development specifically, theoretically, English word reading may be particularly challenging for Asian LMs due to the linguistic distance between an Asian language and English. Asian LMs may lack sufficient English exposure prior to formal schooling. During the emergent literacy period, NE-speakers and children who speak other native languages are exposed to and gain familiarity with their home language (Chall, 1996; Clay, 2001; Fitzgerald & Shanahan, 2000). It is well known that NE-speaking children grasp basic understandings about beginning and ending sounds and begin to acquire phonological segmenting and blending skills. The oral language to which NE-speaking students are exposed at home matches the reading language at school and serves as a base for learning to read in English. Thus, NE-speaking students can apply the acquired English language knowledge, especially English phonological awareness, when they start formal reading instruction at school. In contrast, Asian LM students are exposed to Asian languages at home, and they encounter a mismatch between their native oral language and reading at school. As a result, Asian LM students may need additional time to develop their English phonological skills. The added time needed to develop English
phonological awareness may lead to a lag in English reading ability growth, as compared to their NE-speaking peers.

There is a large linguistic distance between English and Asian oral and written languages. Asian languages and English differ greatly (1) in the actual sounds that comprise the languages and (2) in their linguistic structure – the way that meaning and sound are linked and how they are encoded in the writing system (Koda, 2007). Firstly, the ability to understand written language is tied to the ability to understand the sounds in spoken language, but the actual sounds and intonation patterns in Asian languages differ from those in English. Specifically, some English phonemes do not exist in Asian languages, making it hard to distinguish between certain sounds (Wang & Geva, 1999). For instance, the /v/ and /f/ consonant sounds do not exist in Korean. Another characteristic of some Asian languages is that they are tonal, signifying that pitches of sounds differentiate meanings. Whereas, in English, varying tones only signifies emotion and not change in meaning. The differences in sounds within each language system imply that it may take more time for Asian LMs to learn the English sound system.

Secondly, written English links phonology and meaning differently from the way that some Asian languages link phonology and meaning. Written English is an alphabetic system and uses grapheme-phoneme relationships to represent words in the writing system (Wang & Koda, 2005; Yamashita, 2013). English allows for the construction of larger units of words from letter-phoneme mappings (Wang & Koda, 2005; Yamashita, 2013). In contrast, many Asian languages do not allow for the construction of larger units of words from letter-phoneme mappings (Wang & Koda, 2005). Many Asian languages are logographies or syllabaries and use morphemes or syllables for words (Wang & Koda, 2005; Yamashita, 2013), with sound represented differently than in English. For instance, in Chinese (the largest Asian group in the U.S.), each syllable, or
character, is mapped onto a morpheme, and each morpheme conveys distinctive meanings (Wong, 2013). Words are usually comprised of two characters, each of which has both a meaning and a sound component (Wong, 2013).

Given the language differences in oral and written word representation, phonemic manipulation may weigh less heavily when learning to read Asian languages such as Chinese. Instead, Asian language reading proficiency may be more dependent on the ability to read holistic visual cues (Yamashita, 2013). The large differences between English and Asian oral and written languages suggest that Asian children could require additional time to develop English phonological skills that would support word recognition and later reading growth.

**Empirical Research Supports the Theoretical Position that Early Word Reading Matters for Longer-Term Reading Growth for Both NE-Speakers and LMs**

Ample research supports the importance of early-grades word reading ability for longer-term reading growth for both NE-speakers (Catts, Bridges, Little, & Tomblin, 2008; Cutuli et al., 2013; Fien, Park, Baker, Smith, Stoolmiller, & Kame’enui, 2010; Foster & Miller, 2007; Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Herbers, Cutuli, Supkoff, Heistad, Chan, Hinz, & Masten, 2012; Kieffer, 2011; Roberts, Mohammed, & Vaughn, 2010; Sparks, Patton, & Murdoch, 2014) and LMs (Gottardo & Mueller, 2009; Kieffer, 2011; Mancilla-Martinez & Lesaux, 2010; Nakamoto, Lindsey, & Manis, 2007; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Roberts, Mohammed, & Vaughn, 2010; Voight, Shinn, & Nation, 2012; Williamson, Fitzgerald, & Stenner, 2014). In the collection of studies on the question of the relationship between early word reading and long-term reading growth, the length of the studies ranged from 1 to 10 school years, and the grades represented were preschool through tenth grade.
All the studies included early-grades word reading and reading comprehension measures for examining growth.

Regardless of whether students were NE-speakers, LMs, were from homeless or mobile family backgrounds, or had language impairments, reading achievement trajectories reflected students’ initial word reading ability in the early elementary grades. More specifically, students who scored higher on initial word reading skills demonstrated greater reading growth than students who initially scored lower on reading skills. The findings support the notion that later reading development hinges upon earlier acquired word reading skills.

To date, only one US study (Roberts, Mohammed, & Vaughn, 2010) has been accomplished on the importance of early-grades word reading ability for longer-term reading growth for Asian LMs. Students were followed from kindergarten through fifth grade using a nationally representative sample. Asian LMs, as compared to NE-speakers, started out higher in reading ability, accelerated similarly, and performed higher than their NE-speaking peers through fifth grade. The finding supports the notion that early word reading ability is important for later reading development.

**What is Known About Reading Trajectories for NE-Speakers and LMs**

Knowledge of the general patterns of NE-speaking students’, heterogeneous LMs’, and homogeneous LMs’ reading growth would provide contextual information for the expected patterns of reading growth. Further, language minority students come from various language backgrounds, and examining homogeneous LM groups may be fruitful in disentangling language effects. The following sections summarize what is known about the reading growth patterns of NE-speakers, heterogeneous groups of LMs, Latino LMs, and Asian LMs.

**For NE-Speaking Students**
Examination of quantitative, multi-time-point studies revealed that in general, reading growth trends for NE-speaking students from elementary through middle school can be characterized by a quadratic curvilinear trend, where rapid growth occurs in the early elementary grades but decelerates in the late elementary grades into middle school (Catts, Bridges, Little, & Tomblin, 2008; Cutuli et al., 2013; Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Herbers, Cutuli, Supkoff, Heistad, Chan, Hinz, & Masten, 2012; Kieffer, 2008, 2011; Roberts, Mohammed, Vaughn, 2010; Nese et al., 2013; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Voight, Shinn, & Nation, 2012; Williamson, Fitzgerald, & Stenner, 2014). The curvilinear trend has held for students from highly varied backgrounds and abilities: typically-developing preschool, elementary, and middle school students (Catts, Bridges, Little, & Tomblin, 2008; Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Herbers, Cutuli, Supkoff, Heistad, Chan, Hinz, & Masten, 2012; Kieffer, 2008, 2011; Nese et al., 2013; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Voight, Shinn, & Nation, 2012) as well as those with language impairments (Catts, Bridges, Little, & Tomblin, 2008), those with reading disabilities (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996), and those from low SES or highly mobile family backgrounds (Cutuli et al., 2013; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Voight, Shinn, & Nation, 2012). Over the course of the growth periods investigated, measured reading subskills included word reading, reading comprehension, and reading achievement.

For LM Students (with Many Language Groups Combined) as Compared to NE-Speakers

It is difficult to state confident conclusions about the growth trajectory patterns of LM students (with many language groups combined) as compared to NE-speakers because only two sets of researchers, in four studies, have accomplished such a comparison (Kieffer, 2008, 2010,
Two of the four studies followed students from kindergarten through eighth grade, while the other two followed students in the elementary grades. However, two tentative conclusions can be stated.

First, SES may be as important as language status for explaining similarities and/or differences in the comparison of LM and NE-student reading growth. Low SES was associated with a lag in reading growth, and the impact of SES increased as students moved into higher grades. In one study, a heterogeneous LM group and their NE-speaking peers from similarly low SES backgrounds were compared from first to fourth grade (Kieffer & Vukovic, 2013). The two groups were similar to each other as well as near national norms for letter-word identification and phonological awareness skills in first grade. By fourth grade, LMs lagged behind the NE-speakers in several areas, namely, vocabulary and oral comprehension skills, but even so, both groups were below national norms, indicating that language status may also play a role in LM reading growth.

Another researcher first followed a group of LM and NE-speaking students from kindergarten through fifth grade, and then in two later studies, followed a subset of students from the same dataset through eighth grade (Kieffer, 2008, 2011, 2012). Low SES was again associated with lower initial reading ability. In these studies, low SES was also associated with slower growth rates as compared to high SES. But when SES was taken into account statistically, LMs showed a higher rate of reading growth and reading performance as compared to NE-speakers. Taken together, the main implications of the studies were that: (1) SES is a moderator of heterogeneous LM reading growth and (2) SES needs to be taken into account statistically when examining reading trajectories over time.
Second, differences in initial oral English proficiency impacted LM students’ (from many language backgrounds) reading development. First-grade LM students who were initially fluent in English in kindergarten caught up with NE-speakers by first grade and maintained similar levels at the national average, while those who were not initially fluent were unable to catch up (Kieffer, 2011). Even though the students with initially lower English fluency demonstrated slightly faster growth rates, they remained below the national average at all time points.

**For Homogeneous Subgroups of LM Students**

Collectively, LMs speak several hundred different languages and vary widely in their ethnic and racial backgrounds (Wolf, Guzman-Orth, & Hauck, 2014). On average, English-proficient students of different races and ethnicities exhibit different reading trajectories (Fryer & Levitt, 2004), and in the same vein, different subgroups of LMs may take on different reading trajectories. Thus, reading development for subgroups of LMs could be different.

Nearly all of the studies that included homogeneous subgroups of LMs focused on native-Spanish-speaking LMs (Fitzgerald, Amendum, & Guthrie, 2008; Lesaux, Crosson, Kieffer, & Pierce, 2010; Mancilla-Martinez & Lesaux, 2010; Manis, Lindsey, & Bailey, 2004; Nakamoto, Lindsey, & Manis, 2007; Roberts, Mohammed, & Vaughn, 2010) while only one study to date exists of Asian language-speaking LMs’ growth (Roberts, Mohammed, & Vaughn, 2010). The following sections synthesize research that specifically examined Latino and Asian LM reading development.

**Latinos.** On the whole, growth for lower-level (e.g., letter identification and word recognition) English reading skills developed similarly for Latino LM and NE-speaking students, but findings for higher level (e.g., text meaning construction and inference-making) skills growth
were mixed. As well, where SES and initial oral English ability were also studied, the results were inconclusive about their impact on Latino English reading growth.

First, in five studies, a large amount of lower-level reading skill growth (reading words in isolation, phonological awareness, and decoding pseudowords) occurred during kindergarten through second grades (Fitzgerald, Amendum, & Guthrie, 2008; Mancilla-Martinez & Lesaux, 2010; Manis, Lindsey, & Bailey, 2004; Nakamoto, Lindsey, & Manis, 2007; Roberts, Mohammed, & Vaughn, 2010). In four of the studies, native-Spanish-speaking LMs began kindergarten or first grade with average level sound-and-word-level skills and remained in the average range (Mancilla-Martinez & Lesaux, 2010; Manis, Lindsey, & Bailey, 2004; Nakamoto, Lindsey, & Manis, 2007; Roberts, Mohammed, & Vaughn, 2010). In the fifth study, native-Spanish-speaking LMs began first or second grade with lower reading levels than their NE-speaking peers but performed at similar levels to NE-speakers on sound-and-word-level skills by the end of second grade or third grade (Fitzgerald, Amendum, & Guthrie, 2008). One study started in preschool (Mancilla-Martinez & Lesaux, 2010), two started in kindergarten (Manis, Lindsey, & Bailey, 2004; Roberts, Mohammed, & Vaughn, 2010), one (Nakamoto, Lindsey, & Manis, 2007) started in first grade, and one (Fitzgerald, Amendum, & Guthrie, 2008) followed two cohorts of students, from first into second grade and from second into third grade. Three of the studies (Mancilla-Martinez & Lesaux, 2010; Nakamoto, Lindsey, & Manis, 2007; Roberts, Mohammed, & Vaughn, 2010) followed students through the end of elementary school.

Although the length of the five studies varied, ranging from one to seven years, as well as the grade levels, ranging from preschool to sixth grade, the overall finding that a considerable amount of sounds and letter-sounds growth occurred was consistent across the studies.
Moreover, the patterns of sound and word-level skills development were consistent even when measured using several different measures of reading skills (phonological awareness, letter and word reading, word automaticity, pseudoword reading) or whether measures came from standardized and normed assessments or researcher-created curriculum-based measures.

Second, findings in six studies (Fitzgerald, Amendum, & Guthrie, 2008; Lesaux, Crosson, Kieffer, & Pierce, 2010; Mancilla-Martinez & Lesaux, 2010; Manis, Lindsey, & Bailey, 2004; Nakamoto, Lindsey, & Manis, 2007; Roberts, Mohammed, & Vaughn, 2010) were mixed regarding Latino LMs’ higher-level reading skill growth. Whereas in three studies, early elementary (Mancilla-Martinez & Lesaux, 2010; Nakamoto, Lindsey, & Manis, 2007) and late elementary Latino LMs (Lesaux, Crosson, Kieffer, & Pierce, 2010) demonstrated higher-level reading skills consistently below grade level, Latino LMs in two other studies (Manis, Lindsey, & Bailey, 2004; Roberts, Mohammed, & Vaughn, 2010) demonstrated higher level reading skills at grade-level. In the sixth study, Latino LMs started out with skills below grade level but experienced rapid growth over one school year, to end with skills above grade level (Fitzgerald, Amendum, & Guthrie, 2008). Perhaps the type of measure used could be attributed to the difference. Whereas Fitzgerald, Amendum, and Guthrie (2008) examined instructional reading level growth, the other studies examined passage comprehension, reading ability, or reading comprehension.

In the sixth study, which only included upper elementary Latino LMs, as well as three studies mentioned in the previous paragraph (in which upper elementary grades were included), Latino LM students demonstrated a lag in reading ability (as compared to NE-speakers and/or
national norms) that was persistent in the upper elementary grades (Lesaux, Crosson, Kieffer, Pierce, 2010; Mancilla-Martinez & Lesaux, 2010; Nakamoto, Lindsey, & Manis, 2007; Roberts, Mohammed, & Vaughn, 2010).

Third, there was very little evidence about the impact of SES on Latino LMs’ reading growth. One reason for the lack of ability to make a confident conclusion is that the prevalence of native-Spanish-speaking students comes from low SES households (Roberts, Mohammed, & Vaughn, 2010), and in five of the six studies reviewed, students came from low-SES backgrounds (Fitzgerald, Amendum, & Guthrie, 2008; Lesaux, Crosson, Kieffer, & Pierce, 2010; Mancilla-Martinez & Lesaux, 2010; Manis, Lindsey, & Bailey, 2004; Nakamoto, Lindsey, & Manis, 2007). With little or no variation in SES, the question of its impact on reading growth cannot be addressed.

In one study, the impact of SES on reading achievement was examined (Roberts, Mohammed, & Vaughn, 2010). The result was that SES moderated English reading growth such that SES may have mattered as much as language status. Prior to controlling for SES, reading achievement trajectories of NE-speakers were dissimilar to Spanish-speaking LMs. Spanish-speaking LMs started school less ready to read and made less progress over time. However, in the same study when SES was controlled, the differences in achievement patterns were minimized, thus supporting the contention that SES moderated reading growth for Latino LMs.

Fourth, the impact of initial oral English ability on Latinos’ English reading growth was also not sufficiently examined to make a firm conclusion. Three of the six studies only included students with initially limited or below grade level oral English proficiency (Mancilla-Martinez & Lesaux, 2010; Manis, Lindsey, & Bailey, 2004; Nakamoto, Lindsey, & Manis, 2007) and one of the six studies only included students who had attained a pre-established cutscore on an oral
English screener at the start of the study (Roberts, Mohammed, & Vaughn, 2010). In these four studies, the lack of variation in oral English proficiency precluded the ability to study its impact on reading ability growth. In the two other studies (Fitzgerald, Amendum, & Guthrie, 2008; Lesaux, Crosson, Kieffer, & Pierce, 2010), there was a mixed SES sample. However, oral English was not included as a moderator, so its impact on reading growth could not be evaluated.

**Asians.** More research is needed to draw a conclusion about the English reading growth pattern for Asian LMs in comparison to that of NE speakers and also to draw a conclusion about the potential impact of SES. To my knowledge, only one study involved Asian LM English reading growth (Roberts, Mohammed, & Vaughn, 2010). Students were followed from kindergarten through fifth grade using a nationally representative sample. The Asian LMs attained a pre-established cutscore for oral English proficiency by the spring of kindergarten. For the Asian LMs, the slope and deceleration reading growth pattern but not the intercept appeared to be similar to those for NE-speakers. Asian LMs actually started out statistically higher in reading but progressed at a similar rate as NE-speakers throughout the study. In the same study, when SES was accounted for, the intercept difference between the two groups was no longer significantly different. The conclusion was that Asian LMs, as compared to NE-speakers, started out higher in reading ability, accelerated similarly, and performed higher than their NE-speaking peers through fifth grade. While the study results were indicative, more research is needed to determine the replicability of the study for other samples.

**Reading Instructional Emphases and Amount of Reading Instruction for Beginning Readers May Matter for NE-Speakers, LMs in General, and Asian LMs**

In the next sections, I first describe the two broad reading instructional emphases in the US, then provide a summary of the shifts in historical early reading instructional emphasis, and
finally present the findings from existing US studies that examined reading instructional emphasis and reading growth. The research findings will be broken out by language group.

**Description of Type of Early-Grades Reading Instructional Emphasis**

As early as the 1960s, researchers have identified ways to characterize emphases in reading instruction. Several characterizations are: learning letter-sound correspondences, learning correspondences between spelling patterns and oral word patterns, learning whole words, and learning words in meaningful context (Chall, 1967; Popp, 1975). The four characterizations can be broadly represented by: (1) a sounds and letter-sound relationships instructional emphasis and (2) a meaning construction instructional emphasis (Chall, 1967).

In general, a sounds and letter-sound reading instruction emphasis focuses on teaching sounds and letter-sound relationships in the beginning stages of learning to read. Proponents believe that code-breaking and word-recognition should be taught systematically and explicitly (Xue & Meisels, 2004). Activities that follow a sounds and letter-sound instructional emphasis include learning the names of letters, writing the letters, phonics, conventions of print, alphabet and letter recognition, matching letters to sounds, writing one’s own name, and rhyming words and word families (cf. Sonnenschein, Stapleton, & Benson, 2010).

On the other hand, in general, a meaning construction reading instructional emphasis focuses on the construction of meaning from the text, most often through authentic reading activities. Proponents believe that the process of learning to read is not comprised of skills learned in a sequence but instead is a natural process that resembles learning how to speak (Xue & Meisels, 2004). Activities that follow a meaning construction instructional emphasis include retelling stories, identifying the main idea and parts of a story, making predictions based on text,
using context cues for comprehension, and learning vocabulary (cf. Sonnenschein, Stapleton, & Benson, 2010).

There has been a history of disagreement about whether one of the two broad characterizations is a more effective approach in general for teaching students to read (Fitzgerald, Elmore, Relyea-Kim, Hiebert, & Stenner, 2016; Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004). Since the 1960s, each decade has generally been characterized by changing emphases of beginning reading instruction, reflecting changing beliefs of educators and researchers (Anderson, Hiebert, Scott, Wilkinson, 1985; Fitzgerald, Elmore, Relyea-Kim, Hiebert, & Stenner, 2016; Hiebert, 2014). Instruction in the 60s had an emphasis on meanings in texts and less of a focus on sound and symbol relationships while instruction in the 70s generally had a focus on phonics and use of phonics to teach new words (Chall, 1996). In the 80s, instruction shifted back towards a meaning-focus. While the 90s started out with an emphasis on whole language and meaning and development of reading skills through authentic texts, with attention on integration and application of reading strategies in the context of authentic texts. The 2000s could be characterized by balanced reading but with more of a focus on decoding, and since the 2010s, the Common Core State Standards Initiative has been a driving force, emphasizing many aspects of reading, including decoding and meaning construction.

In sum, two characterizations of early grades reading instructional emphases are sounds and sound-letter emphasis and meaning emphasis. While different emphases have been associated with different decades of the last half century, some contend that the issue is not whether letter-sounds relationships and meaning construction should be taught, but rather, the issue is the degree to which they are emphasized in the classroom (Anderson, Hiebert, Scott, & Wilkinson, 1985).
Research on Early Reading Instructional Emphasis and Overall Amount of Reading Instruction on Longer-Term Reading Growth

The next sections summarize empirical findings about the effectiveness of the two instructional emphases on reading growth, separated by language status, first for NE-speakers and second for LMs. Additionally, results of research on the amount of reading instruction are presented. The research in the following sections almost exclusively focused on NE-speakers, with only one study including a heterogeneous LM group (Vadasy & Sanders, 2012). No researchers have specifically investigated the impact of different early grades reading instructional emphasis on Asian LMs’ reading growth.

The following sections draw from six recent US studies (the only studies accomplished to date) examining the relationship between early elementary reading instructional emphasis and students’ reading growth (Connor, Morrison, & Katch, 2004; Connor, Morrison, & Petrella, 2004; Foorman, Francis, Fletcher, & Schatchneider, 1998; Sonnenschein, Stapleton, & Benson, 2010; Vadasy & Sanders, 2012; Xue & Meisels, 2004). All the studies included NE-speakers, and one study also included a heterogeneous (by native language) group of LMs (Vadasy & Sanders, 2012). Tables 2.1 to 2.3 show all of the studies broken out by which instructional emphasis was examined and provide a summary of key characteristics of the studies. Three of the studies followed students for one school year (kindergarten, first, second, or third grade) (Connor, Morrison, & Katch, 2004; Connor, Morrison, & Petrella, 2004; Foorman, Francis, Fletcher, & Schatchneider, 1998; Xue & Meisels, 2004), one followed students from first grade through second grade (Vadasy & Sanders, 2012), and one followed students throughout elementary school (Sonnenschein, Stapleton, & Benson, 2010). Three of the studies were one-year studies, two were two-year studies, and one was a six-year study. All of the studies were in
primary grades only. The studies assessed at least one of the following to measure reading growth: word recognition, letter and sound identification, vocabulary, and comprehension.

In the following subsections, studies will be ordered according to the instructional emphasis/es that was/were included in the study. In two studies (Connor, Morrison, & Petrella, 2004; Sonnenschein, Stapleton, & Benson, 2010), only meaning construction instruction was examined. In another study (Foorman, Francis, Fletcher, & Schatschneider, 1998), sounds and letter-sounds instruction was directly compared to meaning construction instruction. And in four other studies (Connor, Morrison, & Katch, 2004; Sonnenschein, Stapleton, & Benson, 2010; Vadas & Sanders, 2012; Xue & Meisels, 2004), the effectiveness of the extent of sounds and letter-sounds instruction and the extent of meaning construction instruction on reading growth was examined. Also, two of the studies examined the relationship between overall amount of reading instruction and students’ reading growth (the only studies accomplished to date) (Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004).

