

2017

Full-Day Kindergarten Program: Fostering Academic and Behavioral Gains for At Risk Students

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Philadelphia College of Osteopathic Medicine

Department of Psychology

**FULL-DAY KINDERGARTEN PROGRAM:
FOSTERING ACADEMIC AND BEHAVIORAL GAINS FOR AT RISK STUDENTS**

By Sarah Stefanakis

Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Psychology

May 2017

PHILADELPHIA COLLEGE OF OSTEOPATHIC MEDICINE
DEPARTMENT OF PSYCHOLOGY

Dissertation Approval

This is to certify that the thesis presented to us by _____
on the _____ day of _____, 20____, in partial fulfillment of the
requirements for the degree of Doctor of Psychology, has been examined and is
acceptable in both scholarship and literary quality.

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Acknowledgements

I would like to take this opportunity to thank my dissertation committee, Drs. Virginia Salzer, Kate Tresco, and Lauren Moulton for their tireless work and dedication. Collectively, they have spent many hours reading, editing, and advising me through the process of dissertation writing. I am blessed to not only have had the benefit of their formal expertise in the dissertation process, but also to have been able to lean on them for guidance, strength, and courage throughout the strenuous process of becoming a Psy. D. in school psychology. Though my words are only a very humble form of gratitude, please accept my sincere and enthusiastic thanks!

I must also take a moment to thank my very dear friend, Kristen Rudiger, for without her laughter, support, and carpooling, I would not have been able to persevere through this program.

I want to thank my family. My mother and father have been essential in every achievement I have made in my life. I have never gone a day without knowing how loved and supported I am. This degree proves how much I can achieve given the stepping-stones they have provided. I very much want to thank my husband, Manny, for his constant love, support, and guidance. His very matter-of-fact mentality helped me to buckle down and write when I was feeling overwhelmed. I also want to thank my three wonderful brothers for urging me to finish, especially my brother Jeremy for his technical advice about the research process.

Abstract

The following study investigated the effectiveness of a full-day kindergarten program as an intervention to foster academic and behavioral gains in students presenting with poor school readiness skills when entering kindergarten. Sixteen public school kindergarten students selected for a pilot full-day kindergarten program participated in the study. The sample included students from low-socioeconomic status families with poor academic skills, students from higher socioeconomic status families with poor academic skills, and students receiving special education services. Dependent-samples t-tests revealed significant growth between the beginning and the end of the school year in phonological processing, print recognition, and early writing skills. Measures of early number sense, however, demonstrated no significant academic growth. Teacher's ratings of student functioning indicated significant social and behavioral growth between the beginning and the end of the school year. The study also examined educational status (i.e., special education or general education) in relation to academic and behavioral functioning at the beginning and the end of the school year. However, educational status was a factor only in teacher's ratings of social and behavioral functioning at the end of the school year; general education students exhibited significantly more developed social and behavioral skills.

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Chapter 1: Introduction

Statement of the Problem

Children enter kindergarten with varying levels of academic and behavioral ability. A child's combined academic and behavioral ability on entry to school is often called school readiness. Although the concept of school readiness is a theoretical construct (Justice, L.M., Bowles, R.P., Pence Turnbull, K.L., & Skibbe, L.E., 2009), empirical researchers have defined school readiness as the skills a child has acquired before entering school that provide a basis for learning (Duncan et al., 2007). Justice et al. (2009) noted that school readiness is a multidimensional construct that includes social, behavioral, and self-regulatory skills, as well as academic skills.

In order to further apply the concept of school readiness to empirical research, Duncan et al. (2007) have described early math applications, early reading skills, early language facility, ability to focus attention, social skills, and socio-emotional behavior as the foundation of future learning. In establishing government guidelines for education policy, the National Education Goals Panel (1995) cited "a wide range of abilities and experiences upon which early learning and development rests" (p.3). To provide a vocabulary for children's early development and learning, the National Education Goals Panel described school readiness in terms of physical wellbeing and motor development, social and emotional development, approaches to learning (e.g., curiosity, creativity, independence), language development (both oral and written), and cognition and general knowledge (i.e., problem-solving skills).

For many children, kindergarten is their first formal educational experience. When children begin their education with adequate readiness skills, they are more

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confident of their learning capability, receive more extensive teacher and peer feedback, and may qualify for a higher ability group that fosters the attainment of advanced skills (Duncan et al., 2007). Furthermore, Wildenger and McIntyre (2012) noted that the first years of schooling forecasted subsequent school achievement, and that students whose early school experience was positive tended to experience continued success. In contrast, children with lower levels of academic and behavioral ability when entering kindergarten were at an immediate disadvantage compared to their peers; research has indicated a strong positive correlation between academic and behavioral skills exhibited in the first year of school and later academic success (Duncan et al., 2007; Justice, Turnbull, Bowles, & Skibbe, 2009; Magnuson & Shager, 2010).

Given the connection between school readiness and future educational achievement, researchers have investigated variables that may affect the development of early academic and behavioral skills; they have found evidence supporting a correlation between socioeconomic status and student achievement. Stull (2013) noted that students from lower economic status families presented with lower knowledge and skill levels when entering school. Moreover, Reardon (2013) discovered long-term educational impact, reporting that students from low-income families have lower rates of high school graduation, college enrollment, and college graduation than students from high-income families. The concern extends beyond academic deficits. Ray and Smith (2010) reported greater social, emotional, and behavioral struggles for students from low-income families entering the formal education system. Furthermore, Conyers, Reynolds, and Ou (2003) reported that the disparity in skill levels can lead to the disproportionate assignment of children from disadvantaged backgrounds to special education programs.

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According to Magnuson and Waldfogel (2005), disadvantaged children were better able to succeed when barriers were eliminated or circumvented. For children from low-income families who entered kindergarten with a low level of readiness skills, a full-day kindergarten program can be an effective intervention by providing more time for the acquisition of skills (Walston & West, 2004).

Special education students are also a population at risk, because these children may enter kindergarten with a lower level of academic and behavioral skills. Not only may their transition into kindergarten be more difficult due to the disparity between these children's skill level and the expected level of school readiness (McIntyre, Eckert, Fiese, Reed, & Wildenger, 2010), their school day may be more challenging. Special education students require increased instructional repetition and behavioral, social, and emotional skill building. A full-day kindergarten may provide the extended structure needed to meet these students' needs.

Purpose of the Study

The purpose of the present study was to determine the effectiveness of a full-day kindergarten as an intervention to foster academic and behavioral gains in students from low-income families with poor school readiness skill. This study extended previous research in a number of ways. The primary goal of this study was to learn if the lengthened school day a full-day kindergarten program provides would significantly assist students who required additional time and services to meet their academic and behavioral needs. In addition, because special education students are also viewed as an at

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risk population, this study investigated whether educational status (i.e., general education or special education) affected the impact of the full-day kindergarten as an intervention.

The following hypotheses derived from the purpose of the study and previous research:

Hypothesis 1. Null Hypothesis: For students in a full-day kindergarten, there is no difference between the level of phonological processing skills measured in September and that measured in June. Alternative Hypothesis: For students in a full-day kindergarten, phonological processing skills significantly increase between measurements in September and in June.

Hypothesis 2. Null Hypothesis: For students in a full-day kindergarten, there is no difference between the level of print-concept knowledge measured in September and that measured in June. Alternative Hypothesis: For students in a full-day kindergarten, the level of print-concept knowledge significantly increases between measurements in September and in June.

Hypothesis 3. Null Hypothesis: For students in a full-day kindergarten, there is no difference between the level of early writing skills measured in September and that measured in June. Alternative Hypothesis: For students in a full-day kindergarten, the level of early writing skills significantly increases between measurements in September and in June.

