EXAMINING THE INFLUENCE OF PRE-KINDERGARTEN ATTENDANCE, FIRST-GRADE LITERACY INSTRUCTIONAL PRACTICES, AND INTRUCTIONAL TIME ON LITERACY GROWTH AND CHILDREN'S SPECIAL EDUCATION STATUS

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Abstract: This study examined the influence of socioeconomic status (SES), preschool attendance, and instructional time and strategies in first grade on special education placement in one of the judgmental categories (i.e., specific learning disability, emotional disturbance, or speech or language impairment) in third grade. It also examined the relationship between reading growth and special education status. Results indicated that when controlling for proficiency in beginning-sounds skills at kindergarten entry, only SES remained a significant predictor of special education placement. Results also indicated a statistically significant, but not practically meaningful, relationship between reading growth and special education status. Strengths and limitations of the study, as well as implications for policy and future research, are discussed.

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CHAPTER I

INTRODUCTION

Reading skills have been linked to a variety of important outcomes, such as success in secondary and post-secondary education, competitiveness in the job market, and overall satisfaction (Kutner, Greenberg, Jin, Boule, Hsu, & Dunleavy, 2007). While reading is considered one of the fundamental skills in American education, many schools are failing to produce literate graduates, resulting in national concern for reading outcomes (Grigg, Donahue, & Dion, 2007). In addition, researchers have identified reading achievement as one of the most important predictors of referral for special education placement (Wei, Blackorby, & Schiller, 2011).

Chatterji (2006) and other researchers have demonstrated that students enroll in kindergarten at varying levels of preparedness (i.e., 'academic readiness'). When students enter school without the proper pre-academic or social skills to ensure success, they are considered 'at risk' for school failure. They often have considerable difficulty grasping new material and may fail to adjust to the school environment, leading to lack of engagement in instruction. Without proper remediation of early academic skills, students who begin on this path tend to fall further behind, until special education is warranted. Demographically, these students are overwhelmingly students of color (Davis, 2003; Fantuzzo et al., 2007; McClelland et al., 2000; Mendez, McDermott, & Fantuzzo, 2002), English-language learners (Farver, Xu, Eppe, & Lonigan, 2006;

García & Miller, 2008), and/or students from impoverished backgrounds (Foster & Miller, 2007; Sirin, 2005).

Academic readiness in early childhood is predictive of later achievement (Duncan et al., 2007), and if not addressed early on, the gap between low-achieving and high-achieving students continues to widen (Morgan, Farkas, & Hibel, 2008; Wei, Blackorby, & Schiller, 2011). One method of addressing children's academic readiness has been the implementation of pre-kindergarten programs (i.e., preschool, nursery school). An alternative to traditional daycare centers, preschools expose children to pre-academic skills such as counting, letter identification, and letter-sound correspondence, and research suggests preschool attendance is associated with improved literacy outcomes and a decreased probability of grade retention across demographic groups (Huang, Invernizzi, & Drake, 2012; Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Magnuson, Ruhm, & Waldfogel, 2007). Despite these findings, presently, preschool is not mandated in any of the 50 states.

While preschool has been demonstrated to provide 'at risk' students with a head start, without proper amounts of adequate instruction during the early grades, the effects of preschool are likely to diminish (Lee & Loeb, 1995). Thus, classroom instructional time has increasingly become a focus of attention as a contributor to children's academic achievement, specifically in terms of reading instruction. Sonnenschein, Stapleton, and Benson (2010), for instance, controlled for children's reading skills at school entry, parental education, and ethnicity and found that for first graders, both the type and amount of literacy instruction contributed to their reading skills. The type of instruction most beneficial for first graders depended on their skill level at the beginning of first grade; children with higher initial reading skills benefited more from integrated language arts instruction, whereas those with lower initial skills benefited more from phonics instruction. However, all first grade children benefited from increased language arts activities. Sonnenschein et al.'s (2010) findings highlighted the importance of taking into account children's early academic skills when they first begin formal schooling when examining literacy growth in

the early elementary years. More research is warranted on the relative impact of preschool attendance and amount and type of classroom literacy instruction on the emerging literacy skills of children at various levels of SES.

Special education is designed to provide students with disabilities better access to the general curriculum, prerequisite skills in order to benefit from that curriculum, and independent living skills to assist them in transitioning to life beyond school (Morgan, Frisco, Farkas, & Hibel, 2010). In 1975, the Education for All Handicapped Children Act (PL 94-142; later called the Individuals with Disabilities Education Improvement Act in 2004) was passed, which made large amounts of funding available to schools if they complied to provide free public education to students with disabilities (Schulte, Osborne, & Erchul, 1998). Although federal spending on special education services continues to grow exponentially, students classified with disabilities are not catching up to their non-disabled peers (Tindal, 1985). This gap between low- and high-achieving students has persisted over the years and resulted in efforts to remove some students from general education in order to provide more specialized instruction. However, Dunn (1968) proposed over half a century ago that pull-out special education services are not appropriate or effective for mildly disabled students (i.e. those with high-incidence disabilities). Though legislation concerning special education has undergone a series of facelifts since Dunn's seminal study (1968), whether or not these changes have influenced outcomes for students with disabilities has yet to be established.

While the debate on the effectiveness of special education ensued, Hocutt (1996) suggested that there are a number of caveats concerning studies examining the effectiveness of special education. According to Hocutt (1996), much of the research conducted in this area involved relatively small samples and lacked methodological rigor. Thus, more recent studies have addressed the question of the effectiveness of special education by investigating longitudinal data in large-scale databases. Large-scale databases have several advantages in efficacy research such as greater statistical power, which allows for more complex analyses (Griffin & Steinbrecher,

2013). Still, few studies have used such data to examine the effects of special education on student outcomes. Given that school psychology has been moving away from the traditional, medical model of mental health (Gutkin, 2012), it is important to address school and classroom practices that have been successful in meeting the needs of incoming students, rather than focusing on characteristics of "disadvantaged" groups that contribute to their academic failure.

The disproportionality of certain demographic groups in special education further complicates the issue of its effectiveness. Students, who lack pre-academic skills at school entry are largely from disadvantaged backgrounds (Child Trends, 2012) and are also more likely to be referred for special education, which is associated with label bias and lower expectations, higher dropout rates, and poorer job prospects (Donovan & Cross, 2002; Osher, Woodruff, & Sims, 2002; Sullivan & Bal, 2013; Grigg et al., 2007). Hosp and Reschly (2004) conducted a study examining academic achievement as a predictor of disproportionality and found that academic achievement contributed significantly across ethnicity and disability. Thus, Hosp and Reschly (2004) emphasized the importance of targeting academic achievement to address the disproportionality of minority and low-income students in special education.

Recent studies have utilized longitudinal data to explore the relationship of academic achievement and special education classification. Hibel, Farkas, and Morgan (2010) investigated student, family, and school predictors in kindergarten of special education placement by fifth grade using the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K; Tourangeau, Nord, Lê, Sorongon, & Najarian, 2009). Specifically, they sought to estimate how well student academic achievement and learning-related behavior predicted the likelihood of being placed in special education. Hibel et al. (2010) found that academic achievement at school entry was the strongest predictor of receipt of special education services and that students' classroom engagement was the second strongest predictor. Similarly, Shifrer, Muller, and Callahan (2010) examined predictors of special education classification under the category of specific learning disability (SLD) in tenth grade students using another large-scale nationally

representative longitudinal dataset. Shifrer et al. (2010) found that among African American and Hispanic students, SES fully mediated the relationship between race and learning disability and that disability status was related to gender, sociodemographic variables, and student achievement.

While earlier studies examined disproportionality by comparing proportions of group membership among the general student population to the proportion of that particular group in special education categories, more recent studies utilize various disability risk ratios. One such study, conducted by Sullivan and Bal (2013), examined the extent to which special education placement was predicted by student- and school-level variables using one school system's public archival data. With this study, Sullivan and Bal (2013) sought to better understand predictors of disproportionality by investigating the influence of several variables simultaneously on disability risk overall and risk of specific disabilities. According to Sullivan and Bal's (2013) results, gender and student SES were the largest predictors of special education placement and, even when accounting for SES, race continued to be a significant predictor of special education placement. These results highlight the necessity of examining disproportionality at multiple levels and of investigating the interactions of race, gender, and SES in predicting special education placement.

The current study sought to extend the work of Sonnenschein, Stapleton, and Benson (2010) and Hibel, Farkas, and Morgan (2010) by estimating the extent to which several child- and classroom-level variables predict the likelihood of special education placement for third grade students.

CHAPTER II

REVIEW OF THE LITERATURE

Reading Achievement

Reading skills have been linked to a variety of important outcomes such as success in secondary and post-secondary education, competitiveness in the job market, and overall satisfaction (Kutner et al., 2007). While reading is considered one of the fundamental skills in American education, many schools were failing to produce literate graduates resulting in national concern for reading outcomes (Grigg et al., 2007). By 2014 all students, including those with disabilities, were expected to reach proficiency according to the 2002 No Child Left Behind Act as part of the Elementary and Secondary Education Act of 2001 by President George W. Bush (No Child Left Behind [NCLB], 2002). NCLB (2002) established accountability checks such as standardized testing requirements and adequate yearly progress reports, but many critics have suggested that NCLB failed to live up to its expectations (Hursh, 2007). Despite the changes in response to NCLB, wide variation in students' reading achievement persists (NCES, 2012).

Researchers have identified reading achievement as one of the most important predictors of referral for special education placement (Hosp & Reschly, 2004; Wei, Blackorby, & Schiller, 2011). Two developmental theories have emerged from the literature to describe the differences in reading achievement between students with and without disabilities: (1) the lag or compensatory growth model, and (2) the deficit or cumulative growth model (Morgan, Farkas, &

Wu, 2011; Wei, Blackorby, & Schiller, 2011). According to the lag model, poor readers given adequate support will catch up with good readers over time. In contrast, the deficit model posits that even with academic support, the skills of poor readers will continue to diverge from those of good readers, and this gap will either persist or continually increase over time.

In the last decade, a number of studies have examined the growth trajectories of students in order to better understand the lag and deficit models. For example, McCoach, O'Connell, Reis, and Levitt (2006) used hierarchical linear modeling (HLM) to examine the reading growth of students from kindergarten to first grade using the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K; Tourangeau et al., 2009) database. McCoach et al.'s (2006) study had several goals:

> ...to determine whether the reading achievement gap between private and public schools exists prior to kindergarten entry as well as whether any preexisting gaps narrow or widen over the first 2 years of school...[to] explore…whether the gap between low- and high-SES schools exists prior to kindergarten entry and whether it widens over the first 2 years of school...[to] examine…the effect of students' SES on their reading growth over the first 2 years of school and whether school poverty level moderated the impact of student SES on reading growth...[and to] examine…the differential impact of student and school characteristics on reading growth during instructional and noninstructional months (p. 17).

McCoach et al. (2006) found that school differences in reading achievement may be the result of student differences in achievement prior to school entry and growth rates during the summer (i.e., noninstructional periods). Their results support what Stanovich (1986) refers to as the Matthew effect in reading (i.e., that the rich get richer while the poor get poorer)—at least in the early years. McCoach et al. (2006) also found that SES was a strong predictor of reading achievement, not only at school entry but also over the summer months resulting in low-SES

students being more likely to lag behind high-SES students in reading growth. Moreover, while McCoach et al. (2006) examined differences between private and public schools, their results suggest that the homogeneity of school populations in terms of SES may account for the variation among schools in student achievement.

Although McCoach and her colleagues (2006) demonstrated the importance of student- and school-level variables on reading achievement, there were several limitations to their study. McCoach et al. (2006) only investigated students in early elementary grades. Research suggests that a shift in reading curriculum occurs in elementary school, where in the early grades students learn to read, and in later grades they read to learn (National Association for the Education of Young Children & the International Reading Association, 1988). Although McCoach et al. (2006) examined SES, race, gender, private versus public education, and age at school entry, they did not examine the possible impact of malleable factors, such as instructional practices, on children's reading skills.

Wei, Blackorby, and Schiller (2011) investigated reading growth in students with disabilities using the Special Education Elementary Longitudinal Study (SEELS). Using HLM, they compared growth in reading of students in 11 IDEIA categories from kindergarten to twelfth grade and found significant differences in students' reading achievement according to their special education classification. Specifically, while the rates of growth between disability categories were comparable, the mean reading achievement varied across the groups. For example, the level of achievement for students with learning disabilities was significantly lower than that of students with speech/language impairment (SLI), emotional disturbance (ED), visual, orthopedic, and other health impairment or autism but higher than students with intellectual or multiple disabilities. However, the slope of reading growth of students with learning disabilities was more steep than that of students with SLI, hearing impairments, or autism. All growth curves decelerated similarly or flat-line in the high school years, with SLI students' reading growth decelerating at a significantly faster rate.

Wei et al. (2011) also found that differences in reading growth across disability varied by gender, race, and SES with male students outperforming female students on letter-word identification, White students scoring higher than African American and Hispanic students, and students from high-SES families performing above those from low-SES families. Overall, Wei et al.'s (2011) study had great implications for policy by highlighting the heterogeneity of disability categories and shedding light on appropriate reading goals for students across disability groups. However, due to the nature of the SEELS database, they were unable to compare the reading growth of disabled students to their non-disabled peers. Additionally, their longitudinal database did not include other variables that may be significant predictors of reading growth, such as reading instruction.

Chatterji (2006) studied the reading achievement gap with the ECLS-K longitudinal database. She investigated school-level (e.g., class/school size, teacher certification, and mean levels of poverty and reading) and child-level (e.g., preschool attendance, gender, ethnicity, SES, and reading achievement) variables using HLM. Chatterji (2006) also investigated instructional time, student attendance, Individualized Education Program (IEP) percentages, and parental involvement, and her study generated a number of significant findings. For example, patterns of reading achievement differed across SES, ethnicity, and gender, although the effects of SES attenuated over time. Overall, African American and low-SES students had lower reading achievement in first grade, which was largely attributable to lack of reading readiness and poorer home literacy environments. Moreover, higher amounts of instructional time were related to increased student achievement. However, Chatterji operationalized instructional time as a composite variable of both math and reading instruction, instead of parceling out reading instruction alone.

The Influence of Socio-Economic Status on Academic Achievement

As Chatterji (2006) and other researchers have demonstrated, students enroll in kindergarten at varying levels of preparedness due to a variety of factors. When students enter

school without the proper skills to ensure success, they are considered "at risk" for school failure. They often have considerable difficulty grasping new material and fail to adjust to the school environment, which may lead to lack of engagement in instruction. If not addressed early on, students that begin on this path tend to fall further behind until the effects become so large that special education is warranted. Demographically, these students are also overwhelmingly students of color (Davis, 2003; Fantuzzo et al., 2007; McClelland et al., 2000; Mendez, McDermott, & Fantuzzo, 2002), English-language learners (Farver, Xu, Eppe, & Lonigan, 2006; García & Miller, 2008), and/or students from impoverished backgrounds (Foster & Miller, 2007; Sirin, 2005).

Much of the literature on child outcomes has consistently found family characteristics to be some of the strongest predictors of children's literacy development (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002). One such characteristic is socio-economic status. Students from low-SES families are less likely to have adequate home-literacy environments, exposure to printed text, verbal interactions with adults, and modeling of engagement with print (Chatterji, 2006; Snow, Burns, & Griffin, 1998). Such environmental factors have grave implications for literacy outcomes. For example, Hart and Risley (1995) found that children from wealthy families had vocabularies twice the size of children on welfare by the time they were three years old. A decade later, Kaplan and Walpole (2005) used the ECLS-K to examine the relationship between SES and reading growth in the first two years of school and found that students from impoverished backgrounds were less likely than their wealthier peers to transition into higher reading proficiency levels. Specifically, their findings demonstrated that low-SES students who began kindergarten with early phonological processing skills transitioned to higher proficiency levels similar to their high-SES peers. This research suggests that adequate preschool instruction may mediate the effects of SES on literacy in the early grades.