The studies varied in design—whether they were intervention studies or investigations of naturally occurring situations. In one study (Foorman, Francis, Fletcher, & Schatschneider, 1998), students were assigned to sounds and letter-sounds or meaning construction instructional groups. In the other studies (Connor, Morrison, & Katch, 2004; Connor, Morrison, & Petrella, 2004; Sonnenschein, Stapleton, & Benson, 2010; Vadas & Sanders, 2012; Xue & Meisels, 2004), the researchers studied the extent of reading instructional emphases that occurred naturally in the classrooms.

Tables 2.1 to 2.3 can serve as an organizer for the following sections. First, results of two studies of meaning construction alone are presented (for NE-speakers). Second, the results from the one study that directly compared the effectiveness of sounds and letter-sounds emphasis and
meaning are presented (for NE-speakers). Third, results from four studies that examined the effectiveness of the extent of sounds and letter-sound emphasis and meaning construction emphasis, without direct comparison of the two, are presented (separated by studies of NE-speakers and LMs). Finally, results of two studies are discussed, where the amount of reading instruction was related to students’ reading growth (for NE-speakers).

**Early instructional emphasis and overall amount of reading instruction: NE-speakers.** Overall, there is an insufficient amount of research for NE-speakers and contradictory findings in the limited existing research to support the superiority of either sounds and letter-sounds instructional emphasis or meaning construction emphasis. Part of the difficulty in determining the more effective instructional emphasis stems from different researchers studying students with different initial reading ability. However, three very tentative statements can be made about early instructional emphasis for NE-speakers’ reading growth and will be expanded in selected sections below. The tentative statements are: (1) An increase in sounds and letter-sounds instructional emphasis may be more effective for reading growth than an increase in meaning instructional emphasis for NE-speaking readers in kindergarten through second grade with initially low reading ability, (2) an increase in meaning instruction instructional emphasis may be more effective for reading growth than an increase in sounds and letter-sounds instructional emphasis for NE-speaking readers in kindergarten through second grade with initially higher reading ability, and (3) a greater amount of overall reading instruction may be effective for reading growth for NE-speakers from kindergarten through second grade.

**Beginning NE-speaking readers: Studies that only examined meaning construction emphasis.** As shown in Table 2.1, the two studies that examined the effectiveness of meaning construction instruction on its own (Connor, Morrison, & Petrella, 2004; Sonnenschein,
Stapleton, & Benson, 2010) indicated contrasting results. While meaning construction instruction was effective for third graders’ reading growth in one study (Connor, Morrison, & Petrella, 2004), it was ineffective for a group of third graders in another study (Sonnenschein, Stapleton, & Benson, 2010). Reasons for the difference were not apparent.

**Beginning NE-speaking readers: Study that directly compared sounds and letter-sounds instruction to meaning construction instruction.** As shown in Table 2.2, only one study (Foorman, Francis, Fletcher, & Schatschneider, 1998) directly compared the effectiveness of the instructional emphases. The result was that on average, a sounds and letter-sounds instruction was more effective than meaning construction, especially for lower ability primary grade students.

**Beginning NE-speaking readers: Studies that examined the extent of sounds and letter-sounds and meaning construction emphases.** Studies produced inconclusive results about whether an increase in a particular instructional emphasis as compared to a second emphasis was associated with more reading growth for NE-speakers. As shown in Table 2.3, from the four sets of studies that compared the extent to which the two instructional emphases were provided, different conclusions were drawn. These studies are different from the Foorman, Francis, Fletcher, and Schatschneider (1998) study discussed in the immediately preceding section because in the present studies the researchers examined the amounts of instructional emphasis (as reported by teachers) whereas in the preceding section, the two emphases were studied in the “absolute” sense—variability in amount of emphasis wasn’t studied.

From the four sets of studies that examined the two instructional emphases, two sets of researchers found that an increased emphasis on sounds and letter-sounds relationships was more effective than an increased emphasis on meaning construction for a specific group of beginning
NE-speaking readers, namely, initially low-scorers on reading ability. So the first tentative statement that can be made is that an increase in sounds and letter-sounds instructional emphasis may be more effective than an increase in meaning instructional emphasis for reading growth for kindergarten through second grade NE-speaking students with lower initial reading ability.

However, two sets of researchers concluded that an increased emphasis on meaning construction was more effective than an increased emphasis on sounds and letter-sounds, on average, for beginning NE-speakers who initially scored high on reading ability. So the second tentative statement that can be made is that an increase in meaning construction instructional emphasis may be more effective than an increase in sounds and letter-sounds instruction for reading growth for kindergarten through second grade NE-speaking students with higher initial reading ability.

**Importance of Overall Amount of Reading Instruction for NE-speakers.** Of the six studies, only two studies examined the relationship between overall amount of reading instruction and NE-speakers’ reading growth (Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004). No other studies were found on the amount of early reading instruction in relation to reading growth. The overall amount of kindergarten and first grade reading instruction positively impacted reading growth for kindergarten (Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004) through third graders (Sonnenschein, Stapleton, & Benson, 2010). While the studies are indicative, more studies are needed to determine the replicability of the findings across different samples. The third tentative statement that can be made is that a greater amount of overall reading instruction may be effective for reading growth for NE-speakers from kindergarten through second grade.
**Early instructional emphasis for heterogeneous LM speakers.** With only one study on the early reading instructional emphasis involving heterogeneous LM speakers from which to draw, no firm conclusion can be made about which reading instructional emphasis would be more effective for heterogeneous LMs’ reading growth.

As shown in Table 2.2, the effectiveness of the particular reading instructional emphasis depended on the LM students’ grade level. On average, an increased amount of *first grade* sounds and letter-sound instruction was more effective than an increased amount of meaning construction instruction for first-grade LM reading growth at the end of first grade (Vadasy & Sanders, 2012). However, an increased amount of *second grade* meaning instruction was more effective than an increased amount of sounds and letter-sounds instruction for end of second grade reading growth (Vadasy & Sanders, 2012). Taken together, it appeared that the effectiveness of the type of early reading instructional emphasis varied according to grade level.

Though the findings may be indicative, to date only one study on LMs has been conducted and only for a heterogeneous group. Thus, no conclusive statement can be made for LMs in general, and more pointedly, for the present study, for Asian LMs in particular.

**Summary for Early Reading Instructional Emphases**

In sum, two ways to characterize emphases in early reading instruction are instruction that emphasizes sounds and letter-sound relationships and instruction that emphasizes meaning construction. There has been a history of disagreement about the most effective approach for teaching beginning students to read, whether NE-speakers or LMs.

From the existing studies on the effectiveness of early reading instructional emphasis on reading growth, it is still unclear which emphasis is more effective, for NE-speakers and for LMs. However, three very tentative statements might be made. (1) An increase in sounds and
letter-sounds instructional emphasis may be more effective for reading growth than an increase in meaning instructional emphasis for NE-speaking readers in kindergarten through second grade with initially low reading ability. (2) An increase in meaning instructional emphasis may be more effective for reading growth than an increase in sounds and letter-sounds instructional emphasis for NE-speaking readers in kindergarten through second grade with initially higher reading ability. (3) A greater amount of sounds instruction and meaning instruction may be better for reading growth for NE-speakers from kindergarten through second grade. No statements can be made for the effectiveness of reading instructional emphasis on long-term reading growth or reading growth beyond elementary school. Additionally, no statements can be made for heterogeneous groups of LMs or specifically for Asian LMs.

**Overall Chapter Summary**

Automaticity theory, the Simple View of Reading, and Ehri’s phases of word development for NE-speakers point to the importance of early word reading for later reading growth. There are no formal theories on the importance of early word reading that specifically pertain to LMs in general or Asian LMs in particular, but early word reading may be important for Asian LMs as well. Given the potential lack of exposure to English prior to formal schooling and linguistic distance between Asian languages and English, English word reading may be more challenging for Asian LMs than for NE-speakers.

What is known about the reading trajectories for NE-speaking students is that reading growth trends from elementary through middle school can be characterized by a curvilinear trend, where rapid growth occurs in the early elementary grades but decelerates in the late elementary grades into middle school.
However, no generalized statement about reading trajectories for LMs can be made because different researchers studied different groups of LMs and came to different conclusions. As well, different researchers examined SES and/or initial oral English proficiency as moderators. In a few studies, controlling for SES and/or initial oral English proficiency minimized differences between NE-speakers’ and heterogeneous groups of LMs’ reading growth patterns. But in another few studies, controlling for SES and/or initial oral English proficiency did not change the heterogeneous LM reading growth patterns as compared to NE-speakers.

Also, it is clear that virtually nothing is known about the reading development of Asian LMs, in particular over fairly long spans of time. To date, only one study has been accomplished on Asian LMs’ reading development and, in that study, students were not followed into middle grades. The slope and deceleration reading growth patterns for Asian LMs in that study that extended through fifth grade were similar to those of NE-speakers. In short, there is insufficient evidence to draw a conclusion about long-term reading growth.

Finally, it is still unclear which reading instructional emphasis is more effective for NE-speakers and/or for LMs. Some limited research evidence suggests that an increase in early reading instruction focusing on sounds and letter-sounds relationships is more important and beneficial for low ability NE-speakers’ reading growth than meaning construction instruction. However, other limited research evidence suggests that an increase in early reading instruction focusing on meaning construction is more important and beneficial for high ability NE-speakers’ reading growth. Moreover, there is also limited evidence that a greater amount of overall early grades instructional emphasis is effective for reading ability growth.

It is important to note that of the studies accomplished to date on the impact of early reading instructional emphasis on reading growth, only one study extended beyond one or two
years. In addition, none of the studies followed students beyond elementary school. Importantly, only one study examined the impact of early reading instructional emphasis on LMs’ reading growth. And no studies focused specifically on Asian LM reading growth over an extended time period. The present study examines the impact of early reading instructional emphasis on NE-speakers’ and Asian LMs’ reading growth through eighth grade and is a first step to address the research gap.
CHAPTER 3

 METHODOLOGY

In the following section, the methodology of the study is described. First, the study design is detailed. Then, the data sources, sample, variables, their reliability and validity estimates, and analysis plan are described.

Design

The nationally representative sample was comprised of 6,715 native-English-speaking kindergarten students and 242 Asian LM kindergarteners followed into eighth grade. Nine-year longitudinal data from the Early Childhood Longitudinal Study – Kindergarten Class of 1998-1999 (ECLS-K: 1998-1999) was utilized. Base-year data were collected in the spring of kindergarten, during the 1998-1999 school year, and four additional waves of data were collected in the spring of first, third, fifth, and eighth grades (resulting in five time points).

The present study drew from three data sources from the ECLS-K: (1) student English reading assessment (spring of kindergarten, first, third, fifth, and eighth grades) that provided a measure of Reading Ability, (2) parent interview (fall of kindergarten), and (3) teacher questionnaire (spring of kindergarten and first grade). Five variables were used as they existed in the ECLS-K, and four new variables were created from items provided in the ECLS-K.

The nine variables were as follows:

(1) To represent reading instructional emphasis/amount, there were three independent variables (the first two were created from items in the teacher
questionnaire, and the third was provided in the questionnaire)—(a) Extent to Which Sounds and Letter-Sound Relationships are Emphasized, (b) Extent to Which Meaning Construction is Emphasized, and (c) Overall Amount of Reading Instruction. Since three variables represented reading instructional emphasis/amount for kindergarten and for first grade, there was a total of six variables.

(2) Language Status (either LM Asian or native-English speaker as provided in the parent questionnaire), used as a moderator.

(3) Reading Ability (theta provided in the ECLS-K database, measured in the spring of kindergarten, first, third, fifth, and eighth grades), used as a dependent variable.

(4) Covariate: SES (provided from the parent questionnaire).

The analysis was performed using Hierarchical Linear Modeling (HLM).

**Data Source: The ECLS-K**

Data for the study originated from the ECLS-K (U.S. Department of Education, 2004), a multisource, multimethod longitudinal study that was conducted by Westat, sponsored by the U.S. Department of Education, National Center for Education Statistics (NCES), and supported by the Survey Research Center and the School of Education at the University of Michigan and Educational Testing Services (ETS). The purposes of the study were four-fold: (1) to study achievement in the elementary years, (2) to assess the developmental status of children in the United States at the beginning of formal schooling and important points during the elementary years, (3) to examine cross-sectionally, the nature and quality of kindergarten programs in the United States, and (4) to study the intersection of family, preschool, and school experiences and
developmental status upon school entry and progress during kindergarten and early elementary years. Thus, the ECLS-K provides comprehensive data from which to analyze a combination of family, school, and individual variables (e.g. SES and reading instruction) and their relationship to elementary and middle grades academic performance. The ECLS-K also sought to represent a diverse group of kindergarten students and included a substantial number of language minority students, allowing for possibilities to investigate the educational developmental patterns and outcomes for students who come from different home backgrounds.

**ECLS-K Data Collection Procedures**

The ECLS-K field staff had prior experience serving as field supervisors on the National Assessment of Educational Progress (NAEP), Trends in International Mathematics and Science Study (TIMSS), and the Panel Study of Income Dynamics – Child Supplement and Monitoring the Future Study. Most of the staff were retired teachers, former educators, those experienced in conducting assessments, or those working in schools or with school-age children. Staff received home study training on the study design and then participated in in-person training sessions prior to fall data collection, with separate sessions for recruiting staff, field supervisors, and assessors. In the spring, returning staff and new staff received different training. Field staff were divided into 100 work areas to collect data, with each team comprising of one field supervisor and three assessors. Each team collected all the data in their work areas, including direct child assessments, parent interviews, and teacher questionnaires.

Child data were conducted through personal interviewing (CAPI). Parent data were conducted through computer-assisted telephone interviewing (CATI) or CAPI. Self-administered questionnaires were completed by teachers. The specific instruments for the information gleaned from the students, parents, and teachers are detailed in the following sections.
Present Study Instruments and their ECLS-K Sources

In the present section, the instruments and the procedures used to administer them in the ECLS-K project are described. In a later section, the variables extracted or created from the instruments, along with reliabilities and validity, are described.

Reading Assessment

Background and content. The ECLS-K test developers, psychometricians, and curriculum specialists sought to create a pool of items that was appropriate for elementary as well as middle grades students. They used the NAEP Reading Framework as a guide. The NAEP Framework included four categories of reading comprehension (initial understanding, developing interpretation, personal reflection and response, and demonstrating a critical stance) targeted toward upper elementary students and beyond. Items were drawn from published large-scale assessments such as the NAEP and the National Education Longitudinal Study (NELS).

On the ECLS-K reading assessment, there were 10 hierarchical reading proficiency levels that would be applicable for students from kindergarten through eighth grade. These levels were: Letter Recognition, Beginning Sounds, Ending Sounds, Sight Words, Comprehension of Words in Context, Literal Inference, Extrapolation, Evaluation of Author’s Craft, Evaluating Nonfiction, and Evaluating Complex Syntax. The reading assessment attempted to reflect age-appropriate skills, so the kindergarten and first grade levels targeted letter and word reading skills (e.g. letter recognition, phoneme recognition, and decoding) while the items at higher levels targeted increasingly difficult comprehension skills (e.g. initial understanding, developing interpretation, personal reflection and response, developing critical stance, and evaluating complex syntax). Table 3.1 lists the skills by proficiency level and which levels were targeted for inclusion at the different grade levels.
Also, items on the assessment followed grade-appropriate formats; kindergarten and first grade items consisted of short sentences while passages became increasingly long and more complex for the items at the higher levels. The assessment contained multiple choice and open-ended items, and similarly-formatted items were grouped in order of increasing difficulty.

**Oral English screener.** Prior to conducting the reading assessment, field staff used school records or teacher reports to identify students who came from a non-English background to determine if they needed to be screened on English oral-proficiency. The purpose of the oral-proficiency screener was to determine if students had sufficient knowledge of English to be able to understand the instructions for the English reading assessment.

The oral-proficiency assessment consisted of three tasks from the PreLAS 2000 (Duncan & De Avila, 1998) that assessed listening comprehension, vocabulary, and ability to understand and produce language. The possible scores ranged from 0 to 60. Based on the results of a national norming sample for the PreLAS, the authors of the PreLAS recommended a cut score of 37. Students who attained the cut score were assumed to be proficient in English, were given the English reading assessment, and were not reassessed on the PreLAS at subsequent time points. Those who did not attain the cut score on the PreLAS were not given the English reading assessment at this initial time point but were reassessed on oral-English at the next time point and then given the English reading assessment if they attained the cutscore for oral-English. All students in the present study sample passed the oral-English proficiency test by the spring of kindergarten. In the spring of kindergarten, the split-half reliability coefficient for the English PreLAS 2000 was .96, and the alpha coefficient was in the .80s and .90s for each of the three subtests (Rock & Pollack, 2002). (The exact coefficients for the three subtests were not provided.)
Procedure. The Item Response Theory (IRT) reading assessment was administered as a two-stage adaptive assessment. The adaptive format enabled accuracy of measurement to be maximized by avoiding floor and ceiling effects and administration time to be minimized. The assessment was measured on a developmental scale so that achievement over time could be examined. For this reason, the assessments were designed to contain overlapping items across at least two rounds of data collection, which could be placed on the same scale even as additional items that reflected students’ growth were added. Items at each grade level were intended to extend the scale.

Students were first given a 12- to 20-item routing section with a wide range of difficulty, which determined the second-stage form received. The second-stage form for kindergarten through fifth grade had low, middle, and high difficulty options, and the form for eighth grade had low and high difficulty options. Students were given the form that contained questions most appropriate to their current ability level, based on the pattern of right and wrong responses in the routing section. Students were not exposed to all test items at every test point.

Items in each level (see levels in Table 3.1) were presented in clusters of four items. At least three of the four items in a level had to be passed in order for students to move to the next level. Student response-patterns were assumed to follow a Guttman model; a student passing a particular proficiency level was assumed to have passed all the lower levels, and a student who failed a particular proficiency level was assumed not to have mastered higher levels.

The students were assessed individually in the school setting by the field staff assessors. Assessors inputted student responses into a laptop. Assessments were untimed, and it took approximately 50 to 70 minutes per student per assessment. Kindergarten and first grade assessment items appeared on an easel and students pointed to their responses or responded
orally and assessors manually entered students’ responses into a laptop computer. Third, fifth, and eighth grade assessment items appeared in a paper-booklet. In third and fifth grade, questions were read by the assessor.

**Scaling and Theta score.** The primary score obtained was Reading Ability (theta). Theta scores were developed from item response theory in order to vertically link scores across the waves of data using IRT procedures. Item Response Theory used the pattern of responses in the administered items, along with the difficulty, discriminating ability, and "guess-ability" of each item, to put examinees on a point (theta) on a continuous ability scale and establish a common scale. In this way, scores could be compared, regardless of the questions administered. The theta represented an estimate of a student’s reading ability and could be used to predict the number of items a student would have correctly answered if she/he had taken all of the questions on both sections of the reading assessment. The theta scores were probabilities of correct responses and not integers. The scaled scores were the theta scores summed over all items in the pool. The potential range for the Reading Ability scaled scores was 0 to 212.

**Parent or Guardian Interview**

The parent interview was conducted primarily in English, but efforts were made to accommodate those who spoke other languages. For instance, Spanish-English bilingual interviewers were trained, and the parent questionnaire was translated into Spanish, Chinese, Lakota, and Hmong. Parents completed the interview in the fall when students were in kindergarten. Interviewers phoned parents and conducted interviews, inputting answers directly into a computer. The interviews lasted about 45-50 minutes. If the family did not have a telephone or the parent did not agree to do a phone interview, the interview was conducted in person. Parents were asked to report information on the students’ home language. They were
asked, “Is any language other than English spoken in your home,” “Is English also spoken in your home,” and “What is the primary language spoken in your home.” Parents also provided information about students’ gender and their race/ethnicity. The categories to choose from were White non-Hispanic, Black/African-American non-Hispanic, Hispanic, Asian, or Other. Additionally, parents were asked to provide information regarding their household income, father’s (or male guardian’s) education, mother’s (or female guardian’s) education, father’s occupational prestige, and mother’s occupational prestige.

**Teacher Questionnaire**

Several questions on the teacher questionnaire provided information regarding the reading instruction that kindergartners and first graders received as well as the teachers’ educational background. The following were questions used for the present study to create two of the three present study variables (Extent to Which Sounds and Letter-Sounds are Emphasized and Extent to Which Meaning Construction is Emphasized) that reflected instructional emphases in kindergarten and first grade.

In the spring of 1999 and 2000, kindergarten and first grade teachers, respectively, were asked to rate the frequency with which students in their classroom engaged in various reading activities. Teachers responded to a list of items split into two sets (shown in Tables 3.5 and 3.6), Eight items pertained to sounds and letter-sound activities, with three items in Set A and five items in Set B. Five items pertained to meaning construction activities, with one item in Set A and four items in Set B. Set A addressed the question, “How often do children in this class work on each of the following reading and language arts activities.” Set B addressed the question, “For this school year as a whole, please indicate how often each of the following reading and language arts skills is taught in your class(es).” The rating choices for Set A items were “never,”
“once a month or less,” “two or three times a month,” “once or twice a week,” “three or four times a week,” or “daily.” The choices for Set B were “taught at a higher grade” and “children should already know,” in addition to the choices for Set A. The same items were included in the kindergarten and first grade questionnaires.

The following question from the teacher questionnaire was used as it existed for the third variable in the present study that reflected instructional emphasis/amount in kindergarten and first grade. Kindergarten and first grade teachers were asked to rate the overall frequency with which students in their classroom engaged in reading and language arts activities. The question that they responded to was, “How often and how much time do children in your class(es) usually work on lessons or projects in the following general topic areas, whether as a whole class, in small groups, or in individualized arrangements?” The rating choices for “how much time” were “1-30 minutes a day,” “31-60 minutes a day,” “61-90 minutes a day,” and “more than 90 minutes a day.”

Sample

ECLS-K Sample

The full ECLS-K sample included 21,409 children across approximately 3,500 classrooms in 1,280 schools during the 1998-99 academic year. Of the 21,409 children, 9,189 children were followed through eighth grade (Tourangeau, Nord, Le, Pollack, & Atkins-Burnett, 2006). To select the nationally representative sample of kindergarteners in the 1998-1999 school year, a multistage probability sample design was utilized. Counties or groups of countries comprised the primary sampling units (PSUs), schools within the PSUs comprised the second-stage units, and students within the schools comprised the third-stage units.
The PSUs were based on a preexisting PSU frame created with 1990 county-level population data. The frame consisted of 1,404 counties or groups of counties containing at least 15,000 people. PSUs for the ECLS-K were modified with 1994 Census Bureau population estimates of five-year-olds by race-ethnicity. PSUs that did not have a minimum of 320 five-year-olds were combined with an adjacent PSU. In total, 100 PSUs were selected, and the PSU frame consisted of 1,335 records.

For the second stage of sampling, existing school universe files, the 1995-96 Common Core of Data (CCD) and the 1995-96 Private School Universe Survey (PSS), were used to select the public and private schools that offered kindergarten programs. The ECLS-K school frame included 18,911 public-school records and 12,412 private-school records. The frame was freshened in the spring of 1998 to include additional, new schools. Each public school contained a minimum of 24 students, and each private school contained a minimum of 12 students and was selected systematically, with probability proportional to size. In total, 1,280 schools were selected, including 934 public schools and 346 private schools.