Hypothesis 4. Null Hypothesis: For students in a full-day kindergarten, there is no difference between the level of early number-sense skills measured in September and that measured measured in June. Alternative Hypothesis: For students in a full-day

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kindergarten, the level of early number-sense skills significantly increases between measurements in September and in June.

Hypothesis 5. Null Hypothesis: For students in a full-day kindergarten, there is no difference between the classroom teacher's ratings of students' levels of social and behavioral skills measured in September and those measured in June. Alternative Hypothesis: For students in a full-day kindergarten, the classroom teacher's ratings of the level of social and behavioral skills significantly increase between measurements in September and in June.

Hypothesis 6. Null Hypothesis: For students in a full-day kindergarten, academic and behavioral functioning does not vary in relation to educational status (i.e., general education or special education). Alternate Hypothesis: For students in a full-day kindergarten, academic and behavioral functioning varies significantly in relation to educational status (i.e., general education or special education).

Chapter 2: Literature Review

Readiness Skills and Future Academic Achievement

Early kindergarten readiness skills are significant, because they are the foundation of all other proficiencies. Researchers have linked early academic skills not only to successful kindergarten experiences but also to future educational outcomes. For example, Duncan et al. (2007) investigated the associations between early academic skills and subsequent school achievement. Utilizing six archived longitudinal data sets, the authors collected information across elementary, and in some cases, middle school years about student achievement. Results emphasized the importance of early math concepts as the most powerful predictor of future learning. Early literacy skills, however, were less powerful but still significant predictors of later achievement.

Magnuson and Shager (2010) provided further support for the impact of early literacy and mathematical skill levels on subsequent academic achievement by connecting the effect of poor early readiness skills to high school graduation rates. The authors cited statistics from the U.S. Department of Education stating that 21% of children from low-income families did not complete high school, but only 4% of children from more affluent families did not earn a high school diploma. Considering the connection between early academic skills and later achievement, effective kindergarten programs must focus on the early remediation of academic deficits in order to provide a strong educational foundation (Duncan et al., 2007).

Socioeconomic Status and Academic Skills

The effect of early school readiness on future achievement is substantial (Claessens, Duncan, & Engel, 2009; Duncan et al., 2006; Magnuson & Shager, 2010;

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Reardon, 2013). Although knowledge of this connection fosters awareness, to develop an effective program, one must understand the environmental variables that influence early readiness skills and in turn future academic performance. The literature that strongly links familial socioeconomic status to levels of school readiness on entering kindergarten and subsequent academic achievement is extensive (Davis-Kean 2005; Magnuson & Shager, 2010; Miller, P., Votruba-Drzal, E., & Setodji, C.M., 2013). Stull (2013), using The Early Childhood Longitudinal Study--Kindergarten cohort from 2000 as the subject pool, explored the relationship between socioeconomic status and school performance. The results indicated that children from low economic status families possessed lower knowledge and skill levels when entering school. On the whole, the study found that familial socioeconomic status was the strongest and most statistically significant variable linked to student achievement: As income increased, so did academic achievement.

Socioeconomic Status and Home Environment

As previously stated, the connection between familial socioeconomic status and student achievement is substantial. This relationship is often mediated by the quality of a student's home environment. Certain environmental conditions foster the development of early academic knowledge, but others stifle growth. In an effort to quantify how home environments differed in relation to socioeconomic level, Bradley, Corwyn, McAdoo, and Coll (2001) measured the relative effects of socioeconomic status on children's home environments. The study's results found that poverty greatly diminished a child's access to learning materials in the home. Generally, children from more affluent socioeconomic status (SES) families were far more likely to have three or more books in the home than those from low-income families. Economic status influenced the amount of time mothers

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read to their children; mothers in impoverished families read half as much as mothers from more affluent families. Poverty also significantly limited exposure to intellectually enriching cultural experiences (e.g., museums, theater). SES affected the perceived physical quality of the home; children from poor families were more likely to describe their homes as dark, monotonous, and dirty. Results from Bradley et al. (2001) demonstrated that income level determined many aspects of the home environment, and that children from low-SES families had less access to the enriching learning experiences that foster the development of early academic skills.

In order to develop an effective intervention to aid children with low school readiness, protective measures warrant inclusion in discussions of the influence of the home environment. Research has indicated that strong social relationships and networks mediated the relationship between income levels and student academic achievement. Miller, Votruba-Drzal, and Setodji (2013) found that family income as a predictor of academic achievement varied by geographic region. The relationship between low SES and academic achievement was three times stronger in large cities than in rural areas. To explain the disparity, the authors hypothesized that the increased environmental stressors (i.e., pollution, violence, overcrowding, noise) associated with low-income families in large cities further hindered school readiness skills and future academic success. The authors also hypothesized that in urban areas, children lacked important life experiences and learning interactions; in rural communities, where social networks are stronger, children had more extensive access to enriching learning experiences regardless of income. The trend in data implied that increased exposure to productive learning

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opportunities and stronger social relationships might serve as protective factors for students from low-income families.

Socioeconomic Status and Specific Cognitive Functioning

Studies on environmental influences on cognitive functioning have revealed the effect that SES has on a child's development. Children learn, to some degree, through experience. Children raised in low-income families were more likely to have had limited exposure to intellectually enriching home learning environments (Bradley et al., 2001), which in turn inhibited the development of cognitive skills.

To analyze its consequences on cognitive functioning, Noble, Norman, and Farah (2005) have measured the effects of socioeconomic status on specific neurocognitive systems. Their study included 60 kindergarten students from the Philadelphia public school system. Of the 60 participants, 30 were from families characterized as low-SES, and 30 were from families characterized as mid-range SES. Exclusionary criteria included a history of head injury, neurological disabilities, or certain pediatric problems. The researchers employed a battery of neuropsychological assessments to measure functioning in the areas of visual cognition, visual-spatial processing, memory, language, and executive functioning. Results indicated that SES was the chief influence on overall cognitive functioning as manifested by all five areas. To determine the impact of SES on each domain of cognition, the researchers conducted an additional statistical analysis. Of the five domains, SES level impacted language and executive functioning most significantly. Regression analysis revealed that SES accounted for 31.4% of the variance in the language domain and 15.3% of the variance in the executive function domain. When specific home environmental factors were analyzed for influence on cognitive

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functioning, the education level of the parents accounted for 26.7% of the variance in scores in the language domain. In the executive function domain, parent education levels accounted for 11.9% of the variance. This study yielded further evidence of the significant detrimental effect of low socioeconomic environments on student development. Moreover, the study identified parent educational level as a strong influence on student cognitive development.

Language development. The ability to utilize language to learn and communicate effectively has proved a predictor of successful kindergarten outcomes (Justice, Bowles, Pence Turnbull, & Skibbe, 2009). Hoff (2003) conducted a study to determine how differences in socioeconomic status related to specific areas of language development, including vocabulary development. The investigator studied 63 mothers and children drawn from high- and middle-income families. The age of the children ranged from 16 to 31 months. The investigator made audio-recordings in the home during routinely occurring events (i.e., getting dressed in the morning), and sampled the audio-recordings on two separate occasions, 10 weeks apart. Analysis of the recordings measured both maternal speech and children's vocabulary production. Results indicated that levels of socioeconomic status significantly influenced children's vocabulary production. Mothers from high-income families produced more utterances, more word variations, longer mean utterances, and more prompts to continue conversation than did the mid-SES mothers. The difference in maternal speech between high-SES and mid-SES families significantly impacted children's vocabulary production. This study provided additional evidence that economic variables significantly affect essential skills required for successful school experiences.