Academic Readiness for School: Pre-Kindergarten Attendance

Academic readiness in early childhood is predictive of later achievement (Duncan et al., 2007), and if not addressed early on, the gap between low-achieving and high-achieving students

continues to widen (Morgan, Farkas, & Hibel, 2008; Wei, Blackorby, & Schiller, 2011). One method of enhancing young children's school readiness has been the implementation of pre-kindergarten instruction. Preschool is an alternative to the traditional daycare center that allows children to be exposed to pre-academic skills such as counting, letter identification, and letter-sound correspondence. Many researchers have investigated preschool programs geared toward early literacy (Teale, Paciga, & Hoffman, 2007). While type of preschool (e.g., pre-kindergarten, Head Start, nursery school) and quality of curriculum vary significantly, numerous studies have demonstrated that preschool attendance is associated with positive student outcomes (Magnuson et al., 2004; Magnuson et al., 2007; Zimmerman, Rodriguez, Rewey, & Heidemann, 2008).

May and Kundert (2007), highlighting issues with school readiness practices, particularly with respect to children labeled at risk for school failure, found that there is no clear definition of what constitutes a child as 'at risk' but that certain environmental and familial factors are associated with risk status. While particular preschool programs such as Head Start have traditionally targeted minority and low-SES groups in an effort to better prepare children whose home environments may not be conducive to school readiness, the quality of these programs has largely been dictated by the neighborhoods in which they reside and the number of certified teachers attracted to those settings. With the transition into formal schooling, many of these children attend schools that lack the resources to ensure success. For example, Rimm-Kaufman, Pianta, and Cox (2000) found that higher district poverty predicted several problems related to academic success at kindergarten entry. They demonstrated that "[u]rban schools are more likely to possess concomitants of risk, such as larger class sizes, greater density of at risk children, and fewer and less intensive transition to kindergarten practices" (Rimm-Kaufman et al., 2000, p. 161). However, Huang, Invernizzi, and Drake (2012) found that even in schools with higher concentrations of low-SES students, pre-kindergarten attendance predicted early academic achievement.

Using the National Institute of Child Health and Human Development (NICHD) database, Downer and Pianta (2006) examined children's preschool experiences from birth through 4.5 years of age, their academic and social skills at school entry, and classroom characteristics to predict functioning in first grade. Results suggest that gender, maternal sensitivity, childcare quality, and classroom experiences such as math instruction contributed to first grade academic and cognitive functioning. Moreover, academic functioning at preschool significantly mediated the relationship between childcare quality and child and family characteristics on the one hand, and first grade achievement on the other. In addition to extending the work of previous research in emphasizing the association of family characteristics (e.g., education level, home learning environment) on academic and cognitive functioning, Downer and Pianta (2006) also illustrated the significance of focusing on early intervention to improve later academic and social outcomes of students.

The Influence of Instructional Time and Practices on Academic Achievement

Instructional time has increasingly become a focus of attention, specifically in terms of reading instruction. According to Sonnenschein, Stapleton, and Benson (2010)—and surely a host of other scholars who would agree— "Although some children may become good readers in any environment, many become such only if they receive good quality instruction" (p. 362). While type of literacy instruction (e.g., whole language or integrated language arts versus phonics) continues to be debate among both practitioners and researchers, most can agree that quality instruction should be provided (Crowe, Conner, & Petscher, 2009). Additionally, intensity is an important aspect of any program, but few studies to date have investigated the effect of time spent on literacy activities on student outcomes.

Xue and Meisels (2004) investigated the effects of type of instruction (i.e., phonics, integrated language arts, or combined approach) on kindergarten achievement. With the ECLS-K database, they examined child characteristics such as family background, reading achievement, and social skills, as well as teacher and school characteristics using HLM. Xue and Meisels

(2004) compared the relative effectiveness of several types of reading instruction in the kindergarten classroom, and found that a combination of phonics and whole language instruction was more effective than either phonics or whole language alone. Their findings also indicated that phonics instruction was equally beneficial to students irrespective of their entry-level achievement. Conversely, the effect of the integrated language arts approach varied by students' initial achievement, with students with lower initial skills benefitting less than those with higher skills at kindergarten entry. Xue and Meisels (2004) also found a positive correlation between instructional time and student achievement. However, their analyses were limited to kindergarten data although more formal literacy instruction occurs in the first grade year.

Guarino, Hamilton, Lockwood, and Rathbun (2006; NCES 2006-031) used the ECLS-K database to examine the relationship between kindergarten classroom instructional practices (both type and amount) and academic achievement in reading and math. They analyzed child-, teacher-, and school-level variables using HLM and found that instructional practices that focused on reading and writing skills, didactic instruction, phonics, and reading and writing activities were associated with reading growth. While these results were consistent with findings from Xue and Meisels (2004), there were several limitations. For example, achievement gain scores were calculated using children's global reading IRT scale scores, which yield an overall change score. Had they also analyzed academic growth using narrower measures of achievement (i.e., proficiency probability scores), they may have been better able to predict the effectiveness of specific instructional activities. Lastly, like Xue and Meisels (2004), Guarino et al. (2006) only analyzed data from the kindergarten year.

Sonnenschein, Stapleton, and Benson (2010) also investigated the relationship between type and amount of classroom literacy instruction on reading achievement using the ECLS-K. Specifically, they sought to determine how much unique variance in reading competencies was explained by phonics instruction versus integrated language arts instruction from kindergarten through fifth grade. Building on Guarino et al. (2006), Sonnenschein et al. (2010) utilized the

proficiency probability achievement scores from first grade students. Consistent with previous research, Sonnenschein et al. (2010) found that much of the variance in literacy growth was predicted by variables evident prior to school entry (i.e., parent education, ethnicity). In addition, they found an interaction between type of instruction and students' initial reading skills in predicting growth. The results of their latent growth model indicated that students with lower reading scores in the fall of kindergarten continued to have lower achievement through fifth grade. When the authors controlled for reading skills at school entry, parental education, and ethnicity, they found that the type and amount of classroom literacy instruction contributed a small amount of unique variance in reading achievement. Their findings highlight the importance of considering the child's initial reading skill level and modifying instructional practices to benefit the lowest-performing students. In addition, other predictors (i.e., preschool attendance) may be useful in examining literacy growth, and the relationship between variables could be teased out in order to identify moderating and mediating factors. More research in this area is warranted, especially in the investigation of time and amount of literacy instruction for subgroups such as special education students.

Special Education and the Issue of Disproportionality

Special education is designed to provide students with disabilities better access to the general curriculum, build their prerequisite skills in order to allow them to benefit from that curriculum, and assist them in developing independent living skills for life beyond school (Morgan, Frisco, Farkas, & Hibel, 2010). In 1975 the Education for All Handicapped Children Act (PL 94-142; later called the Individuals with Disabilities Education Improvement Act in 2004 [IDEIA]) was passed which made large amounts of federal funding available to schools if they complied to provide free and appropriate public education to students with disabilities (Schulte, Osborne, & Erchul, 1998). Since the enactment of federal legislation, the number of students classified with disabilities increased from 3.7 million in 1977 to 6.1 million in 1999 (Hanushek, Kain, & Rivkin, 2002). As of 2012, these numbers had further increased to approximately 6.5

million (U.S. Department of Education, 2012). Although federal spending on special education services continues to grow exponentially, students classified with disabilities are not catching up to their non-disabled peers (Tindal, 1985).

According to the U.S. Department of Education (2012), out of the nearly 6.5 million students currently receiving special education, 37.5% are categorized under specific learning disability (SLD); 21.8% have speech or language impairments (SLI); 10.6% fall under other health impairments (OHI); 7.1% are classified as having intellectual disability (ID; formerly, mental retardation) and 6.3%, emotional disturbance (ED). Approximately six percent (5.8%) of those receiving services are classified under autism and 5.7% are developmentally delayed, while the remaining 5.2% have been categorized under hearing-impaired, orthopedic-impaired, visually impaired, deaf/blind, or as having traumatic brain injury or multiple disabilities. These disabilities can be divided into two categories—high-incidence and low-incidence. While low-incidence disabilities occur at a much lower rate and have a known biological or organic basis, high-incidence disabilities are those that occur more frequently and cannot be directly explained by biological anomalies. The latter consists of mild intellectual disability, emotional disturbance, specific learning disability, and speech-language impairment. Except for mild ID, which is not distinguished from moderate to severe ID in the aforementioned statistics, high-incidence disabilities make up approximately sixty-five percent of all students served in special education.

Reschly (2002) highlighted several characteristics that individuals with high-incidence disabilities have in common:

> (a) Identification usually occurs after school entrance subsequent to teacher referral and psychological and educational testing; (b) referrals typically are made due to low achievement, which is often accompanied by disruptive classroom behavior of varying severities; (c) reading problems are the primary or secondary reasons for about 75% to 80% of referrals; (d) incidence is positively correlated with poverty; and (e) persons with high incidence disabilities are

rarely officially identified as being disabled during their adult role performance. (p. 118)

Thus, mild ID, ED, SLD and SLI have been described as "judgmental" or subjective disability categories because the students in these categories do no exhibit distinct physical features and are not accompanied with a diagnosis by a physician (Donovan & Cross, 2002). Rather, classification in these categories relies heavily on contextual factors (e.g., school expectations; MacMillan & Reschly, 1998). In addition to making up the majority of all students classified with disabilities, the judgmental categories contain disproportionate numbers of minority students. Efforts have been given by the U.S. Office of Civil Rights to monitor overrepresentation of minority students in ID, ED, SLD, and SLI categories, and researchers, policy makers, administrators, and student advocates have sought to address the issue of disproportionality for several decades (Albrecht, Skiba, Losen, Chung, & Middelberg, 2012; Donovan & Cross, 2002; Dunn, 1968; Heller, Holtzman, & Messick, 1982; Hibel, Farkas, & Morgan, 2010; Hosp & Reschly, 2004; MacMillan & Reschly, 1998; Shifrer, Muller, & Callahan, 2010; Sullivan & Bal, 2013; Zhang et al., 2012). Nonetheless, disproportionality continues to be a critical factor in the field of special education (Skiba et al., 2008).

The National Research Council (NCR), established in 1916 by the National Academy of Sciences, developed the Panel on Selection and Placement of Students in Programs for the Mentally Retarded in 1979 to explore disproportionality in special education. Funded by the U.S. Department of Education's Office of Civil Rights (OCR), Heller et al. (1982) analyzed data collected by the OCR to verify that disproportionality exists, to identify geographic trends in disproportionality among special education programs, and to examine correlates of disproportionality. Heller et al. (1982) found that disproportionality in special education is alarming, not simply because of unequal numbers, but because disproportionality is a symptom of invalid assessment for the classification of special education and classification is often followed by low-quality instruction within the special education classroom.

A second NCR report was published in 2002 by Donovan and Cross, who found that the issues outlined in Heller et al. (1982) were still prevalent. Charged with the purpose of examining representation of minority students in special and gifted education, their committee expanded their scope of correlates to include school-level variables and other environmental factors that may impede child development prior to school entry. Although Heller et al. (1982) investigated disproportionality in special education only two decades prior to Donovan and Cross (2002), the proportion of minority students in special education had risen drastically by the time the second report was published. Moreover, the number of students labeled as intellectually disabled decreased, while the number of students categorized as learning disabled doubled.

Thus, Donovan and Cross (2002) explored the role of context in academic achievement and behavior, acknowledging that:

> The same child can perform very differently depending on the level of teacher support, and aggressive behavior can be reversed or exacerbated by effective or ineffective classroom management. In practice, it can be quite difficult to distinguish internal child traits that require the ongoing support of special education from inadequate opportunity or contextual support for learning and behavior. (p. 3)

Like their predecessors, Donovan and Cross (2002) and the NRC committee found evidence of disproportionality among minority students that could be contributed to contextual factors such as poverty, low birth weight and malnutrition, and exposure to teratogens. Additionally, Donovan and Cross (2002) reported that school-level variables such as proportion of low-income students, per-pupil expenditures, and less qualified teachers contribute to disproportionality. They also highlighted that subjectivity of the referral and assessment practices may lead to the misidentification of students with the most need. Thus, the data available at that time were insufficient to determine whether special education placement was a risk or benefit to students.

Within their report, Donovan and Cross (2002) advocate for early identification of students at risk for school failure. However, they note that overall, special education identification relies heavily on the traditional, medical model, or the "wait-to-fail" model as identified by critics. Use of the traditional model in classification practices may exacerbate the issue of disproportionality. Research suggests that some groups of children are more likely to be exposed to health, environmental, nutritional, social, and economic factors that contribute to disability (Hibel, Farkas, & Morgan, 2010; Hosp & Reschly, 2004). The "wait-to-fail" model focuses on remediation rather than intervention, which results in leaving a large number of students from disadvantaged backgrounds that lack previous exposure, preparedness, and resources to flounder in the meantime (Gutkin, 2012).

Given that school psychology has been moving away from the medical model of mental health (Gutkin, 2012), it is important to address the characteristics of schools that have been successful in meeting the needs of incoming students, as opposed to focusing on characteristics of "disadvantaged" groups that contribute to their academic failure. Many empirical studies have explored the incidence and correlates of disproportionality in special education, focusing on factors that are more amenable to change. For example, Hosp and Reschly (2004) used the 1998 OCR dataset to calculate relative risk ratios for ID, ED, and SLD categories, comparing minority students to White students. They also used data from 1997-1998 Common Core of Data (CCD) for school and community variables and the U.S. Department of Education's district-level achievement data disaggregated by race to determine the proportion of students in each ethnic group passing reading, math, or writing. The purpose of their study was to determine the extent to which academic, demographic, and economic variables explain the variance in risk ratio and to determine if academic achievement alone explains most of this variance. The relative strength of each predictor block was examined using weighted multiple least squares regression and revealed that academic achievement was a strong predictor across ethnicity and disability categories. While much of the research on disproportionality relies primarily on unalterable variables, Hosp

and Reschly's results reveal the importance of academic achievement—which can be targeted with early identification and empirically-based interventions—on disproportionality of minority and low-income students in special education.

While Hosp and Reschly (2004) demonstrated the significance of achievement as a predictor of special education disproportionality, their study relied heavily on aggregate and cross-sectional data (See also, Blair & Scott, 2002; Coutinho et al., 2002, Hosp & Reschly, 2002), and more recent studies (Hibel et al., 2010; Shifrer, Muller, & Callahan, 2010) were able to track longitudinal data on student-level achievement and behavior. Hibel, Farkas, and Morgan (2010) investigated the effects of student, family, and school predictors in kindergarten on special education placement by fifth grade using the ECLS-K. Specifically, they sought to estimate how well student academic achievement and learning-related behavior predicted the likelihood of being placed in special education. Hibel et al. (2010) found that academic achievement at school entry was the strongest predictor of receipt of special education services. Achievement at school entry explained all of the variance between SES and SLI, and it explained much of the variance between SES and special education placement overall—and in the categories of LD and MR, particularly. At the school-level, low-performing students that attended schools with higher percentages of minority enrollment were less likely to be placed in special education than were students who attended low-minority enrollment schools, when achievement, behavior, and SES were controlled. Additionally, enrollment in a higher achieving school was related to increased likelihood of special education placement, indicating what Hibel et al. (2010) refer to as the "frog-pond" effect. Overall, Hibel et al. (2010) found that the likelihood of special education for minority students was equal to or less than that of non-Hispanic White students, which contradicts previous findings of disproportionality and warrants the further investigation of disproportionality in special education.

Similarly, Shifrer, Muller, and Callahan (2010) examined predictors of SLD identification in tenth grade using another large-scale nationally representative longitudinal

dataset and found that among African American and Hispanic students, SES fully mediated the relationship between race and learning disability. Shifrer et al. (2010) also found that disability status was related to gender, sociodemographic variables, and history of achievement, and that language proficiency was related to special education placement among ELL students. Additionally, Shifrer et al. (2010) discussed the differences between the bivariate analysis conducted in traditional studies on disproportionality and multivariate analysis, underscoring the need to use more sophisticated analysis when studying predictors of disproportionality.