Regarding the third stage of sampling, the goal was to select a self-weighting sample as well as attain a minimum sample size for each targeted subpopulation. To meet sampling goals, Asian and Pacific Islander students (API) needed to be oversampled. In order to obtain the student sample, a list of the kindergarteners enrolled at each school was obtained and two independent sampling strata were formed. One contained API students and the second contained all the other students. When possible, within each stratum, students were selected with equal probability systematic sampling.

Students who changed schools between the fall of kindergarten and the fall of first grade were subsampled and followed into their new schools. The first grade sample was freshened by
adding students who did not have a chance to be included in the sample in kindergarten, for instance, students who had newly arrived in the United States and thus, is nationally representative of kindergarten and first graders. However, in third, fifth, and eighth grades, the sample was not freshened and thus, is not representative of all U.S. students enrolled in the third, fifth, or eighth grade but is representative of the population cohort who participated in the ECLS-K study.

Analytic Sample

The sample for the present study consisted of a subsample of the full ECLS-K dataset. The following criteria had to be met in order to be included in the sample. A student had to have: (1) non-missing data from the parent interview regarding the primary language spoken in the home, (2) at least one Reading Ability score in the spring of kindergarten, first, third, fifth, or eighth grades, (3) the same teacher in the fall and spring of kindergarten, (4) a sampling weight, (5) a score for kindergarten sounds and letter-sounds instructional emphasis, (6) a score for kindergarten meaning construction instructional emphasis, (7) a score for kindergarten overall amount of reading instruction, (8) a score for first grade sounds and letter-sounds instructional emphasis, (9) a score for first grade meaning construction instructional emphasis, and (10) a score for first grade overall amount of reading instruction. Note that there was no teacher identification available in the fall of first grade (it was only provided for spring of first grade), so it had to be assumed that students had the same teacher in the fall and spring of first grade.

Table 3.2 lists the number of students by language-status groups who met and did not meet the three inclusion criterion. After dropping the cases that had missing data for primary language spoken at home, a total of 14,624 students remained in the sample, with 14,145 native-English-speaking students and 479 Asian LM students. Of the 21,409 students in the full initial
ECLS-K sample, 6,957 students, including 6,715 native-English-speaking students and 242 Asian LM students, met the full inclusion criterion and were included in the sample for the present study.

Table 3.3 includes information regarding the demographics for the present study sample. About half of the students in the overall sample and the two subsamples were male. The mean age in the spring of kindergarten was 74.97 months for the overall sample, 74.36 for the native-English-speakers, and 74.99 for the Asian LMs. For the full sample and the native-English-speaking group, White, Non-Hispanics were the majority race/ethnicity, with 67.14% of the full sample and 69.56% of the native-English-speaking group identifying as White, Non-Hispanic. Black/African American, non-Hispanic accounted for the second largest percentage (10.95%), followed by Hispanics (9.66%). It is likely that the 9.66% of Hispanic NE-speakers were second or third generation Americans, which could explain why their families only spoke English at home. The trends for SES level were different for NE-speakers and Asian LMs. For NE-speakers, about 70% were categorized in the third, fourth, and fifth (moderate to high) quintiles while for Asian LMs, only about 50% were in the three highest quintiles. It is interesting to note that almost 50% of the Asian LMs resided in the West while less than 20% of the NE-speakers resided in the West. Regarding English-oral language proficiency, for the Asian LM subgroup, all students scored at or above the cut score by the spring of kindergarten.

To better understand the Asian LM students’ oral English levels and their Reading Ability levels in the spring of first grade, Table 3.4 includes information regarding the oral-English proficiency level and spring of kindergarten Reading Ability scores for the NE-speakers and the subgroups of Asian LMs, separated according to the time point at which they passed the oral-English proficiency screener. Two conclusions arise from the table figures: (1) There was
some variation in the Asian students’ oral English levels in kindergarten. (2) It is quite possible that the Asian LMs’ oral-English proficiency was not up to par with that of their NE-speaking peers.

First, of the 242 Asian LMs in the present study, about 25% were identified as not needing to take the screener while almost half passed by the fall of kindergarten, and the remaining quarter passed by the spring of kindergarten.

Second, considering the total PreLAS score for the group that passed the assessment in the fall, 25% of the students barely passed, scoring between 37 and 41, with a cutscore of 37. Similarly, 25% of the students who passed the assessment in the spring also just barely passed, scoring between 37 and 42. So even by the end of kindergarten, a full quarter of the Asian students in the present sample minimally passed the oral-English test.

Although the LM students appeared to do relatively well on two of the subtests at their respective time points, Simon Says and Art Show, those subtests assessed listening comprehension of basic English instructions and picture vocabulary. They measured language knowledge that was likely reasonably easily attained through everyday conversation. The subtest of oral speech (Tell Stories) reveal a different aspect of the students’ oral-English levels since it involved a combination of skills. The subtest required both comprehension of spoken English and ability to produce language that expressed that comprehension, and students were rated on complexity of sentence structure and vocabulary. At the time they passed the oral English test, the LM students did not perform as well on the Tell Stories task as they did on the other two tasks. Fifty-percent of the Asian LMs who passed the PreLAS in the fall of kindergarten scored between 20 and 24 on the Tell Stories subtest, garnering just around half of the possible total points for the Tell Stories subtest (40). Similarly, 50% of those who passed the PreLAS in the
spring scored between 20 and 28. So even by the end of kindergarten, about an eighth of the Asian students in the present sample were not rated highly on their oral-English production abilities.

With regards to Reading Ability in the spring of kindergarten, although the mean Reading Ability score for the Asian subgroups who did not need the assessment or passed in the fall was slightly higher than that for the NE-speakers, the standard deviations were larger, indicating a greater spread of ability in the Asian subgroup. Moreover, the upper range for the Asian LM group who passed in the spring was noticeably lower than for the NE-speakers, Asian LMs who did not need to take the PreLAS, and Asian LMs who passed the PreLAS in the fall (109.63 versus 156.85, 137.02, and 156.85, respectively). Taken together, on the whole, the Asian LMs appeared to have comparable Reading Ability scores as their NE-speaking peers in the spring of first grade.

Variables in the Present Study

As discussed above, the variables for the present study were obtained from the child assessments, parent interviews, and teacher questionnaires.

Reading Ability

Reading Ability was the theta score on the reading assessment at five time points, in the spring of kindergarten, first, third, fifth, and eighth grades.

Validity and reliability. To ensure content validity, for the ECLS-K assessment, curriculum specialists across the United States reviewed the pool of reading assessment items to ensure appropriate content, difficult, relevance, and sensitivity. Items that were approved were then field tested. The test authors established construct validity by correlating theta, or Reading Ability, test scores from the field tests to those from the Kaufman Test of Educational...
Achievement (KTEA; Kaufman & Kaufman, 1998) and the Woodcock-McGrew-Werder Mini-Battery of Achievement (MBA; Woodcock, McGrew, & Werder, 1994). Construct validity was in the mid-to-upper .80s for the KTEA and .83 and .73 with the MBA. The test authors suggested that validity for the eighth grade reading assessment could be inferred since it consisted of items from previously validated instruments, the NAEP, the National Education Longitudinal Study (NELS) of 1988, the Education Longitudinal Study (ELS) of 2002, and the ECLS-K fifth grade English reading assessment (Najarian, Pollack, & Sorongon, 2009).

Additionally, reliability for the reading assessment was high. Internal consistency reliabilities ranged from .87 to .96, depending on the wave of data, with the reliability in the spring of eighth grade being the lowest, at .87, and the rest being in the .90s (Tourangeau, Nord, Le, Sorongon, & Najarian, 2009).

**Reading Instructional Emphasis/Amount Variables**

Three different reading instructional emphasis/amount variables were created or used directly from the ECLS-K: Extent to Which Sounds and Letter-Sound Relationships are Emphasized, Extent to Which Meaning Construction is Emphasized, and Overall Amount of Reading Instruction. Since the same variables were measured in kindergarten and first grade, each student had a total of six scores for reading instructional emphasis/amount. In the following sections, each of the three reading instructional emphasis/amount variables is explained and then the reliabilities are first provided.

**Extent to Which Sounds and Letter-Sound Relationships are Emphasized.** As shown in Table 3.5, eight individual items on the kindergarten and first grade teacher questionnaire that pertained to the frequency with which teachers reported engaging in phonemic awareness, phonics, and decoding skills activities in the classroom were used to represent Extent to Which
Sounds and Letter-Sound Relationships are Emphasized (ESLSE) (cf. Xue & Meisels, 2004; Sonnenschein, Stapleton, & Benson, 2010). The ratings for each item were coded 1 = never, 2 = once a month or less, 3 = two or three times a month, 4 = once a week, 5 = three or four times a week, and 6 = daily. “Taught at a higher grade level” and “children should already know” responses were also coded as 1 (never). The eight scores were averaged to create one summative score for the Extent to Which Sounds and Letter-Sound relationships were Emphasized variable. The higher the score, the more frequently activities involving sounds and letter-sound relationships were used in the classroom.

Cronbach’s alphas were .72 and .80 for kindergarten and first grade, respectively (items were standardized to mean equals 0 and variance equals 1). Also in two prior studies, with different samples from one another and a different sample from the present study, when responses for the eight items in Table 3.5 plus three additional ones were averaged, reliability (unspecified type) was .72 in kindergarten (Xue & Meisels, 2004) and .73 and .77 (Cronbach’s alpha), respectively, in kindergarten and first grade (Sonnenschein, Stapleton, & Benson, 2010).

**Extent to Which Meaning Construction is Emphasized.** As shown in Table 3.6, five individual items on the kindergarten and first grade teacher questionnaire that pertained to the frequency with which teachers reported engaging in comprehension and fluency activities as well as activities that boosted students’ motivation or interest in tasks in the classroom were used to represent Extent to Which Meaning Construction is Emphasized (EMCE) (cf. Xue & Meisels, 2004; Sonnenschein, et al., 2010). The ratings for each item were coded 1 = never, 2 = once a month or less, 3 = two or three times a month, 4 = once a week, 5 = three or four times a week, and 6 = daily. “Taught at a higher grade level” and “children should already know” responses were also coded 1 (never). The five scores were averaged to create one summative score for the
Extent to Which Meaning Construction is Emphasized variable. The higher the score, the more frequently activities involving meaning construction were used in the classroom.

Cronbach’s alphas were .73 and .75 for kindergarten and first grade, respectively (items were standardized to mean equals 0 and variance equals 1). Also, in two prior studies, when responses for the five items in Table 3.6 plus thirteen additional ones were averaged, reliability (unspecified) was .86 in kindergarten (Xue & Meisels, 2004) and .86 and .83 (Cronbach’s alpha), respectively, in kindergarten and first grade (Sonnenschein, Stapleton, & Benson, 2010).

**Overall Amount of Reading Instruction.** Each student had one score for Overall Amount of Reading Instruction (OARI) for his/her kindergarten classroom and one score for OARI for his/her first-grade classroom. The variable was derived for the present study from teachers’ self-report regarding the amount of time per day that students in their classroom engaged in general reading and language arts activities. The possible range was 1 (1-30 minutes a day) to 4 (more than 90 minutes a day). The higher the score, the more frequently reading and language arts activities were incorporated in the daily classroom activities. No reliability estimates were provided from the previous studies.

**Control Variable**

**SES.** The ECLS developers created a composite variable to capture various aspects of socioeconomic status. This variable was derived from five ECLS-K questionnaire items regarding families’ overall household income, father’s education, mother’s education, father’s occupational prestige, and mother’s occupational prestige. The ECLS-K authors transformed each of the five items to z-scores with a mean of 0 and a standard deviation of 1 and then averaged the five z-scores. The actual SES score range in the study was from -4.75 to 2.67.

**Language Status**
The ECLS developers created a composite variable to classify LMs and NE-speakers. Their classifications were derived from parent responses to three questions, “Is any language other than English regularly spoken in your home (PLQ020),” “Is English also spoken in your home (PLQ030),” and “What is the primary language spoken in your home (PLQ060).” The ECLS developers classified a student as an NE-speaker if he/she primarily spoke English at home: 1) If the response to PLQ020 was “no language other than English is regularly spoken in the home” or 2) If the response to PLQ020 was “a language other than English is regularly spoken in the home,” and the response to PLQ060 was “English is the primary language in the home.”

A student was classified as an LM as follows: 1) If the response to PLQ020 was “a language other than English is regularly spoken in the home” and the response to PLQ030 was “English was not also spoken in the home” or 2) If the response the response to PLQ020 was “a language other than English is regularly spoken in the home” and the response to PLQ060 was “English is not the primary language in the home.”

In the present study, the Language Status variable accounted for students’ race/ethnicity as well as home language. Students were identified as NE-speakers using the criteria above. Students were identified as LMs using the criteria above, and then only LMs who were Asian (as reported by the parent or guardian) were retained in the sample. The Language Status variable was coded as either “0,” indicating Asian LM, or “1,” indicating NE-speaker. Note that the public use version of the ECLS dataset suppressed the reporting of students’ primary language (PLQ060), so the students’ specific home language could not be identified in the present study.

Data Analytic Approach
My research question was: What is the relationship between kindergarten and first grade reading instructional emphases/amount and Asian LM students’ reading ability growth from kindergarten through eighth grade, as compared to that of NE-speakers? Reading instructional emphasis/amount (in both kindergarten and first grade, but measured separately by grade) was defined (and measured) three separate ways as (1) degree of emphasis on sounds and letter-sound relationships, (2) degree of emphasis on meaning construction, and (3) overall amount of reading instruction. Socioeconomic status was controlled.

The analytical approach to address the research question was Hierarchical Linear Modeling (HLM). In the following sections, first, the reasons for using HLM will be outlined. Then the guidelines and procedure for preparing the data will be presented. Next, the HLM analytic approach will be described. Lastly, the final equations will be listed.

Justification for Using HLM

Conducting HLM was the most appropriate model strategy to address the research question for three reasons. First, it allowed for the consideration of the nested, or clustered, data (time was nested within students and students were nested within teachers). Second, HLM allowed for the examination of potential interaction effects (for the Language Status and reading instructional emphasis/amount variables), which was the primary focus of the present study. Additionally, HLM was able to accommodate sampling weights.

Data Preparation

Before analysis began, data needed to be prepared. The following section outlines the test for multicollinearity, the strategy for handling missing data, correction for biases, and preliminary analyses, followed by the modeling strategy general procedures and fit criteria.
**Multicollinearity.** Multicollinearity was tested with a tolerance value (1- \( R^2 \)). A large \( R^2 \) would indicate that a large amount of the variance in the predictor could be explained by the other predictors. A tolerance value smaller than 0.2 would suggest that the predictor was redundant (Soh, 2015). In the present study, multiple regression was conducted in Stata, and the adjusted \( R^2 \) was examined.

**Missing data.** As expected for longitudinal studies, there were missing values in the ECLS-K. The percentages of missing data for the Reading Ability variable in the spring of kindergarten, first, third, fifth, and eighth grades were as follows: .50%, .42%, 3.82%, 4.94%, and 20.40%. As suggested by Bollen and Curran (2006), to investigate whether the data were missing at random, Little’s Missing Completely at Random test, a test that used the expectation-maximization method, was run. The result was that the data were not missing completely at random (\( \chi^2 = 360.9172, df = 54; p < 0.001; \) Little & Rubin 1987), suggesting the possibility that the same students who were missing data in fifth grade were also missing in eighth grade. One plausible explanation could be that students had changed schools and could not be assessed. Because the data were not missing at random, multiple imputation (MI) was used to retain more data (Rubin, 1987).

Multiple imputation involves producing multiple sets of plausible values for missing values based on observed data (Rubin, 1987). The MI procedure used in the present study utilized chained equations, using an algorithm to sequentially impute multiple variables (Statacorp, 2015). Five sets of imputed data were generated and then combined into one set of results. The parameter estimates from the five sets were averaged and the standard errors were adjusted.
Correcting for biased estimates. The ECLS-K public-use dataset included survey weights for use with longitudinal analyses. The child-specific weight that was appropriate for analyzing student data from the spring of kindergarten through the spring of eighth grade was used. Multiprobabilistic sampling and oversampling of certain subpopulations could lead to biased estimates of standard errors and chi-square tests, but including the survey weights in the analyses corrected for the biased estimates and clustering effects.

Standardized and centered variables. Reading Ability, Extent to Which Sounds and Letter-Sound Relationships are Emphasized, Extent to Which Meaning Construction is Emphasized, and Overall Amount of Reading Instruction were standardized and the instantaneous change rate and acceleration/deceleration change rate were centered for the present study, to allow for comparison of effect coefficients (Xue & Meisels, 2004).

Preliminary Analyses

Preliminary analyses were conducted in Stata. Descriptive statistics, correlations among all the variables, and outliers were examined to gain a sense of the relationship between variables and univariate distributions.

The Present Study Analytical Models

Two sets of 3-level HLM models were conducted using the mixed command in Stata. One set was for kindergarten and one set was for first grade. The same models were conducted for kindergarten and first grade. The dependent variable was Reading Ability measured at five time points. The predictors were Extent to Which Sounds and Letter-Sound Relationships are Emphasized, Extent to Which Meaning Construction is Emphasized, and Overall Amount of Reading Instruction. The control variable was SES. Repeated measures for Reading Ability
across time (grades) (Level 1) were nested within students (Level 2), and students were nested within teachers (Level 3).

Language Status and SES were modeled for students at Level 2. Reading instructional emphasis/amount variables (Extent to Which Sounds and Letter-Sound Relationships are Emphasized, Extent to Which Meaning Construction is Emphasized, and Overall Amount of Reading Instruction) were modeled at Level 3 for the classroom teacher. There were three cross-level interactions, each of the three reading instructional emphasis/amount variables separately with Language Status. The interactions addressed the possible moderating effect of Language status on Reading Ability growth.

**Fitting the models.** Fitting the models involved three steps, for each of the kindergarten and first grade models separately. The model equations are shown in Table 3.7 and an explanation of the symbols are listed in Table 3.8. As recommended by Singer and Willet (2003), the first step was to fit an unconditional means model (Model 1) that did not contain Level 1, 2, or 3 predictors. The next step was to compare the fit of an unconditional linear growth model (Model 2) to an unconditional quadratic growth model (Model 3). The purposes of the unconditional models were to determine the shape of the growth curve, whether there was any variance in Reading Ability initial level (intercept), and/or any variance in Reading Ability change over time (slope). After determining whether the linear or quadratic model better fit Reading Ability growth in the second step, the third step was to run the full conditional model (Model 4) with predictors at Level 2 (SES and Language Status), Level 3 (Extent to Which Sounds and Letter-Sound Relationships are Emphasized, Extent to Which Meaning Construction is Emphasized, and Overall Amount of Reading Instruction), and the three interactions between Language Status and reading instructional emphases/amount.
The multilevel models. The following section lists the multilevel model equations for the unconditional means model, unconditional growth models, and the full conditional model. Since the HLM in the present study consisted of three levels, with time (Level 1) nested within student (Level 2), and student nested within teacher (Level 3), each model contained one or more equations at each level. Table 3.7 lists the Models 1-4 equations.

Unconditional means model. The unconditional means model (Model 1) described and partitioned variation in the outcome (Singer & Willet, 2003). No predictors were present at Level 1, 2, or 3. The equations were:

Level 1: \( Y_{ij} = \pi_{0ij} + \varepsilon_{ij} \)

Level 2: \( \pi_{0ij} = \beta_{00j} + r_{0ij} \)

Level 3: \( \beta_{00j} = \gamma_{000} + \upsilon_{00j} \)

Where \( t \) represented a time point, \( i \) represented an individual student, \( j \) represented a teacher, \( Y_{ij} \) represented an individual \( i \)'s observed Reading Ability score at time \( t \) in teacher \( j \)'s class, \( \pi_{0ij} \) represented individual \( i \)'s true initial status in teacher \( j \)'s class, \( \beta_{00j} \) was the mean Reading Ability score in teacher \( j \)'s class, and \( \gamma_{000} \) was the grand mean. The random time effect, \( \varepsilon_{ij} \), was the difference between the predicted and observed Reading Ability score at any time point. The random student effect, \( r_{0ij} \), was the difference between student \( ij \)'s mean and the teacher mean. And the random teacher effect, \( \upsilon_{00j} \), was the difference between teacher \( j \)'s mean and the grand mean.

The assumption was that each student’s Level 1 residuals were independently and identically distributed and have homoscedastic variance across time points and students.
Unconditional linear growth model. The unconditional linear growth model (Model 2) represented within-person change in Reading Ability over time. The only predictor was time, at Level 1. No predictors were present at Level 2 or 3. The equations were:

Level 1: \( Y_{tij} = \pi_{0ij} + \pi_{1ij} \text{TIME}_{tij} + \varepsilon_{tij} \)

Level 2: \( \pi_{0ij} = \beta_{00j} + r_{0ij} \)
\( \pi_{1ij} = \beta_{10j} + r_{1ij} \)

Level 3: \( \beta_{00j} = \gamma_{000} + \upsilon_{00j} \)
\( \beta_{11j} = \gamma_{100} + \upsilon_{10j} \)

Where \( j \) represented the time point, \( Y_{ij} \) represented an individual’s observed score at time \( j \), \( \pi_{0i} \) represented individual \( i \)’s true initial status, and \( \pi_{1i} \) represented individual \( i \)’s true annual rate of linear change. The residual, \( \varepsilon_{ij} \), was the difference between the predicted and observed score at any time point.

The Level 1 errors were assumed to be independently and heteroscedastically distributed over time and within student.