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Reading development. The development of reading proficiency has a major effect on academic trajectory and professional success. Moreover, research has discovered that socioeconomic factors contributed significantly to early-childhood literacy skills. Magnuson and Shager (2010) reviewed the data compiled from the Early Childhood Longitudinal Study--Kindergarten Cohort from 1998 and found that children from low-income families scored .65 of a standard deviation lower on tests of early reading than higher income families. Aikens and Barbarin (2008) utilized the same archival data to study the relationship between SES and the development of reading ability in children from kindergarten through third grade. Results indicated that as SES increased, so did reading achievement. Not only did students from higher SES families present with higher reading ability in kindergarten, their rate of growth in reading skills was also substantially greater than that of students from lower SES families.

Although research has indicated that SES impacted reading achievement, it did not account for all the variability in reading skills across economic classes. Understanding mediating factors is imperative when building programs to address academic deficits for at risk youth. Noble, Farah, and McCandliss (2006) examined the interaction of SES and phonological awareness on reading achievement. The study included 168 first graders from nine New York Public schools. Participants' SES level varied. The researchers employed a number of measures to assess phonological awareness, word reading, and reading comprehension. Based on levels of phonological awareness, results indicated that SES affected reading achievement differently; more specifically, SES significantly impacted reading abilities only in students who also exhibited poor phonological awareness. For students with higher levels of phonological

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awareness, SES level no longer influenced variance in reading skills. This research emphasized the need for high-quality kindergarten experiences for students from low SES environments. In addition, the research assisted in guiding intervention and compensatory skill building, because sufficient phonological awareness partially negated the effects of low-SES environments.

Mathematics. Research on SES-related differences in literacy has been substantial; however, the literature concerning the effects of low-SES on math abilities was sparser. Studies that analyzed the multitude of variables that influence early mathematics achievement have found connections between SES and math skills. For example, Byrnes and Wasik (2009) studied the factors most strongly associated with math achievement in kindergarten and first and third grades using the Early Childhood Longitudinal Study – Kindergarten Data database. The pertinent categories included family socioeconomic status, frequency of exposure to math content, and pre-existing math skills. Findings indicated that children from higher-SES families had increased levels of math achievement at the end of kindergarten and first and third grades. Moreover, Magnuson and Shager (2010) reviewed the data compiled from the Early Childhood Longitudinal Study--Kindergarten Cohort from 1998 and found children from low-SES families scored .72 of a standard deviation lower on tests of early math skills than peers from higher SES families. Highlighting the importance of such proficiencies, Claessens, Duncan, and Engel (2009) discovered that early math skills were predictive of fifth-grade achievement. The researchers learned that students who had a greater degree of number sense in kindergarten demonstrated substantially higher skills in fifth grade not only math but in reading as well. The research distinctly identified the importance of

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early math skills, as well as the connection between SES and math achievement. Given that students from low-SES families performed less well on math achievement measures and that math achievement is predictive of later school achievement, early intervention to support math skills is critical.

Social/Emotional, Behavioral Functioning and Academic Achievement

The research reviewed by this study has linked impoverished SES to the quality of home environment, cognitive functioning, language acquisition, and reading and mathematics achievement. As a whole, the research established a strong connection between socioeconomic status and student achievement. Additional factors, including social and emotional functioning, have also emerged in the research as contributing to academic success. Hair, Halle, Terry-Humen, Lavelle, and Calkins (2006) noted the manifestations of early school readiness in kindergarten that predicted outcomes at the end of first grade. The authors drew on the National Education Goals Panel as cited in Kagen et al. (1995) to define the construct of school readiness, and consequently studied social and emotional functioning and its capacity to predict subsequent school achievement. Results of the study indicated that children identified as at social/emotional risk when entering kindergarten were more likely to perform poorly on measures of reading and math at the end of first grade. In addition, children identified as at social/emotional risk demonstrated increased difficulty with self-regulation and decreased ability to work to their best potential. McClelland, Acock, and Morrison (2006) investigated the affect of learning-related skills, such as self-regulation, responsibility, independence, and cooperation on academic achievement throughout elementary school. Their results supported previous research examining the connection between

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psychosocial skills and academic achievement. Stated more specifically, children who scored below proficiency on measures of learning-related skills in kindergarten scored significantly lower on measures of reading and math through sixth grade. The results of this study not only contributed to existing discussions of factors that influence school achievement, but also provided evidence that social/emotional and behavioral skill deficits found in kindergarten persisted throughout elementary school.

Socioeconomic Status and Social/Emotional and Behavioral Functioning

Considering the importance of social, emotional, and behavioral functioning on successful student outcomes, the connection between economic hardship and children's social and emotional wellbeing requires further exploration. With students entering the formal education system, Ray and Smith (2010) identified greater social and emotional struggle in students from low-income families. Bolger, Patterson, Thompson, and Kupersmidt (1995) measured the impact of economic status on internalizing behaviors (i.e., shy, anxious), externalizing behaviors (i.e., acting out, aggressive), self-esteem, and peer acceptance in a school setting. Results of the study indicated that children from impoverished families exhibited higher levels of externalizing and internalizing behaviors, had fewer friends, and self-reported lower levels of self-esteem than other children. Early interventions that support at risk populations should take great care to foster psychosocial adjustment in order to enhance their academic achievement.

Socioeconomic Status and Preschool Enrollment

In light of the research that has supported the connection between socioeconomic status and early achievement skills, early intervention is imperative for low-income children. However, students from low-SES families are less likely to attend early

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educational programs, such as preschool or early childhood centers. Meyers, Rosenbaum, Ruhm, and Waldfogel (2003) noted that the likelihood that children age 3-5 attended early education programs was significantly greater for children from high-income families than for children from low-income families. Trucker-Drob (2011) conducted a longitudinal twin study to measure disparities in preschool enrollment between children from low-income families and children from high-income families. Results indicated that children from high-income families were more likely to attend preschool. The effect was two-fold: Students from low-income families were not only less likely to live in an intellectually enriched home; they were also less likely to attend a formal early childhood education program. Children from low-income families tended to have lower school readiness skills than their higher SES peers, resulting in significant educational obstacles upon entering into the compulsory education system.

Preschool Impact on Student Achievement

Early childhood experiences, such as attending a high quality preschool, assist children in building the pre-academic and behavioral readiness skills necessary for entry into kindergarten. Magnuson and Shager (2010) describe these skills as the ability to identify letters and numbers as well as behavioral skills such as being able to sit for a period of time and follow directions. Magnuson, Meyers, Ruhm, and Waldfogel (2004) utilized data from the Early Childhood Longitudinal Study--Kindergarten Class of 1998-1999 to analyze the impact of early education programs on subsequent academic success in kindergarten and first grade. Students who attended a formal care facility in the year prior to kindergarten scored better on measures of math and reading in kindergarten than those who received only parental care.

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Early literacy skills created a foundation for later reading development. Valenti and Tracey (2009) found evidence supporting the positive effects of a full-day pre-school on first grade literacy achievement. Early literacy skills were present less frequently in low-income populations. Prior research had revealed that children from lower income families were less likely to have access to materials that foster literacy development in the home. The investigators noted that full-day preschool programs provided students with an environment that was intentionally created to nurture growth of prereading skills.

Research has extensively reviewed the extent to which familial socioeconomic conditions influenced student achievement. Children from low-SES families were not only less likely to benefit from learning-enriched home environments, but also less likely to attend early-childhood education programs. As a result, these children often entered kindergarten with fewer academic readiness skills and more social-emotional concerns. The impact on their kindergarten experiences was significant, and teachers were often unable to fill the achievement gap present at the start of the school year. In consequence, students from low-SES families often experienced less school success and higher drop-out rates (Magnuson & Shager, 2010; Reardon, 2013).