While earlier studies examined disproportionality by comparing proportions of group membership among the general student population to the proportion of that particular group in special education categories, more recent studies have utilized various disability risk ratios. One such study, conducted by Sullivan and Bal (2013) examined the extent to which culturally and linguistically diverse students and those with low SES are disproportionally represented in special education and the extent to which special education placement is predicted by student- and school-level variables using a school system's public archival data. Sullivan and Bal (2013) sought to better understand predictors of disproportionality by investigating the influence of several variables simultaneously on disability risk overall and risk of specific disabilities. According to Sullivan and Bal's (2013) results, gender and eligibility for free or reduced-price lunch were the largest predictors of special education placement. Unlike their predecessors (Hibel et al., 2010; Shifrer et al., 2012), Sullivan and Bal (2013) demonstrated that while SES was a partial mediator, race continued to be a significant predictor of receipt of special education services. These results highlight the necessity of examining disproportionality at multiple levels and of investigating the interactions of race, gender, and SES in predicting special education placement.

Effectiveness of Special Education

While special education was designed to provide specialized services for students with disabilities in order to allow them access to the general curriculum, from which they would

otherwise not likely benefit, there is some evidence that special education may not remediate skills but may instead serve as a "dead-end placement" for these students (Reschly, 2002). Thus, the paradox of special education ensues where "identification is meant to allocate necessary and appropriate services and additional resources for students with disabilities, but it may also lead to stigmatization, segregation, exposure to low expectations, receipt of weak curriculum, and constraint of postschool outcomes." (Sullivan & Bal, 2013, p. 476). For example, several studies have indicated that special education students display below-basic levels of achievement and tend to have higher dropout rates and poorer job prospects (US Department of Education et al., 2007; Donovan & Cross, 2002; Osher, Woodruff, & Sims, 2002).

Dunn (1968) proposed over half a century ago, that pull-out special education services were not appropriate or effective specifically for mildly-disabled students (i.e. those with high-incidence disabilities). Moreover, he noted that much of the research of that time indicated students with mild disabilities made similar gains in special education classes as they did in general education. Therefore, Dunn (1968) and other researchers have suggested that such students remain in the regular education classroom and receive differentiated instruction. More than a decade later, Carlberg and Kavale (1980) conducted a meta-analysis exploring the posttreatment differences of special versus regular education placement in fifty research articles. Consistent with Dunn (1968), Carlberg and Kavale's (1980) results demonstrated special education placement was inferior to regular education placement overall, but they also found that effects differed by category. For example, among students with SLI and what Carlberg and Kavale (1980) and predecessors referred to as educable mental retardation, special education had negative effects on achievement. However, the achievement of students with learning disabilities and behavioral disorders/emotional disturbance was positively affected by special education placement.

Since Carlberg and Kavale's study in 1980, legislation concerning special education has undergone a series of facelifts, but whether or not these changes have influenced outcomes for

students with disabilities has yet to be established. While much debate on the effectiveness of special education ensued, Hocutt (1996) suggested that there are a number of caveats concerning studies examining the effectiveness of special education. According to Hocutt (1996), much of the research conducted in this area involved relatively small samples and lacked methodological rigor. Because of the nature of the population under study, randomization is not possible and valid comparison groups cannot be used. The latter poses one of the biggest methodological problems, as many of the studies exploring effectiveness of special education seek to compare the student outcomes between those receiving special education and those in general education. However, program effects are likely confounded by achievement differences among the students that qualify for special education (Blackorby & Wagner, 1996). Moreover, because many of the studies examined aggregated data for outcomes, Hocutt (1996) suggested that subsequent studies evaluate outcomes grouping students by disability. Thus researchers have sought to remediate concerns with early research on special education effectiveness by utilizing longitudinal databases and more thorough statistical methods.

More recent studies have addressed the question of the effectiveness of special education by investigating longitudinal data in large-scale databases. Large-scale databases have several advantages in efficacy research including greater statistical power, which allows for more complex analyses (Griffin & Steinbrecher, 2013). Still, few studies have used such data to examine the effects of special education on student outcomes. Hanushek, Kain, and Rivkin (2002) investigated changes in individual performance among students who transitioned from or into special education versus those who continued receiving special education services using longitudinal data from the University of Texas at Dallas (UTD) Texas Schools Project. The project tracked three cohorts of students between third and seventh grade amounting to a sample of over 760,000 students. Hanushek et al. (2002) found that special education was related to larger gains in math achievement from fourth grade to fifth grade, specifically among students who were classified as learning-disabled or emotionally disturbed. Additionally, results for

reading gains approached significance. Ehrhardt, Huntington, Molino, and Barbaresi (2013) used data from the ECLS-K to further investigate the effectiveness of special education among children with reading disabilities between first and fifth grades. They found that early entry into special education was associated with greater gains in reading achievement for children with reading disabilities and that family SES was independently associated with reading achievement.

In order to account for nesting effects, researchers have investigated special education effectiveness using multilevel modeling. In 2010, Morgan, Frisco, Farkas, and Hibel (2010) conducted a study using the ECLS-K, to investigate the effects of special education in third grade on academic achievement and behavior in fifth grade. The study had a larger, nationally representative sample (N = 6,318) than had been established in earlier studies. Furthermore, Morgan et al. (2010) used propensity scoring, a technique that calculates the probability of being in the treatment group versus the control group using a logistic regression equation (Shadish, Cook, & Campbell, 2002). Morgan et al. (2010) found no statistically significant effects of special education on student achievement. Similarly, Sullivan and Field (2013) examined the effect of preschool special education services on academic skills in kindergarten. Using the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B), they estimated the effects of preschool special education on reading and math outcomes and found that special education services had a negative effect on reading and math. Thus, research on special education efficacy continues to be inconsistent. While some researchers indicate that special education services led to improved achievement, others have demonstrated special education placement had no effect or worse, negative effects on student achievement.

In sum, much of the research to date has identified reading achievement as an important predictor of later achievement. However, students from low-SES families may lack appropriate home-literacy environments to adequately prepare them for school (Child Trends, 2012). Thus, the implementation of preschool has attempted to remediate the pre-academic skills these students may lack. Research demonstrates that skills at kindergarten entry continue to be a key indicator of

later academic success. Additionally, students who continue to struggle in reading after school entry are also at risk for being referred for special education, though research has been inconsistent regarding the effectiveness of special education. The disproportionality of certain demographic groups in special education further complicates the issue of its effectiveness. Ample research has demonstrated that special education placement is associated with label bias and lower expectations, higher dropout rates, and poorer job prospects (Donovan & Cross, 2002; Osher, Woodruff, & Sims, 2002; Sullivan & Bal, 2013; Grigg et al., 2007). Therefore, while special education is meant to provide resources to allow struggling students greater access to the general curriculum, it may result in inequitable opportunities beyond school. In a review article on the historical and contemporary patterns in special education assessment, Reschly (2002) highlights that disproportionality—namely overrepresentation—"is not the problem; rather the problem is overrepresentation in stigmatizing classifications and placement in programs with dubious benefits" (p. 127). Consequently, more research is warranted to further explore the relationship between reading growth and special education in terms of student and classroom predictors in order to better advocate for all learners.

The Present Study

Findings from the literature reviewed in this chapter reveal a complicated history of legislation, special education, and student success. While much of the research to date has identified reading achievement as an important predictor of later achievement, students from low-SES families continuously demonstrate a lack of home-literacy environments conducive for school readiness. Additionally, students who struggle in reading after school entry are at risk for being referred for special education. The literature also demonstrates that special education placement is associated with several negative outcomes, while its effectiveness at remediating student difficulties is inconsistent at best. Implications of these studies indicate a need to identify environmental stimuli that predict special education classification in order to better advocate for all learners. Thus, the current study sought to extend the work of Sonnenschein et al. (2010) and

Hibel et al. (2010) by estimating the extent to which several child- and classroom-level variables predict the likelihood of special education placement for third grade students. The research questions and hypotheses for the current study are presented below.

Research Questions

Among non-homeschooled students, controlling for children's beginning-sounds skills in the fall of kindergarten:

1. Do time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in children's first grade classrooms predict children's special education status in the spring of third grade, over and above the effects of children's SES and pre-K attendance?
2. Do the time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in children's first grade classrooms moderate the effects of child SES and child pre-K attendance on the children's special education status in the spring of third grade?
3. Does children's growth in literacy from kindergarten to first grade predict their special education status in the spring of third grade?

Research Hypotheses

This study investigated the following hypotheses. Among non-homeschools students, controlling for children's beginning-sounds skills as measured at kindergarten entry:

Question 1

H_0: Time spent on literacy activities, amount of phonics activities, and amount of integrated language arts of activities in first grade will not predict special education status in the spring of third grade, over and above the effects of SES and pre-K attendance.

H_1: Time spent on literacy activities, amount of phonics activities, and amount of integrated language arts of activities in first grade will predict special education status in the spring of third grade, over and above the effects of SES and pre-K attendance.

Question 2

H_0: Time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in first grade will not moderate the effects of SES and pre-K attendance on special education status in the spring of third grade.

H_1: Time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in first grade will moderate the effects of SES and pre-K attendance on special education status in the spring of third grade.

Question 3

H_0: Growth in literacy from kindergarten to first grade will not predict special education status in the spring of third grade.

H_1: Growth in literacy from kindergarten to first grade will predict special education status in the spring of third grade.

Operational Definitions of Key Variables

The operational definitions of the variables used in this study are listed below. Additional information about the variables included in the study can be found in Chapter 3: Methods and in the Appendix.

Special education status. Special education status is a categorical variable based on report by the child's third grade special education teacher. Children were deemed to have received special education services if the special education teacher reported that they qualified for services under one of three high-incidence categories: SLD, ED, or SLI. Children possessing more than one classification were included in the study only if the primary classification was SLD, ED, or SLI. Children were deemed not to have received special education services if the child had no Individualized Education Program (IEP). Children with special education classifications that were not primarily SLD, ED, or SLI were excluded from the study.

Socioeconomic status. Child SES as measured by ECLS-K personnel is a continuous composite variable that takes into account the child's household income and parents' education as measured in the fall of the students' kindergarten year.

Child pre-kindergarten attendance. Child pre-K attendance is dichotomous variable based on parent report of the type of program attended most by the child in the year immediately prior to enrolling in kindergarten. Children were classified as having attended pre-K if their parent reported that they attended pre-kindergarten, preschool, Head Start, or nursery school. Children whose parent reported they primarily received daycare, family care, or any other type of care were classified as not having attended pre-K.

Growth in literacy. Growth in child literacy from kindergarten to first grade is measured as the difference between two individually administered IRT scaled scores based on direct assessment of children's overall literacy skills. The IRT scaled scores utilized in the present study were obtained in the spring of kindergarten and in the spring of first grade.

Beginning-sounds skills. Beginning-sounds skills are derived from the results of a direct reading assessment administered to children repeatedly beginning in the fall of their kindergarten year. The test evaluates sets of specific reading skills in eight areas of increasing difficulty: (1) Letter Recognition, (2) Beginning Sounds, (3) Ending Sounds, (4) Sight Words, (5) Comprehension of Words in Context, (6) Literal Inference, (7) Extrapolation, and (8) Evaluation. The Beginning Sounds test measured children's skills associating letters with sounds at the beginning of words. Scores are reported as proficiency probability scores ranging from 0 to 1 (continuous).

Amount of phonics activities in first grade. A phonics scale score was constructed from items in the spring-third grade teacher questionnaire concerning instructional practices. This measure was also used by Xue & Meisels (2004) and Sonnenschein et al. (2010). More information on the construction of this variable can be found in Chapter 3: Methods.

Amount of integrated language arts activities in first grade. An integrated language arts scale score was constructed from items in the spring-third grade teacher questionnaire concerning instructional practices. This measure was also used by Xue & Meisels (2004) and Sonnenschein et al. (2010). More information on the construction of this variable can be found in Chapter 3: Methods.

Time spent on literacy activities in the first grade classroom. A composite variable was created by the researcher from two ordinal-level, teacher-reported variables in the ECLS-K database. The first variable measures how often children in the class worked on reading and language arts. The second variable measures how much time children in the class spent working on reading and language arts. These ECLS-K variables were recoded and then multiplied together to achieve an approximation of the average duration (in minutes) of classroom literacy instruction per week. More information on these variables can be found in Chapter 3: Methods.

CHAPTER III

METHODS

The current study utilized both the public and restricted versions of the Early Childhood Longitudinal Study-Kindergarten (ECLS-K) database. The ECLS-K Restricted Use Dataset was used to access students' special education status, which is suppressed in the public-use file in order to protect their confidentiality. This chapter describes the participants and measures used during data collection; variables selected for the current study and rationale for their inclusion; and an explanation of the procedures, statistical methodology, and data analyses steps.

Participants

The ECLS-K database, funded by the U.S. Department of Education's National Center for Education Statistics (NCES), is a longitudinal database that tracks the academic and social progress of a nationally representative sample of children from kindergarten entry in 1998 through eighth grade. In 1998, a total of 21,409 children in over 1,200 schools were surveyed from across the country using a probability sample design to identify a representative sample of children. On average, seventeen students were sampled from each school. In order to ensure adequate analyses, some groups (e.g., Asian-Pacific Islanders) were overrepresented within the sample. Over time, children from certain demographic groups (e.g., low SES) were disproportionately likely to have exited the study prematurely. Statistical weights were designed

to mathematically account for these divergences. Due to student attrition, the representativeness of the sample was altered over time (Tourangeau et al., 2009).

For the current study, students enrolled in third grade during the 2001-2002 school year—excluding those who were homeschooled—were analyzed. Students missing data for the direct reading assessment from the spring of their kindergarten or first grade year, socio-economic variables, time spent on literacy activities and type of instructional strategies as reported by the classroom teacher, or information regarding preschool attendance as reported by the parent were not included in this study. The application of statistical weights and missing value analyses will be discussed later in this chapter.

Measures

During their kindergarten and first grade years, data were collected in both the fall and spring from the child, parent, teacher and school administrator. Thereafter, data were collected in the spring of the students' third, fifth, and eighth grade years (Tourangeau et al., 2009). A brief discussion of the relevant data collection procedures and instrumentation used in the ECLS-K is provided below.

Direct child assessment. Direct child assessments evaluating students' cognitive development were administered using computer-assisted interviews during each wave of data collection. The primary language spoken at home was determined by examining school records prior to assessment. When home language information was not available through school records, teachers provided the information. The English Oral Language Development Scale (OLDS) was administered to students whose primary language was not English at kindergarten entry, and students with proficient scores took the English version of the ECLS-K. All other students were excluded from direct assessments other than measurements of height and weight. Information was also gathered to assess which special needs students would be excluded from the direct cognitive assessments. Many students served under an IEP or 504 Plan could participate with minimal

accommodations (n=182); however, students needing Braille, enlarged print, or sign language did not participate in direct cognitive assessments (n=88; Tourangeau et al., 2009).

Aside from the language screener (i.e., OLDS), the direct child assessments evaluated reading skills (language and literacy), mathematical thinking, general knowledge in science and social studies, psychomotor abilities, and physical height and weight (Tourangeau et al., 2009).

Teacher questionnaire. In order to collect data on classroom instructional strategies (e.g., activities, curriculum, and evaluative measures), teacher characteristics (e.g., training and experience, pedagogical philosophy), and perceptions of school climate, questionnaires were administered to the participating classroom teachers. In kindergarten through third grade, the classroom teacher, who instructed the participating students for the majority of the day, completed the survey. Beginning in third grade, special education teachers also were asked to complete questionnaires. Questionnaires administered to special education teachers included items regarding the student's disability, extent and type of services received, and primary placement (Tourangeau et al., 2009).

Parent interview. In all waves of data collection, parents or guardians were asked to participate in a computer-assisted interview to provide information of each participating child's environment outside of school. Parents completed items on child characteristics (e.g., health and special needs, child care arrangements and preschool, types and frequency of academic activities) and family characteristics (e.g., composition, parental involvement in school, parent background including educational level and income) (Tourangeau et al., 2009).