Unconditional quadratic growth model. The unconditional quadratic growth model (Model 3) added a quadratic term to the linear growth model, reflecting acceleration or deceleration of the growth trajectory. The equations were:

Level 1: \( Y_{tij} = \pi_{0ij} + \pi_{1ij}(\text{Time})_{tij} + \pi_{2ij}(\text{Time})_{tij}^2 + \varepsilon_{tij} \)

Level 2: \( \pi_{0ij} = \beta_{00j} + r_{0ij} \)
\( \pi_{1ij} = \beta_{10j} + r_{1ij} \)
\( \pi_{2ij} = \beta_{20j} + r_{2ij} \)

Level 3:
\( \beta_{00j} = \gamma_{000} + \upsilon_{00j} \)
\[ \beta_{11j} = \gamma_{100} + \nu_{10j} \]
\[ \beta_{21j} = \gamma_{200} + \nu_{20j} \]

**Full conditional model.** Adding the predictors, including the interactions, the full conditional model equations (Model 4) were:

**Level 1:**  
\[ Y_{tij} = \pi_{0ij} + \pi_{1ij}(Time)_{tij} + \pi_{2ij}(Time)^2_{tij} + \epsilon_{tij} \]

**Level 2:**  
\[ \pi_{0ij} = \beta_{00j} + \beta_{01j}(LANG)_{ij} + \beta_{02j}(SES)_{ij} + r_{0ij} \]
\[ \pi_{1ij} = \beta_{10j} + \beta_{11j}(LANG)_{ij} + \beta_{12j}(SES)_{ij} + r_{1ij} \]
\[ \pi_{2ij} = \beta_{20j} + \beta_{21j}(LANG)_{ij} + \beta_{22j}(SES)_{ij} + r_{2ij} \]

**Level 3:**  
\[ \beta_{00j} = \gamma_{000} + \gamma_{001}(Sound)_{j} + \gamma_{002}(Mean)_{j} + \gamma_{003}(Overall)_{j} + \nu_{00j} \]
\[ \beta_{01j} = \gamma_{010} + \gamma_{011}(Sound)_{j} + \gamma_{012}(Mean)_{j} + \gamma_{013}(Overall)_{j} + \nu_{01j} \]
\[ \beta_{02j} = \gamma_{020} \]
\[ \beta_{10j} = \gamma_{100} + \gamma_{101}(Sound)_{j} + \gamma_{102}(Mean)_{j} + \gamma_{103}(Overall)_{j} + \nu_{10j} \]
\[ \beta_{11j} = \gamma_{110} + \gamma_{111}(Sound)_{j} + \gamma_{112}(Mean)_{j} + \gamma_{113}(Overall)_{j} + \nu_{11j} \]
\[ \beta_{12j} = \gamma_{120} \]
\[ \beta_{20j} = \gamma_{200} + \gamma_{201}(Sound)_{j} + \gamma_{202}(Mean)_{j} + \gamma_{203}(Overall)_{j} + \nu_{20j} \]
\[ \beta_{21j} = \gamma_{210} + \gamma_{211}(Sound)_{j} + \gamma_{212}(Mean)_{j} + \gamma_{213}(Overall)_{j} + \nu_{21j} \]
\[ \beta_{22j} = \gamma_{220} \]

The final combined model (one model applicable for both kindergarten and first grade but conducted separately by grade) was:

\[ Y_{tij} = \gamma_{000} + \gamma_{100}(Time)_{tij} + \gamma_{200}(Time)^2_{tij} + \gamma_{001}(Sound)_{j} + \gamma_{101}(Sound)_{j}(Time)_{tij} + \gamma_{201}(Sound)_{j}(Time)^2_{tij} + \gamma_{002}(Mean)_{j} + \gamma_{102}(Mean)_{j}(Time)_{tij} + \gamma_{202}(Mean)_{j}(Time)^2_{tij} + \gamma_{003}(Overall)_{j} + \gamma_{103}(Overall)_{j}(Time)_{tij} + \gamma_{203}(Overall)_{j}(Time)^2_{tij} + \gamma_{020}(SES)_{ij} + \gamma_{120}(SES)_{ij}(Time)_{tij} + \gamma_{220}(SES)_{ij}(Time)^2_{tij} \]
\[ + \gamma_{010}(\text{Lang}) + \gamma_{110}(\text{Lang})_{ij}(\text{Time})_{ij} + \gamma_{210}(\text{Lang})_{ij}(\text{Time})^2_{ij} \]
\[ + \gamma_{011}(\text{Sound})_{ij}(\text{Lang})_{ij} + \gamma_{111}(\text{Sound})_{ij}(\text{Lang})_{ij}(\text{Time})_{ij} + \gamma_{211}(\text{Sound})_{ij}(\text{Lang})_{ij}(\text{Time})^2_{ij} \]
\[ + \gamma_{012}(\text{Mean})_{ij}(\text{Lang})_{ij} + \gamma_{112}(\text{Mean})_{ij}(\text{Lang})_{ij}(\text{Time})_{ij} + \gamma_{212}(\text{Mean})_{ij}(\text{Lang})_{ij}(\text{Time})^2_{ij} \]
\[ + \gamma_{013}(\text{Overall})_{ij}(\text{Lang})_{ij} + \gamma_{113}(\text{Overall})_{ij}(\text{Lang})_{ij}(\text{Time})_{ij} + \gamma_{213}(\text{Overall})_{ij}(\text{Lang})_{ij}(\text{Time})^2_{ij} \]
\[ + \nu_{10j}(\text{Time})_{ij} + \nu_{12j}(\text{Time})_{ij} + \nu_{20j}(\text{Time})^2_{ij} + \nu_{22j}(\text{Time})^2_{ij} \]
\[ + \nu_{01j}(\text{Lang})_{ij} + \nu_{11j}(\text{Lang})_{ij}(\text{Time})_{ij} + \nu_{21j}(\text{Lang})_{ij}(\text{Time})^2_{ij} \]
\[ + \nu_{00j} + \nu_{01j} + \epsilon_{uj} \]

**Model evaluation.** Evaluation of the models involved the Wald Test. Due to the use of multiple imputation, neither the log likelihood ratio (LLR) test, the Akaike Information Criterion (AIC), nor the Bayesian Information Criterion (BIC) could be used to compare models (StataCorp, 2015). Instead, the Wald test was run (Rubin, 1987; StataCorp, 2015), which is comparable to the LLR test.

The Wald test examines the null hypothesis that one or more parameters is equal to a given value. When the p-value is statistically significant, the null hypothesis can be rejected, meaning that removing the variable(s) from the model will impair model fit because the variable(s) is an important part of predicting the dependent variable (Reading Ability). On the contrary, when the p-value is not statistically significant, the null hypothesis cannot be rejected, meaning that removing the variables will not impair model fit and that the variable(s) is not an important part of predicting the dependent variable.

Comparing models to determine the best fitting model involves two steps (Stata FAQ, 2016). For instance, when comparing Model 3 to Model 4, first, the model with more predictors (Model 4) would be conducted. Second, the Wald test examines whether the added predictors (from Model 3 to Model 4) are simultaneously equal to zero. The output provided are chi-squares.
and p-values associated with the chi-square and degrees of freedom. Evaluation of the p-values helps determine whether the null hypothesis could be rejected. If the null hypothesis can be rejected, the added predictors are not simultaneously equal to zero, so including them statistically significantly improves the model fit and consequently, the less parsimonious model is better.
CHAPTER 4
RESULTS

In the current chapter, the results are presented. First, I describe the preliminary analyses. Then, I present the results of the HLM analyses that address the research question. The research question was: What is the relationship between kindergarten and first grade reading instructional emphases/amount and Asian LM students’ reading ability growth from kindergarten through eighth grade, as compared to that of NE-speakers? Reading instructional emphasis/amount (in both kindergarten and first grade, but measured separately by grade) was defined (and measured) three separate ways as (1) degree of emphasis on sounds and letter-sound relationships, (2) degree of emphasis on meaning construction, and (3) overall amount of reading instruction. Socioeconomic status was controlled. Finally, I summarize the findings.

Preliminary Analyses

In the preliminary analyses, descriptive statistics, correlations between all the variables, and multicollinearity and outliers were examined.

Descriptive Statistics

Reading Ability. Table 4.1 shows the raw score means, standard deviations, and range of the Reading Ability scores at each of the five time points, by overall sample, Asian LM group, and NE-speaking group. Sampling weights provided by the ECLS-K authors were applied, which corrects the summary statistics for over/undersampling and nonresponse (missing data) (Tourangeau, Nord, Lê, Pollack, & Atkins-Burnett, 2006).
As expected, the mean Reading Ability scores for the overall and two subgroups increased at each time point. Notably, the mean Reading Ability for the full sample, the Asian LM, and NE-speaker subgroups, were similar at all five time points. For instance, the spring of kindergarten means were 47.67, 51.90, and 47.62, respectively. The spring of eighth grade means were 170.64, 178.74, and 170.54, respectively. The similarity in average performance across the two language groups is remarkable. Given that the Asian LMs were from a non-English home language background, it is surprising that they attained, on average, Reading Ability similar to their NE-speaking peers, even for those who at least minimally passed an oral English assessment by the spring of kindergarten.

 Compared to NE-speakers, Asian LMs demonstrated slightly more variability in the spring of kindergarten (21.46 points versus 14.49). However, variability for the remaining time points was similar across the two groups.

 Although the spread in scores from the spring of first grade through spring of eighth grade was similar for the Asian LM and NE-speaking subgroups, the lower ends of score ranges were noticeably different. More specifically, the lower score for Asian LMs was consistently higher than that of NE-speakers. For instance, in fifth grade, the minimal-score difference between the two groups was the largest of any grade (103.22 versus 65.22, respectively). On the other hand, the upper limits were more similar. The difference between the two groups on the upper limits of Reading Ability was the largest in fifth grade, with a 12.48 point difference.

**Reading instructional emphases/amount.** Table 4.2 shows the means, standard deviations, and range of the reading instructional emphases/amount scores at each of the five time points, by overall sample, Asian LM group, and NE-speaking group. Table 4.2 also contains labels for what the scores signify. Sampling weights were again applied for the summary statistics. Figures 4.1
and 4.2 show the raw means reading instructional emphases/amount scores for the overall sample, Asian LM group, and NE-speaking group.

**Kindergarten reading instructional emphases/amount, full sample.** On the whole, kindergarten teachers emphasized sounds and letter-sound relationships in their instruction from once a week to three or four times a week (M = 4.74) and meaning construction, slightly less often (M = 4.20). On average, kindergarten teachers spent from 31 to 90 minutes a day teaching reading (M = 2.55).

Among kindergarten teachers, there was a moderate amount of variability in the Extent to Which Sounds and Letter-Sound Relationships were Emphasized (SD = .56) and Extent to Which Meaning Construction was Emphasized (SD = .75). There was also a fairly large amount of variability in Overall Amount of Reading Instruction (SD = .93).

Also notable in Table 4.2, unsurprisingly, all kindergarten teachers did some amount of emphasis on sounds and letter-sound relationships (sample minimal score was 2.27) and meaning construction (sample minimal score was 1.83). At minimum, kindergarten teachers emphasized sounds and letter-sound relationships as well as meaning construction once a month. Additionally, some teachers may only have accomplished as little as 1 to 30 minutes of reading instruction daily (sample minimal score = 1).

**First grade reading instructional emphases/amount, full sample.** On the whole, first grade teachers emphasized sounds and letter-sound relationships in their instruction once a week to three to four times a week (M = 4.37) and meaning construction, slightly more often (M = 4.63). On average, first grade teachers spent between 61 minutes and more than 90 minutes a day teaching reading (M = 3.46).
Among first grade teachers, there was a fairly large amount of variability in Extent to Which Sounds and Letter-Sound Relationships were Emphasized (SD = .95) and a moderate amount of variability in the Extent to Which Meaning Construction was Emphasized (SD = .53). There was also a moderate to fairly large amount of variability in Overall Amount of Reading Instruction (SD = .73). Additionally in Table 4.2, unsurprisingly, all first grade teachers did some amount of emphasis on sounds and letter-sound relationships (sample minimal score was 1.64) and meaning construction (sample minimal score was 2.72). At minimum, first grade teachers emphasized sounds and letter-sound relationships as well as meaning construction once a month. Lastly, some teachers may only have accomplished as little as 1 to 30 minutes of reading instruction daily (sample minimal score = 1).

**Kindergarten versus first grade reading instructional emphases/amount, full sample.**

Comparing reading instruction provided by kindergarten versus first grade teachers, on the whole, kindergarten and first grade teachers emphasized sounds and letter-sound relationships (M = 4.74 versus M = 4.37) and meaning construction (M = 4.20 versus M = 4.63) to a similar extent. On average, kindergarten teachers placed slightly more emphasis on sounds and letter-sound relationships than on meaning construction (M = 4.74 versus M = 4.20) while first grade teachers placed slightly more emphasis on meaning construction than on sounds and letter-sound relationships (M = 4.63 versus M = 4.37).

A more noticeable difference between kindergarten and first grade teachers’ reading instruction was that on average, first grade teachers spent more time each day in reading instruction (M = 3.46 versus M = 2.55), spending between 61 minutes and more than 91 minutes per day versus between 31 and 90 minutes per day.
Turning to the comparison of the two language status groups, on the whole, Asian LMs and NE-speakers received a similar amount of kindergarten Extent to Which Sounds and Letter-Sound Relationships were Emphasized ($M = 4.62$ versus $M = 4.74$) and Extent to Which Meaning Construction was Emphasized ($M = 4.15$ versus $M = 4.20$). Additionally, both Asian LMs and NE-speakers received on average between 31 to 90 minutes of reading instruction per day ($M = 2.77$ and $M = 2.55$, respectively).

Variability in kindergarten Extent to Which Sounds and Letter-Sound Relationships were Emphasized (SD = .61 versus SD = .56) and Extent to Which Meaning Construction was Emphasized (SD = .75 for both groups) was similar for Asian LMs and NE-speakers. Variability in the Overall Amount of Reading Instruction was also similar (SD = .92 versus SD = .93).

As expected, every Asian LM and NE-speaking student received some amount of emphasis on sounds and letter-sound relationships (sample minimal score = 3.18 and 2.27, respectively). However, at minimum, some Asian LMs received the particular emphasis more frequently (sample minimal score = 3.18, between 2 to 3 times a month to once a week) than did some NE-speakers who received the lowest amount of sounds and letter-sound relationships emphasis (sample minimal score = 2.27, between once a month to 2 to three times a month). Also, every Asian LM and NE-speaker received some amount of emphasis on meaning construction (sample minimal score = 2.56 and 1.83, respectively). At minimum, some Asian LMs received slightly more meaning construction emphasis (sample minimal score = 2.56, between once a month to 2 to 3 times a week) than did some NE-speakers who received the lowest amount of meaning construction emphasis (sample minimal score = 1.83, at least once a
month). Additionally, some Asian LMs and NE-speakers only received as little as 1 to 30 minutes of reading instruction daily (sample minimal score = 1 for both groups).

**Asian LMs versus NE-speakers’ reading first grade instructional emphases/amount.**

On the whole, Asian LMs and NE-speakers received a similar amount of first grade Extent to Which Sounds and Letter-Sound Relationships were Emphasized (M = 4.33 versus M = 4.37) and Extent to Which Meaning Construction was Emphasized (M = 4.67 versus M = 4.63). Additionally, both Asian LMs and NE-speakers received on average between 61 minutes and more than 90 minutes of reading instruction per day (M = 3.47 and M = 3.46).

Variability in first grade Extent to Which Sounds and Letter-Sound Relationships were Emphasized (SD = .94 versus SD = .95) and Extent to Which Meaning Construction was Emphasized (SD = .54 versus SD = .53) was similar for Asian LMs and NE-speakers, respectively. Variability in the Overall Amount of Reading Instruction was also similar (SD = .65 versus SD = .73).

As expected, every Asian LM and NE-speaking student received *some* amount of emphasis on sounds and letter-sound relationships (sample minimal score = 2.09 and 1.64, respectively). However, at minimum, some Asian LMs received the particular emphasis more frequently (sample minimal score = 2.09 or approximately once a month) than did some NE-speakers (sample minimal score = 1.64 which signified never to once a month). Also, each Asian LM and NE-speaking student received *some* amount of emphasis on meaning construction (sample minimal score = 2.83 and 2.72, respectively). At minimum, Asian LMs and NE-speakers received similar amounts of meaning construction emphasis, between once a month to two to three times a month. Additionally, at minimum, some Asian LMs received 31 to 60 minutes of
reading instruction every day (sample minimal score = 2) while some NE-speakers received as little as 1 to 30 minutes of reading instruction daily (sample minimal score = 1).

Correlations

The zero-order correlations (with sampling weights) among the Reading Ability scores, reading instruction variables, and control variable are shown in Table 4.3. All correlations were Pearson correlations because, with sampling weights added, only Pearson correlations could be done. That is, with sampling weights added, no Rho or Spearman correlations could be conducted. However, it was not inappropriate to conduct Pearson correlations because they provided a quantification of the linear relationships between the variables, the primary relationship of interest (C. Wiesen, personal communication, January 24, 2016).

First, as expected, the five Reading Ability scores were strongly positively correlated with one another, with correlations ranging between $r = .45$ and $.85$ (see the upper left triangle in Table 4.3.). The correlation between kindergarten and eighth grade Reading Ability was the weakest, and the correlation between third and fifth grade Reading Ability was the strongest.

Second, the relationships between kindergarten instructional emphasis and Reading Ability at the five time points were examined. It was surprising that all three of the kindergarten reading instructional emphases/amount variables either had no relationship or very weak relationships with Reading Ability across all time points. For emphasis on sounds and letter-sound relationships, there were either weak positive or negative correlations or no significant relationship between kindergarten Extent to Which Sounds and Letter-Sounds Relationships were Emphasized and Reading Ability scores at the five time points, ranging from approximately -.06 to .11 (see box on the left-hand, middle side of Table 4.3).

Similarly, for the kindergarten relationship between Extent to Which Meaning Construction was Emphasized and Reading Ability at the five time points, there were also weak
positive or negative correlations or no significant relationship that ranged from -.04 to .08 (see box on the left-hand, middle side of Table 4.3).

Again similarly, correlations between kindergarten Overall Amount of Reading Instruction and Reading Ability at the five time points were either non-significant or very weak correlations, ranging from -.05 to .05 (see box on the left-hand, middle side of Table 4.3).

Third, the correlations between the three first grade instructional emphasis/amount variables with Reading Ability were examined at the five time points. It was again surprising that all three of the kindergarten reading instructional emphases/amount variables either had no relationship or very weak relationships with Reading Ability across all time points. Extent to Which Sounds and Letter-Sounds Relationships were Emphasized and Reading Ability scores at the five time points were all significant, but very weak and surprisingly, negative, ranging from -.17 to -.11 (see box on the bottom left of Table 4.3).

Correlations between first grade Extent to Which Meaning Construction was Emphasized and Reading Ability at the five time points were either non-significant or significant but very weak, ranging from -.05 to .01 (see box on the bottom left of Table 4.3).

Correlations between first grade Overall Amount of Reading Instruction and Reading Ability at the five time points were all significant, but again very weak, though in the positive direction, ranging from .03 to .09 (see box on the bottom left of Table 4.3).

Fourth, the relationship between Language Status and Reading Ability at the five time points were either non-significant or significant but very weak, in the negative direction ranging from -.03 to -4.00e-3 (approximately zero) (see box in the left-hand middle section of Table 4.3), with NE-speaking students demonstrating lower Reading Ability.
Fifth, as expected, the relationships between SES and Reading Ability at all five time points were significantly moderately positive, with correlations ranging from .35 to .44 (see unboxed area on the left side of Table 4.3). The correlation between SES and kindergarten Reading Ability was the weakest and the correlation between SES and eighth grade Reading Ability was the strongest.

**Multicollinearity**

Multicollinearity was tested with a tolerance value (1 - R²). R is the multiple regression coefficient of a predictor that was predicted by all other predictors in the regression. A large R² would indicate that a large amount of the variance in the predictor could be explained by the other predictors and that there is little variance left to predict. A tolerance value smaller than 0.2 would suggest that the predictor was redundant (Soh, 2015). In the present study, no R² exceeded the tolerance value of 0.2, and thus, no variables needed to be eliminated.

**Outliers**

To determine if there were outliers, Cook’s distance (Cook’s D) was conducted. First, ordinary least squares regression was used to examine whether there were outliers or observations with high leverage (extreme values on a predictor). Then the “predict” command and “cooksd” option were used to calculate the values of Cook’s D. A Cook’s D larger than 1 meant that the observation was highly influential. No Cook’s D exceeded 1, and thus, no datapoints needed to be eliminated.

**Choosing the Quadratic Model to Capture Reading Ability Growth**

The next sections detail the Wald test that was used for model comparisons, then the results first for the unconditional models and next for the conditional models, separated by the kindergarten models and the first grade models.
Prior to conducting the full model with the predictors, unconditional growth models (unconditional means model, unconditional linear, and unconditional quadratic) were conducted to determine the best form of growth. Table 4.4 provides the Sources of Variance for all models. Due to the use of multiple imputation, neither the LLR, AIC, nor the BIC could be used to compare models (StataCorp, 2015). Instead, the Wald test was used (Rubin, 1987; StataCorp, 2015). The Wald test can be used to compare models. The test evaluates the null hypothesis that the coefficients of added predictors from one model to another are simultaneously equal to zero (that they are not accounting for significantly additional variance) (UCLA Statistical Consulting Group, n.d.). If the p-values in the output are less than .05, the null hypothesis can be rejected, meaning that the added predictors are accounting for significantly additional variance in the dependent variable (Reading Ability). So including the added predictors statistically significantly improves the model fit, and the more “complicated” model is better. On the contrary, when the p-value is not statistically significant, the null hypothesis cannot be rejected, meaning that removing variables will not significantly improve model fit and that the variable(s) is(are) not an important part of predicting the dependent variable.

Choosing the Quadratic Model to Capture Reading Ability Growth: Kindergarten Model

**Unconditional means model (Model 1).** The unconditional means model (Model 1) did not contain any Level 1, 2, or 3 predictors. The purpose was to examine whether there was any variance in Reading Ability across students. As shown in Table 4.4, the Model 1 intercept was significant ($F = 57.91, p < .001$), indicating that there was significant variation in Reading Ability among students. The temporal change ICC was .8530, meaning that 85.30% of the total variation in Reading Ability was due to differences across time. The within-students ICC was .1055, meaning that 10.55% of the total variation in Reading Ability was due to differences
across students. And the within-teachers ICC was .0415, meaning that 4.15% of the total variation in Reading Ability was due to differences across teachers. The ICC results indicated that Reading Ability was only slightly correlated within-teachers and within-students but strongly correlated across the time points.

**Unconditional linear growth model (Model 2).** After the unconditional means model was run, the unconditional linear growth model was conducted (Model 2), which included time as a Level 1 predictor but did not contain any Level 2 or 3 predictors. Table 4.4 summarizes the results of Model 2. About 16.46% of the variation in initial Reading Ability scores was due to teachers; the remaining 83.54% was due to students. About 19.61% of the variation in Reading Ability instantaneous (linear) change rate was due to teachers; the remaining 80.39% was due to students. The indication is that the inclusion of the linear change rate was able to capture more variance in Reading Ability scores.

Model 1 was compared to Model 2 using the Wald test. The results, $F(1) = 82529.80$, $p < .001$, indicated that the unconditional linear growth model had a better fit than the unconditional means model.

**Unconditional quadratic growth model (Model 3).** Next, the unconditional quadratic growth model (Model 3) was conducted, that included time as a linear and a quadratic term but did not contain any Level 2 or 3 predictors. Table 4.4 summarizes the results of Model 3. About 17.55% of the variation in initial Reading Ability scores was due to teachers; the remaining 82.45% was due to students. About 14.04% of the variation in Reading Ability instantaneous (linear) change rate was due to teachers; the remaining 85.96% was due to students. About 6.25% of the variation in Reading Ability acceleration/deceleration change rate was due to teachers; about 93.75% was due to students.
Although Model 2 fit the observed data well, Model 3 fit the observed data even better for three reasons. First, the fixed effects for the intercept, instantaneous growth rate, and acceleration/deceleration rate were all statistically significant, \( p < .001 \). Second, when the quadratic term was added to the model, the Wald Test was statistically significant, \( F(1) = 17806.23, p < .001 \), meaning that the null hypothesis that the quadratic term was equal to zero could be rejected and that it was an important part of predicting Reading Ability. Third, a graphical representation (see Figure 4.4) of the predicted Reading Ability scores suggested that growth was non-linear and a quadratic model may better represent the reading ability growth pattern. The slightly positive coefficient associated with the instantaneous change rate, \( \beta = .05, p < .001 \) and the very slightly negative coefficient associated with the acceleration/deceleration change rate, \( \beta = -2.92e-4, p < .001 \), indicated that students’ Reading Ability growth rate initially increased but then decelerated slightly in the later grades.