Socioeconomic Status and Special Education Referrals

Conyers, Reynolds, and Ou (2003) reported that individuals from disadvantaged backgrounds were often overidentified as special education students due to the significant contrast in their achievement levels with peers from more affluent families. In an educational setting, legal mandates (IDEIA, 2004) required the identification and referral for special education evaluations of students who demonstrated persistent

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underachievement. Children from low-income families were consequently often overrepresented in special education programs.

Blair and Scott (2002) studied how markers often associated with low-socioeconomic status (e.g., low birth weight, low parent education, delayed medical care) influenced the rate that students were designated as Learning Disabled. The authors examined archival birth and school records for a group of 14- to 16-year-old students educated in the Florida public school system. Results indicated that 30 % of boys classified as Learning Disabled and 39% of girls classified as Learning Disabled also exhibited low-socioeconomic status markers. Sullivan and Bal (2013) found further support for socioeconomic status as a predictive variable for special education identification. The authors concluded that students who were eligible for free and reduced-cost lunch were significantly more likely to qualify for special education services than their peers. Moreover, educational programs that target at risk populations early may reduce overall special education referrals, especially when special education identification results from academic and behavioral skill deficiencies caused by low-SES markers rather than an actual disability.

Educating Special Education Students

The designation “at risk populations” refers not only to children with a higher probability of school failure due to economic and academic variables, but also to children with a higher probability of school failure due to diagnosed disabilities. When educating students with disabilities, school districts must consider such legal mandates as the Individuals with Disabilities Education Improvement Act (IDEIA, 2004), which requires that students with disabilities be educated in the environment least restrictive to them.

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DeVore & Russell (2007) maintained that the least restrictive environment is the setting in which students without disabilities would be educated. In order to meet this requirement, school districts must provide inclusive settings in which children with disabilities are afforded ample opportunity to interact with nondisabled peers. An effective kindergarten model should incorporate ample opportunity for disabled students for increased interactions and instructional experiences with non-disabled peers.

For students with disabilities, the transition into kindergarten can be increasingly challenging because of heightened academic, behavioral, and social/emotional risk factors. In a study of parent concerns surrounding the transition process, McIntyre, Eckert, Fiese, Reed and Wildenger (2010) found that parents of students with disabilities reported more significant transition concerns than parents of general education students. In particular, of a sample of parents of special education students, almost half reported some or many concerns in regard to following directions, self-advocacy, and academic and behavioral readiness skills. Heightened fears in parents of students with disabilities entering kindergarten may have resulted from their children's lower skill levels in comparison to nondisabled peers. To address skill deficits for students with disabilities, kindergarten programs should provide transition support for students and their families, in addition to evidence-based instructional practices. An extended school-day structure, such as a full-day kindergarten, would provide more opportunities for repetition of instruction and practice of skills.

Full-day Kindergarten Research

Magnuson and Waldfogel (2005) concluded that disadvantaged youth can succeed when appropriate supports are provided and barriers are eliminated or circumvented.

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The research stated that students who entered kindergarten without preacademic and behavioral readiness skills were at a disadvantage (Duncan et al., 2006; Duncan et al., 2007; Magnuson & Shager 2010). In addition, students who entered kindergarten with documented disabilities required targeted academic and behavioral interventions in order to meet their needs. Effective programs to support students with academic and behavioral risk factors should utilize empirically supported practices. One such practice is a full-day kindergarten.

The movement toward full-day kindergarten developed from the need to meet a number of social, economic, and educational demands (Walston & West, 2004). The belief that a full-day kindergarten has possible educational benefit due to the longer duration of the school day is of particular importance (Wolgemuth, Cobb, Winokur, Leech, & Ellerby, 2006). It may be especially valuable to students from low-income families who may enter kindergarten with fewer academic skills, and thus may require more time to acquire appropriate grade-level reading and mathematics skills (Walston & West, 2004).

Although the research on the positive effects of a full-day kindergarten is extensive, it is also inconsistent. The inconsistency is particularly problematic, given the number of variables often associated with full-day kindergarten research (e.g., long-term versus immediate academic impact, differing achievement measures, and demographic disparities). Thus, the following review of the literature serves to navigate the variance among research studies, as well as to create a context and rationale for the present study.

Short-term achievement impact for low-SES students. De Costa (2005) sought to measure the academic effectiveness of a full-day kindergarten for students from

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low-income families during the kindergarten school year. His sample comprised two cohorts of students over two years. The full-day kindergarten students predominantly lived in low-income communities; the sample of half-day kindergarten students spanned a range of economic strata. In the first cohort, 13 schools participated (194 students) and in the second, 12 schools participated (220 students). The study drew comparisons between students who attended a full-day program and those who attended a half-day program.

De Costa's study assessed students by using Clay's Observation Survey, an individually administered assessment of emergent reading ability. Skill areas included book-reading level, letter identification, readiness to read words, hearing, writing, and recording sounds, and concepts about print. The test was administered after the first month of school (pretest) and again at the end of the kindergarten school year (posttest). Analysis of the data yielded a number of conclusions. Students from the half-day kindergarten, who were predominantly from higher SES families, entered kindergarten with greater readiness skills than their low-SES counterparts. This finding is supported extensively in the literature (Davis-Kean, 2005; Magnuson & Shager, 2010; Miller, P., Votruba-Drzal, E., & Setodji, C. M., 2013; Stull, 2013). Posttest analysis revealed a reverse in trend, in which the full-day kindergarten students (mostly from low-income families) outperformed their half-day counterparts. Results, however, were only significant for two subtests. Nevertheless, the investigator did not discount the small difference in posttest scores; full-day students had started well behind their more affluent counterparts at the beginning of the school year (De Costa, 2005). The author concluded that with the assistance of the full-day program, the low-SES students were able to catch

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up and then keep pace academically with their half-day counterparts. De Costa (2005) explained, “All advantage in terms of reading and writing outcomes expected at the kindergarten level attributed to higher SES appear to have been eliminated by providing low SES children with full-day kindergarten opportunities” (p.33).

Zvoch, Reynolds, and Parker (2008) measured the impact of a full-day kindergarten program on short-term literacy gains for Title I-eligible (a measure of socioeconomic need) students. The treatment group included six elementary schools with full-day kindergarten programs that also qualified for Title I funds. The control group consisted of six elementary schools with half-day programs that fell just short of the Title I threshold. The investigators assessed student literacy with the Dynamic Indicators of Basic Literacy Skills (DIBELS), administered three times during the school year. Results of the study confirmed two previous findings. The authors reported that initial literacy skills at the onset of kindergarten were lower for the economically disadvantaged students attending the full-day kindergarten, but those same students demonstrated a faster rate of literacy acquisition than their half-day counterparts.

Long-term achievement impact for low-socioeconomic status students.

Another way to measure the effectiveness of a full-day kindergarten program was to examine state standardized test scores across demographic variables. Schroeder (2007) utilized this method to measure the effect of a full-day kindergarten program on standardized test performance in third grade by low-income populations. Predictor variables included participation in full-day or half-day kindergarten, as well as eligibility for Title I funds. The participants included 1,411 students from a large, mid-western, urban school district. The investigator collected data over the course of three years,

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comprising three separate cohorts of student data. The Indiana Statewide Testing for Educational Progress served as the achievement measure in the domains of language arts literacy and math.