Variables Selected for the Current Study

To address the research questions of the current study, child (level-1) and classroom (level-2) variables were drawn from direct child assessment, parent interview, and classroom teacher questionnaires from the spring of kindergarten and first grade years. The following sections outline each of the major variables. Table 1 provides a summary of the ECLS-K variables selected to analyze the research questions. The name, source, round of data, and

description of each variable are included in the table. Detailed information about the ECLS-K variables included in this study and their response options, including their theoretical minimum and maximum values, is provided in the Appendix.

The variables gender (GENDER), race (RACE), and child identification number (CHILDID) are included in every analysis using the ECLS-K database automatically and also were included in the study. The spring 2001 school identification number (S4_ID) was also included in the analysis as a grouping variable. Although the level-2 variables included in the study are classroom-level variables, it was assumed that classrooms within the same schools would adhere to similar administrative guidelines for reading curriculum and instructional time. Thus, students were grouped according to the schools they attended at the end of first grade.

Dependent Variable

Special education status. Data about students' special education status were drawn from special education teacher questionnaires in the third grade year and are represented by the ECLS-K variable, E5PRMDIS. For the purpose of this study, a new, dichotomous variable (DISABILITI) was created. DISABILITI was assigned a value of 1 if a student was reported to have a primary classification of specific learning disability (SLD), emotional disturbance (ED), or speech or language impairment (SLI) on the individualized education program (IEP). The variable was assigned a value of 0 if there was no special education classification of SLD, ED, or SLI on the IEP. Students with more than one classification were included only if the primary classification on their IEP was SLD, ED, or SLI. Students with primary classifications other than SLD, ED, and SLI were excluded from the study.

Level-1 Independent Variables

Socio-economic status. The ECLS-K included a composite measure of SES, which was derived from information gathered from the parent interview. For the current study, the continuous SES composite (WKSESL), standardized as a z-score, was used. The SES composite takes into account parent/guardian education levels and prestige of occupation, in addition to

household income. The SES composite used in this study was measured in the fall of the children's kindergarten year (Tourangeau et al., 2009).

Table 1.

ECLS-K Variables Selected for Inclusion in the Current Study.

Variable Name	Source	Round of Data	Description
WKSESL	Parent	Fall-kindergarten	Child SES (continuous)
P1PRIMPK	Parent	Fall-kindergarten	Type of care child received most the year before starting kindergarten
C1R4RPB2	Direct child assessment	Fall-kindergarten	Beginning Sounds Proficiency probability score (continuous, between 0 and 1)
C2R4RSCL	Direct child assessment	Spring-kindergarten	Reading IRT scale score
C4R4RSCL	Direct child assessment	Spring-first grade	Reading IRT scale score
A4 Q47A – A4 Q47BB	Teacher	Spring-first grade	How often do children in this class work on each of the following reading and language arts activities?
A4 Q49A – A4 Q49S	Teacher	Spring-first grade	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.
A4OFTRDL	Teacher	Spring-first grade	How often do children in the class work on reading and language arts?
A4TXRDLA	Teacher	Spring-first grade	How much time do children in the class work on reading and language arts?
E5PRMDIS	Special education teacher	Spring-third grade	Child's primary special education classification

Pre-kindergarten attendance. The ECLS-K collected data from the participating parents during the fall of children's kindergarten year regarding their children's primary care arrangements prior to kindergarten entry. These data are represented by the variable P1PRIMPK. The wording of this item and its response options can be viewed in the Appendix.

For the purpose of this study, the ECLS-K variable for pre-kindergarten attendance was recoded into a dichotomous variable (ANYPREK). Children whose parents indicated they

attended preschool, nursery school, or pre-kindergarten program (including Head Start) were assigned a value of 1 indicating they attended pre-kindergarten. All other students (e.g., those whose parents reported their primary placement was daycare or care by relatives) were assigned a value of 0 indicating they did not attend pre-kindergarten.

Growth in literacy. Reading achievement was measured by the direct child assessment of language and literacy, specifically with respect to early literacy skills (i.e., print familiarity, recognition of letters, beginning sounds, ending sounds, sight words, and words in context); receptive vocabulary; and listening and reading comprehension. In addition to items created by a team of early childhood experts, psychometricians, and educators, the reading assessment was comprised of select items from several standardized assessments: Peabody Individual Achievement Test—Revised (Markwardt, 1989), Peabody Picture Vocabulary Test—Third Edition (Dunn, Dunn, & Dunn, 1997), Primary Test of Cognitive Skills (Huttenlocher & Levine, 1990), and Woodcock-Johnson Psychoeducational Battery—Revised (Woodcock & Johnson, 1990). The computer-assisted ECLS-K reading assessment was delivered in two stages—the first of which was a 12-20 item routing test used to determine the difficulty level of the second stage—and observed by a field supervisor for procedural fidelity.

Several different types of scores can be used to describe performance on the reading assessment, but for the purposes of the current study, two scores were used: IRT scale scores and proficiency probabilities. IRT scale scores use patterns of right, wrong, and omitted items to place each student on a continuous scale of ability. Thus, IRT can compensate for guessing difficult items correctly and distortion of scores based on omitted items. In addition, IRT allows for the longitudinal measurement of gain in achievement although the same test is not administered at each point. In this study, gain scores were obtained for reading achievement by subtracting the estimated number correct at time 1 (spring-kindergarten; C2R4RSCL) from the estimated number correct at time 2 (spring-first grade; C4R4RSCL). Gain scores were represented by the continuous variable, RDGROWTH.

Proficiency probability scores are also useful for measuring longitudinal gains. Proficiency-level scores are continuous variables based on clusters of assessment questions with similar content and difficulty (i.e., proficiency levels), which are ideal for studying achievement in a limited set of skills. Thus, proficiency probability scores allow for a more targeted examination of gains made over time in specific areas. Proficiency levels are ordered in progression of difficulty, and mastery of higher levels are related to proficiency in items comprising lower levels. There were five reading proficiency levels measured in each wave of data collection: (1) upper- and lower-case letter identification; (2) letter-sound correspondence at the beginning of words; (3) letter-sound correspondence at the end of words; (4) sight word recognition; and (5) reading in context. In later grades, proficiency of the following components was added: ability to make literal inferences; extrapolation of information from the text; identification of author's intent and real-life application; nonfiction comprehension and evaluation; and understanding of complex vocabulary and syntax. In the current study, only the second proficiency level, letter-sound correspondence at the beginning of words as measured in fall of kindergarten (C1R4RPB2), was used in the analyses (Tourangeau et al., 2009).

In summary, the present study included two measures of reading achievement. The first measure consisted of children's reading achievement gain scores, computed as the difference between their IRT scaled scores in spring of kindergarten and their IRT scaled scores in spring of first grade. The second measure consisted of students' proficiency probability scores in letter-sound correspondence at the beginning of words (or beginning-sounds skills), as measured in the fall of kindergarten. The first measure was used as a predictor variable in Question 3; the second measure was included as a control variable in all steps of the analyses. Response rates for C2R4RSCL, C4R4RSCL, and C1R4RPB2 can be found in the Appendix.

Table 2.

ECLS-K Items Included in the Phonics Scale Score.

Question
Q47: How often do children in this class work on each of the following reading and language arts activities?
1. Work on learning the names of the letters
2. Practice writing the letters of the alphabet
3. Work on phonics
Q49: 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).
4. Conventions of print (left to right orientation, book holding)
5. Alphabet and letter recognition
6. Matching letters to sounds
7. Writing own name (first and last)
8. Rhyming words and word families
9. Reading multi-syllable words, like adventure
10. Alphabetize
11. Reading aloud fluently

Level-2 Independent Variables

Type of literacy activities. Type of literacy activities conducted in classrooms was also measured using the teacher questionnaire. Items from the spring-third grade teacher questionnaire (Questions 47 and 49) that refer to frequency of specific literacy activities were included in the analysis. For the current study, ECLS-K variables representing teacher responses to questionnaire items A4 Q47A (i.e., A4LERNLT) through A4 Q47BB (i.e., A4LONGPR) and A4 Q49A (i.e., A4CONVNT) through A4 Q49S (i.e., A4RDFLNT) were recoded according to Xue and Meisels' (2004) and Sonnenschein et al.'s (2010) categorization of literacy activities (i.e., phonics vs.

integrated language arts). Phonics literacy activities include those involving phonemic awareness and decoding skills, while integrated language arts consist of comprehension activities and those targeting motivation. The mean response to the items that make up the phonics scale was computed to create one score (PHONICS). This process was repeated for the integrated language arts scale (INTLANG). More information on these variables and corresponding activities can be viewed in Tables 2 and 3 and in the Appendix.

Time spent on literacy activities. Time spent on literacy activities was measured using part A of the spring-third grade teacher questionnaire. Two ordinal variables that refer to frequency and minutes of reading instructional methods were included in the analysis. The first variable (A4OFTRDL) refers to how often children in the class worked on reading and language arts. Item responses ranged from 1(*Never*) to 5(*Daily*) on a Likert scale. The second variable (A4TXRDLA) refers to how much time children in the class spent working on reading and language arts. Item responses ranged from 1(*1-30 minutes a day*) to 4(*More than 90 minutes a day*) on a Likert scale.

A composite variable was created representing an approximation of the total number of minutes of literacy instruction provided each week in the first grade classroom. The ECLS-K variables A4OFTRDL and A4TXRDLA were recoded into A4FREQ_RD and A4DUR_RD, respectively, to represent the average frequency and average duration of reading and language arts activities in first grade. The product of the recoded variables was calculated to form a new continuous variable for exposure to classroom literacy instruction (A4EXPOSURE). For example, if a teacher reported that students worked on literacy activities *daily* for *61-90 minutes a day*, using the corresponding values within the formula, A4EXPOSURE = A4FREQ_RD* A4DUR_RD, the average weekly total exposure for students in that classroom would be computed as 375 minutes of literacy instruction. A summary of the original variables, recoded variables, and descriptions can be found in Table 4. Additional information about A4OFTRDL and A4TXRDLA can be found in the codebook, located in the Appendix.

Table 3.

ECLS-K Items Included in the Integrated Language Arts Scale Score.

Question
Q47: How often do children in this class work on each of the following reading and language arts activities?
1. Discuss new or difficult vocabulary
2. Dictate stories to a teacher, aide, or volunteer
3. Listen to you read stories where they see print (e.g. big books)
4. Retell stories
5. Read aloud
6. Write with encouragement to use invented spellings, if needed
7. Read books they have chosen for themselves
8. Compose and write stories or reports
9. Do an activity or project related to a book or story
10. Publish their own writing
11. Perform plays and skits
Q49: 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).
12. Identifying the main idea and parts of a story
13. Making predictions based on text
14. Using context cues for comprehension
15. Communicate ideas orally
16. Remembering and following directions that include a series of actions
17. Composing and writing stories with an understandable beginning, middle, and end
18. Vocabulary

Table 4.

Summary of Recoded Variables for Time Spent on Literacy Activities.

Source variable		Recoded variable	
A4OFTRDL		A4FREQ_RD	
1	Never	0	0 times per week
2	Less than once a week	.5	.5 time per week on average
3	Once or twice a week	1.5	1.5 times per week on average
4	3 or 4 times a week	3.5	3.5 times per week on average
5	Daily	5	5 times per week
A4TXRDLA		A4DUR_RD	
1	1-30 minutes a day	15	15 minutes per day on average
2	31-60 minutes a day	45	45 minutes per day on average
3	61-90 minutes a day	75	75 minutes per day on average
4	More than 90 minutes a day	90	90 minutes per day

Procedures

Much of the information for the current study is available in the ECLS-K Public Use dataset, available to the general public for research purposes. However, to protect the anonymity of subpopulations within the ECLS-K, including those with special needs, some variables are only available through the Restricted Use Database. The NCES has standard protocols and requirements for researchers to gain access to this database in order to ensure the care and protection of data. In compliance with the NCES provisions for proper use and protection of the Restricted Use Database (Tourangeau et al., 2009) and federal regulations (i.e., USA Patriot Act, 2001; Education Sciences Reform Act, 2002), a secure lab was previously established and maintained for use of Restricted ECLS-K Data. The application for the use of the Restricted Use Database for the current study was submitted to NCES and approved September 9, 2014 in order to utilize data involving students, who were classified for special education in third grade.

Data Analysis

To address the research questions posed in this study, a two-level multilevel modeling analysis was utilized with the student level at level 1and the classroom level at level 2. As Chapter 2 demonstrated, social research—especially education research—often utilizes hierarchical data (e.g., students are nested in classrooms, classrooms are nested in schools, schools are nested in districts, etc.). Analyzing such data without accounting for the nested structure of the data can result in aggregation bias, incorrect standard errors, and other errors that reduce the validity and generalizability of the results (Raudenbush & Bryk, 2002). While early studies ignored the hierarchical structure of such data, statistical techniques have advanced to remediate the limitations of conventional statistics. Multilevel modeling, such as hierarchical linear modeling (HLM), allows researchers to examine data that are nested. Advantages of HLM include better estimates of individual effects, hypothesis testing of cross-level effects, and the ability to partition variance-covariance components (Raudenbush & Bryk, 2002).

Because the outcome variable (i.e., special education status) is dichotomous, the research questions were analyzed using hierarchical generalized linear modeling (HGLM). While HLM is appropriate for linear, normally distributed data, HGLM allows for the analyses of nonlinear, nonnormally distributed data such as dichotomous data (Raudenbush & Bryk, 2002). For HGLM, regression coefficients are interpreted similar to those in HLM. In this study, continuous variables (i.e., beginning-sounds skills) are interpreted as the change in log-odds of special education placement for each unit change in the variable. The analysis steps for HGLM are described below for each of the research questions.

Research Question 1. When controlling for children's beginning-sounds skills in the fall of kindergarten, do time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in children's first grade classrooms predict children's special education status in the third grade, over and above the effects of children's SES and pre-K attendance? Question 1 was addressed by conducting four sets of analyses. First, a one-way

ANOVA with random effects was conducted. This fully unconditional model contained the outcome variable, special education status, with no predictors. Its purpose was to partition the total variance in the outcome variable into within-classroom and between-classroom components. Secondly, a random-coefficient regression model was analyzed to determine the extent to which children's beginning-sounds skills measured in the fall of kindergarten predict the probability of being placed in special education with a primary classification of SLD, ED, or SLI by third grade. Next, a random-coefficient regression model was run to determine the extent to which children's beginning-sounds skills, SES, and pre-K attendance predict the probability of being placed in special education by third grade. Finally, a random intercepts model with level-1 covariates and level-2 predictors was conducted to ascertain the extent to which the classroom-level variables (time spent on literacy activities in the first grade, amount of phonics activities, and amount of integrated language arts activities) predict the probability of special education placement over and above the prediction of the child-level variables (beginning-sounds skills in the fall of kindergarten, SES, and pre-K attendance).

Research Question 2. When controlling for children's beginning-sounds skills in the fall of kindergarten, do the time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in children's first grade classrooms moderate the effects of child SES and child pre-K attendance on the children's special education status in third grade? Question 2 was analyzed using an intercepts- and slopes-as-outcomes model to determine the extent to which time spent on literacy activities and type of literacy activities in first grade interacts with the child-level variables to predict the probability of special education placement in the third grade.

Research Question 3. When controlling for children's beginning-sounds skills in the fall of kindergarten, does children's growth in literacy from kindergarten to first grade predict their special education status in third grade? Question 3 was analyzed with a random-coefficient regression model to determine the extent to which children's beginning-sounds skills in the fall of

kindergarten and literacy growth in first grade predict the probability of being placed in special education by third grade.

Statistical software. SPSS 22.0 software program was used to store the dataset and conduct descriptive analyses. HLM 7 software (Raudenbush, Bryk, Cheong, Congdon, & Toit, 2011) was used to conduct the analyses for each of the research questions.

Application of sampling weights. The NCES provides sampling weights to aid researchers in statistically adjusting the analyses so as to reflect the U.S. population. The weights not only adjust for differences in sampling rates among various subgroups (e.g., oversampling of Asian students), but they also statistically adjust for missing responses from students, parents, teachers, and school administrators. Because the current study analyzed data gathered from the child direct assessment from both spring of kindergarten and spring of first grade, in conjunction with parent data from the fall of kindergarten and teacher data from spring of first grade, the sampling weight C1_5FP0 was applied as recommended by NCES personnel (J. McCarroll, personal communication, July 14, 2014).