**Choosing the Quadratic Model to Capture Reading Ability Growth: First Grade Model**

Finding the first grade model to capture Reading Ability growth required taking the same steps as for the kindergarten model.

**Unconditional means model (Model 1).** The unconditional means model (Model 1) did not contain any Level 1, 2, or 3 predictors. Table 4.4 summarizes the results of Model 1 for the series of first grade models. The temporal change ICC was .7246, meaning that 72.46% of the total variation in Reading Ability was due to differences across time. The within-students ICC was .1935, meaning that 19.35% of the total variation in Reading Ability was due to differences across students. And the within-teachers ICC was .0819, meaning that 8.19% of the total variation in Reading Ability was due to differences across teachers. The ICC results indicate that
Reading Ability was only slightly correlated within-teachers and within-students but strongly correlated across the time points.

**Unconditional linear growth model (Model 2).** After the unconditional means model was conducted, the unconditional linear growth model was conducted (Model 2), which included time as a Level 1 predictor but did not contain any Level 2 or 3 predictors. Table 4.4 summarizes the results of Model 2. About 23.28% of the variation in initial Reading Ability was due to teachers; the remaining 76.72% was due to students. About 13.37% of the variation in instantaneous Reading Ability change rate was due to teachers; the remaining 86.63% was due to students. The indication was that the inclusion of the linear change rate was able to capture more variance in Reading Ability scores.

Model 1 was compared to Model 2 using the Wald test. The results, $F(1)=55979.56$, $p=<.001$, indicated that the unconditional linear growth model had a better fit than the unconditional means model.

**Unconditional quadratic growth model (Model 3).** Next, the unconditional quadratic growth model (Model 3) was conducted, that included time as a linear and a quadratic term but did not contain any Level 2 or 3 predictors. Table 4.4 summarizes the results of Model 3. About 76.80% of the variation in initial Reading Ability was due to teachers; the remaining 23.20% was due to students. About 10.92% of the variation in instantaneous Reading Ability change rate was due to teachers; the remaining 89.08% was due to students. About 7.42% of the variation in Reading Ability acceleration/deceleration change rate was due to teachers; the remaining 92.58% was due to students.

Although Model 2 fit the observed data well, Model 3 fit the observed data even better for three reasons. First, the fixed effects for the intercept, instantaneous growth rate, and
acceleration/deceleration rate were all statistically significant, $p < .001$. Second, when the quadratic term was added to the model, the Wald Test was statistically significant, $F(1) = 12245.64$, $p < .001$, meaning that the null hypothesis that the quadratic term was equal to zero could be rejected and that it was an important part of predicting Reading Ability. Third, a graphical representation (see Figure 4.4) of the predicted Reading Ability scores also suggested that growth was non-linear and a quadratic model may better represent the reading ability growth pattern. The slightly positive coefficient associated with the instantaneous growth rate, $\beta = .05$, $p < .001$ and the very slightly negative coefficient associated with the acceleration/deceleration rate, $\beta = 3.27e-4$, $p < .001$ indicated that students’ Reading Ability change rate initially increased but then decelerated slightly in the later grades.

**Final Model Results**

In the following sections, the results for the final HLM model analyses will be presented, first for the kindergarten model and then for the first grade model. In the final model, the outcome was Reading Ability (growth—intercept, instantaneous change rate, and acceleration/deceleration change rate), and there were (1) four main effects (three reading instructional emphasis/amount variables and Language Status), (2) three interactions—the interaction of Language Status with each of the three reading instructional emphasis/amount variables, and (3) the control variable (SES). For kindergarten and first grade separately, first the results for the interactions between each of the three kindergarten reading instructional emphasis/amount variables and Language Status on Reading Ability growth are presented. Second, results for the main effects of Language Status and the reading instructional emphasis/amount variables are presented. Third, results for the control variable (SES) are presented. Table 4.4 shows the sources of variances and related effects. Table 4.5 summarizes
the conclusions for the statistically significant effects, which readers may find useful as an overview when reading the following sections.

**Is the Relationship Between Kindergarten Early Reading Instructional Emphasis/Amount and Reading Growth Different for Asian LMs as compared to Their NE-Speaking Peers?**

**The three interactions.** None of the three kindergarten interactions were statistically significant for any of the growth parameters. First, the interaction between Language Status and kindergarten Extent to Which Sounds and Letter-Sound Relationships were Emphasized was *not* statistically significantly related to Reading Ability growth—at the intercept (spring of kindergarten Reading Ability), for instantaneous change rate, or for acceleration/deceleration change rate. In addition, the interaction between Language Status and kindergarten Extent to Which Meaning Construction was Emphasized was *not* statistically significantly related to Reading Ability growth— at the intercept, for instantaneous change rate, or acceleration/deceleration change rate. Lastly, the interaction between Language Status and kindergarten Overall Amount of Reading Instruction was *not* statistically significantly related to Reading Ability growth—at the intercept, for instantaneous change rate, or acceleration/deceleration change rate.

**Main effects.** Only the main effect for Language Status was significantly related to Reading Ability growth, and it was significant for the intercept ($\beta(\text{SE}) = -.154(.047)$, $p < .01$), instantaneous change rate ($\beta(\text{SE}) = .006(.001)$, $p < .001$), and acceleration/deceleration change rate ($\beta(\text{SE}) = -5.79e-5(1.230e-5)$, $p < .001$). Notably, there were no main effects for any of the three reading instructional emphases/amount variables.

Figure 4.5 shows Reading Ability growth for the two language groups. The initial status Beta, -.154, was the average difference in spring of kindergarten standardized Reading Ability
score between Asian LMs (the reference group) and NE-speakers (comparison group), holding all other predictors constant. So on average, compared to Asian LMs, we would expect NE-speakers to be .154 of a standard deviation unit lower on Reading Ability score, holding all other predictors constant. Translated to predicted raw score units, compared to Asian LMs, we would expect the average spring of kindergarten Reading Ability predicted raw score for NE-speakers to be 2.23 points lower. Also, as a point of comparison, the sample raw means (and standard deviations) for spring of kindergarten were only slightly lower for NE-speakers than for Asian LMs—47.62(14.38) and 51.90(21.46), respectively. Additionally, visually in Figure 4.5, there was a minimal difference on initial Reading Ability for the two groups. Although there was a statistically significant difference in initial Reading Ability between the two groups, it was a weak effect.

The Beta, .006, was the average difference in standardized instantaneous Reading Ability change rate between Asian LMs (reference group) and NE-speakers (comparison group). So on average, compared to Asian LMs, we would expect NE-speakers to have .006 of a standard deviation faster initial takeoff, holding all other predictors constant. As shown in Figure 4.5, NE-speakers demonstrated an almost imperceptible slightly faster change rate than did Asian LMs. So the difference between the two groups in Reading Ability initial takeoff rate, although statistically significant, was minimal.

The Beta, -5.79e-5, was the average difference in standardized acceleration/deceleration Reading Ability change rate between Asian LMs (reference group) and NE-speakers (comparison group). So on average, compared to Asian LMs, we would expect NE-speakers to have 5.79e-5 of a standard deviation faster deceleration change rate, holding all other predictors constant. That is, although statistically significant, the difference between the groups was nearly
imperceptible. As shown in Figure 4.5, compared to Asian LMs, NE-speakers demonstrated a visibly faster deceleration change rate. The predicted Reading Ability gap between NE-speakers and Asian LMs widened between fifth and eighth grade, where NE-speakers ended eighth grade with somewhat lower Reading Ability. The sample raw mean spring of eighth grade Reading Ability scores for Asian LMs (178.74) was also slightly higher than that of NE-speakers (170.54). Thus, there was a weak difference between the two language groups.

**Control variable.** Socioeconomic status was not statistically significant at the Reading Ability intercept, instantaneous change rate, or acceleration/deceleration change rate. So students from higher SES backgrounds did not have statistically significant higher or lower initial Reading Ability, faster or slower instantaneous change rates, or faster or slower acceleration change rates, controlling for all other predictors.

**Is the Relationship Between First Grade Early Reading Instruction and Reading Growth Different for Asian LMs as Compared to Their NE-Speaking Peers?**

In the following sections for the first-grade final model, first the results for the interactions between each of the three first grade reading instructional emphasis/amount variables and Language Status on Reading Ability growth are presented. Second, results for the main effects of Language Status and the reading instructional emphasis/amount variables are presented. Third, results for the control variable (SES) are presented. Table 4.4 shows the sources of variances and related effects. Table 4.5 overviews the significant effects alone, which readers may find useful when reading the following sections.

**The three interactions.** Only the interaction between Language Status and first grade Extent to Which Sounds and Letter-Sound Relationships were Emphasized was statistically significantly related to Reading Ability growth, for instantaneous change rate ($\beta(SE) =$
-.004(.002), p < .05) and acceleration/deceleration change rate (β(SE) = 4.34e-5(1.670e-5), p < .01).

Figure 4.6 depicts the significant interaction effect. To create the figure, first, students’ scores for Extent to Which Sounds and Letter-Sound Relationships were Emphasized were ranked, and using terciles, students were separated into three groups (students receiving lesser, medium, and greater amounts of sounds/letters emphases in first grade). The medium group was eliminated. Four lines were plotted for the different Language Status groups.

Figure 4.6 reveals that Language Status and Extent to Which Sounds and Letter-Sound Relationships were Emphasized interacted in a complicated way on Reading Ability takeoff change rate and acceleration/deceleration change rate. Visual examination of the figure suggests seven main points. First, looking at the initial status of the four groups, it appears that their predicted Reading Abilities were very slightly different, with Asian LMs with lesser sounds/letters emphasis having the highest predicted Reading Ability. But the effect was not statistically significant.

Second, turning to the instantaneous change rate, the NE-speakers with lesser sounds/letters emphasis (second line from the top) demonstrated a faster instantaneous Reading Ability change rate than the other three groups, and the other three subgroups were similar in takeoff rate.

Third, all four groups demonstrated deceleration in Reading Ability. However, the two NE-speaker groups (second line from top and the bottom line) decelerated a lot more than the two Asian LM groups (top line and third line from top), regardless of amount of sounds/letters emphasis.
Fourth, at the intercept and initial takeoff, *through the primary grades*, students with lesser sounds/letters emphasis (top two lines) outperformed students for predicted Reading Ability when compared to students who had received first-grade greater sounds/letters emphasis (bottom two lines), regardless of Language Status.

Fifth, for students with greater sounds/letters emphasis (third line from top and bottom line), the Asian LMs (third line from top) consistently outperformed NE-speakers (bottom line) on predicted Reading Ability *throughout all grades*.

But sixth, for students with lesser sounds/letters emphasis (top two lines), that consistency between language groups was not evident. Between the two lesser sounds/letters emphasis groups, Asian LMs demonstrated higher initial and eighth grade predicted Reading Ability while the NE-speakers either slightly surpassed, or attained approximately the same, Reading Ability level as the Asian LMs in the late elementary grades.

Seventh, in the spring of eighth grade, Asian LMs with lesser sounds/letters emphases (top line) outperformed the other three groups on predicted Reading Ability (sample mean = 184.71). Native-English speakers with greater sounds/letters emphases (bottom line) performed the lowest (sample mean = 166.44). The spring of eighth grade sample means for Asian LMs with greater sounds/letters emphasis (third line from top) and NE-speakers with lesser sounds/letters emphasis (second line from top) were 176.29 and 174.24, respectively.

**Main effects.** The main effects for Language Status and Extent to Which Sounds and Letter-Sounds Were Emphasized were each statistically significant for all three of their respective growth curve parameters. Notably, there were no main effects for Extent to Which Meaning Construction was Emphasized or for Overall Amount of Reading Instruction. In the following sections, first the results for the Language Status main effect are presented and then
the results for the Extent to Which Sounds and Letter-Sounds Were Emphasized main effect are presented.

**Language Status.** The main effect for Language Status was statistically significantly related to Reading Ability growth for initial status ($\beta(\text{SE}) = -0.155(0.059)$, $p < .001$), instantaneous change rate ($\beta(\text{SE}) = 0.008(0.002)$, $p < .001$), and acceleration/deceleration rate ($\beta(\text{SE}) = -9.750e-5(1.60e-5)$, $p < .001$). Figure 4.7 depicts the main effect for Language Status.

The main effect for Language Status at the initial status was statistically significant. However, a dilemma in interpretation arose. The main effect was significant, meaning that on average, one group (NE-speakers) started lower than the other group (Asian LMs) at the intercept. However, although the interaction of Language Status with sounds/letters was not significant, the breakout of subgroups in Figure 4.6 suggests that on average, Asian LMs did not consistently outperform NE-speakers at the outset.

The significant effect for Language Status for instantaneous change rate did not hold in the face of the interaction. From examination of the four subgroups in Figure 4.6, the NE-speakers with lesser sounds/letters emphasis (second line from the top) demonstrated a faster instantaneous Reading Ability change rate, but the other three groups were similar in takeoff rate.

The significant main effect for Language Status for acceleration/deceleration held in the face of the interaction. The acceleration/deceleration Beta, $-9.750e-5$, was the average difference in standardized acceleration/deceleration Reading Ability change rate between Asian LMs and NE-speakers. So on average, compared to Asian LMs, we would expect NE-speakers to have a miniscule amount of a standard deviation faster deceleration, holding all other predictors constant.
From examination of the four subgroups in Figure 4.6, it is clear that the main effect held in the face of the interaction. Comparing the NE-speaker groups (second line from the top and bottom line) with the two Asian LM groups (top line and third line from the top), NE-speakers as a whole decelerated more than did Asian LMs, with all other predictors held constant. Additionally, the main effect depicted in Figure 4.7 displays the language groups’ difference in deceleration clearly.

**Extent to Which Sounds and Letter-Sound Relationships were Emphasized.** The main effect for Extent to Which Sounds and Letter-Sound Relationships were Emphasized was significantly related to Reading Ability at the intercept ($\beta(\text{SE}) = -.151(.06), p < .05$), for instantaneous rate of change ($\beta(\text{SE}) = .004(.002)$, and acceleration/deceleration rate of change ($\beta(\text{SE}) = -4.010e-5(1.670e-5)$). However, only the effect for the intercept held in the face of the interaction.

The intercept Beta, -.151, was the average difference in spring of first grade standardized Reading Ability score for one-unit standardized difference in Extent to Which Sounds and Letter-Sound Relationships were Emphasized, holding all other predictors constant. So on average, in the spring of first grade, we would expect that students who received one standard deviation unit more of sounds/letters emphasis to score .151 of a standard deviation unit lower on Reading Ability, with all other predictors constant. Translated to sample raw score units, we would expect students who received a one raw score unit increase in sounds/letters emphasis to be associated with, on average, a 3.68 predicted Reading Ability raw score change. The raw score scale approximately doubles the amount of instructional time in moving from one raw score unit to the next. For instance, on average, moving from a raw score of 3 (2 to 3 times a month) to 4 (4 times a month) was associated with 3.68 predicted raw score points lower for NE-
speakers than Asian LMs. Essentially, a small difference in the increase in amount of sounds/letters emphasis was related to a small difference in predicted Reading Ability.

The Extent to Which Sounds and Letter-Sound Relationships were Emphasized main effect for instantaneous rate of change did not hold in the face of the interaction. As seen in Figure 4.6, the instantaneous rate of change was moderated by Language Status.

The Extent to Which Sounds and Letter-Sound Relationships were Emphasized main effect for acceleration/deceleration rate of change also did not hold in the face of the interaction. As seen in Figure 4.6, the acceleration/deceleration rate of change was moderated by Language Status, essentially a disordinal interaction occurred.

**What was learned from the analysis of first grade interactions and main effects?**

When the first grade interactions and main effects were taken as a whole, the relationship between predicted Reading Ability growth and the degree to which first grade teachers emphasized sounds/letters in reading instruction was moderated by Language Status but the relationship was different at different phases of Reading Ability growth. 1) At the start of the Reading Ability growth curve, that is at the intercept, there was no moderating effect of Language Status on the relationship between sounds/letters emphasis and students’ Reading Ability attainment. 2) But also at the start of the growth curve, the amount of first grade sounds/letters emphasis was differentially related to the Reading Ability takeoff rate according to Language Status. Most notably, the NE-speakers who experienced the least amount of sounds/letters emphasis in first grade had a distinctively faster takeoff than did the other subgroups. 3) The most salient impact of Language Status on the relationship between sounds/letters emphasis and Reading Ability was evident during the later phase of Reading Ability development. And the moderating Language Status effect was different from that in the
earlier phase. On the whole, although NE-speakers decelerated faster than did Asian LMs, in comparison to NE-speakers and other Asian LMs, Asian LMs who experienced greater sounds/letters emphasis in first grade appeared to exhibit the least amount of deceleration in Reading Ability through the deceleration years, that is, from approximately fifth grade through the spring of eighth grade.

**Control variable.** SES was not statistically significant on the Reading Ability intercept, Reading Ability instantaneous change rate, or Reading Ability acceleration/deceleration change rate. So students from higher SES backgrounds did not have statistically significant higher or lower initial Reading Ability, faster or slower instantaneous change rates, or faster or slower acceleration change rates, controlling for all other predictors.

**Summary of the Main Findings**

For kindergarten, Language Status did not moderate the effects of sounds/letters emphasis, meaning construction, or overall amount of reading instruction on Reading Ability. However, there were differences between Asians and NE-speakers at initial status (end of kindergarten), (with Asian LMs having higher Reading Ability than NE-speakers), in how quickly they picked up speed at the end of kindergarten moving into the primary grades (with NE-speakers showing faster speed), and in deceleration rates (with NE-speakers demonstrating faster deceleration).

For first grade, Language Status did not moderate the effects of meaning construction or overall amount of reading instruction on Reading Ability. However, it did moderate the relationship between sounds/letters emphasis with Reading Ability, but the moderation effect was different at different phases of Reading Ability growth. 1) At the intercept, or beginning of the growth curve, there was no moderating Language Status effect on the relationship between
sounds/letters emphasis and Reading Ability attainment. 2) However, also at the start of the
growth curve, the amount of sounds/letters emphasis was differentially related to the Reading
Ability takeoff rate according to Language Status, where NE-speakers who experienced lesser
amount of sounds/letters emphasis distinctly demonstrated a faster takeoff rate than the other
three groups. 3) Most notable was the moderating Language Status effect for the relationship
between sounds/letters emphasis and Reading Ability in the later phase of Reading Ability
development, between fifth and eighth grades. Although, on the whole, NE-speakers decelerated
faster than did Asian LMs, Asian LMs who experienced a greater amount of sounds/letters
emphasis experienced a slower deceleration, in comparison to their NE-speaking peers.
CHAPTER 5
CONCLUSION AND DISCUSSION

In the current chapter, the main conclusions from the present study are presented and discussed. First, the main study conclusions are described. Then the present study’s limitations are discussed. Third, a discussion of possible meanings of the findings is presented. Finally, practical and research implications that extend from the findings are presented.

Conclusions

Synthesizing across kindergarten and first grade, four conclusions arose. (1) Students’ language status did not moderate the relationship between two aspects of instructional emphasis, the degree to which meaning was emphasized or the overall amount of reading instruction, with reading ability growth—neither in kindergarten nor in first grade. (2) However, by first grade, students’ language status did moderate to some extent the relationship between the degree to which teachers emphasized sounds/letters during the first grade year with reading ability growth. (That moderation was not witnessed in kindergarten.) The way in which language status mattered was complicated. The most salient differences in the growth patterns were at initial takeoff rate at the end of first grade and in the pattern of deceleration through the middle grades. Native-English speakers who received a lesser amount of sounds/letters emphasis throughout first grade demonstrated a slightly faster reading ability takeoff rate than the other three groups. Also, although on the whole, NE-speakers decelerated somewhat faster than did Asian LMs in the later phase of reading ability development between fifth and eighth grades, Asian LMs who received a greater amount of sounds/letters emphasis experienced a somewhat slower deceleration, in
comparison to their NE-speaking peers. (3) Turning to the pattern of reading ability growth for the two language groups as a whole, regardless of degree of reading instructional emphasis on sounds/letters, the most salient differences in the two growth patterns were at initial reading ability at the end of first grade and in the pattern of deceleration through the middle grades. On the whole, Asian LMs outperformed their peers by small margins on reading ability in the spring of kindergarten and first grade. And a more obvious difference was that Asian LMs demonstrated less deceleration in reading ability in the middle school grades than their peers. (4) Only in first grade (that is, not in kindergarten), on the whole, regardless of language status, students who were exposed to sounds/letters to a lesser degree than their peers in first grade displayed slightly higher reading ability by the spring of first grade.

**Limitations**

The current study has several limitations that may be important to keep in mind while considering the conclusions and discussions. Some of the limitations are related to the use of secondary data in that a complete cadre of desirable variables was not always present in secondary datasets. First, neither Asian native-oral language nor native reading ability variables were available in the ECLS-K dataset and thus could not be controlled or examined in the ways that they might interact with other variables. It could be important to address such factors because proficiency in a native-language has bearings on learning to read in an additional language.

Second, the sample was limited to Asian LM students who were deemed sufficiently proficient in English oral language to take the reading assessment in the spring of kindergarten, so the findings would not necessarily be applicable to those who had not attained a minimal level of oral English proficiency by the spring of kindergarten. Additionally, even though all Asian
LM students had attained at least a minimum proficiency level in oral-English by the spring of kindergarten, it is unknown whether Asian LMs’ English proficiency was on a par with that of their NE-speaking peers. While Asian LMs may have attained basic English vocabulary and syntactical structures—enough to pass the oral-English screener, their potential underexposure to English in general settings and as importantly, in academic settings, may have set them behind NE-speakers in deep vocabulary knowledge and language that appears in academic contexts more frequently than in general language settings. Deep vocabulary knowledge and academic language play important roles in reading development (Stahl & Nagy, 2006). Deep vocabulary knowledge involves knowing a network of concepts that are related to a word (Bernhardt, 2011). Academic vocabulary is language that occurs more in school settings and involve domain knowledge (Cummins, 1999).

Third, information on the Asian LMs’ specific native-language was unavailable. Among Asian languages, the manner in which phonology, meaning, and written representation are linked varies. Some Asian languages such as Chinese are considered logographies or syllabaries and use morphemes or syllables for words, while other Asian languages such as Korean are alphabetic. The latter group of Asian students would have been likely to have home exposure that was more consistent with English phonology, potentially giving them an advantage in reading English over the former group. Since the ECLS-K is a nationally representative sample, the U.S. Census, which seeks to provide a comprehensive study of the U.S. population, may provide some indication of the proportions of students from the different Asian languages. In 2000, the Census indicated that after Spanish, Chinese was the most popular non-English language spoken in the home. So perhaps most of the present Asian LM sample came from home languages where
written language is conveyed in logographs or syllabaries and not from alphabetic language backgrounds. However, there is no way to know with certainty.