According to Schroeder (2007), results indicated a significant effect for full-day kindergarten on long-term achievement scores in both language arts and math for low-income populations. Stated more specifically, students from low-income families who participated in the full-day program scored 15-25 points higher on state standardized testing than their counterparts in the half-day program. Schroeder also measured the effect of poverty on achievement in relation the growth resulting from the full-day kindergarten intervention. He conducted the analysis by comparing the degree of difference in academic achievement between economic groups (in which poverty negatively affected scores) to the extent of the gains by the low-income students in the full-day program (in which the full-day kindergarten positively affected scores). The growth achieved by low-income students as a result of the full-day kindergarten mitigated the negative affect of poverty. The author of the study concluded that the full-day kindergarten was an effective intervention for offsetting the impact of poverty on academic achievement.

Although Schroeder's findings (2007) were unique, there were a number of limitations in the study's methodology. Considering the time elapsed between the intervention (full-day kindergarten) and the administration of the measurement tool (third grade state standardized tests), a number of extraneous variables may have also influenced achievement gains. In addition, as an achievement measure, state standardized tests include a significant amount of variability, because such tests are

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administered in a large group setting. Schroeder (2007) specifically stated that, “testing administered by teachers for entire classes instead of using trained testing specialists may show a lack of quality and uniformity in test results” (p.433).

In line with Schroeder’s research, De Costa (2005) also investigated the long-term effect of a full-day kindergarten on student achievement, using grade level assessments in first, second, and third grade. He assessed long-term impact as part of the study previously mentioned, and his sample was the same two cohorts of students. The study drew comparisons between students who attended a full-day program and those who did not. To investigate long-term academic impact, De Costa employed district-made standardized measures for reading and writing. Assessment results provided information about relative grade-level standing (i.e., above grade level, at grade level, or below grade level).

For the first grade reading and writing prompt, no significant difference in the proportion of students at or above grade level emerged between full-day and half-day kindergarten participants. Similar results appeared for the second grade reading and writing prompt. Furthermore, in second grade, low-SES students who attended the full-day program constituted significantly smaller proportions of children at or above grade level. This result indicated a long-term decrease in skill for low-income students (De Costa, 2005). These findings contrasted with Schroeder’s research; De Costa found no significant long-term advantage of full-day kindergarten for economically disadvantaged youth.

Although Saam and Nowak (2005) found qualitative support for the effectiveness of a full-day kindergarten program for students from low-income families

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(teacher feedback), intriguingly, quantitative achievement data did not yield the same conclusion. According to teachers' reports gathered via semi-structured interviews, the full-day program allowed for more individualized instruction for students with academic needs and more time for specialized programming.

To conduct quantitative analysis, Saam and Nowak used third grade state achievement-test scores in math and language arts. The researchers analyzed the scores of students who were previously enrolled in either the full-day or half-day kindergarten. Third grade students previously enrolled in the full-day program scored significantly lower on the language arts section than students previously enrolled in the half-day program. However, math achievement scores yielded no significant difference. When the researchers controlled results to include only students from low-SES families, no significant difference in test scores appeared between those who attended full-day or half-day programs. The authors noted that the results of the study found that no significant difference in test scores existed between the full-day kindergarten students and the half-day students. The lack of a pretest administered at the start of kindergarten was a significant limitation of the present study; thus, no conclusions were reached about levels of academic growth resulting from either type of kindergarten program. This emphasized the importance of a pretest, posttest model to establish growth as a consequence of such an intervention.

The Saam and Nowak (2005) study found inconsistent long-term effects of full-day kindergarten in low-income populations. The study bore the limitation of the absence of preassessment data needed to determine long-term growth differentials resulting from a full-day kindergarten. Studies that explore growth models may better

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account for the impact of a full-day kindergarten, since low-SES students tend to start full-day programs behind their more affluent peers.

Integrating baseline data. A number of studies have attempted to include the influence of initial ability levels on subsequent full-day kindergarten effect size. Studies have also attempted to include numerous sources of data (e.g., norm-referenced assessments, curriculum-based measures, and qualitative feedback from school staff.) For example, Wolgemuth, Cobb, Winokur, Leech, and Ellerby (2006) studied the immediate and long-term impact of a full-day program on academic achievement. Taking into consideration initial ability levels, the authors hypothesized that ability levels at school entry would covary with achievement levels at the end of kindergarten, as well as with long-term achievement growth. The study also sought to measure the long-term impact of a full-day program by collecting data through fourth grade.

The sample in Wolgemuth et al. (2006) included 489 students from an elementary school in the Midwest. Students were enrolled in either a half-day or full-day program. It is noteworthy that the majority of the students in this sample received no financial assistance for lunch, indicating that they were not economically disadvantaged. Students' initial assessment took place at the start of kindergarten through individually administered curriculum-based reading measures. Target skills included recognition of letters and ability to produce letter sounds. Initial math skills were assessed in a similar manner. Target math skills included ability to recognize numbers and to count to ten. Researchers also utilized a reading fluency measure. District-administered, standardized norm-reference assessments in grades two through four provided long-term data.

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The findings of Welgemuth et al. (2006) yielded a number of conclusions. Statistical analysis confirmed initial ability as a covariate of subsequent achievement. In fact, the relationship between initial ability and subsequent achievement proved statistically significant, and corroborated the previous assertion that assessment of the effectiveness of full-day kindergarten should consider preassessment data. It also corroborated the need for early intervention: Initial ability greatly influences later achievement. The results of the study demonstrated the immediate impact of the full-day kindergarten; students performed significantly better on measures of curriculum-based reading at the end of the kindergarten year compared to their half-day counterparts. De Costa (2005) and Zvoch, Reynolds, and Parker (2008) drew similar conclusions about the short-term effectiveness of a full-day kindergarten on academic achievement. The findings of Welgemuth et al. (2006) extended the literature to include students from non-disadvantaged backgrounds. However, the evidence was not as consistent in regard to long-term academic impact.

Results indicated that by the end of first grade, the advantage of a full-day kindergarten was minimally evident in measures of curriculum-based reading (statistically significant, but small effect size). In norm-referenced assessments in second, third, and fourth grade, whether the kindergarten was full- or half-day had no significant affect on scores of math or reading achievement. The authors concluded that though the initial impact of a full-day kindergarten was significant, the learning growth faded as students' progressed from grade to grade (Welgemuth et al., 2006).

Utilizing growth trajectory models. Previous studies have examined the long-term effect of a full-day kindergarten program by measuring achievement levels at a

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particular point in time (e.g., the end of kindergarten or first grade). Votruba-Drzal, Li-Grining, and Maldonado-Carreno (2008) measured immediate and long-term consequences of full-day programs by analyzing growth trajectories rather than absolute achievement scores. The authors employed archival data from the Early Childhood Longitudinal Study--Kindergarten Class of 1998-1999. The sample numbered 13,776 children. Measurement of academic achievement derived from individualized cognitive assessments designed by the Early Childhood Longitudinal Study. Many of the instruments were adaptations of measures with high reliability and validity. The investigators collected assessment data in the fall of the kindergarten year, at the end of the kindergarten year, and then in each successive grade through fifth. No significant differences in achievement scores appeared between the full-day and half-day students in the fall of the kindergarten year. However, from the fall to the spring, students in the full-day program demonstrated steeper learning curves than their half-day counterparts. Although differences in academic growth were manifested during the kindergarten year, the author observed that by the end of third grade, the advantage of the full-day program had faded out. By the end of the fifth grade school year, the positioning flipped, and the half-day kindergarten students were now achieving higher growth trajectories. The authors hypothesized that home environments may have caused the early performance edge to fade; many of the full-day kindergarten students came from low-SES families. The advantage that higher SES students had in the home environment enabled them to outpace the full-day students, once the assistance of an extended school day was removed.