Missing data analyses. As stated previously, students who were missing data for the direct reading assessment, preschool attendance, socio-economic status, time spent on literacy activities or type of instructional strategies—were not included in this study. Cases with missing data at level 1 (i.e., direct reading assessment, preschool attendance, and SES) were deleted listwise based on the variables included in the model during the analyses. Additionally, in order to run HLM software, no missing data can be present at level 2. Thus, cases with missing data on classroom-level variables (i.e., time spent on literacy activities and type of instructional strategies) were deleted before conducting multilevel analyses. Participants included in the study were compared to those excluded according to ethnicity, gender, preschool attendance and special education status.

Statistical power and meaningfulness of results. Because of the large number of participants in this database, the statistical power of the analyses was very high, increasing the

likelihood of finding statistically significant results. Thus, in the interpretation of the results, it is most important to attend to the practical significance in order to understand the meaningfulness of the results. The meaningfulness of results is best measured by effect size. Large sample sizes do not inflate effect sizes as they do statistical significance; rather they stabilize and increase the reliability of effect sizes.

CHAPTER IV

RESULTS

Demographics of the Analytic Sample

The demographic characteristics of third grade students classified as having a disability and those with no classification (prior to excluding students with missing data) are displayed in Table 5. The unweighted sample consisted of approximately 9,500 third graders, of which 50% were female. Student ethnicity included Hispanic (19%), Black/African-American non-Hispanic (15%), White non-Hispanic (58%), and other race/ethnicity (8%).

Missing Data Analyses

Missing data analyses were conducted to compare the analytic sample to cases that were excluded from the study due to missing data on the direct reading assessment, preschool attendance, socio-economic status, time spent on literacy activities or type of instructional strategies. Chi-square analyses (χ^2) were conducted to compare the study sample to the excluded participants across categorical variables using an online interactive calculation tool (Preacher, 2001). Results indicate the study sample differed to a statistically significant extent from the excluded participants in terms of gender [χ^2 (1) = 1017.25, $p < .001$], ethnicity [χ^2 (3) = 180277.01, $p < .001$], pre-K attendance [χ^2 (1) = 13204, $p < .001$] and special educational status

Table 5.

Demographic Characteristics of Students by Special Education Status, Spring of Third Grade.

	SPED Classification		No SPED Classification	
	N	*%*	*N*	*%*
Gender				
Female	140	2.9	4611	97.1
Male	260	5.2	4497	94.8
Ethnicity				
Hispanic	60	3.3	1754	96.7
Black/African American non-Hispanic	40	2.8	1386	97.2
White non-Hispanic	260	4.7	5254	95.3
Other race/ethnicity	30	4.0	711	96.0

Note. Data are unweighted.

[χ^2 (1) = 37.93, $p < .001$]. Table 6 displays the unweighted percentages for each of the categorical study variables. On average, excluded participants were more likely to be male, to have not attended pre-K, and to be classified as having no special education. In terms of ethnicity, excluded participants were more likely to be identified as Black, Hispanic, or other ethnicity.

Independent t-tests were conducted to compare the study sample to the excluded participants across continuous variables using the GraphPad QuickCalcs Web site: http://www.graphpad.com/quickcalcs/ttest1/ (accessed March 2017). As Table 7 shows, among standardized child- and classroom-level variables, participants that were excluded from the study differed from those in the study sample across each of the child and classroom variables. On average, the classrooms of excluded participants were of lower SES, had lower beginning-sounds skills, and achieved less growth in literacy between kindergarten and first grade than the participants retained in the analysis. Additionally, the excluded participants spent more time on literacy activities, received more phonics instruction and were exposed to less integrated language

arts instruction than those in the study sample. A summary of descriptive statistics and t-test results for each of the standardized variables is presented in Table 7.

Table 6.

Percentage of Students by Gender, Ethnicity, Pre-K Attendance, and Special Education Status.

	Participants Included	Participants Excluded[1]
Gender		
Female	50.5	48.5
Male	49.5	51.5
Ethnicity		
Hispanic	13.5	32.5
Black/African American non-Hispanic	14.7	15.9
White non-Hispanic	64.5	42.6
Other race/ethnicity	7.2	9.0
Pre-K attendance		
Yes pre-K	71.4	64.7
No pre-K	28.6	35.1
Special Education Status		
SPED Classification	3.4	3.3
No SPED Classification	95.7	95.4

[1]Participants Excluded: Students in schools missing data for preschool attendance, socio-economic status, direct reading assessment scores, time spent on literacy activities, or type of instructional strategies.

Correlations for level-1 and level-2 variables can be viewed in Tables 8 and 9, respectively. There were statistically significant correlations between all child-level variables selected for the analyses (i.e., SES, pre-K attendance, and growth in literacy), as well as classroom-level variables (i.e., time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities).

Table 7.

Descriptive Statistics for Standardized Level-1 and Level-2 Variables (Weighted).

	Participants Included			Participants Excluded[1]			
	M (*SD*)	*Min*	*Max*	*M* (*SD*)	*Min*	*Max*	*t*
Child-level variables							
Child socio-economic status	0.07 (0.75)	-4.75	2.75	-0.15 (0.80)	-4.75	2.67	231.34§
Beginning-sounds skills	0.33 (0.34)	0.00	1.00	0.32 (0.34)	0.00	1.00	10.45§
Growth in child literacy	33.47 (15.22)	-17.12	105.85	32.77 (16.32)	-10.26	102.28	32.04§
Classroom-level variables							
Time spent on literacy activities	401.28 (79.33)	22.50	450.00	401.69 (79.17)	22.50	450.00	2.35*
Amount of phonics activities	5.12 (0.95)	2.36	6.89	5.28 (0.96)	1.00	7.00	97.77§
Amount of integrated language arts activities	5.12 (0.51)	3.11	7.00	5.10 (0.58)	1.00	7.00	22.38§

Note. *$p < .05$; §$p < .001$.

Table 8.

Pearson Correlations for Level-1 Variables.

Variable Name	Child socio-economic status	Beginning-sounds skills
Beginning-sounds skills	.398	-
Growth in child literacy	.206	.323

Note. All correlations statistically significant, $p < .01$.

Table 9.

Pearson Correlations for Level-2 Variables.

Variable Name	Time spent on literacy activities	Amount of phonics activities
Amount of phonics activities	.056	-
Amount of integrated language arts activities	.103	.360

Note. All correlations statistically significant, $p < .01$.

Research Question 1

When controlling for children's beginning-sounds skills in the fall of kindergarten, do time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in children's first grade classrooms predict children's special education status (i.e., whether or not children have a primary special education classification of SLD, ED, or SLI) in the third grade, over and above the effects of children's SES and pre-K attendance?

Fully unconditional model. A one-way analysis of variance (ANOVA) with random effects was conducted to partition the total variance in special education status into within-classroom and between-classroom components. This yielded a fully unconditional model with no predictors and with special education status as the outcome variable. A Bernoulli sampling model and logit link function was used due to the binary nature of the outcome variable (i.e., classification vs no classification). The fully unconditional model is presented below.

Level-1 model:

$$\eta_{ij} = \beta_{0j} \quad (1)$$

Level-2 model:

$$\beta_{0j} = \gamma_{00} + u_{0j},\ u_{0j} \sim N(0, \tau_{00}) \quad (2)$$

Combined:

$$\eta_{ij} = \gamma_{00} + u_{0j} \quad (3)$$

Here, γ_{00} is the average log-odds of having a special education classification in third grade across schools. The results of the ANOVA indicated a statistically non-significant chi-square [χ^2 (1084) = 962.06, $p > .50$] for the intercept component (τ). According to Garson (2013), a significant intercept component is indicative of a significant intra-class correlation (ICC), which would suggest that a multilevel model is appropriate and necessary. The ICC, which measures the proportion of variance in special education status between schools, was computed using Snijders and Bosker's (1999; as cited in O'Connell et al., 2008) formula: $p = \tau_{00} / (\tau_{00} + 3.29)$. Based on the analysis of the fully unconditional model, $\tau_{00} = .60$, resulting in an ICC of .154. This suggests that approximately 15% of the variance in special education status is between schools, while 85% is at the individual level. This ICC value is consistent with previous research demonstrating that values between .05 and .20 are common in the application of cross-sectional multilevel modeling in social research (Peugh, 2010). However, a non-zero ICC alone is not sufficient to justify the use of multilevel analyses (O'Connell & McCoach, 2008).

Average cluster size (n_c) was also calculated to determine if the sample size of third graders across schools met Kreft's criteria for the appropriateness of multilevel modeling. According to Kreft (1996), researchers should strive for 30 groups of 30 individuals or 50 groups of 20 individuals per group (i.e. the 30/30 rule or 50/20 rule, respectively). Kreft also noted that when the number of groups is large, as few as 5 individuals per group could result in adequate power (See Hox, 1998 and O'Connell & McCoach, 2008). For the current study, $n_c = 8683/1089 = 7.9$.

In multilevel modeling, the design effect (DEFF) statistic must also be considered. According to Peugh (2010), the DEFF must be applied to standard errors to adjust for the negative bias inherent in nested data. The ICC and mean cluster size (n_c) were used to calculate DEFF within the formula: $DEFF = 1 + (n_c - 1)ICC$. For the analytic sample in this study, $DEFF = 2.06$. As described in Peugh (2010), prior research suggests that $DEFF > 2$ necessitates multilevel modeling. Thus, despite the non-significant intercept component and relatively small average

cluster size (7.9), the ICC (.154) and DEFF (2.06) together justify a need for the multilevel modeling of special education status data (Peugh, 2010). Table 10 displays a summary of the odds ratio, standard error, and statistical significance of the logistic regression models for each of the analyses.

Random-coefficient regression model with control variable. The second step in the analysis of Question 1 was to estimate the level-1 model with beginning sounds as the only predictor to determine the relative contribution of beginning-sounds skills at the beginning of kindergarten to the probability of having a special education classification of SLD, ED, or SLI in the spring of third grade. All analyses controlled for beginning-sounds skills. The model is presented below.

Level-1 model:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}*(C1R4RPB2_{ij}) \quad (4)$$

Level-2 model:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} \quad (5)$$

Combined:

$$\eta_{ij} = \gamma_{00} + \gamma_{10}*C1R4RPB2_{ij} + u_{0j} \quad (6)$$

As Table 10 (Model 2) shows, results of the initial random-coefficient regression model indicate that beginning-sounds skills is a statistically significant predictor of having a primary special education classification of SLD, ED, or SLI by the spring of third grade (γ = -3.86, p < .001). For every one-unit increase in beginning-sounds skills proficiency score, the odds of special education classification primarily in SLD, ED, or SLI are multiplied by $e^{-3.86}$ = .021. Beginning-sounds skills scores were reported as proficiency probability scores ranging from 0 to 1. Thus, the odds of a child fully proficient in beginning-sounds skills receiving special education

services for SLD, ED, or SLI in the spring of third grade is .021 times the odds of a completely nonproficient child.

Random-coefficient regression model. In step 3 of the analysis, SES and pre-K attendance were added to the model to determine the extent to which children's beginning-sounds skills, SES, and pre-K attendance predict the probability of being placed in special education as SLD, ED, or SLI by the spring of third grade. The model is displayed below.

Level-1 model:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}*(C1R4RPB2_{ij}) + \beta_{2j}*(WKSESL_{ij}) + \beta_{3j}*(ANYPREK_{ij}) \quad (7)$$

Level-2 model:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30} \quad (8)$$

Combined:

$$\eta_{ij} = \gamma_{00} + \gamma_{10}*C1R4RPB2_{ij} + \gamma_{20}*WKSESL_{ij} + \gamma_{30}*ANYPREK_{ij} + u_{0j} \quad (9)$$

Results from the random-coefficient regression model indicated that two of the three child-level variables predicted special education status in third grade. Table 10 (Model 3) shows that beginning-sounds skills remained a significant predictor of having a special education classification of SLD, ED, or SLI (γ = -3.71, $p < .001$). Controlling for beginning-sounds skills at kindergarten entry and for pre-K attendance, child SES also was a significant predictor of the probability of having a special education classification (γ = -0.30, p = .026), while preschool attendance was not a significant predictor (γ = -0.05, p = .700). For every one-unit increase in child SES, the odds of special education classification primarily in SLD, ED, or SLI decreased by a factor of $e^{-0.30}$ = .742. On average, children with higher SES had lower odds of receiving special

education services in the third grade than were children with lower SES, even when controlling for beginning-sounds skills and pre-K attendance.

Random intercepts model with level-1 covariates and level-2 predictors. Lastly, a random intercepts model was run to determine the extent to which the classroom-level variables predict the probability of special education status over and above the prediction of the child-level variables. The model is shown below.

Level-1 model:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}*(C1R4RPB2_{ij}) + \beta_{2j}*(WKSESL_{ij}) + \beta_{3j}*(ANYPREK_{ij}) \quad (10)$$

Level-2 model:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}*(PHONICS_j) + \gamma_{02}*(INTLANG_j) + \gamma_{03}*(A4EXPOSU_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30} \quad (11)$$

Combined:

$$\eta_{ij} = \gamma_{00} + \gamma_{01}*PHONICS_j + \gamma_{02}*INTLANG_j + \gamma_{03}*A4EXPOSU_j + \gamma_{10}*C1R4RPB2_{ij} +$$

$$\gamma_{20}*WKSESL_{ij} + \gamma_{30}*ANYPREK_{ij} + u_{0j} \quad (12)$$

Results, shown in Table 10 (Model 4), indicate that when the classroom variables were included, none of them were statistically significant, and the findings of the previous model were essentially unchanged.

Research Question 2

When controlling for children's beginning-sounds skills in the fall of kindergarten, do the time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in children's first grade classrooms moderate the effects of child SES and child pre-K attendance on the children's special education status in third grade?

For Question 2, an intercepts- and slopes-as-outcomes model was constructed in order to determine the extent to which time spent on literacy activities and type of literacy activities in

first grade interact with the child-level variables to predict the probability of special education placement in the third grade. The model is presented below.

Level-1 model:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}*(C1R4RPB2_{ij}) + \beta_{2j}*(WKSESL_{ij}) + \beta_{3j}*(ANYPREK_{ij}) \quad (13)$$

Level-2 model:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}*(PHONICS_j) + \gamma_{02}*(INTLANG_j) + \gamma_{03}*(A4EXPOSU_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}*(PHONICS_j) + \gamma_{12}*(INTLANG_j) + \gamma_{13}*(A4EXPOSU_j) + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}*(PHONICS_j) + \gamma_{22}*(INTLANG_j) + \gamma_{23}*(A4EXPOSU_j) + u_{2j}$$

$$\beta_{3j} = \gamma_{30} + \gamma_{31}*(PHONICS_j) + \gamma_{32}*(INTLANG_j) + \gamma_{33}*(A4EXPOSU_j) + u_{3j} \quad (14)$$

Combined:

$$\eta_{ij} = \gamma_{00} + \gamma_{01}(PHONICS_j) + \gamma_{02}(INTLANG_j) + \gamma_{03}(A4EXPOSU_j) + \gamma_{10}(C1R4RPB2_{ij}) +$$

$$\gamma_{20}(WKSESL_{ij}) + \gamma_{30}(ANYPREK_{ij}) + \gamma_{11}(C1R4RPB2_{ij})(PHONICS_j)$$

$$+ \gamma_{12}(C1R4RPB2_{ij})(INTLANG_j) + \gamma_{13}(C1R4RPB2_{ij})(A4EXPOSU_j)$$

$$+ \gamma_{21}(WKSESL_{ij})(PHONICS_j) + \gamma_{22}(WKSESL_{ij})(INTLANG_j) + \gamma_{23}(WKSESL_{ij})(A4EXPOSU_j)$$

$$+ \gamma_{31}(ANYPREK_{ij})(PHONICS_j) + \gamma_{32}(ANYPREK_{ij})(INTLANG_j)$$

$$+ \gamma_{33}(ANYPREK_{ij})(A4EXPOSU_j) + r_{ij} \quad (15)$$

Because the classroom-level variables were not significant predictors when added to the model in analysis of Question 1, the intercepts- and slopes-as-outcomes model was not further analyzed.