Fourth, data for the variables Extent to Which Sounds and Letter-Sound Relationships Were Emphasized, Extent to Which Meaning Construction Was Emphasized, and Overall Amount of Reading Instruction were collected through self-reports. Self-report data has often been criticized for a potential lack of reliability (Mancilla-Martinez, Gamez, Vagh, & Lesaux, 2016). However, there are studies that demonstrate the reliability of self-report data (Ginns & Barrie, 2004; Mancilla-Martinez, Gamez, Vagh, & Lesaux, 2016). Additionally, self-reports completed by mail (as was the case in the ECLS-K data collection) may be less susceptible to bias than self-reports via phone or face-to-face interviews (Xue & Meisels, 2004).

Discussion

The present study is the first to explore the potential moderating effect of language status on the relationship between reading instructional emphasis/amount and reading growth and takes a first step at expanding the research base. It is also one of the first large-scale studies to examine Asian LM reading growth and the first to examine that growth beyond fifth grade.

As the conclusions and results are discussed, it is important to keep in mind that the Asian LMs in the present study had passed an oral-English proficiency screener by the spring of kindergarten and had some level of oral-English. So the findings pertain to Asian LMs who have attained at least a minimum level of oral-English and not to all Asian LMs. Moreover, there was also variation in the Asian LMs’ oral-English proficiency level where some students barely passed the screener while others had somewhat higher scores. So simply passing the screener did not necessarily mean that the Asian LMs’ English proficiency was comparable to that of the NE-students.
Language Status Does Not Moderate the Relationship Between Two Aspects of Reading Instructional Emphasis and Reading Ability Growth

In kindergarten and first grade, language status did not moderate the relationship between neither the extent to which meaning was emphasized nor the overall amount of reading instruction. No prior studies addressed that question, but the result deviated from expectations drawn from related theory and other prior relevant findings about why meaning instruction and amount of reading instruction should matter for reading growth.

Turning first to meaning emphasis, some would argue that degree to which meaning instruction is emphasized in the early elementary grades should matter for students’ reading growth in general. From a theoretical standpoint, meaning instruction should be important for reading ability growth because reading involves both decoding ability and language comprehension (Gough & Tunmer, 1986; Lesaux & Kieffer, 2010; Sonnenschein, Stapleton, & Benson, 2010; Zinar, 2000). So hypothetically although sounds and letter-sound relationships is an important component of the early stages of learning to read, early grades reading instruction should not focus exclusively on either sounds and letter-sound relationships or meaning construction. In fact, the point is not whether sounds instruction or meaning construction matter for reading growth but rather, the degree to which each is emphasized in the instruction (Anderson, Hiebert, Scott, & Wilkinson, 1986; Sonnenschein, Stapleton, & Benson, 2010).

Additionally, early emphasis on meaning during reading instruction has been hypothetically related to later reading growth (National Early Literacy Panel, 2009), especially from middle grades on, when creating meaning from a variety of different types of texts becomes more and more important.
In addition to theory, research reviews and existing studies support the general importance of meaning-related instruction. The National Reading Panel (2000) reviewed extant research and identified meaning construction (in the form of vocabulary and reading comprehension) as an area that reading instruction should address for students in general. Several prior studies (Connor, Morrison, & Katch, 2004; Connor, Morrison, & Petrella, 2004; Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004) examined the degree to which meaning construction was emphasized for primary grades NE-speakers and reading ability growth. They found that meaning construction emphasis in the early elementary grades was effective for reading growth but it depended on students’ initial ability. Students who received more meaning construction emphasis and had initially higher reading skills demonstrated greater reading growth than those with initially lower reading skills.

Turning to explorations of NE-speaker versus LM reading growth in the context of meaning emphasis, the one existing study (Vadasy & Sanders, 2012) on the effectiveness of meaning instructional emphasis on reading growth for LMs and NE-speakers provided tentative support for the contention that language status and amount of meaning instruction should matter for reading growth. Vadasy and Sanders (2012) obtained a comparison between lower-achieving NE-speakers and ethnically heterogeneous LMs’ reading growth from first through second grades. They concluded that language group mattered for the relationship between reading instructional emphasis and two-year reading growth. The NE-speakers experienced more reading growth than the LMs when they received a greater emphasis on meaning in first grade (the same effect was not found for the LMs).

Taken together, the prior theory and few related findings provide some support that the degree to which meaning instruction is emphasized would matter for reading growth and that the
importance of early grades meaning instruction might be different for LMs versus their NE-speaking peers. However, in the present study, for Asian LMs and NE-speakers alike, the degree to which they were exposed to meaning instruction in kindergarten and first grade was unrelated to reading ability growth, even regardless of initial reading ability at the end of first grade. The variant result for the NE-speakers in the present study may be connected to the fact that earlier studies did not extend past fifth grade. Perhaps when a longer time period is considered, the impact of early grades meaning instruction becomes lessened. Possibly, as students move into the middle and higher grades, instructional focus on meaning becomes more and more important.

As well, no prior studies specifically examined the importance of early-grades meaning instruction for Asian students’ longer-term reading growth. It is possible that earlier theoretical and research-related positions on the importance for emphasizing meaning in early grades do not apply to students like the Asian LMs in the present study who had at least a minimum amount of oral-English proficiency. Whether the same results would adhere for Asian students with less oral-English ability by the end of kindergarten is an open question.

Additionally, perhaps the nature of the meaning instructional emphasis scale lacked sufficient precision to capture a potential relationship with reading growth.

Turning next to the overall amount of reading instruction, no formal theories directly support the notion that amount of reading instruction matters. And while no studies to date have investigated the impact of language status on the relationship between overall amount of reading instruction and reading ability growth, the two existing studies with NE-speakers on the effectiveness of overall amount of reading instruction on reading growth in general provided tentative support that amount of reading instruction should matter. The present study findings contrasted with those of the two previous studies (Sonnenschein, Stapleton, & Benson, 2010;
Xue & Meisels, 2004). Both sets of researchers found that for NE-speakers (one followed kindergartners and the other, students through the elementary grades) an increase in amount of reading instruction (in kindergarten or kindergarten and first grade) was associated with an increase in reading ability growth. The variant result for the NE-speakers in the present study may be connected to the fact that earlier studies did not extend past fifth grade. Perhaps when a longer time period is considered, the impact of early grades meaning instruction becomes lessened. Possibly, as students move into the middle and higher grades, the amount of early reading instruction becomes less and less important.

As well, when considering just the Asian students in the present study, another reason for the different results may be that there is something about being Asian and having at least a minimum amount of oral-English proficiency. Whether the same results would adhere for Asian students with less oral-English ability by the end of kindergarten is an open question.

Additionally, perhaps the nature of the amount of reading instruction scale lacked adequate precision to capture a potential relationship with reading growth.

Language Status Does Matter for the Relationship Between Sounds Instruction and Reading Ability Growth

It is difficult to compare the complicated moderation of language status on the relationship between sounds/letters emphasis and reading ability in part because no formal theoretical positions exist for LM reading development in general or Asian LM reading development specifically, and only one prior study has directly examined language status as a moderator on the sounds/letters and reading ability relationship. However, related theory and a body of research supported the contention that sounds instruction matters for reading growth in general.
For students in general, from a theoretical standpoint, sounds/letters instruction should be important for reading ability growth. The early stages in Ehri’s phases of word development theory heavily focus on sounds, letters, and words, pointing to the importance of acquiring early word reading for later reading growth. An implication from the theory is that instruction focusing on sounds, letters, and words may support reading growth.

Research reviews and related research studies support the general importance of sounds/letters instruction. The National Reading Panel (2000) identified phonemic awareness and phonics as areas that reading instruction should address for students in general. They concluded that sounds instruction was particularly important for preschoolers and early elementary students. Several prior studies examined the degree to which sounds was emphasized for NE-speakers in the elementary grade(s) (Connor, Morrison, & Katch, 2004; Sonnenschein, Stapleton, & Benson, 2010; Xue & Meisels, 2004) or directly compared sounds and meaning instruction (Foorman, Francis, Fletcher, & Schatschneider, 1998) and concluded that the sounds emphasis was effective for reading growth but it depended on students’ initial ability. Students who received more sounds emphasis and had initially lower reading skills demonstrated greater reading growth than those with initially higher reading skills.

Further, the one existing study on the effectiveness of sounds instructional emphasis for both NE-speakers and LMs on reading growth provided tentative support that sounds instruction may matter for reading growth in the primary grades. In the aforementioned Vadasy and Sanders (2012) study comparing lower-achieving NE-speakers’ and linguistically heterogeneous LMs’ reading growth from first through second grade, the LMs experienced more reading growth with a greater emphasis on sounds in first grade. The same effect was not found for the NE-speakers.
That is, language group mattered for the relationship between sounds reading instructional emphasis and two-year reading growth.

The present study results are inconsistent with both prior theoretical conjecture and the limited shorter-term studies. Contrary to prior theory and the limited primary grades research, in the present study when viewed across a relatively long run, that is, through at least eighth grade, more early grades emphasis on sounds/letters is not generally more beneficial for reading growth. Rather, more sounds/letters emphasis is beneficial in the long run only for initially lowest-performing Asian LMs. In the following sections, points about the differential impact of language status will be discussed in phases, starting with the impact at initial growth rate.

First, at the initial takeoff point of growth, NE-speakers who received a lesser emphasis in sounds/letters experienced the fastest initial takeoff while their peer subgroups (whether NE-speaker or Asian LM) experienced a slightly slower rate. These NE-speakers had slightly higher reading ability, on the whole, than their NE-speaking peers at the end of first grade. Perhaps their pattern of comparative rapid takeoff for the NE-speaker group is supported by automaticity theory (LaBerge & Samuels, 1974). Given that the subgroup of NE-speakers had slightly higher reading ability than their other NE peers, it is plausible that the NE-speakers with the fastest takeoff were proficient or near proficient already in sounds/letters. If the students had reasonably good knowledge of sounds/letters, then they would not have needed to receive a great amount of sounds emphasis.

Moving now to the later part of the reading growth curve, three notable results require discussion. First, on the whole, both NE-speakers’ and Asian LMs’ reading ability growth decelerated starting after third grade. Second, NE-speakers decelerated faster than did Asian LMs in later phase of reading ability development, between fifth and eighth grades. Third, Asian
LMs who experienced a greater amount of sounds/letters emphasis experienced a slower deceleration, in comparison to their NE-speaking peers.

Starting with the first of the three results, there is mounting prior evidence that NE-speaking students, and to a much more limited extent LM students, experience noticeable reading ability growth deceleration in later elementary grades and into middle school (Catts, Bridges, Little, & Tomblin, 2008; Cutuli et al., 2013; Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Herbers, Cutuli, Supkoff, Heistad, Chan, Hinz, & Masten, 2012; Kieffer, 2008, 2011; Roberts, Mohammed, Vaughn, 2010; Nese et al., 2013; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Voight, Shinn, & Nation, 2012; Williamson, Fitzgerald, & Stenner, 2014). The reading ability growth deceleration noted in the present study for both NE-speakers and Asian LMs is consistent with the quadratic reading growth curves noted in prior studies.

Second, there is no prior research that can shed light on the differential deceleration patterns of Asian LMs and NEs through the middle grades. In the present study, Asian LMs demonstrated a somewhat slower deceleration than their NE peers. The only plausible explanation to date is that there is something about coming from an Asian background that contributes to the differential slowing of reading ability growth. Perhaps home values and emphasis on the importance of reading may have been related to the slower deceleration in the middle grades (Peng & Wright, 1984). In spite of the lack of understanding of the reason for the language status difference, the result is interesting in that it portends what might happen in high school. If NE-speakers continue to decelerate faster than Asian LMs through high school, the reading ability gap between Asian LMs and NE-speakers would continue to increase, with Asian LMs outperforming NE-speakers.
Third, no reasons were apparent for why a greater emphasis on sounds/letters emphasis in first grade was able to provide Asian LMs with a boost in reading ability growth in the middle grades as compared to their NE-speaking peers.

**The Importance of Language Status for Reading Ability Growth, Regardless of Reading Instructional Emphases**

Turning to the pattern of reading ability growth for the two language groups as a whole, regardless of degree of reading instructional emphasis on sounds/letters, two notable results for kindergarten and first grade require discussion. First, Asian LMs outperformed their peers by small margins on reading ability at the start of the curve (spring of kindergarten and spring of first grade). Second, Asian LMs demonstrated less deceleration in reading ability in the middle school grades as compared to their peers.

Starting with the first result at the start of the curve (for both spring of kindergarten and spring of first grade), in the present study, on the whole, Asian LMs slightly outperformed their peers. The result differed from one relevant theory about how home language may matter in reading ability and one study that compared a heterogeneously linguistic LM group with their NE-speaking peers. As for the relevant theory, linguistic distance theory highlights the large linguistic distance between English and Asian oral and written languages in the actual sounds that comprise the languages and in their linguistic structure, the way that meaning and sound are linked and how they are encoded in the writing system (Koda, 2007). Because of the linguistic distance that Asians experience, the theory suggests that at least in the initial elementary grades, NE-speakers would outperform their Asian LMs peers. There is no immediate explanation for the divergence from that theory in the present results.
Also, one set of researchers (Kieffer, 2011) compared linguistically heterogeneous LM groups that included Asians to their NE-speaking peers and reported lower initial reading proficiency in the fall of kindergarten for LMs as compared to their NE-speaking peers, *even for LMs who started kindergarten with some oral-English*. One plausible explanation for why the prior study results contrasted with the present study findings could be due to the difference in starting time points. It is possible that if the present study had also followed the students starting from the fall of kindergarten instead of the end of kindergarten, the findings would be more similar. Also, in Kieffer’s study, many linguistic groups were included. It is possible that even in Kieffer’s study, the Asian students actually did outperform their NE-speaking peers, though there is no way to ascertain subgroup performance in that study.

On the other hand, the present study results are similar to those in the only other study that specifically examined Asian students. Roberts, Mohammed, and Vaughn (2010) found that kindergarten Asian LMs also outperformed their NE-speaking peers in reading ability in the spring of kindergarten. Like the Asian LMs in the present study, the Asian LMs in the Roberts, Mohammed, and Vaughn (2010) study had some degree of oral-English proficiency by the end of kindergarten.

Considering the theory and the two previous studies again suggests that perhaps there is something different about the Asian LMs who have some level of oral English by end of kindergarten. Again, perhaps value that is placed on reading in the home setting may be related to the high reading ability demonstrated by the Asian LMs (Peng & Wright, 1994).

Second, turning to deceleration patterns, there are currently no prior studies that compared Asian LMs’ and NE-speakers’ English reading ability growth through the middle grades. The present study is the first. However, findings from limited studies comparing middle
grades linguistically heterogeneous LMs and NE-speakers point to the similarities (rather than differences) in LM and NE-speaker reading deceleration trends through eighth grade when SES is controlled (Kieffer, 2011, 2012). Those prior findings contrasted with the present study findings. Again, the only immediately plausible explanation for the divergence in results is that there is something about the Asian home culture that may be mediating or moderating the Asian students’ reading growth (Peng & Wright, 1984). As well, perhaps Asian children who have some level of oral English by the end of kindergarten are especially primed to make rapid early gains in reading.

The growth curves in the current study could be viewed as an extension of the reading growth curve result in the Roberts, Mohammed, and Vaughn (2010) study, which only followed Asian LMs through fifth grade. The prior researchers reported that at the end of elementary school, the reading ability acceleration rate for Asian LMs did not differ from that of NE-speakers. And similarly, an examination of the reading ability for students in the present study revealed no difference in reading ability acceleration/deceleration for NE-speakers and Asian LMs in fifth grade. But perhaps if the students in the prior study were followed through eighth grade, they would demonstrate a divergence in reading ability between the NE-speakers and Asian LMs. The present study may be revealing a difference in acceleration/deceleration that could not be observed in the prior study.

Finally, considering the whole of the reading growth curve, it was somewhat surprising that Asian LMs on the whole performed so well in comparison to their NE-speaking peers throughout the elementary grade and particularly through the middle grades. Although some of the Asian students’ advantage might be attributed to the fact that they had attained at least a minimal level of oral English, there was also variation in the group’s oral-English proficiency
level. Some students barely passed the test, and another group passed with somewhat higher scores. So it is likely that there were some Asian LMs whose English proficiency was substantially below that of the lowest-performing NE-students.

The Importance of Sounds/Letter Emphasis on Reading Growth Regardless of Language Status

Only in first grade (that is, not in kindergarten), on the whole, students who were exposed to sounds/letters to a lesser degree in first grade than others displayed higher reading ability at the spring of first grade, regardless of their language status. As discussed earlier in another context, the finding is surprising given the extant theory and research that suggests early grades students need to “crack the code,” and emphasis on sounds/letters is expected. A potential explanation could again be that, on average, the first grade students in the present study did not need a large amount of sounds/letters emphasis because they may already have had sufficient knowledge of sounds/letters to make substantial reading ability progress. No additional conjecture is immediately possible.

Instructional Implications

Several important instructional implications could be offered. First, on average, for long-term reading growth, it did not matter how much meaning emphasis students received in kindergarten or first grade. Recall that the present study examined the degree to which meaning was emphasized. The question wasn’t whether it was all or nothing. So there may actually be an optimal level of meaning emphasis that is important for reading growth. However, it was not feasible to determine that possibility from the present study. Given that the study did not aim to investigate whether or not meaning construction mattered, educators should not mistake the present study finding to mean that they should avoid spending instructional time on meaning.
Additionally, the relationship between meaning construction emphasis and reading ability growth was not different for Asian LMs and NE-speakers. So perhaps, educators could provide similar amounts of meaning construction emphasis to Asian LMs and NE-speakers.

Second, on average, for long-term reading growth, it did not matter how much overall amount of reading instruction students received in kindergarten or first grade. Again, there may be an optimal amount of reading instruction that is related to reading growth, but it was not feasible to determine that amount from the present study. Given that the study did not aim to investigate whether or not reading instruction mattered, educators should not mistake the present study finding to mean that they should avoid spending instructional time on reading activities.

Additionally, the relationship between overall amount of reading instruction and reading ability growth was not different for Asian LMs and NE-speakers. So perhaps, educators could provide similar amounts of overall amount of reading instruction to Asian LMs and NE-speakers.

Third, the delayed boost in reading growth from first grade emphasis on sounds/letters for the initially lower performing Asian LMs could provide implications for educators and policy makers evaluating the benefits of early grades reading instruction and programs. Even though these Asian LMs received a greater amount of sounds/letters emphasis in first grade, it was not until the middle grades that they seemed to reap some benefits from the instructional emphasis. So perhaps educators should keep the end goal, or long-term reading growth patterns, in mind and exercise caution with regards to expecting immediate results.

Fourth, an important instructional implication arises from the deceleration pattern at the end of the trajectories. If the difference in deceleration continues, Asian LMs will outperform their peers to an even greater extent at the end of high school (the raw score difference in reading ability between the two language groups was the widest in eighth grade). To address the existing
and potentially widening gap, educators may need to be especially sensitive to NE-speakers’ reading ability growth trends in the middle grades. Few schools continue special classes in reading after the elementary grades, and middle grades language arts classes tend to focus on writing. Perhaps the deceleration could be slowed if more attention was given to developmental reading through the middle grades, which could be especially important for NE-speakers.

Also, perhaps middle grades educators’ heightened awareness and sensitivity to the potential differences in the value that parents/guardians and students place on reading may help to support students’ reading growth by providing appropriate at-home activities.

Fifth, it may be important for educators to keep in mind that the Asian LMs in the present study had at least some oral-English abilities. It is possible that Asians with virtually no oral-English or somewhat less oral English ability would not display the same growth as those in the present study. Without further evidence from additional studies that focus on Asian LMs, educators may have to rely on advice for reading instruction that stems from research with LMs in general.

Sixth, NE-speakers who received a greater amount of sounds emphasis in first grade demonstrated faster reading ability deceleration after third grade as compared to their peers. It is possible that they may already have developed adequate sounds/letters knowledge even before, or early in first grade, and overemphasizing it in first grade had a later negative effect on their reading growth. Perhaps primary grade teachers should be educated on potential negative effects of over-emphasizing sounds/letters and trained to use assessments to diagnosis reading skills and determine which aspect of reading to emphasize at different points in time for particular students. In essence, the students may benefit from differentiated instruction.

**Implications/Directions for Future Research**
The present study is a step toward discovering more about how instructional practices impact the reading growth of one particular LM group, namely, Asians who have attained at least a minimum level of oral-English proficiency. A next step would be to investigate whether the same pattern of findings hold for other Asian LM groups, especially those who do not attain a minimum level of oral-English proficiency until a later time point.

Another direction for future research would be to follow Asian LMs and NE-speakers into high school to see if the deceleration patterns in the middle grades hold.

A follow-up would be to seek out potential explanations for NE-speakers’ faster deceleration in the middle grades, as compared to the Asian LMs. Perhaps studying home values on the importance of reading could be informative.

Furthermore, it may be fruitful to look at how later grades reading instruction, in particular, meaning construction, relates to reading ability growth. Meaning construction becomes more important as students enter the later elementary through high school grades when students are expected to read and understand varied genres of texts, make inferences, and evaluate complex syntax and vocabulary. Extra support or instruction in higher level reading subskills may be related to reading ability in the later grades.

Additionally, perhaps future research could incorporate teacher instructional logs as a method of tracking the amount of instructional emphasis that teachers provide throughout the day. This method may be a more accurate representation of instruction throughout the day, where teachers would not solely be relying on their memories.