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Meta-analysis of full-day kindergarten research. Although the research on the effectiveness of a full-day kindergarten is extensive, researchers have also cited a number of pitfalls in the current findings. Criticisms include an inability to isolate variables associated with full-day kindergarten studies (i.e., affects in low-income populations, affects on literacy and math, curriculum changes associated with full-day, increase in length of school day), difficulty determining long-term impact beyond the kindergarten year, and use of randomization and control groups (Brewster & Railback, 2002; Cooper, Allen, Patall, & Dent, 2010). However, in order to compile the existing data and narrow the focus of the research, Cooper et al. (2010) utilized a meta-analysis design to explore the overall effectiveness of a full-day program for academic and behavioral growth, specific effect size among disadvantaged children, and influence on long-term achievement.

Cooper et al. (2010) sampled 40 studies, six of which incorporated measures of both achievement and self-confidence and four that included achievement and improvement in student independence. Cumulatively, a significant effect size emerged in measures of achievement. However, effects on achievement faded out by third grade. Results indicated insignificant effect size for full-day kindergarten in measures of self-confidence and ability to work and play with others. Unfortunately, the researchers were unable to apply the meta-analytical techniques to distinguish the effects of full- versus half-day kindergarten in separate income brackets. The researchers noted, however, that the full-day kindergarten's impact on achievement was greater in urban than in nonurban communities. Despite the study's intention to identify the influence of the full-day

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kindergarten, investigators found insufficient evidence of the affect of full-day kindergarten on learning-related abilities associated with academic achievement.

Time as a variable. Studies that investigate the effectiveness of a full-day kindergarten program often have difficulty isolating the specific variables that correlate with increased academic achievement. For instance, studies have examined how the length of the school day affects the delivery of instruction and the proportion of the school day spent on certain activities. Wolgemuth et al. (2006) utilized teacher feedback to link the variable of time (more available in a full-day program) to student growth. The authors interviewed four kindergarten teachers who had previously taught both full-day and half-day programs. The interviews were open-ended and lasted approximately one hour in length. All four teachers reported that they expected their full-day kindergarten students, on the whole, to perform better than their half-day counterparts at the end of the kindergarten school year. When asked what variable they attributed to the difference in achievement, the teachers identified the increased time available for reviewing and drilling material. However, all the teachers expressed doubt that the differences in achievement would last beyond the kindergarten year. Although the teachers were able to provide anecdotal support for the connection between increased time and achievement, statistical analysis was not utilized to substantiate the connection.

Elicker and Mathur (1997), however, did quantify the differences in activities and the amount of time allocated for each activity in both full- and half-day kindergarten by means of a randomized observational procedure. In addition to measuring the children's daily experiences, the authors also incorporated parent and teacher perspectives and achievement measures. The investigators used the random assignment procedure to place

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students into the full- and half-day programs. The study was conducted in one school in a middle-class, Midwestern community. Four full-day and eight half-day classrooms were analyzed as part of the study. In this sample, approximately 13% of students were from low-income families. Measures included the Childhood Classroom Observation System, teacher interviews, parent interviews, and kindergarten academic report cards.

In regard to school-day activities, the study's results indicated that the full-day program resulted in more child-initiated learning, teacher-directed individual learning, higher levels of student engagement, and higher levels of positive affect, which applied in both absolute and relative terms. Teacher feedback revealed that students in the full-day program were better able to initiate and demonstrate flexibility in classroom activities, and were able to explore their environment at a deeper level. Teachers also reported that their individual interactions with students increased as result of the lengthened school day. Parents offered similar praise, observing that the full-day program enabled a more relaxed pace and environment, the opportunity for learning in greater depth, and increased teacher attention to each student.

In terms of academic outcomes, analysis of the report card grades indicated slightly greater progress at the end of the kindergarten year for the full-day kindergarten students. The study provided a wealth of information about how the content of a full-day program may differ from a half-day program; however, the achievement measures in the study were based on subjective judgments of academic skill. The subjective nature of the achievement measures limited their potential for generalization. Although the study found that full-day kindergarten programs increased the amount of time spent in effective

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instruction, the nature of the measures vitiated the connection to academic achievement (Elicker & Mathur, 1997).

Current study rationale. Closing the achievement gap between children who enter school lacking preacademic skills and those who are better prepared is an essential undertaking (Allen, Patall, & Dent, 2010). In order to support students with limited preacademic skills, which the research suggests are more likely to be from low-income families, the purpose of the present study is to demonstrate the effectiveness of a full-day kindergarten as an intervention to foster academic and behavioral/social gains in those students. Moreover, in students who already receive special education services, a full-day kindergarten will provide the additional instruction time necessary to make both academic and social progress.

Chapter 3: Methodology and Proposed Analysis

Participants

Participants in this study were 16 public school kindergarten students who were selected for a pilot full-day kindergarten program. The school district that piloted this program was located in the northeastern region of the United States and had a total student population (prekindergarten to twelfth-grade) of approximately 8,500. The average age of the 16 participants in the full-day kindergarten program was 5.5 years ($SD = .7$); 37% of the students were females; 50% were eligible for Special Education and Related Services and thus had an Individualized Education Program (IEP). No students qualified for English as a Second Language services.

Two distinct selection criteria were used for placement in the program, one for students with an IEP, the other for the incoming general-education kindergarten students. Eight special education students were members of the full-day kindergarten program. The district's preschool Child Study Teams compiled the list of preschool students based on certain criteria (students who would qualify for general education kindergarten, students who required related services, students with no significant behavioral difficulties, and students who demonstrated functional communication skills). The categories of special education students included Other Health Impaired (six students), Autistic (one student), and Communication Impaired (one student).

Selection for the general education participants entailed eligibility for Free and Reduced Lunch (the standard metric for low-income status in the public schools) and/or low performance on a prekindergarten readiness assessment. For all incoming kindergarten registrants, parents were asked to complete a form indicating their annual

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income. This information was sent to the school district's central office to determine eligibility for Free and Reduced Lunch services. In addition, all incoming registrants were individually assessed using the Kindergarten Readiness Test (a standardized measure for determining a student's readiness for kindergarten). Scores were organized from lowest to highest for all students (regardless of eligibility for Free and Reduced Lunch). A second list presented scores from lowest to highest for Free and Reduced Lunch eligible students only. All students who scored in the deficient range or in the low-average range and were eligible for Free and Reduced Lunch were selected for the full-day program, a total of five participants. Three participants who did not qualify for Free and Reduced Lunch but scored in the deficient range were selected for the full-day program.

Program Description

The pilot full-day kindergarten program developed through a multi-disciplinary collaboration, including the special and general education departments. Its purpose was to assist students at risk for academic failure early in their school experience. The program followed a full-day schedule, in contrast to the half-day schedule of all other kindergarten classes.

Instructional minutes and curriculum. The additional time in the school day permitted extended literacy instruction beyond that afforded in the half-day program, the incorporation of hands-on and center-focused mathematics instruction, as well as the incorporation of a science and social studies curriculum in literacy instruction through centers-based group projects. The full-day program followed the New Jersey Core Curriculum Content Standards for kindergarten, which was consistent with the half-day

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program's instructional guidelines. In both the half- and full-day kindergarten programs, the district utilized the Readers and Writers Workshop model developed by the Teachers College at Columbia University to guide literacy instruction. In both the full and half-day kindergartens, literacy instruction occupied a total of 90 minutes per day. However, the extended length of the school day in the full-day kindergarten provided an extraordinary level of flexibility in the schedule to allow extended morning circles (which builds language skills), phonics and word work expansion, and opportunities for reading aloud during snack time. These added instructional opportunities in literacy were not consistently available in the half-day program due to time restrictions.