Research Question 3

When controlling for children's beginning-sounds skills in the fall of kindergarten, does children's growth in literacy from kindergarten to first grade predict their special education status in third grade?

Question 3 was analyzed with a random-coefficient regression model to determine the extent to which children's beginning-sounds skills and literacy growth predict the probability of being placed in special education by third grade. The model is presented below.

Level-1 model:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}*(C1R4RPB2_{ij}) + \beta_{2j}*(RDGROWTH_{ij}) \quad (16)$$

Level-2 model:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20} \quad (17)$$

Combined:

$$\eta_{ij} = \gamma_{00} + \gamma_{10}*C1R4RPB2_{ij} + \gamma_{20}*RDGROWTH_{ij} + u_{0j} \quad (18)$$

Results, displayed in Table 10 (Model 5), indicate that growth in literacy is a significant predictor of special education status in third grade ($\gamma = -0.05$, $p < .001$), when controlling for beginning-sounds skills. For each one-unit increase in growth score, the odds of a primary special education classification of SLD, ED, or SLI are multiplied by $e^{-0.05} = .95$. That is, children with higher literacy growth from kindergarten to first grade had lower odds of receiving special education services in SLD, ED, or SLI than were children with lower literacy growth.

Table 10.

Logistic Regression Models Predicting Special Education Status, Spring of Third Grade.

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Exp(β)	*SE*	Exp(β)	*SE*	Exp(β)	*SE*	Exp(β)	*SE*	Exp(β)	*SE*
Child-level variables										
Beginning sounds			0.021	0.256[§]	0.025	0.250[§]	0.025	0.252[§]	0.041	0.253[§]
Child SES					0.742	0.134*	0.743	0.133*		
Pre-K attendance					0.993	0.153	0.994	0.153		
Growth in literacy									0.950	0.006[§]
Classroom-level variables										
Time on literacy							1.000	0.001		
Phonics							0.975	0.076		
Integrated language arts							1.025	0.161		
Intercept	0.035[§]		0.022[§]		0.021[§]		0.021[§]		0.019[§]	

Notes. Weighted data. Results represent population-average models with robust standard errors. Exp(β) = odds ratio; *SE* = standard error. [*]$p < .05$; [§]$p < .001$.

CHAPTER V

DISCUSSION

As discussed in Chapter 2, one goal of the current study was to extend the work of Sonnenschein et al. (2010) and Hibel et al. (2010). Sonnenschein et al. (2010) examined the relationship between type and amount of classroom literacy instruction on reading achievement using the ECLS-K. They found that much of the variance in literacy growth was predicted by variables evident prior to school entry (i.e., parent education, ethnicity). In addition, they found an interaction between type of instruction and students' initial reading skills in predicting growth. Specifically, students with lower reading scores in the fall of kindergarten continued to have lower achievement through fifth grade. When the authors controlled for reading skills at school entry, parental education, and ethnicity, type and amount of classroom literacy instruction contributed a small amount of unique variance in reading achievement. Hibel et al. (2010) investigated the effects of student, family, and school predictors in kindergarten on special education placement by fifth grade. They found that academic achievement at school entry was the strongest predictor of receipt of special education services. Achievement at school entry explained all of the variance between SES and SLI and much of the variance between SES and special education placement overall.

The purpose of this study was to estimate the extent to which several child- and classroom-level variables predict the likelihood of special education placement for third grade

students using the ECLS-K dataset. This chapter begins with a discussion of the study's findings. Next, a discussion of the strengths and limitations of the study will ensue. Finally, implications for policy and future research will be discussed.

Discussion of the Findings

In Question 1, we investigated if time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in children's first grade classrooms predicted children's special education status in the third grade, over and above the effects of children's SES and pre-K attendance. Analysis of this research question resulted in two statistically significant findings. First, similar to Hibel, Farkas, and Morgan (2010), academic achievement at kindergarten entry predicted special education status in third grade. Specifically, we found that the odds ratio of receiving special education services in one of the judgmental categories was inversely related to beginning-sounds skills proficiency.

The finding that academic achievement at school entry predicted special education was expected. Hibel et al. (2010) revealed that lower-performing students are at-risk for special education placement in fifth grade using the Item Response Theory (IRT) score as a measure of academic achievement. Conversely, Sonnenschein et al. (2010) investigated reading achievement using proficiency probability scores. Proficiency probability scores demonstrate how proficient a student is in discrete reading skills. Therefore, in the current study, the beginning-sounds skills proficiency score was entered into the first step of the analysis to serve as a controlling variable.

Our second finding was that family socio-economic status at kindergarten entry was a significant predictor of special education status in third grade, over and above the effects of beginning-sounds skills. In the present study, SES was a composite measure of parent/guardian education levels, prestige of occupation, and household income. Previous research supports the notion that SES contributes to children's school achievement (Foster & Miller, 2007; Sirin, 2005; Sonnenschein et al., 2010). For example, Sullivan and Bal (2013), using receipt of free- or reduced price-lunch as an indicator of SES, demonstrated that students with lower SES were

more likely to be identified for special education under the categories of SLD, ED, and intellectual disability (ID), while children with parents that did not receive a college degree were more likely to be identified for special education in general and as SLD, specifically.

It should be noted that the argument of ethnic disproportionality in special education continues to be prevalent in the field of education. Despite consensus that there is a significant relationship between SES and special education eligibility, the literature remains divided on how important SES is in the prediction of special education status (i.e., how much of the variance in special education can be explained by SES). Some educational researchers argue that ethnic disproportionality can be partially- (Donovan & Cross, 2002; MacMillan & Reschly, 1998) or fully-explained (Hibel et al., 2010; Morgan et al., 2015) by socioeconomic factors. For instance, Morgan et al. (2015) posited that when SES was controlled for, minority students were not over-represented in special education; instead Morgan et al. insisted that students from culturally and linguistically diverse backgrounds were under-represented. However, Skiba et al. (2015), in response to Morgan et al. (2015), posit that the relationship between socioeconomic factors, race, achievement and eligibility for special education services is more complex., Skiba and colleagues suggested that whether or not SES explained ethnic differences in special education largely depended on the source from which special education status was derived. Specifically, when teachers or administrators provided information about students' disability status (e.g., Hibel et al., 2010; Morgan et al., 2015; Shifrer et al., 2011), racial/ethnic differences in special education were nonsignificant. However, those studies using a direct count of students enrolled in special education (e.g., Skiba, Poloni-Staudinger, Simmons, Feggins-Azziz, & Chung, 2005; Sullivan & Bal, 2013) demonstrated racial/ethnic disproportionality despite the inclusion of socioeconomic factors. While the examination of ethnic disproportionality in special education is beyond the scope of the current study, it is important to ground this study's findings in the literature on predictors of special education and to reiterate the complexity of the question "who is placed in special education?" (Hibel et al., 2010).

In this study, after controlling for beginning-sounds skills, pre-k attendance did not predict special education status. Information about children's preschool attendance was obtained by parent report. Children whose parents reported they attended pre-kindergarten, preschool, Head Start, or nursery school were classified as having attended pre-K while those whose parents reported they primarily received daycare, family care, or any other type of care were classified as not having attended pre-K. Although the finding that preschool attendance did not predict the receipt of special education services in third grade was not expected, it is consistent with a large body of research about the attenuating effects of preschool over time. While many studies have demonstrated positive, immediate student outcomes from preschool participation (Magnuson et al., 2004; Zimmerman, Rodriguez, Rewey, & Heidemann, 2008), others reveal that the effects of preschool largely dissipate by first grade (Magnuson et al., 2007).

Some researchers suggest that the lack of long-term effectiveness of preschool attendance is a result of inconsistency across preschool curricula. While some preschools emphasize academic readiness, others focus on social and emotional development. Additionally, the type and amount of language and literacy instruction differs across preschool teachers. For instance, Connor, Morrison, and Slominski (2006) found that there was a significant amount of variability in type and amount of instruction in preschool classrooms and that these variables were related to children's emergent literacy skill acquisition. Apart from differences in preschool curricula, preschool quality may vary across and between types of programs and affect student outcomes. Keys, Farkas, Burchinal, Vandell, Ruzek, and Howes (2013) investigated the predictive validity of preschool center quality on child outcomes using the Early Childhood Environment Rating Scale-Revised (ECERS-R) across four longitudinal databases and found that preschool quality was related to language acquisition and math skills, in general. Additionally, preschool quality predicted the language skills among children whose mothers had at least a Bachelor degree; quality also predicted the social skill development of children who had lower cognitive skills at

preschool-entry or whose mothers had attended college. Thus, the lack of significance found in the present study may be attributed to variance in curricular focus or preschool quality.

Another factor that may contribute to this finding is what Foster and Miller (2007) refer to as an overlapping pattern of literacy development. Foster and Miller summarized the stages of literacy according to Chall (1983) as emergent literacy, phonics, fluency, and reading comprehension. According to Chall's theory of literacy development, emergent literacy or pre-literacy skill development occurs primarily before formal schooling begins (stage 0) and is a prerequisite for phonics (stage 1), which is the focus of kindergarten literacy programs. In first and second grades, students build their fluency of decoding (stage 2), and by third grade, the focus is comprehension of written text (stage 3). Thus, as children progress through the stages and school grades, the emphasis of literacy instruction changes from "learning to read" to "reading to learn." In order to extend Chall's work, Foster and Miller (2007) investigated literacy development through third grade using the ECLS-K and mapped the developmental trajectories for students with high, low, and average literacy skills at kindergarten entry. They found that students with lower phonics skills at school entry were able to close the gap in phonics performance by the end of elementary school, but by the time those students caught up with their peers in phonics skills, a gap in comprehension had developed. Thus, while preschool attendance may be effectively remediating students' phonics skills, beginning-sounds skills and SES appear to have a residual and compounding effect on reading achievement.

While we anticipated that time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in first grade would predict special education status in third grade, results indicated that the classroom-level variables did not predict special education status. These results are seemingly inconsistent with the literature. Connor et al. (2006) found that type and amount of literacy instruction in preschool predicted reading achievement. Specifically, students that received explicit code-focused activities made greater gains in alphabet and letter-word growth, while those who received explicit meaning-focused activities made gains

in vocabulary. Additionally, Xue and Meisels (2004) demonstrated main effects and an interaction effect of phonics and integrated language arts instruction on mean classroom achievement in kindergarten classrooms. Guarino et al. (2006) also found that instructional strategies (i.e., phonics, didactic instruction, reading and writing skills, and reading and writing activities) were related to growth in literacy. Sonnenschein et al. (2010) again revealed that type and amount of instruction predicted student outcomes. Research also suggests the poor reading performance is associated with special education placement.

One reason for the nonsignificant finding in the current study may be a result of our operationalization of the special education variable. Students with a primary diagnosis of one of the judgmental categories (i.e., SLI, ED, and SLD) were grouped together. However, SLD may refer to a learning disability in math, reading, or writing areas. Students with significant reading difficulties that had a primary disability in one of the low-incidence categories were also not captured here. Thus, any significant effects of instructional strategies and time on special education placement may have been masked. Another explanation for this nonsignificant finding may be that instructional time only referred to how often and how much time the classroom teacher spent on reading and language arts. Students who struggle in reading often receive small group intervention with a reading specialist, tutoring by a teacher's aide, or assistance from another teacher that may not be accounted for in the instructional time variable.

For Question 2, we intended to examine if the time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in children's first grade classrooms moderate the effects of child SES and child pre-K attendance on the children's special education status in third grade. We expected that time spent on literacy activities, amount of phonics activities, and amount of integrated language arts activities in first grade would moderate the effects of SES and pre-K attendance on special education status in third grade. However, due to the nonsignificance of the classroom-level variables in Question 1, Question 2 was not further analyzed.

For Question 3, we examined if children's growth in literacy from kindergarten to first grade predicted special education status in third grade. We hypothesized that growth in literacy from kindergarten to first grade would predict special education status in third grade. We found that growth in literacy did predict receipt of special education services. However, the odds ratio of 0.95 approaches 1, and therefore this finding lacks practical significance. Although not practically significant, the finding that growth in literacy predicts later classification in one of the judgmental disability categories is consistent with the literature. As discussed in Chapter 2, several studies have demonstrated the Matthew effect in reading—those with lower literacy skills at the beginning of formal schooling continue to have lower skills than their same-grade peers over the course of their education—which results in the literacy achievement gap (Foster & Miller, 2007; Morgan et al., 2008; Sonnenschein et al., 2010, Stanovich, 1986). Previous research also suggests that lower-performing students are at risk for special education placement. Morgan, Farkas, and Wu (2011) investigated reading and math growth across children with and without special education classifications and found that among individuals with learning disabilities (LD) and SLI, the achievement gap between them and their typically-developing peers increased between kindergarten and fifth grade. Sanford, Park, and Baker (2013) also demonstrated that students receiving special education services and those classified as having greater reading risk had lower literacy growth rates in second and third grades than their peers.

Strengths of this Study

One strength of the current study is the use of a largescale, longitudinal dataset. The data collection procedures resulted in a sample of students—grades kindergarten through eighth grade—across the country and thereby increases the generalizability of the results. In addition, longitudinal data allow for the investigation of student outcomes over time. The nature of these data allow for more sophisticated statistical analyses. In the present study, hierarchical generalized linear modeling (HGLM) was used to investigate child- and classroom-level predictors of special education status. As discussed in Chapter 3, education research often utilizes

hierarchical data, which if not accounted for, can result in aggregation bias, incorrect standard errors, and other errors that reduce the validity and generalizability of the results (Raudenbush & Bryk, 2002). Multilevel modeling allows for better estimates of individual effects, hypothesis testing of cross-level effects, and the ability to partition variance-covariance components (Raudenbush & Bryk, 2002).

Another strength of this study is the use of the calculated variable, exposure to classroom literacy instruction. In previous studies (i.e., Xue & Meisels, 2004; Sonnenschein et al., 2010), instructional time was a categorical variable representing either how often (*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*) or how much time (*1-30 minutes a day*, *31-60 minutes a day*, *61-90 minutes a day*, or *more than 90 minutes a day*) teachers spent on specific literacy activities. However, in the present study, instructional time was the product of the two recoded categorical variables. The resulting composite provided a more precise estimate of the total number of minutes of literacy instruction, on average, provided each week in the first grade classroom and could be treated as a continuous variable.

Most importantly, this study attempted to investigate the predictive validity of malleable variables (i.e., preschool attendance, instructional time, instructional strategies) on special education status in third grade. The present study is well-grounded in the current literature on reading achievement. Foster and Miller (2007) highlighted four major findings in the research on reading achievement:

> "(a) reading disabilities in later grades can be accurately predicted by prekindergarten and kindergarten literacy skills, (b) disorders in reading are often linked to an underlying linguistic deficit, (c) treatment of emergent literacy problems (e.g., phonemic awareness) in the early grades can reduce or eliminate the need for reading intervention in later years for some students, and (d) students who are identified and treated for reading disorders in the later elementary grades

(third grade or later) have a poor chance of catching up to their typically developing peers" (p. 173).

Previous (and much of the current) literature on special education outcomes focuses on unchangeable variables, such as race/ethnicity and SES. While examination of these variables are necessary to highlight social, economic, and educational inequity, there is little scientist-practitioners can do outside of advocacy to remediate such concerns. Additionally, even if policy change occurred immediately and erased such inequities, it would likely not remediate the residual effects of poverty and racial bias. However, investigation of variables that can be directly manipulated may result in important implications for educational practices. As Sullivan and Bal (2013) suggest, "disproportionality research should dedicate greater attention to school policies and procedures related to instruction and discipline and their implications for students' academic difficulties and treatment within the context of special education referral and identification" (p. 491). Thus the findings of this study adds to the body of literature on literacy skill development, instructional strategies and time, and special education classification.