Lastly, perhaps a finer-grained measure of classroom instruction could be developed that could better encapsulate the differences in amounts of reading instructional emphasis/overall
amount. Perhaps in addition to the six and four possible response choices for the emphasis scales and overall amount, respectively, a new vertical scale could be devised that is continuous.
Table 2.1

*Studies that Only Examined Meaning Construction Instruction for NE-Speakers*

<table>
<thead>
<tr>
<th>Authors</th>
<th>N</th>
<th>Grade</th>
<th>Outcome</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connor, Morrison, &amp; Petrella (2004)</td>
<td>73 NES</td>
<td>Fall 3rd to Spring 3rd</td>
<td>Reading comprehension</td>
<td>Increased Reading comprehension is effective, especially for students with initially lower reading ability</td>
</tr>
<tr>
<td>Sonnenschein et al. (2010)</td>
<td>6,381 NES</td>
<td>Fall 3rd to Spring 3rd</td>
<td>Reading ability</td>
<td>Increased Reading ability is not effective</td>
</tr>
</tbody>
</table>

*Note.* 3rd = third grade; NES = native-English speakers; Students in Sonnenschein, Stapleton, and Benson (2010)’s study were followed from kindergarten through fifth grade. Both sounds and letter-sounds instruction and meaning construction instruction were examined in kindergarten and first grade, but only meaning construction instruction was examined in third grade. Data were from the Early Childhood Longitudinal Study, and only meaning construction instruction data were collected in third grade.
Table 2.2

Study that Directly Compared Sounds and Letter-Sounds Instruction and Meaning Construction Instruction for NE-Speakers

<table>
<thead>
<tr>
<th>Authors</th>
<th>N</th>
<th>Grades</th>
<th>Outcome</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foorman et al.</td>
<td>285</td>
<td>Two cohorts:</td>
<td>Reading comprehension</td>
<td>Sounds is more effective than meaning, especially for lower ability students</td>
</tr>
<tr>
<td>(1998)</td>
<td></td>
<td>Fall K to Spring 1&lt;sup&gt;st&lt;/sup&gt;, Fall 1&lt;sup&gt;st&lt;/sup&gt; to Spring 2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: K = kindergarten; 1<sup>st</sup> = 1<sup>st</sup> grade; 2<sup>nd</sup> = 2<sup>nd</sup> grade.*
Table 2.3

**Studies that Examined Degree to Which Sounds and Letter-Sounds Instruction and Meaning Construction Instruction for NE-Speakers and LM Speakers**

<table>
<thead>
<tr>
<th>Authors</th>
<th>N (n)</th>
<th>Grades</th>
<th>Outcome(s)</th>
<th>Result(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connor, Morrison, &amp; Katch (2004)</td>
<td>108</td>
<td>NES</td>
<td>Reading ability: decoding,</td>
<td>Increased sounds emphasis is more effective than meaning for students with</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall 1&lt;sup&gt;st&lt;/sup&gt; to Spring 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>vocabulary</td>
<td>initially lower ability;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Increased meaning emphasis is more effective than sounds for students with</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>initially higher ability</td>
</tr>
<tr>
<td>Sonnenschein et al. (2010)</td>
<td>6,381</td>
<td>NES</td>
<td>Reading ability</td>
<td>In K, increased sounds emphasis is more effective for students with initially lower ability;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall K to Spring 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td></td>
<td>In K and 1&lt;sup&gt;st&lt;/sup&gt;, increased meaning is more effective for students with initially higher ability</td>
</tr>
<tr>
<td>Vadasy &amp; Sanders (2012)</td>
<td>137</td>
<td>(78 LM &amp; 59 NES)</td>
<td>Reading comprehension</td>
<td>LM: In 1&lt;sup&gt;st&lt;/sup&gt;, increased sounds is more effective than meaning;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall 1&lt;sup&gt;st&lt;/sup&gt; to Spring 2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td></td>
<td>In 2&lt;sup&gt;nd&lt;/sup&gt;, increased meaning is more effective than sounds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NES: In 1&lt;sup&gt;st&lt;/sup&gt;, increased meaning is more effective than sounds</td>
</tr>
<tr>
<td>Xue &amp; Meisels (2004)</td>
<td>13,609</td>
<td>NES</td>
<td>Reading ability</td>
<td>Increased sounds and meaning is more effective for all students; Increased meaning is more effective for students with initially higher ability</td>
</tr>
</tbody>
</table>

*Note.* K = kindergarten; 1<sup>st</sup> = 1<sup>st</sup> grade; 2<sup>nd</sup> = 2<sup>nd</sup> grade; LM = language minority students; NES = native-English-speakers; Students in Sonnenschein, Stapleton, and Benson (2010)’s study were followed from kindergarten through fifth grade. Both sounds and letter-sounds instruction and meaning construction instruction were examined in kindergarten and first grade, but only meaning construction instruction was examined in third grade. Data were from the Early Childhood Longitudinal Study, and only meaning construction instruction data were collected in third grade.
<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Letter Knowledge:</strong> Identifying Upper-and Lower-Case Letters by Name</td>
<td>K, 1</td>
</tr>
<tr>
<td>2</td>
<td><strong>Beginning Sounds:</strong> Associating Letters with Sounds at the Beginning of Words</td>
<td>K, 1</td>
</tr>
<tr>
<td>3</td>
<td><strong>Ending Sounds:</strong> Associating Letters with Sounds at the End of Words</td>
<td>K, 1</td>
</tr>
<tr>
<td>4</td>
<td><strong>Sight Words:</strong> Recognizing Common “Sight” Words</td>
<td>K, 1, 3</td>
</tr>
<tr>
<td>5</td>
<td><strong>Words in Context:</strong> Reading Words in Context</td>
<td>K, 1, 3</td>
</tr>
<tr>
<td>6</td>
<td><strong>Literal Inference:</strong> Making Inferences Using Cues that were Directly Stated with Key Words in Text</td>
<td>1, 3, 5</td>
</tr>
<tr>
<td>7</td>
<td><strong>Extrapolation:</strong> Identifying Clues Used to Make Inferences and Using Personal Background Knowledge Combined with Cues in a Sentence to Understand Use of Homonyms</td>
<td>1, 3, 5, 8</td>
</tr>
<tr>
<td>8</td>
<td><strong>Evaluation:</strong> Demonstrating Understanding of Author’s Craft and Making Connections Between a Problem in the Narrative and Similar Life Problems</td>
<td>1, 3, 5, 8</td>
</tr>
<tr>
<td>9</td>
<td><strong>Evaluating Nonfiction:</strong> Demonstrating Ability to Comprehend Biographical and Expository Text</td>
<td>5, 8</td>
</tr>
<tr>
<td>10</td>
<td><strong>Evaluating Complex Syntax:</strong> Evaluating Complex Syntax and Understanding High-Level Vocabulary</td>
<td>8</td>
</tr>
</tbody>
</table>
### Table 3.2

**Number (Percentage) of Children, by Language-Status Groups, Who Met and Did Not Meet Each Inclusion Criterion**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Asian LM learners</th>
<th>Native-English-speaking students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Children meeting inclusion criterion</td>
<td>Children eliminated</td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>N</td>
</tr>
<tr>
<td>1. Non-missing Home Language</td>
<td>479</td>
<td>–</td>
</tr>
<tr>
<td>2. Non-missing and valid data on Level of Reading Comprehension Proficiency at one or more occasions (spring K, 1&lt;sup&gt;st&lt;/sup&gt;, 3&lt;sup&gt;rd&lt;/sup&gt;, 5&lt;sup&gt;th&lt;/sup&gt;, 8&lt;sup&gt;th&lt;/sup&gt;)</td>
<td>478 (99.79)</td>
<td>1</td>
</tr>
<tr>
<td>3. Had same teacher in fall and spring of Kindergarten</td>
<td>442 (92.28)</td>
<td>36</td>
</tr>
<tr>
<td>4. Had non-missing Sampling Weight</td>
<td>337 (70.35)</td>
<td>105</td>
</tr>
<tr>
<td>5. Had K Sounds Score</td>
<td>310 (64.72)</td>
<td>27</td>
</tr>
<tr>
<td>6. Had K Meaning Score</td>
<td>310 (64.72)</td>
<td>0</td>
</tr>
<tr>
<td>7. Had K Overall Reading Score</td>
<td>306 (63.88)</td>
<td>4</td>
</tr>
<tr>
<td>8. Had 1&lt;sup&gt;st&lt;/sup&gt; Sounds Score</td>
<td>263 (54.91)</td>
<td>43</td>
</tr>
<tr>
<td>9. Had 1&lt;sup&gt;st&lt;/sup&gt; Meaning Score</td>
<td>263 (54.91)</td>
<td>0</td>
</tr>
<tr>
<td>10. Had 1&lt;sup&gt;st&lt;/sup&gt; Overall Reading Score</td>
<td>242 (50.52)</td>
<td>21</td>
</tr>
</tbody>
</table>

*Note. K = kindergarten; 1<sup>st</sup> = 1<sup>st</sup> grade; 3<sup>rd</sup> = 3<sup>rd</sup> grade; 5<sup>th</sup> = 5<sup>th</sup> grade; 8<sup>th</sup> = 8<sup>th</sup> grade; Sounds = Extent to Which Sounds and Letter Sounds Were Emphasized; Meaning = Extent to Which Meaning Construction was Emphasized; Overall = Overall Amount of Reading Instruction*
Table 3.3

*Descriptive Statistics for the Present Study Full Sample and Subsamples by Age, Gender, Race, SES, Language Proficiency and School Sector*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Full Sample (N=6,957)</th>
<th>Asian Language-Minority Subsample (n=242)</th>
<th>Native-English-Speaking Student Subsample (n=6,715)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in months(^a)</td>
<td>74.97(4.35)</td>
<td>74.36(4.06)</td>
<td>74.99(4.36)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boy</td>
<td>50.01%</td>
<td>50.00%</td>
<td>50.01%</td>
</tr>
<tr>
<td>Girl</td>
<td>49.99%</td>
<td>40.00%</td>
<td>49.99%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White non-Hispanic</td>
<td>67.14%</td>
<td>n/a</td>
<td>69.56%</td>
</tr>
<tr>
<td>Black non-Hispanic</td>
<td>10.95%</td>
<td>n/a</td>
<td>11.35%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>9.66%</td>
<td>n/a</td>
<td>10.01%</td>
</tr>
<tr>
<td>Asian</td>
<td>6.20%</td>
<td>100%</td>
<td>2.81%</td>
</tr>
<tr>
<td>Other</td>
<td>5.98%</td>
<td>n/a</td>
<td>6.20%</td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1(^{st}) Category</td>
<td>10.67%</td>
<td>23.97%</td>
<td>10.19%</td>
</tr>
<tr>
<td>2(^{nd}) Category</td>
<td>18.87%</td>
<td>18.60%</td>
<td>18.88%</td>
</tr>
<tr>
<td>3(^{rd}) Category</td>
<td>21.22%</td>
<td>14.05%</td>
<td>21.47%</td>
</tr>
<tr>
<td>4(^{th}) Category</td>
<td>23.26%</td>
<td>18.60%</td>
<td>23.43%</td>
</tr>
<tr>
<td>5(^{th}) Category</td>
<td>25.99%</td>
<td>18.84%</td>
<td>26.03%</td>
</tr>
<tr>
<td>Region of residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>19.94%</td>
<td>16.53%</td>
<td>20.06%</td>
</tr>
<tr>
<td>Midwest</td>
<td>28.91%</td>
<td>20.66%</td>
<td>29.20%</td>
</tr>
<tr>
<td>South</td>
<td>31.55%</td>
<td>13.64%</td>
<td>32.20%</td>
</tr>
<tr>
<td>West</td>
<td>19.61%</td>
<td>49.17%</td>
<td>18.50%</td>
</tr>
</tbody>
</table>

*Note. SES = Socioeconomic status; K = Kindergarten, 1\(^{st}\) = First grade; \(^a\)Age in the spring of kindergarten; Some descriptives do not add up to 100% because of missing data.*
Table 3.4

Oral-English Proficiency and Spring of Kindergarten Reading Ability Scores for NE-Speakers and LM Subgroups who Attained the Minimum Proficiency Level at Different Time Points

<table>
<thead>
<tr>
<th></th>
<th>NE-speakers (n=6,680)</th>
<th>LMs who did not need PreLAS (n=60)</th>
<th>LMs who passed PreLAS, Fall K (n=114)</th>
<th>LMs who passed PreLAS, Spring K (n=68)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pos-Sible Scores</td>
<td>M(SD) Range</td>
<td>M(SD) Range</td>
<td>M(SD) Range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ranges for Quartiles</td>
<td>Ranges for Quartiles</td>
<td>Ranges for Quartiles</td>
</tr>
<tr>
<td>Total</td>
<td>0-60</td>
<td>45.65 (5.89)</td>
<td>37-60</td>
<td>26.83 (7.93)</td>
</tr>
<tr>
<td>PreLas Score, Fall K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0-10</td>
<td>9.15 (1.00)</td>
<td>6-10</td>
<td>0-10</td>
</tr>
<tr>
<td>Simon Says, Fall K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0-10</td>
<td>9.17 (1.23)</td>
<td>3-10</td>
<td>2-10</td>
</tr>
<tr>
<td>Art Show, Fall K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>0-10</td>
<td>0-20</td>
<td>20-40</td>
<td>24-24</td>
</tr>
<tr>
<td>----------------</td>
<td>------</td>
<td>------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>(Spring K)</td>
<td>(.91)</td>
<td>(.91)</td>
<td>(1.05)</td>
<td>(1.05)</td>
</tr>
<tr>
<td>Art Show,</td>
<td>9.21</td>
<td>9.21</td>
<td>9.21</td>
<td>9.21</td>
</tr>
<tr>
<td>(Spring K)</td>
<td>(.91)</td>
<td>(.91)</td>
<td>(.91)</td>
<td>(.91)</td>
</tr>
<tr>
<td>Tell Stories,</td>
<td>27.33</td>
<td>20-40</td>
<td>20-24</td>
<td>24-24</td>
</tr>
<tr>
<td>Fall K</td>
<td>(5.13)</td>
<td>45.68</td>
<td>(5.68)</td>
<td>(5.90)</td>
</tr>
<tr>
<td>PreLas Score,</td>
<td></td>
<td>37-60</td>
<td>37-42</td>
<td>42-45</td>
</tr>
<tr>
<td>Spring K</td>
<td></td>
<td>(5.31)</td>
<td>27.29</td>
<td>20-24</td>
</tr>
<tr>
<td>Tell Stories,</td>
<td></td>
<td>(5.31)</td>
<td>27.29</td>
<td>20-24</td>
</tr>
<tr>
<td>Spring K</td>
<td></td>
<td></td>
<td>27.29</td>
<td>20-24</td>
</tr>
<tr>
<td>Read, Spring K</td>
<td>0-212</td>
<td>212-39.91</td>
<td>39.91-45.75</td>
<td>45.75-51.75</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>47.65</td>
<td>54.27</td>
<td>41.62</td>
<td>51.36</td>
</tr>
<tr>
<td></td>
<td>22.35</td>
<td>33.02</td>
<td>27.83</td>
<td>45.75</td>
</tr>
<tr>
<td></td>
<td>52.05</td>
<td>156.85</td>
<td>41.41</td>
<td>58.26</td>
</tr>
<tr>
<td></td>
<td>22.35</td>
<td>156.85</td>
<td>156.85</td>
<td>137.02</td>
</tr>
<tr>
<td></td>
<td>47.65</td>
<td>54.27</td>
<td>41.62</td>
<td>51.36</td>
</tr>
<tr>
<td></td>
<td>22.35</td>
<td>33.02</td>
<td>27.83</td>
<td>45.75</td>
</tr>
<tr>
<td></td>
<td>52.05</td>
<td>156.85</td>
<td>41.41</td>
<td>58.26</td>
</tr>
<tr>
<td></td>
<td>22.35</td>
<td>156.85</td>
<td>156.85</td>
<td>137.02</td>
</tr>
</tbody>
</table>

*Note:* Simon Says, Art Show, and Tell Stories are the three subtests of the PreLAS, the Oral English-language proficiency assessment. The PreLAS scores range from 0 to 60; Simon Says tests for listening comprehension of basic English instructions (i.e., touch ear, pick up paper, knock on table) and ranges from 1 to 10; Art Show tests for picture vocabulary, the ability to produce language, and command of expressive language. Students are asked to name pictures shown to them. It ranges from 1 to 10; Let’s Tell Stories assesses natural speech. Students are read two different stories and have to retell what happened, using pictures as prompts. Scores are based on complexity of sentence structure and vocabulary. Scores range from 0 to 40; *a*In the spring of kindergarten, there were 35 missing Reading Ability for the NE-speaking group; *b*For the Asian LMs who did not pass the oral-English proficiency screener until the spring of kindergarten, only 47 of the screener scores were reported in the fall; the full 68 scores were reported in the spring.
Table 3.5

Extent to Which Sounds and Letter-Sound Relationships Were Emphasized

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set A: How often do children in this class work on each of the following reading and language arts activities?</td>
</tr>
<tr>
<td>1. Work on learning the names of the alphabet</td>
</tr>
<tr>
<td>2. Practice writing the letters of the alphabet</td>
</tr>
<tr>
<td>3. Work on phonics</td>
</tr>
<tr>
<td>Set B: For this school year as a whole, please indicate how often each of the following reading and language arts skills is taught in your class(es).</td>
</tr>
<tr>
<td>4. Conventions of print (left to right orientation, book holding)</td>
</tr>
<tr>
<td>5. Alphabet and letter recognition</td>
</tr>
<tr>
<td>6. Matching letters to sounds</td>
</tr>
<tr>
<td>7. Writing own name (first and last)</td>
</tr>
<tr>
<td>8. Rhyming words and word families</td>
</tr>
</tbody>
</table>

Note: Set A response options were: never, once a month or less, two or three times a month, once a week, three or four times a week, and daily
Set B response options were: taught at a higher grade level, children should already know, never, once a month or less, two or three times a month, once a week, three or four times a week, and daily
Table 3.6
Extent to Which Meaning Construction Was Emphasized

Question
Set A: How often do children in this class work on each of the following reading and language arts activities?
   1. Retell stories
Set B: For this school year as a whole, please indicate how often each of the following reading and language arts skills is taught in your class(es).
   2. Identifying the main idea and parts of a story
   3. Making predictions based on text
   4. Using context cues for comprehension
   5. Vocabulary

Note: Set A response options were: never, once a month or less, two or three times a month, once a week, three or four times a week, and daily
Set B response options were: taught at a higher grade level, children should already know, never, once a month or less, two or three times a month, once a week, three or four times a week, and daily
Table 3.7 Multilevel Model Equations

<table>
<thead>
<tr>
<th>Model</th>
<th>Level 1 Model</th>
<th>Level 2 Model</th>
<th>Level 3 Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>( Y_{ij} = \pi_{0ij} + e_{ij} )</td>
<td>( \pi_{0ij} = \beta_{00j} + r_{0ij} )</td>
<td>( \beta_{00j} = \gamma_{000} + \upsilon_{00j} )</td>
</tr>
<tr>
<td>2</td>
<td>( Y_{ij} = \pi_{0ij} + \pi_{1ij}(Time)<em>{ij} + e</em>{ij} )</td>
<td>( \pi_{0ij} = \beta_{00j} + r_{0ij} )</td>
<td>( \beta_{00j} = \gamma_{000} + \upsilon_{00j} )</td>
</tr>
<tr>
<td></td>
<td>( \pi_{1ij} = \beta_{10j} + r_{1ij} )</td>
<td>( \beta_{10j} = \gamma_{100} + \upsilon_{10j} )</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>( Y_{ij} = \pi_{0ij} + \pi_{1ij}(Time)<em>{ij} + \pi</em>{2ij}(Time)<em>{ij}^2 + e</em>{ij} )</td>
<td>( \pi_{0ij} = \beta_{00j} + r_{0ij} )</td>
<td>( \beta_{00j} = \gamma_{000} + \upsilon_{00j} )</td>
</tr>
<tr>
<td></td>
<td>( \pi_{1ij} = \beta_{10j} + r_{1ij} )</td>
<td>( \beta_{10j} = \gamma_{100} + \upsilon_{10j} )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \pi_{2ij} = \beta_{20j} + r_{2ij} )</td>
<td>( \beta_{20j} = \gamma_{200} + \upsilon_{20j} )</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>( Y_{ij} = \pi_{0ij} + \pi_{1ij}(Time)<em>{ij} + \pi</em>{2ij}(Time)<em>{ij}^2 + e</em>{ij} )</td>
<td>( \pi_{0ij} = \beta_{00j} + \beta_{01j}(LANG)<em>{ij} + \beta</em>{02j}(SES)<em>{ij} + r</em>{0ij} )</td>
<td>( \beta_{00j} = \gamma_{000} + \gamma_{001}(Sound)<em>{ij} + \gamma</em>{002}(Mean)<em>{ij} + \gamma</em>{003}(Overall)<em>{ij} + \upsilon</em>{00j} )</td>
</tr>
<tr>
<td></td>
<td>( \pi_{1ij} = \beta_{10j} + \beta_{11j}(LANG)<em>{ij} + \beta</em>{12j}(SES)<em>{ij} + r</em>{1ij} )</td>
<td>( \beta_{10j} = \gamma_{100} + \gamma_{101}(Sound)<em>{ij} + \gamma</em>{102}(Mean)<em>{ij} + \gamma</em>{103}(Overall)<em>{ij} + \upsilon</em>{10j} )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \pi_{2ij} = \beta_{20j} + \beta_{21j}(LANG)<em>{ij} + \beta</em>{22j}(SES)<em>{ij} + r</em>{2ij} )</td>
<td>( \beta_{20j} = \gamma_{200} + \gamma_{201}(Mean)<em>{ij} + \gamma</em>{202}(Overall)<em>{ij} + \upsilon</em>{20j} )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \beta_{00j} = \gamma_{000} + \upsilon_{00j} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \beta_{01j} = \gamma_{001}(Sound)<em>{ij} + \gamma</em>{002}(Mean)<em>{ij} + \gamma</em>{003}(Overall)<em>{ij} + \upsilon</em>{01j} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \beta_{02j} = \gamma_{002}(Mean)<em>{ij} + \gamma</em>{003}(Overall)<em>{ij} + \upsilon</em>{02j} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \beta_{10j} = \gamma_{100} + \gamma_{101}(Sound)<em>{ij} + \gamma</em>{102}(Mean)<em>{ij} + \gamma</em>{103}(Overall)<em>{ij} + \upsilon</em>{10j} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \beta_{11j} = \gamma_{110} + \gamma_{111}(Sound)<em>{ij} + \gamma</em>{112}(Mean)<em>{ij} + \gamma</em>{113}(Overall)<em>{ij} + \upsilon</em>{11j} )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
$\beta_{12j} = \gamma_{120}$

$\beta_{20j} = \gamma_{200} + \gamma_{201}(\text{Sound})_j + \gamma_{202}(\text{Mean})_j + \gamma_{203}(\text{Overall})_j + \nu_{20j}$

$\beta_{21j} = \gamma_{210} + \gamma_{211}(\text{Sound})_j + \gamma_{212}(\text{Mean})_j + \gamma_{213}(\text{Overall})_j + \nu_{21j}$

$\beta_{22j} = \gamma_{220}$

Note: The same series of models were run for the kindergarten and first grade models separately. The only difference in the two sets of models was that the kindergarten conditional models included the kindergarten teacher variables and the first grade conditional models included the first grade teacher variables. LANG=Language Status; Sound=Extent to Which Sounds and Letter-Sounds Relationships are Emphasized; Mean=Extent to Which Meaning Construction is Emphasized; Overall=Overall Amount of Reading Instruction.
Table 3.8

*Symbols and Explanation*

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Applied to My Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t$</td>
<td>Time point</td>
</tr>
<tr>
<td>$i$</td>
<td>Student</td>
</tr>
<tr>
<td>$j$</td>
<td>Teacher</td>
</tr>
<tr>
<td>$Y_{ij}$</td>
<td>Student $i$’s observed Reading Ability score at time $t$ for teacher $j$</td>
</tr>
<tr>
<td>$\pi_{0ij}$</td>
<td>Student $i$ of teacher $j$’s true initial status</td>
</tr>
<tr>
<td>$\pi_{1ij}$</td>
<td>Student $i$ of teacher $j$’s instantaneous growth rate</td>
</tr>
<tr>
<td>$\pi_{2ij}$</td>
<td>Student $i$ of teacher $j$’s acceleration/deceleration growth rate</td>
</tr>
<tr>
<td>$\beta_{00j}$</td>
<td>Average initial Reading Ability for teacher $j$</td>
</tr>
<tr>
<td>$\beta_{01j}$</td>
<td>Average difference in initial Reading Ability for teacher $j$ for 1-unit difference for NE-speakers</td>
</tr>
<tr>
<td>$\beta_{02j}$</td>
<td>Average difference in initial Reading Ability for teacher $j$ for 1-unit difference in SES</td>
</tr>
<tr>
<td>$\beta_{10j}$</td>
<td>Average instantaneous change rate for teacher $j$</td>
</tr>
<tr>
<td>$\beta_{11j}$</td>
<td>Average difference in instantaneous Reading Ability change rate for teacher $j$ for 1-unit difference for NE-speakers</td>
</tr>
<tr>
<td>$\beta_{12j}$</td>
<td>Average difference in instantaneous Reading Ability change rate for teacher $j$ for 1-unit difference in SES</td>
</tr>
<tr>
<td>$\beta_{20j}$</td>
<td>Average acceleration/deceleration Reading Ability change rate for teacher $j$</td>
</tr>
<tr>
<td>$\beta_{21j}$</td>
<td>Average difference in acceleration/deceleration Reading Ability change rate for teacher $j$ for 1-unit difference in Language Status</td>
</tr>
</tbody>
</table>
\beta_{22j} \quad \text{Average difference in acceleration/deceleration}
\quad \text{Reading Ability change rate for teacher } j \text{ for 1-unit}
\quad \text{difference in SES}