The district did not utilize a formal math curriculum for kindergarten; rather the teacher assembled materials based on the New Jersey Core Curriculum Content Standards for kindergarten. Math instruction consumed 60 minutes daily, employing whole-group and centers-based instructional approaches. Math instruction was performed in a similar manner in the half-day program. Science and social studies instruction utilized the Readers and Writers Workshop model, employing nonfictional reading materials. The extended school day enabled the kindergarten teacher to offer project-based learning opportunities for science and social studies that were not afforded to students in the half-day program.

Related services. A number of specialists provided services in the classroom to support student development. The extended school day presented an opportunity to pilot a daily yoga program entitled Get Ready to Learn. The school occupational therapist facilitated this program, completing it in the first 20 minutes of each day. Program goals for daily yoga included increased attention and self-regulation throughout the school day.

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According to Koenig, Buckley-Reen, and Garg (2012), the Get Ready to Learn yoga program produced an overall reduction in maladaptive behaviors in students with Autism Spectrum Disorder. The occupational therapist also provided a weekly 30-minute handwriting instruction. The speech therapist devoted 30 minutes weekly class-wide to foster language development and pragmatic skills. The guidance counselor offered a monthly 30-minute lesson in character development and solving interpersonal conflict. The school psychologist and learning consultant provided weekly consultations for academic interventions and behavior management. The district behaviorist presented a weekly class-wide behavior program development, as well as the development and monitoring of individual behavior plans for students in need. In contrast, related service providers did not support the half-day program in the same manner.

Teacher qualifications and support staff. The classroom teacher was dually certified in early elementary education and special education. Two full-day paraprofessionals posted to the classroom responded to students' learning and behavioral needs. The classroom paraprofessionals joined the students during lunch, recess, and specialists to mediate peer conflict, to develop language skills, and to generalize behavioral skills taught in the classroom to the entire school environment. In contrast, paraprofessionals did not support the half-day program, and the teacher lacked dual certification in early elementary education and special education.

Staff collaboration. To ensure optimal communication among professionals, they attended a monthly meeting to discuss student progress and ongoing academic and/or behavioral difficulties. At this meeting, all of the professionals contributing to the full-day class, including the school principal, evaluated classroom procedures and student

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growth. Prior to the meeting, participants received an email reminding them of the upcoming meeting and presenting its agenda. After the meeting, all participants received an email detailing the proceedings, including the Director of Student Support Services, to ensure that she was apprised of the classroom's functioning. In contrast, no monthly staff meeting supported the half-day kindergarten.

Procedures and Measures

Early academic skills were tested to measure growth in literacy and math as a result of the full-day kindergarten program. The selection of appropriate measures began with a consensus on the specific skills and abilities that are the foundation of early learning (i.e., academic readiness skills). Researchers have operationalized this theoretical concept to include early reading skills, early math concepts, and language skills, both oral and written (Duncan et al., 2007; National Education Goals Panel, 1995). Empirical research guided specific test selection, which found that the Woodcock Johnson test of Achievement, Third Edition, was a reliable and valid measure of academic achievement in young children (Schrank & Flanagan, 2003). Moreover, Burns (2008) provided support for the technical proficiency of the Wechsler Individualized Achievement Test, Third Edition, noting that the measure was an "excellent choice" for assessing academic skills in school-age populations.

The WJ-III and WIAT-III were administered individually during the first three weeks of the school year (as a baseline measure) and again in the last month of the school year (as a postmeasure of growth). The purpose of the baseline and postmeasure assessments was to determine the effectiveness of the full-day kindergarten on academic achievement. Standard scores were calculated using grade-based norms. The classroom

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teacher responded to the Teacher Behavioral Survey to in the last month of the school year. She rated each student's behavior as she remembered it from the beginning of the school year, as well as rating it in the final month of the school year.

Phonological awareness. The Early Reading subtest of the Wechsler Individual Achievement Test--Third Edition (WIAT-III; Wechsler, 2008) measured phonological awareness. This task required the child to name letters of the alphabet, identify and generate rhyming words, identify words with the same beginning and ending sounds, blend sounds, match sounds with letter blends, and match written words with pictures. Grade-based reliability for kindergarten students was .89 (Wechsler, 2008). Melby-Lervag, Lyster, & Hulme (2012) defined phonological awareness as the ability to process and manipulate the sound structure of words. The authors conducted a meta-analysis to determine the role of phonological awareness in the development of word reading and discovered a significant association between phonological skills and learning to read. Furthermore, Duncan et al. (2007) identified early reading skills as among the many early readiness skills students should possess when entering school..

Recognition of print. The Letter-Word Identification subtest of the Woodcock-Johnson Test of Achievement--Third Edition (WJ-III; Woodcock, McGrew & Mather, 2001) measured early print concepts. Early print concepts refer to basic letter and word knowledge. This task required the child to identify letters and then pronounce words correctly. Letter-Word Identification has a median reliability of .91 in ages 5 to 19. (Woodcock, McGrew & Mather, 2001). Melby-Lervag, Lyster, and Hulme (2012) noted that letter knowledge was highly correlated with future decoding skills, and necessary for the development of adequate reading skills.

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Writing. The Spelling subtest of the Woodcock-Johnson Test of Achievement-Third Edition (WJ-III; Woodcock, McGrew & Mather, 2001) measured early writing skills. This task required the child to write orally presented individual letters and words correctly. Initial items measure prewriting skills, such as drawing lines and tracing letters. The next items require the child to produce upper and lowercase letters. The remaining items ask the students to spell words correctly. This test has a median reliability of .89 in ages 5 to 19 (Woodcock, McGrew & Mather, 2001). Early writing skills, as defined by Diamond, Gerde, & Powell (2008), included the ability to write the letters of the alphabet, writing one's name, and simple word writing. Their study revealed a significant positive association between the development of children's writing and their overall understanding of letters and letter sounds. Furthermore, Parker, Burns, & McMaster (2012) noted that children who developed a strong writing foundation had a greater likelihood of positive future educational outcomes.

Numerical concepts. The Applied Problems subtest of the Woodcock-Johnson Test of Achievement--Third Edition (WJ-III; Woodcock, McGrew & Mather, 2001) measured early number sense. This task required the child to analyze and solve math problems. This test has a median reliability of .92 in ages 5 to 19. (Woodcock, McGrew & Mather, 2001). Another measure of early number sense was the Math Problem Solving subtest of the Wechsler Individual Achievement Test- Third Edition (WIAT-III; Wechsler, 2008). This task requires the child to solve basic math problems. Grade-based reliability for kindergarten students was .93 (Wechsler, 2008). According to Marcelino, Sousa, Cruz, and Lopes (2012) early numerical sense includes the ability to count small quantities, identify number patterns, compare number size, count, estimate, and perform

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basic number transformations. The authors studied whether early number sense predicted subsequent mathematical achievement and found a significant positive relationship.