Limitations of this Study

The secondary analysis of a largescale dataset such as the ECLS-K has both benefits and disadvantages. One disadvantage is that the measurement of the study variables is limited to the ECLS-K authors' operationalization of that variable. In the current study, all classroom-level variables were reported by teachers. Self-reported data can result in over- or under-estimates of the behavior of concern (Sonnenschein et al., 2010). Therefore, direct observations would provide more reliable, objective measures of time spent on literacy activities and use of instructional strategies. Similarly, in the measurement of preschool attendance, type of preschool program (i.e., pre-kindergarten, preschool, Head Start, and nursery school) was reported by parents and quality of preschool could not ascertained. Previous research demonstrates that preschool quality varies greatly, with public school-based preschool resulting in more positive student outcomes (Magnuson et al., 2007). Thus, the nonsignificance of preschool attendance in the study may have

been confounded by varying levels of quality or academic focus. Lastly, because the severity of intellectual disability was not differentiated within the ECLS-K dataset, students with mild ID were not included in the number of students with a primary classification of one of the judgmental special education categories. Research suggests that while moderate to severe ID tends to have an organic etiology, mild ID is typically included in the subjective group because it is not well-differentiated from SLD and often is only apparent in school-age children (Donovan & Cross, 2002). The exclusion of students classified with mild ID limits the generalizability of the study's findings.

While the ECLS-K initially included a nationally-representative sample of students, relocation of students and missed assessments resulted in missing data at both levels of the analyses. The treatment of cases with missing data was a limitation in the current study. HGLM does not allow for missing data at the highest level of analyses. Therefore, students missing classroom-level data were deleted before the analyses were conducted. Additionally, students who were missing data for preschool attendance, socio-economic status, and direct reading assessment scores, were deleted listwise based on the variables included in the model, during the analyses. When the analytic sample was compared to the excluded sample of participants, chi-square analyses revealed statistically significant differences between the analytic sample and the excluded participants in terms of gender, ethnicity, preschool attendance, and special education status. Furthermore, independent t-tests revealed that excluded participants had lower beginning-sounds skills, achieved less growth in literacy, spent more time on literacy activities, received more phonics instruction, and were exposed to less integrated language arts instruction than those included in the study, thus introducing bias into the sample.

Implications for Policy and Future Research

Despite its flaws, the current study has several implications for educational research and policy. One caveat is that while this study utilized complex statistical analyses, its findings are correlational, not causal. Conducting correlational research provides a basis for further

investigation of important variables and informs applied research. As previously mentioned, experimental manipulation of variables is necessary in order to determine what instructional time and strategies best remediate reading deficits. Nonetheless, this study highlights the importance of controlling for SES and emergent skills at kindergarten entry, which otherwise may confound the results of future studies. Future research should further examine the effects of instructional time and strategies on reading outcomes across diverse populations.

Future studies should continue to examine trends in longitudinal data to better understand the regional and national responses to education reform. The second iteration of the ECLS-K has been released and poses an opportunity to compare instructional practices and student outcomes across the United States over two decades. While the original ECLS-K followed the kindergarten class of 1998-1999 through eighth grade, the kindergarten class of 2010-2011 is the focus of the newest wave of data collection. With the implementation of the 2002 No Child Left Behind Act to the widespread popularity of response-to-intervention and most recently, the 2015 Every Student Succeeds Act, the climate and national discourse surrounding education continues to evolve. Careful scrutiny of universal instructional strategies and changes in special education referral and identification is warranted to better understand the influence of education reform on educational practices.

Future research should further examine reading growth and instructional strategies prior to formal schooling and during noninstructional periods after school entry. The implementation of preschool instruction was intended to level the playing field for students lacking literacy-enriched environments in order to promote school readiness. However, variations in preschool quality, curricular focus, amount (i.e., full-day vs. half-day), and funding source (i.e., private vs. public) results in inconsistent results of preschool effectiveness. One of the significant findings of the current study is that beginning-sounds skills at kindergarten entry was predictive of special education classification in third grade. Thus, it is important that researchers continue to identify instructional strategies that improve emergent literacy for ‘at-risk’ students prior to kindergarten.

Additionally, support for these learners should continue through early schooling. McCoach, O'Connell, Reis, and Levitt (2006) found that the gap between low- and high-SES students appeared to narrow during the kindergarten year but widened again at the beginning of first grade. According to the findings by Foster and Miller (2007), the stages of literacy development are both hierarchical and overlapping, and by the time a gap at one stage has closed, another has been established. Thus, future studies should investigate instructional strategies during the summer months that prepare students for the next literacy stage (e.g., implementing fluency-building interventions during the summer after kindergarten).

Conclusion

The current study utilized public- and restricted-use data from a large-scale, longitudinal database to investigate child- and classroom-level predictors of special education placement. The goal of this study was to extend the research of Hibel et al. (2010) and Sonnenschein et al. (2010) to determine the relative contribution of type and amount of instructional strategies in first grade on special education classification in third grade and to examine the relationship between reading growth and receipt of special education services in one of the judgmental categories (i.e., SLD, ED, or SLI). Results demonstrate that beginning-sounds skills and SES were significant predictors of special education status. Results also showed that there was a significant, but not meaningful, relationship between reading growth and special education status. Classroom-level variables were not predictive of special education status; however, students, who were missing data for preschool attendance, socio-economic status, direct reading assessment scores, time spent on literacy activities, or type of instructional strategies were excluded from the model. Missing data analyses revealed significant differences between the excluded and analytic samples that may have affected the study's results. Despite its limitations, the findings of the current study contribute to the literature on reading growth and special education. Future research should examine instructional variables and targeted literacy intervention before school entry and during the summer months.

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APPENDIX

Selected Variables from the ECLS-K Full Sample K-8 Public-Use File Codebook

Variable Name : CHILDID Child Identification Number
Record Number : 1
Position : 1-8
Format : C8
Comment :

Response	Codes	Unweighted Frequency	Percent
CHILD ID		21,409	100.0
		21,409	**100.0%**

Variable Name : GENDER Child Composite Gender
Record Number : 1
Position : 377-378
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Male	1	10,950	51.1
Female	2	10,446	48.8
Not ascertained	-9	13	0.1
		21,409	**100.0%**

Variable Name : RACE Child Composite Race
Record Number : 1
Position : 379-380
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
White, non-Hispanic	1	11,788	55.1
Black or African American, non-Hispanic	2	3,224	15.1
Hispanic, race specified	3	1,839	8.6
Hispanic, race not specified	4	1,987	9.3
Asian	5	1,366	6.4
Native Hawaiian, other Pacific Islander	6	224	1.0
American Indian or Alaska Native	7	381	1.8
More than one race, non-Hispanic	8	549	2.6
Not ascertained	-9	13	0.1
		21,409	**100.0%**

Variable Name : C1R4RPB2 C1 RC4 PROB2 - Beginning Sounds
Record Number : 1
Position : 1012-1017
Format : N6.3
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
0 - 1	0 - 1	17,622	82.3
Not applicable	-1	1,456	6.8
Not ascertained	-9	48	0.2
		2,283	10.7
		21,409	**100.0%**

Variable Name : C2R4RSCL C2 RC4 Reading IRT Scale Score
Record Number : 1
Position : 1224-1229
Format : N6.2
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
22 - 157	22 - 157	18,937	88.5
Not applicable	-1	956	4.5
Not ascertained	-9	24	0.1
		1,492	7.0
		21,409	**100.0%**

Variable Name : C4R4RSCL C4 RC4 Reading IRT Scale Score
Record Number : 1
Position : 1684-1689
Format : N6.2
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
24 - 185	24 - 185	16,336	76.3
Not applicable	-1	338	1.6
Not ascertained	-9	9	0.0
		4,726	22.1
		21,409	**100.0%**

Variable Name : P1FIRKDG P1 First-Time Kindergartener
Record Number : 1
Position : 3378-3379
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Yes	1	17,219	80.4
No	2	850	4.0
Don't know	-8	20	0.1
Not ascertained	-9	8	0.0
		3,312	15.5
		21,409	**100.0%**

Variable Name : WKSESL WK Continuous SES Measure
Record Number : 1
Position : 3505-3509
Format : N5.2
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
-5 - 3	-5 - 3	20,141	94.1
		1,268	5.9
		21,409	**100.0%**

Variable Name : T5GLVL T5 Grade Level of Child
Record Number : 1
Position : 4206-4207
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Kindergarten	1	3	0.0
First grade	2	26	0.1
Second grade	3	1,310	6.1
Third grade	4	13,604	63.5
Fourth grade	5	53	0.2
Fifth grade	6	1	0.0
Ungraded classroom	7	17	0.1
Not ascertained	-9	291	1.4
		6,104	28.5
		21,409	**100.0%**

What kind of program did {CHILD} attend the most?

Variable Name : P1CPRGPK P1 CCQ290 What Program Child Got Most
Record Number : 2
Position : 691-692
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Day care center	1	1,712	8.0
Nursery school	2	386	1.8
Preschool	3	5,348	25.0
Prekindergarten program	4	2,869	13.4
Not applicable	-1	7,760	36.2
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	22	0.1
		3,312	15.5
		21,409	**100.0%**

Q23. How often and how much time do children in your class usually work on lessons or projects in the following general topic areas, whether as a whole class, in small groups, or in individualized arrangements? Q23A. Reading and language arts

Variable Name : A4OFTRDL A4 Q23A How Often Reading and Language Arts
Record Number : 4
Position : 2154-2155
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	1	0.0
Less than once a week	2	2	0.0
Once or twice a week	3	104	0.5
Three or four times a week	4	166	0.8
Daily	5	14,066	65.7
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	227	1.1
		11,684	54.6
		21,409	**100.0%**

Q23. How often and how much time do children in your class usually work on lessons or projects in the following general topic areas, whether as a whole class, in small groups, or in individualized arrangements? Q23A. Reading and language arts

Variable Name : A4TXRDLA A4 Q23A Time for Reading and Language Arts
Record Number : 4
Position : 2156-2157
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
1-30 minutes a day	1	188	0.9
31-60 minutes a day	2	1,393	6.5
61-90 minutes a day	3	3,929	18.4
More than 90 minutes a day	4	8,004	37.4
Not applicable	-1	1	0.0
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	1,051	4.9
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47A. Work on learning the names of the letters

Variable Name : A4LERNLT A4 Q47A Frequency Work on Letter Names
Record Number : 4
Position : 2360-2361
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	3,270	15.3
Once a month or less	2	1,691	7.9
Two or three times a month	3	399	1.9
Once or twice a week	4	666	3.1
Three or four times a week	5	1,047	4.9
Daily	6	6,687	31.2
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	806	3.8
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47B. Practice writing the letters of the alphabet

Variable Name : A4PRACLT A4 Q47B Frequency Writing Alphabet
Record Number : 4
Position : 2362-2363
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	631	2.9
Once a month or less	2	1,009	4.7
Two or three times a month	3	625	2.9
Once or twice a week	4	1,576	7.4
Three or four times a week	5	1,744	8.1
Daily	6	8,472	39.6
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	509	2.4
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47C. Discuss new or difficult vocabulary

Variable Name : A4NEWVOC A4 Q47C Frequency New Vocabulary
Record Number : 4
Position : 2364-2365
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	2	0.0
Once a month or less	2	18	0.1
Two or three times a month	3	65	0.3
Once or twice a week	4	1,527	7.1
Three or four times a week	5	3,377	15.8
Daily	6	9,366	43.7
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	211	1.0
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47D. Dictate stories to a teacher, aide, or volunteer.

Variable Name : A4DICTAT A4 Q47D Frequency Dictate Stories
Record Number : 4
Position : 2366-2367
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	2,480	11.6
Once a month or less	2	2,992	14.0
Two or three times a month	3	2,054	9.6
Once or twice a week	4	3,263	15.2
Three or four times a week	5	1,611	7.5
Daily	6	1,587	7.4
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	579	2.7
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47E. Work on phonics

Variable Name : A4PHONIC A4 Q47E Frequency Work On Phonics
Record Number : 4
Position : 2368-2369
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	29	0.1
Once a month or less	2	26	0.1
Two or three times a month	3	59	0.3
Once or twice a week	4	483	2.3
Three or four times a week	5	1,982	9.3
Daily	6	11,748	54.9
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	239	1.1
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47F. Listen to you read stories where they see the print (e.g., big books)

Variable Name : A4SEEPRI A4 Q47F Frequency Story/See Print
Record Number : 4
Position : 2370-2371
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	223	1.0
Once a month or less	2	632	3.0
Two or three times a month	3	1,064	5.0
Once or twice a week	4	2,406	11.2
Three or four times a week	5	2,736	12.8
Daily	6	7,317	34.2
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	188	0.9
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47G. Listen to you read stories but they don't see the print

Variable Name : A4NOPRNT A4 Q47G Frequency Story/Don't See Print
Record Number : 4
Position : 2372-2373
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	1,210	5.7
Once a month or less	2	746	3.5
Two or three times a month	3	647	3.0
Once or twice a week	4	1,545	7.2
Three or four times a week	5	2,187	10.2
Daily	6	7,933	37.1
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	298	1.4
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47H. Retell stories

Variable Name : A4RETELL A4 Q47H Frequency Retell Stories
Record Number : 4
Position : 2374-2375
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	127	0.6
Once a month or less	2	611	2.9
Two or three times a month	3	1,664	7.8
Once or twice a week	4	5,550	25.9
Three or four times a week	5	3,487	16.3
Daily	6	2,731	12.8
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	396	1.8
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47I. Read aloud

Variable Name : A4READLD A4 Q47I Frequency Read Aloud
Record Number : 4
Position : 2376-2377
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	11	0.1
Once a month or less	2	43	0.2
Two or three times a month	3	124	0.6
Once or twice a week	4	1,303	6.1
Three or four times a week	5	3,323	15.5
Daily	6	9,550	44.6
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	212	1.0
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47J. Read silently

Variable Name : A4SILENT A4 Q47J Frequency Read Silently
Record Number : 4
Position : 2378-2379
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	87	0.4
Once a month or less	2	90	0.4
Two or three times a month	3	112	0.5
Once or twice a week	4	905	4.2
Three or four times a week	5	2,251	10.5
Daily	6	10,903	50.9
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	218	1.0
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47K. Work in a reading workbook or on a worksheet

Variable Name : A4WRKBK A4 Q47K Frequency Work Books/Sheets
Record Number : 4
Position : 2380-2381
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	509	2.4
Once a month or less	2	464	2.2
Two or three times a month	3	516	2.4
Once or twice a week	4	2,379	11.1
Three or four times a week	5	3,306	15.4
Daily	6	7,162	33.5
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	230	1.1
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47L. Write words from dictation to improve spelling

Variable Name : A4WRTWRD A4 Q47L Frequency Write from Dictation
Record Number : 4
Position : 2382-2383
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	686	3.2
Once a month or less	2	715	3.3
Two or three times a month	3	869	4.1
Once or twice a week	4	6,422	30.0
Three or four times a week	5	2,705	12.6
Daily	6	2,948	13.8
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	221	1.0
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47M. Write with encouragement to use invented spellings, if needed

Variable Name : A4INVENT A4 Q47M Frequency Write w/Invented Spellings
Record Number : 4
Position : 2384-2385
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	171	0.8
Once a month or less	2	96	0.4
Two or three times a month	3	348	1.6
Once or twice a week	4	1,939	9.1
Three or four times a week	5	3,171	14.8
Daily	6	8,656	40.4
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	185	0.9
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47N. Read books they have chosen for themselves

Variable Name : A4CHSBK A4 Q47N Frequency Chose Books to Read
Record Number : 4
Position : 2386-2387
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	15	0.1
Once a month or less	2	49	0.2
Two or three times a month	3	208	1.0
Once or twice a week	4	1,288	6.0
Three or four times a week	5	2,368	11.1
Daily	6	10,464	48.9
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	174	0.8
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47O. Read text with controlled vocabulary