\gamma_{000} \quad \text{Overall average true initial Reading Ability}

\gamma_{001} \quad \text{Overall average difference in initial Reading Ability}
\quad \text{for 1-unit difference in Sounds instruction}

\gamma_{002} \quad \text{Overall average difference in initial Reading Ability}
\quad \text{for 1-unit difference in Meaning instruction}

\gamma_{003} \quad \text{Overall average difference in initial Reading Ability for}
\quad \text{1-unit difference in Overall Reading instruction}

\gamma_{010} \quad \text{Overall average initial Reading Ability for NE-}
\quad \text{speakers}

\gamma_{011} \quad \text{Overall average difference in initial Reading Ability}
\quad \text{for 1-unit difference in Sounds instruction for NE-}
\quad \text{speakers}

\gamma_{012} \quad \text{Overall average difference in initial Reading Ability}
\quad \text{for 1-unit difference in Meaning instruction for NE-}
\quad \text{speakers}

\gamma_{013} \quad \text{Overall average difference in initial Reading Ability}
\quad \text{for 1-unit difference in Overall Reading instruction for}
\quad \text{NE-speakers}

\gamma_{020} \quad \text{Overall average Reading Ability for 1-unit difference}
\quad \text{in SES}

\gamma_{100} \quad \text{Overall average instantaneous Reading Ability change}
\quad \text{rate}

\gamma_{101} \quad \text{Overall average instantaneous Reading Ability change}
\quad \text{rate for 1-unit difference in Sounds instruction}

\gamma_{102} \quad \text{Overall average instantaneous Reading Ability change}
\quad \text{rate for 1-unit difference in Meaning instruction}

\gamma_{103} \quad \text{Overall average instantaneous Reading Ability change}
\quad \text{rate for 1-unit difference in Overall Reading instruction}
\[ \gamma_{110} \] Overall average instantaneous Reading Ability change rate for NE-speakers

\[ \gamma_{111} \] Overall average difference in instantaneous Reading Ability change rate for 1-unit difference in Sounds instruction for NE-speakers

\[ \gamma_{112} \] Overall average difference in instantaneous Reading Ability change rate for 1-unit difference in Meaning instruction for NE-speakers

\[ \gamma_{113} \] Overall average difference in instantaneous Reading Ability change rate for 1-unit difference in Overall Reading instruction for NE-speakers

\[ \gamma_{120} \] Overall average instantaneous Reading Ability change rate for 1-unit difference in SES

\[ \gamma_{200} \] Overall average acceleration/deceleration Reading Ability change rate

\[ \gamma_{201} \] Overall average acceleration/deceleration Reading Ability change rate for 1-unit difference in Sounds instruction

\[ \gamma_{202} \] Overall average acceleration/deceleration Reading Ability change rate for 1-unit difference in Meaning instruction

\[ \gamma_{203} \] Overall average acceleration/deceleration Reading Ability change rate for 1-unit difference in Overall Reading instruction

\[ \gamma_{210} \] Overall average acceleration/deceleration Reading Ability for NE-speakers

\[ \gamma_{211} \] Overall average difference in acceleration/deceleration Reading Ability change rate for 1-unit difference in Sounds instruction for NE-speakers

\[ \gamma_{212} \] Overall average difference in acceleration/deceleration Reading Ability change rate for 1-unit difference in Meaning instruction for NE-speakers
\( \gamma_{213} \) Overall average difference in acceleration/deceleration Reading Ability change rate for 1-unit difference in Overall Reading instruction for NE-speakers

\( \gamma_{220} \) Overall average acceleration/deceleration Reading Ability change rate for 1-unit difference in SES

\( \epsilon_{ij} \) Random time effect, difference between the predicted and observed Reading Ability score at any time point

\( r_{0ij} \) Random student effect for initial Reading Ability

\( r_{1ij} \) Random student effect for instantaneous Reading Ability change rate

\( r_{2ij} \) Random student effect for acceleration/deceleration Reading Ability change rate

\( \nu_{00j} \) Random teacher effect for initial Reading Ability for NE-speakers

\( \nu_{01j} \) Random teacher effect for initial Reading Ability on SES

\( \nu_{10j} \) Random teacher effect for instantaneous Reading Ability change rate for NE-speakers

\( \nu_{11j} \) Random teacher effect for instantaneous Reading Ability change rate on SES

\( \nu_{20j} \) Random teacher effect for acceleration/deceleration Reading Ability change rate for NE-speakers

\( \nu_{21j} \) Random teacher effect for acceleration/deceleration Reading Ability change rate on SES

*Note.* LANG = Language Status; Sounds instruction = Extent to Which Sounds and Letter-Sounds Relationships are Emphasized; Meaning instruction = Extent to Which Meaning Construction is Emphasized; Overall Reading instruction = Overall Amount of Reading Instruction; NE-speakers = native-English speaker.
Table 4.1

*Ranges (n) and Means (SD) for Reading Ability Scores (with Sampling Weights Applied) by Full Sample, Asian LMs, and Native-English-Speaking Student Groups and Testing Time Point*

<table>
<thead>
<tr>
<th>Spring Grade</th>
<th>Full Sample</th>
<th>Asian LMs</th>
<th>NE-Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range (n)</td>
<td>Range (n)</td>
<td>Range (n)</td>
</tr>
<tr>
<td></td>
<td>M(SD)</td>
<td>M(SD)</td>
<td>M(SD)</td>
</tr>
<tr>
<td>K</td>
<td>22.66-156.85 (6922)</td>
<td>29.44-156.85 (242)</td>
<td>22.66-156.85 (6680)</td>
</tr>
<tr>
<td></td>
<td>47.67(14.49)</td>
<td>51.90(21.46)</td>
<td>47.62(14.38)</td>
</tr>
<tr>
<td>1st</td>
<td>26.80-184.05 (6928)</td>
<td>44.28-171.80 (240)</td>
<td>26.80-184.05 (6688)</td>
</tr>
<tr>
<td></td>
<td>80.25(23.14)</td>
<td>87.11 (26.65)</td>
<td>80.17(23.08)</td>
</tr>
<tr>
<td>3rd</td>
<td>51.61-200.75 (6691)</td>
<td>79.70-188.27 (231)</td>
<td>51.61-200.75 (6460)</td>
</tr>
<tr>
<td></td>
<td>130.53(27.53)</td>
<td>131.52(22.79)</td>
<td>130.51(27.58)</td>
</tr>
<tr>
<td>5th</td>
<td>65.22-203.22 (6613)</td>
<td>103.22-202.22 (220)</td>
<td>65.22-203.22 (6393)</td>
</tr>
<tr>
<td></td>
<td>152.59(25.90)</td>
<td>153.89(23.90)</td>
<td>152.58(25.92)</td>
</tr>
<tr>
<td>8th</td>
<td>86.63-208.90 (5538)</td>
<td>106.99-207.10 (136)</td>
<td>86.63-208.90 (5402)</td>
</tr>
<tr>
<td></td>
<td>170.64(27.37)</td>
<td>178.74(23.15)</td>
<td>170.54(27.40)</td>
</tr>
</tbody>
</table>

*Note.* The possible range of Reading Ability was from 0 to 212. Due to missing data, the sample sizes at given time points for the full sample and the total group and subsample participant numbers do not always add up to 6,957, 242, and 6,715, respectively.
Table 4.2

Ranges (n) and Means (SD) for Reading Instructional Emphases/Amount and SES (with Sampling Weights Applied) by Full Sample, Asian LMs, and Native-English-Speaking Student Groups

<table>
<thead>
<tr>
<th></th>
<th>Full Sample (n=6,957)</th>
<th>Asian Language-Minority Subsample (n=242)</th>
<th>Native-English-Speaking Student Subsample (n=6,715)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Possible Range</td>
<td>Range</td>
<td>M(SD)</td>
</tr>
<tr>
<td>K Sounds</td>
<td>1.00-6.00</td>
<td>2.27-6.00</td>
<td>4.74(.56)</td>
</tr>
<tr>
<td>K Meaning</td>
<td>1.00-6.00</td>
<td>1.83-6.00</td>
<td>4.20(.75)</td>
</tr>
<tr>
<td>K Overall</td>
<td>1.00-4.00</td>
<td>1.00-4.00</td>
<td>2.55(.93)</td>
</tr>
<tr>
<td>1st Sounds</td>
<td>1.00-6.00</td>
<td>1.64-6.00</td>
<td>4.37(.95)</td>
</tr>
<tr>
<td>1st Meaning</td>
<td>1.00-6.00</td>
<td>2.72-6.00</td>
<td>4.63 (.53)</td>
</tr>
<tr>
<td>1st Overall</td>
<td>1.00-4.00</td>
<td>1.00-4.00</td>
<td>3.46(.73)</td>
</tr>
<tr>
<td>SES</td>
<td>-4.75-2.67</td>
<td>.11(.76)</td>
<td>-1.22-2.33</td>
</tr>
</tbody>
</table>

Note. Sounds = Extent to Which Sounds and Letter-Sounds Relationships are Emphasized for the Kindergarten teachers (1 = Never, 2 = once a month or less, 3 = two or three times a month, 4 = once a week, 5 = three or four times a week, and 6 = daily); Meaning = Extent to Which Meaning Construction is Emphasized (1 = Never, 2 = once a month or less, 3 = two or three times a month, 4 = once a week, 5 = three or four times a week, and 6 = daily); Overall = Overall Amount of Reading Instruction (1 = 1-30 minutes a day, 2 = 31-60 minutes a day, 3 = 61-90 minutes a day, and 4 = more than 90 minutes a day); SES = the average of up to five standardized measures (household income, father’s or male guardian’s education, mother’s or female guardian’s education, father’s occupational prestige, and mother’s occupational prestige).
Table 4.3

Correlations Among Reading Ability, Control Variables, and Instructional Emphasis/Amount Variables, Estimated with Longitudinal Sampling Weights

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
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</thead>
<tbody>
<tr>
<td>1.K Read</td>
<td></td>
<td>.75</td>
<td></td>
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<tr>
<td>2. 1st Read</td>
<td></td>
<td>.56</td>
<td>.72</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 3rd Read</td>
<td></td>
<td></td>
<td></td>
<td>.53</td>
<td>.69</td>
<td>.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 5th Read</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.45</td>
<td>.57</td>
<td>.74</td>
<td>.77</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. 8th Read</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6. Lang</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7. SES</td>
<td></td>
<td>.35</td>
<td>.37</td>
<td>.41</td>
<td>.43</td>
<td>.44</td>
<td>-.11e-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. K Sound</td>
<td></td>
<td>.11</td>
<td>.04</td>
<td>-.03</td>
<td>-.06</td>
<td>-.06</td>
<td>.02</td>
<td>-.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. K Mean</td>
<td></td>
<td>.08</td>
<td>-.01</td>
<td>-9.20e-3</td>
<td>-.04</td>
<td>-.03</td>
<td>8.20e-3</td>
<td>-.02</td>
<td>.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. K Overall</td>
<td></td>
<td>.05</td>
<td>-.02</td>
<td>-.03</td>
<td>-.05</td>
<td>-.05</td>
<td>-.03</td>
<td>-.07</td>
<td>.26</td>
<td>.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. 1st Sound</td>
<td></td>
<td>-.11</td>
<td>-.15</td>
<td>-.16</td>
<td>-.17</td>
<td>-.13</td>
<td>4.10e-3</td>
<td>-.15</td>
<td>.03</td>
<td>-.02</td>
<td>-.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. 1st Mean</td>
<td></td>
<td>.01</td>
<td>9.00e-4</td>
<td>-.03</td>
<td>-.05</td>
<td>-.03</td>
<td>-8.20e-3</td>
<td>-.03</td>
<td>.12</td>
<td>.15</td>
<td>.04</td>
<td>.36</td>
<td></td>
</tr>
<tr>
<td>13. 1st Overall</td>
<td></td>
<td>.04</td>
<td>.07</td>
<td>.07</td>
<td>.09</td>
<td>.03</td>
<td>-7.00e-4</td>
<td>.01</td>
<td>.02</td>
<td>.06</td>
<td>.05</td>
<td>-6.80e-3</td>
<td>.17</td>
</tr>
</tbody>
</table>

Note. K=kindergarten; 1st=1st grade; 3rd=3rd grade; 5th=5th grade; 8th=8th grade; Read=Reading Ability; Sound=Sounds and Letter-Sounds Relationships Emphasis; Mean=Meaning Construction Emphasis; Overall=Overall Amount of Reading Instruction; *** p<.001, ** p<.01, * p<.05 (2-tailed tests); Asian LMs were the reference group; All correlations were Pearson correlations since they provide a quantification of the linear relationships between the variables, the primary relationship of interest.
Table 4.4

Results of Fitting a Taxonomy of the Kindergarten and First Grade Hierarchical Linear Models (Unconditional and Conditional)

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Kindergarten</th>
<th>First Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1: Unconditional Means</td>
<td>Model 2: Unconditional Linear Growth</td>
</tr>
<tr>
<td></td>
<td>Model 1: Unconditional Linear Growth</td>
<td>Model 2: Unconditional Linear Growth</td>
</tr>
<tr>
<td></td>
<td>Model 1: Unconditional Means</td>
<td>Model 2: Unconditional Linear Growth</td>
</tr>
<tr>
<td><strong>Fixed Effects</strong></td>
<td>β (SE)</td>
<td>β (SE)</td>
</tr>
<tr>
<td>Initial Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Intercept</td>
<td>.053*** (0.007)</td>
<td>-.942*** (0.006)</td>
</tr>
<tr>
<td>2. Lang Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE-speakers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>γ010</td>
<td>-1.154*** (0.047)</td>
<td></td>
</tr>
<tr>
<td>3. SES</td>
<td></td>
<td>-.023 (0.078)</td>
</tr>
<tr>
<td>4. Sounds Emphasis</td>
<td></td>
<td>.081 (0.046)</td>
</tr>
<tr>
<td>5. Meaning Emphasis</td>
<td></td>
<td>-.046 (0.052)</td>
</tr>
<tr>
<td>6. Overall Amount of Instruction</td>
<td></td>
<td>-.052 (0.050)</td>
</tr>
<tr>
<td>7. Lang Status x Sounds</td>
<td>−0.056 (0.046)</td>
<td>.074 (0.062)</td>
</tr>
<tr>
<td>8. Lang Status x Meaning</td>
<td>.047 (0.053)</td>
<td>-.048 (0.075)</td>
</tr>
<tr>
<td>9. Lang Status x Overall Amount</td>
<td>.051 (0.049)</td>
<td>.021 (0.074)</td>
</tr>
<tr>
<td>Instantaneous Change Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \gamma_{100} )</td>
<td>( \gamma_{110} )</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>1. Instan. Rate</strong></td>
<td>(.025^{***})</td>
<td>(.053^{***})</td>
</tr>
<tr>
<td><strong>2. Lang Status NE-speakers</strong></td>
<td></td>
<td>6.031e-3^{***}</td>
</tr>
<tr>
<td><strong>3. SES</strong></td>
<td></td>
<td>3.580e-4</td>
</tr>
<tr>
<td><strong>4. Sounds Emphasis</strong></td>
<td></td>
<td>-9.434e-4</td>
</tr>
<tr>
<td><strong>5. Meaning Emphasis</strong></td>
<td></td>
<td>-1.611e-3</td>
</tr>
<tr>
<td><strong>6. Overall Amount of Instruction</strong></td>
<td></td>
<td>4.769e-4</td>
</tr>
<tr>
<td><strong>7. Lang Status x Sounds</strong></td>
<td></td>
<td>-2.413e-4</td>
</tr>
<tr>
<td><strong>8. Lang Status x Meaning</strong></td>
<td></td>
<td>1.857e-3</td>
</tr>
<tr>
<td><strong>9. Lang Status x Overall Amount</strong></td>
<td></td>
<td>-1.140e-3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>( \gamma_{200} )</th>
<th>( \gamma_{210} )</th>
<th>( \gamma_{220} )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Accel/Decel Rate</strong></td>
<td>(-2.94e-4^{***})</td>
<td>(-2.372e-4^{***})</td>
<td>(-3.277e-4^{***})</td>
</tr>
<tr>
<td><strong>2. Lang Status NE-Speakers</strong></td>
<td>(-5.79e-5^{***})</td>
<td>(-9.750e-5^{***})</td>
<td></td>
</tr>
<tr>
<td><strong>3. SES</strong></td>
<td>(-2.15e-6)</td>
<td>(-1.560e-5)</td>
<td>(2.83e-5)</td>
</tr>
</tbody>
</table>
4. Sounds Emphasis $\gamma_{201}$ 2.24e-6 (1.290e-5) ** -4.010e-5 (1.670e-5) 
5. Meaning Emphasis $\gamma_{202}$ 1.500e-5 (1.130e-5) ** 3.630e-5 (1.960e-5) 
6. Overall Amount of Instruction $\gamma_{203}$ -2.74e-6 (1.290e-5) -2.97e-6 (1.52e-5) 
7. Lang Status x Sounds $\gamma_{211}$ 3.650e-6 (1.310e-5) ** 4.340e-5 (1.670e-5) 
8. Lang Status x Meaning $\gamma_{212}$ -1.560e-5 (1.220e-5) -3.260e-5 (1.970e-5) 
9. Lang Status x Overall Amount $\gamma_{213}$ 6.190e-6 (1.230e-5) ** -2.480e-6 (1.530e-5) 

Variance Components

<table>
<thead>
<tr>
<th></th>
<th>1. Teacher (Temporal)</th>
<th>2. Teacher (Instan Change Rate)</th>
<th>3. Teacher Accel/Decel Change Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.212 (.008)</td>
<td>.002 (1.235e-4)</td>
<td>4.100e-5 (3.630e-6)</td>
</tr>
<tr>
<td></td>
<td>.153 (.007)</td>
<td>.005 (3.569e-4)</td>
<td>3.930e-5 (9.530e-6)</td>
</tr>
<tr>
<td></td>
<td>.131 (.007)</td>
<td>.005 (9.378e-4)</td>
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<td>.135 (.024)</td>
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<td>.281 (.011)</td>
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<tr>
<td></td>
<td>.259 (.011)</td>
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</tr>
<tr>
<td></td>
<td>.257 (.011)</td>
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<tr>
<td></td>
<td>.253 (.058)</td>
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</tr>
</tbody>
</table>

Wald Test (F) 82528.55 41585.57 3111.81 55979.23 30827.37 1761.90

Note. *** p<.001, ** p<.01, * p<.05; Lang Status=Language Status; Instan Rate=Instantaneous Rate, Accel/Decel =Acceleration/Deceleration; x=interaction.
Table 4.5
Summarizing Kindergarten and First Grade Final Significant Effects for Reading Ability
Intercept, Instantaneous Change Rate, and Acceleration/Deceleration Change Rate, for Reading Instructional Emphases/Amount Variables and Language Status Main and Interaction Effects

<table>
<thead>
<tr>
<th></th>
<th>Intercept</th>
<th>Take Off</th>
<th>Accel/Decel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lang Status</td>
<td>Weak effect</td>
<td>Weak effect</td>
<td>Weak effect</td>
</tr>
<tr>
<td>1. Lang Status</td>
<td>Weak main effect, Asian LMs outperformed NE-speakers</td>
<td>Does not hold due to interaction</td>
<td>Weak effect appears to hold, even with interaction</td>
</tr>
<tr>
<td>2. Sounds</td>
<td>Weak main effect, Asian LMs outperformed NE-speakers</td>
<td>Does not hold due to interaction</td>
<td>Does not hold due to interaction</td>
</tr>
<tr>
<td>3. Lang Status X Sounds</td>
<td>Weak effect</td>
<td>Weak effect</td>
<td></td>
</tr>
</tbody>
</table>

Note: Lang Status = Language Status, Sounds = Sounds and Letter-Sounds Relationships Reading Instructional Emphasis, Meaning = Meaning Construction Instructional Emphasis, Overall = Overall Amount of Reading Instruction; X = Interaction.
Figure 4.1

*Kindergarten Reading Instructional Emphases/Amount for Full Sample, Asian LMs, and Native-English-Speaking Student Groups*

![Bar chart showing reading instructional emphases/amount for different groups.](image)

**Note.** Sounds = Sounds and Letter-Sounds Relationships Reading Instructional Emphasis, Meaning = Meaning Construction Instructional Emphasis, Overall = Overall Amount of Reading Instruction.
Figure 4.2

First Grade Reading Instructional Emphases/Amount for Full Sample, Asian LMs, and Native-English-Speaking Student Groups

Note. Sounds = Sounds and Letter-Sounds Relationships Reading Instructional Emphasis, Meaning = Meaning Construction Instructional Emphasis, Overall = Overall Amount of Reading Instruction.
Figure 4.3

*Predicted Reading Ability Growth from Kindergarten to Eighth Grade for the Kindergarten Model, with Sampling Weights Applied*

Note. K = kindergarten; 1\textsuperscript{st} = first grade; 3\textsuperscript{rd} = third grade; 5\textsuperscript{th} = fifth grade; 8\textsuperscript{th} = eighth grade.
Figure 4.4

*Predicted Reading Ability Growth From First Grade to Eighth Grade for the First Grade Model, with Sampling Weights Applied*

Note. K = kindergarten; 1st = first grade; 3rd = third grade; 5th = fifth grade; 8th = eighth grade.
Figure 4.5

*Predicted Reading Ability Growth Across Grades for Kindergarten Asian LMs and NE-Speakers, with Sampling Weights Applied*

Note. K = kindergarten; 1st = first grade; 3rd = third grade; 5th = fifth grade; 8th = eighth grade.
Predicted Reading Ability Across Grades for First Grade Asian LMs and Native English-Speakers with Low Amount of Sounds and Letter-Sound Relationships Instructional Emphasis and High Amount of Sounds and Letter-Sound Relationships Instructional Emphasis, with Sampling Weights Applied

Note. K = kindergarten; 1<sup>st</sup> = first grade; 3<sup>rd</sup> = third grade; 5<sup>th</sup> = fifth grade; 8<sup>th</sup> = eighth grade.
Figure 4.7 Predicted Reading Ability Growth Across Grades for First Grade Asian LMs and NE-Speakers, with Sampling Weights Applied

Note. K = kindergarten; 1st = first grade; 3rd = third grade; 5th = fifth grade; 8th = eighth grade.
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