Variable Name : A4CNTVOC A4 Q47O Frequency Read Controlled Vocab
Record Number : 4
Position : 2388-2389
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	274	1.3
Once a month or less	2	154	0.7
Two or three times a month	3	322	1.5
Once or twice a week	4	1,535	7.2
Three or four times a week	5	3,905	18.2
Daily	6	8,096	37.8
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	280	1.3
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47P. Read text with strong phonetic patterns

Variable Name : A4PHONET A4 Q47P Frequency Read Phonetic Patterns
Record Number : 4
Position : 2390-2391
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	196	0.9
Once a month or less	2	301	1.4
Two or three times a month	3	616	2.9
Once or twice a week	4	2,764	12.9
Three or four times a week	5	4,152	19.4
Daily	6	6,217	29.0
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	320	1.5
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47Q. Read patterned or predictable text

Variable Name : A4PATTRN A4 Q47Q Frequency Read Patterned Text
Record Number : 4
Position : 2392-2393
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	145	0.7
Once a month or less	2	225	1.1
Two or three times a month	3	847	4.0
Once or twice a week	4	3,210	15.0
Three or four times a week	5	4,240	19.8
Daily	6	5,581	26.1
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	318	1.5
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47R. Read thematic or literature based text

Variable Name : A4LITERA A4 Q47R Frequency Literature Based Text
Record Number : 4
Position : 2394-2395
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	220	1.0
Once a month or less	2	425	2.0
Two or three times a month	3	1,001	4.7
Once or twice a week	4	3,106	14.5
Three or four times a week	5	3,975	18.6
Daily	6	5,575	26.0
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	264	1.2
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47S. Compose and write stories or reports

Variable Name : A4COMPOS A4 Q47S Frequency Write Stories/Report
Record Number : 4
Position : 2396-2397
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	190	0.9
Once a month or less	2	876	4.1
Two or three times a month	3	2,096	9.8
Once or twice a week	4	5,076	23.7
Three or four times a week	5	3,472	16.2
Daily	6	2,674	12.5
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	182	0.9
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47T. Do an activity or project related to a book or story

Variable Name : A4DOPROJ A4 Q47T Frequency Work Related to Book
Record Number : 4
Position : 2398-2399
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	159	0.7
Once a month or less	2	1,233	5.8
Two or three times a month	3	2,843	13.3
Once or twice a week	4	5,475	25.6
Three or four times a week	5	2,860	13.4
Daily	6	1,817	8.5
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	179	0.8
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47U. Publish their own writing

Variable Name : A4PUBLSH A4 Q47U Frequency Publish Own Writing
Record Number : 4
Position : 2400-2401
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	1,865	8.7
Once a month or less	2	4,262	19.9
Two or three times a month	3	3,754	17.5
Once or twice a week	4	2,868	13.4
Three or four times a week	5	818	3.8
Daily	6	513	2.4
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	486	2.3
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47V. Perform plays and skits

Variable Name : A4SKITS A4 Q47V Frequency Perform Plays/Skits
Record Number : 4
Position : 2402-2403
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	3,268	15.3
Once a month or less	2	8,417	39.3
Two or three times a month	3	1,924	9.0
Once or twice a week	4	482	2.3
Three or four times a week	5	72	0.3
Daily	6	81	0.4
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	322	1.5
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47W. Write stories in a journal

Variable Name : A4JRNL A4 Q47W Frequency Write in Journal
Record Number : 4
Position : 2404-2405
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	1,288	6.0
Once a month or less	2	1,236	5.8
Two or three times a month	3	1,285	6.0
Once or twice a week	4	3,049	14.2
Three or four times a week	5	2,637	12.3
Daily	6	4,746	22.2
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	325	1.5
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47X. See or hear stories from story tellers or other artists

Variable Name : A4TELLRS A4 Q47X Frequency of Story Tellers
Record Number : 4
Position : 2406-2407
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	4,176	19.5
Once a month or less	2	7,320	34.2
Two or three times a month	3	880	4.1
Once or twice a week	4	887	4.1
Three or four times a week	5	352	1.6
Daily	6	573	2.7
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	374	1.7
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47Y. Work in mixed-achievement groups on language arts activities

Variable Name : A4MXDGRP A4 Q47Y Frequency Mixed Level Groups
Record Number : 4
Position : 2408-2409
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	1,356	6.3
Once a month or less	2	1,444	6.7
Two or three times a month	3	2,067	9.7
Once or twice a week	4	2,921	13.6
Three or four times a week	5	2,308	10.8
Daily	6	4,171	19.5
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	299	1.4
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47Z. Peer tutoring

Variable Name : A4PRTUTR A4 Q47Z Frequency Peer Tutoring
Record Number : 4
Position : 2410-2411
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	1,582	7.4
Once a month or less	2	1,688	7.9
Two or three times a month	3	2,324	10.9
Once or twice a week	4	4,167	19.5
Three or four times a week	5	2,132	10.0
Daily	6	2,355	11.0
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	318	1.5
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47AA. Work on projects in small groups

Variable Name : A4SMGRPJ A4 Q47AA Frequency of Projects in Small Groups
Record Number : 4
Position : 2412-2413
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	583	2.7
Once a month or less	2	2,502	11.7
Two or three times a month	3	3,801	17.8
Once or twice a week	4	3,794	17.7
Three or four times a week	5	2,073	9.7
Daily	6	1,558	7.3
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	255	1.2
		6,843	32.0
		21,409	**100.0%**

Q47. How often do children in this class do each of the following reading and language arts activities? Q47BB. Work on long term projects (at least a week long)

Variable Name : A4LONGPR A4 Q47BB Frequency of Long Projects
Record Number : 4
Position : 2414-2415
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Never	1	3,940	18.4
Once a month or less	2	6,364	29.7
Two or three times a month	3	2,488	11.6
Once or twice a week	4	788	3.7
Three or four times a week	5	375	1.8
Daily	6	379	1.8
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	232	1.1
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49A. Conventions of print (left to right orientation, book holding)

Variable Name : A4CONVNT A4 Q49A Convention of Print
Record Number : 4
Position : 2418-2419
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	37	0.2
Children should already know	2	6,380	29.8
Once a month or less	3	1,258	5.9
2-3 times a month	4	448	2.1
1-2 times a week	5	662	3.1
3-4 times a week	6	865	4.0
Daily	7	4,629	21.6
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	287	1.3
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49B. Alphabet and letter recognition

Variable Name : A4RCGNZE A4 Q49B Alphabet and Letter Recognition
Record Number : 4
Position : 2420-2421
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	9	0.0
Children should already know	2	5,585	26.1
Once a month or less	3	1,000	4.7
2-3 times a month	4	611	2.9
1-2 times a week	5	778	3.6
3-4 times a week	6	979	4.6
Daily	7	5,362	25.0
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	242	1.1
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49C. Matching letters to sounds

Variable Name : A4MATCH A4 Q49C Matching Letters to Sounds
Record Number : 4
Position : 2422-2423
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	7	0.0
Children should already know	2	2,339	10.9
Once a month or less	3	543	2.5
2-3 times a month	4	459	2.1
1-2 times a week	5	882	4.1
3-4 times a week	6	1,905	8.9
Daily	7	8,103	37.8
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	328	1.5
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49D. Writing own name (first and last)

Variable Name : A4WRTNME A4 Q49D Writing Own Name
Record Number : 4
Position : 2424-2425
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	17	0.1
Children should already know	2	4,511	21.1
Once a month or less	3	1,099	5.1
2-3 times a month	4	708	3.3
1-2 times a week	5	735	3.4
3-4 times a week	6	767	3.6
Daily	7	6,438	30.1
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	291	1.4
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49E. Rhyming words and word families

Variable Name : A4RHYMNG A4 Q49E Rhyming Words and Word FAMILIES
Record Number : 4
Position : 2426-2427
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	4	0.0
Children should already know	2	265	1.2
Once a month or less	3	333	1.6
2-3 times a month	4	1,318	6.2
1-2 times a week	5	3,932	18.4
3-4 times a week	6	4,538	21.2
Daily	7	3,944	18.4
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	232	1.1
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49F. Reading multi-syllable words, like adventure

Variable Name : A4SYLLAB A4 Q49F Reading Multi-Syllable Words
Record Number : 4
Position : 2428-2429
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	804	3.8
Children should already know	2	32	0.1
Once a month or less	3	443	2.1
2-3 times a month	4	1,080	5.0
1-2 times a week	5	3,435	16.0
3-4 times a week	6	3,820	17.8
Daily	7	4,662	21.8
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	290	1.4
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49G. Common prepositions such as over and under, up and down

Variable Name : A4PREPOS A4 Q49G Common Prepositions
Record Number : 4
Position : 1716-1717
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	480	2.2
Children should already know	2	997	4.7
Once a month or less	3	1,125	5.3
2-3 times a month	4	2,596	12.1
1-2 times a week	5	3,816	17.8
3-4 times a week	6	2,561	12.0
Daily	7	2,674	12.5
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	317	1.5
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49H. Identifying the main idea and parts of a story

Variable Name : A4MAINID A4 Q49H Identify Main Idea of Story
Record Number : 4
Position : 2432-2433
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	150	0.7
Children should already know	2	37	0.2
Once a month or less	3	248	1.2
2-3 times a month	4	942	4.4
1-2 times a week	5	4,232	19.8
3-4 times a week	6	4,602	21.5
Daily	7	4,198	19.6
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	157	0.7
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49I. Making predictions based on text

Variable Name : A4PREDIC A4 Q49I Make Predictions Based on Text
Record Number : 4
Position : 2434-2435
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	54	0.3
Children should already know	2	36	0.2
Once a month or less	3	153	0.7
2-3 times a month	4	333	1.6
1-2 times a week	5	3,285	15.3
3-4 times a week	6	4,380	20.5
Daily	7	6,126	28.6
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	199	0.9
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49J. Using context cues for comprehension

Variable Name : A4TEXTCU A4 Q49J Use Cues for Comprehension
Record Number : 4
Position : 2436-2437
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	93	0.4
Children should already know	2	9	0.0
Once a month or less	3	170	0.8
2-3 times a month	4	180	0.8
1-2 times a week	5	2,024	9.5
3-4 times a week	6	4,277	20.0
Daily	7	7,650	35.7
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	163	0.8
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49K. Communicating complete ideas orally

Variable Name : A4ORALID A4 Q49K Communicate Ideas Orally
Record Number : 4
Position : 2438-2439
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	27	0.1
Children should already know	2	70	0.3
Once a month or less	3	92	0.4
2-3 times a month	4	206	1.0
1-2 times a week	5	1,454	6.8
3-4 times a week	6	2,881	13.5
Daily	7	9,661	45.1
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	175	0.8
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49L. Remembering and following directions that include a series of actions

Variable Name : A4DRCTNS A4 Q49L Follow Complex Directions
Record Number : 4
Position : 2440-2441
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	79	0.4
Children should already know	2	51	0.2
Once a month or less	3	227	1.1
2-3 times a month	4	619	2.9
1-2 times a week	5	1,982	9.3
3-4 times a week	6	3,028	14.1
Daily	7	8,357	39.0
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	223	1.0
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49M. Using capitalization and punctuation

Variable Name : A4PNCTUA A4 Q49M Use Capitalization/Punctuation
Record Number : 4
Position : 2442-2443
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	17	0.1
Children should already know	2	17	0.1
Once a month or less	3	12	0.1
2-3 times a month	4	121	0.6
1-2 times a week	5	674	3.1
3-4 times a week	6	2,006	9.4
Daily	7	11,553	54
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	166	0.8
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49N. Composing and writing complete sentences

Variable Name : A4COMPSE A4 Q49N Compose/Write Complete Sentence
Record Number : 4
Position : 2444-2445
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	33	0.2
Children should already know	2	15	0.1
Once a month or less	3	25	0.1
2-3 times a month	4	147	0.7
1-2 times a week	5	1,349	6.3
3-4 times a week	6	3,310	15.5
Daily	7	9,508	44.4
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	179	0.8
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49O. Composing and writing stories with an understandable beginning, middle, and end

Variable Name : A4WRTST0 A4 Q49O Story Has Beginning/Middle/End
Record Number : 4
Position : 2446-2447
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	473	2.2
Children should already know	2	26	0.1
Once a month or less	3	1,058	4.9
2-3 times a month	4	2,446	11.4
1-2 times a week	5	4,766	22.3
3-4 times a week	6	2,952	13.8
Daily	7	2,625	12.3
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	220	1.0
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49P. Conventional spelling

Variable Name : A4SPELL A4 Q49P Conventional Spelling
Record Number : 4
Position : 2448-2449
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	202	0.9
Children should already know	2	8	0.0
Once a month or less	3	87	0.4
2-3 times a month	4	234	1.1
1-2 times a week	5	2,334	10.9
3-4 times a week	6	3,563	16.6
Daily	7	7,867	36.7
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	271	1.3
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49Q. Vocabulary

Variable Name : A4VOCAB A4 Q49Q Vocabulary
Record Number : 4
Position : 2450-2451
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	78	0.4
Children should already know	2	12	0.1
Once a month or less	3	47	0.2
2-3 times a month	4	156	0.7
1-2 times a week	5	2,089	9.8
3-4 times a week	6	3,285	15.3
Daily	7	8,642	40.4
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	257	1.2
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49R. Alphabetizing

Variable Name : A4ALPBTZ A4 Q49R Alphabetizing
Record Number : 4
Position : 2452-2453
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	356	1.7
Children should already know	2	38	0.2
Once a month or less	3	1,497	7.0
2-3 times a month	4	3,067	14.3
1-2 times a week	5	6,046	28.2
3-4 times a week	6	1,823	8.5
Daily	7	1,470	6.9
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	269	1.3
		6,843	32.0
		21,409	**100.0%**

Q49. For this school year as a whole, please indicate how each of the following reading and language art skills is taught in your class. Q49S. Reading aloud fluently

Variable Name : A4RDFLNT A4 Q49S Reading Aloud Fluently
Record Number : 4
Position : 2454-2455
Format : N2.0
Comment : Blanks (no value) in the frequency distribution indicate nonresponse for the entire instrument.

Response	Codes	Unweighted Frequency	Percent
Taught at a higher grade level	1	86	0.4
Children should already know	2	9	0.0
Once a month or less	3	56	0.3
2-3 times a month	4	170	0.8
1-2 times a week	5	1,519	7.1
3-4 times a week	6	3,769	17.6
Daily	7	8,775	41.0
Refused	-7	0	0.0
Don't know	-8	0	0.0
Not ascertained	-9	182	0.9
		6,843	32.0
		21,409	**100.0%**

VITA

Tiffany C'Javon Hornsby

Candidate for the Degree of

Doctor of Philosophy

Thesis: EXAMINING THE INFLUENCE OF PRE-KINDERGARTEN ATTENDANCE, FIRST-GRADE LITERACY INSTRUCTIONAL PRACTICES, AND INTRUCTIONAL TIME ON LITERACY GROWTH AND CHILDREN'S SPECIAL EDUCATION STATUS

Major Field: Educational Psychology, Option: School Psychology

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Educational Psychology, Option: School Psychology at Oklahoma State University, Stillwater, Oklahoma in July, 2017.

Completed the requirements for the Master of Science in Educational Psychology, Option: School Psychometrics at Oklahoma State University, Stillwater, Oklahoma in December, 2012.

Completed the requirements for the Bachelor of Science in Psychology at Howard University, Washington, D.C. in May, 2010.

Experience:

2016-2017	School Psychologist Resident, Harrisonburg City Public Schools, Harrisonburg, VA.
2015-2016	Doctoral Intern in Clinical Psychology, The May Institute, Inc., Randolph, Massachusetts.
2014-2015	Doctoral Practicum Student, School Psychology Center, Oklahoma State University, Stillwater, Oklahoma.
2014-2015	OTISS External Consultant, Behavioral Solutions, LLC; Oklahoma State Department of Education, Oklahoma City, Oklahoma.
2013-2014	School-Based Practicum Student, Highland Park Elementary School, Stillwater Middle, Junior High, and High Schools, Stillwater, Oklahoma.
2013	Adolescent Therapy Practicum Student, Lincoln Alternative High School, Stillwater, Oklahoma.
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