Social and behavioral skills. A Teacher Behavior Survey assessed the effectiveness of the full-day kindergarten on behavioral and social growth. Cooper and Farran (1991) conceptualized social and behavioral skills as learning-related behaviors and classified them as two distinct constructs, interpersonal skills and work-related skills. As interpersonal skills, the authors identified cooperative work, cooperative play, and sharing; work-related skills included listening to and following directions, staying on task, and managing work material. According to Duncan et al. (2007), test assessments offered an objective measure of how a student performs academically; however, teacher ratings of behavior that describe typical, everyday functioning in the classroom setting are equally important. Consequently, a collaborative process involving the classroom teacher and school psychologist, as well as student support staff members created a Teacher Behavior Survey to monitor behavioral growth throughout the school year. According to Cooper & Farran (1991), the process of developing a behavior rating scale starts with reviewing relevant research on important behaviors, and proceeds to gathering feedback from relevant professionals. Therefore, the current survey development process entailed interviews with the kindergarten teacher and service providers to identify problematic kindergarten behaviors. A review of these behaviors followed, narrowing down the list of those identified in the context of current literature. In line with Cooper and Farran's research, the Teacher Rating Scale listed 11 behaviors: follows rules, focuses attention, follows one-step directions, follows multiple-step directions, conflict resolution, self-advocacy, independent problem solving, ability to transition, works

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collaboratively, plays with others, and independent seatwork (See Figure 1). The measure used a three-point rating scale: didn't have skill (1), approached skill (2), and demonstrated skill most of the time (3). The kindergarten teacher rated the student on each behavior based on her perception of skill acquisition. Although the survey asked the teacher to document skill levels in both September and June, the survey was completed only once, in June. As a result, the teacher was asked to reflect on student skills at the beginning of the year. This was a limitation of the study, for her perceptions may be less accurate in the September ratings. The Teacher Rating Scale appears in Figure 1 below:

Behavioral Scores

1. Didn't have skill
2. Approached skill
3. Demonstrated skill most of the time

1 2 3

Follows classroom rules (e.g., quiet mouth,
quiet body, follows directions)

Focuses attention for 10-15 minutes
(maintains attention despite extraneous
distractions)

Follows one-step directions

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Follows multiple-step directions

Demonstrates conflict resolution skills with peers (works through conflicts with peers independently without adult assistance)

Demonstrates self-advocacy skills (e.g., asking for help when in need of supplies, unsure how to proceed, or task is too difficult)

Demonstrates independent problem-solving (able to create solutions for a problem without adult assistance)

Transitions from activity to activity with ease (e.g., morning unpacking, work to snack and snack to work, work to lunch and lunch to work)

Works in a group collaboratively (able to confer with peers and complete an academic task collaboratively)

Plays with a group of peers (without adult support)

Independent seatwork (completes seatwork without assistance when presented at student level)

Figure 1. Sample of Teacher Rating Scale

Chapter 4: Results

Presentation of Results

Researchers have identified the skills necessary at the beginning of kindergarten for future educational success. In terms of academic knowledge, students who arrive in kindergarten with early reading skills, early math concepts, and early language development are considered to possess the foundation necessary for future learning, but students who lack these skills when entering school are likely to have poorer educational outcomes (Duncan et al., 2007; Justice, Bowles, Peirce Turnbull, & Skibbe (2009); Magnuson & Shager (2010). Thus, the primary focus of the present study was assessing the effectiveness of a full-day kindergarten classroom in building the specific academic skills identified as the foundation of future learning. A secondary focus of the present study was assessing the program's effectiveness in building the necessary social and behavioral skills considered as the basis of successful school functioning. The study also endeavored to assess whether academic and behavioral growth varied based on students' educational status (i.e., general education or special education).

Achievement measures. Dependent-samples *t*-tests compared changes from the beginning to the end of the school year. Because the present study conducted five comparisons, the Bonferonni Correction for Multiple Tests changed the significance probability from $p < .05$ to $p < .01$. The Bonferonni Correction reduced the chance of a false positive result, since that chance increases when multiple statistical analyses are conducted.

Phonological Processing. To measure gains in phonological processing, a skill considered necessary for early reading development (Melby-Lervag, Lyster, & Hulme,

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2012), kindergarten students were administered the Early Reading subtest of the Wechsler Individual Achievement Test--Third Edition at the beginning and end of the school year. Dependent-samples *t*-tests compared the phonological processing gains made from the beginning to the end of the school year. The results showed (Table 1) that phonological processing significantly increased between the assessments at the beginning ($M = 76.75, SD = 11.56$) and end of the school year ($M = 93.62, SD = 12.67$), $t(15) = -4.24, p < .001, d = 1.06$.

Print Recognition. To measure gains in print recognition, an underlying skill involving decoding and word reading (Melby-Lervag, Lyster, & Hulme, 2012), kindergarten students were administered the Letter-Word Identification subtest of the Woodcock-Johnson Test of Achievement--Third Edition at the beginning and end of the school year. Dependent-samples *t*-tests compared the print concepts gains made between the beginning and the end of the school year. The results showed (Table 1) that knowledge of print concepts significantly increased between the assessments at the beginning ($M = 100.12, SD = 11.40$) and end of the school year ($M = 107.87, SD = 10.53$), $t(15) = -4.08, p < .001, d = 1.02$.

Early Writing Skills. To measure gains in early writing skills, a skill considered necessary for the development of overall literacy skills (Parker, Burns, & McMaster, 2012), kindergarten students were administered the Spelling subtest of the Woodcock-Johnson Test of Achievement--Third Edition at the beginning and the end of the school year. Dependent-samples *t*-tests compared writing gains made between the beginning and the end of the school year. The results showed (Table 1) that early writing skills

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significantly increased between the assessments at the beginning ($M = 98.31, SD = 12.67$) and end of the school year ($M = 109.62, SD = 10.06$), $t(15) = -4.65, p < .000, d = 1.20$.

Early Math Concepts. To measure gains in early math concepts, which are considered as the foundation of future mathematical achievement (Marcelino, Sousa, Cruz, & Lopes, 2012), kindergarten students were administered the Applied Problems subtest of the Woodcock-Johnson Test of Achievement--Third Edition, and the Math Problem Solving subtest of the Wechsler Individual Achievement Test--Third Edition at the beginning and end of the school year. Dependent-samples t -tests compared math gains made from the beginning to the end of the school year. The results show (Table 1) early math skill did not a significantly increase on either measure between assessments at the beginning and end of the school year. On the Applied Problems subtest, scores at the beginning of the school year ($M = 102.75, SD = 11.84$) not only failed to increase significantly, but scores declined when assessed at the end of the school year ($M = 99.75, SD = 10.61$), $t(15) = 1.16, p = .263, d = .29$. Results from the Problem Solving subtest indicated an increase in scores between assessments the beginning ($M = 91.43, SD = 11.50$) and end of the school year; however, the increase was not statistically significant ($M = 97.37, SD = 10.79$), $t(15) = -1.75, p = .100, d = .43$. Table 1 depicts the results of all academic assessments.

Table 1.

Pretest and posttest means, standard deviations, and t-tests at beginning and end of school year

Academic Skill	Pretest	Posttest	t	df
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Phonological Processing	76.75 (11.56)	93.62 (12.67)	-4.24**	15
Print Concepts	100.12 (11.40)	107.87 (10.53)	-4.08**	15
Writing	98.31 (12.67)	109.62 (10.06)	-4.65**	15
Number Sense - Applied Problems	102.75 (11.84)	99.75 (10.61)	1.16	15
Number Sense - Problem Solving	91.43 (11.50)	97.37 (10.79)	-1.75	15

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

Social and Behavioral Measure. To determine growth in social and behavioral skills, the kindergarten classroom teacher completed the Teacher Behavior Survey at the end of the school year. The Survey asked the kindergarten teacher to reflect on behavioral capacity in the beginning of the school year (pretest) and rate each student on 11 criteria. She rated the students' behavioral functioning in June, which reflected end-of-year functioning (posttest). The measure employed a three-point rating scale across the following levels of capability: didn't have skill (1), approached skill (2), demonstrated skill most of the time (3). Dependent-samples *t*-tests compared changes from the beginning to the end of the school year. Because the survey required 11 evaluations, the Bonferonni Correction for Multiple Test changed the significance

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probability from $p < .05$ to $p < .0045$. During data analysis, each behavior was examined both individually and collectively. Individual behavioral growth was examined for planning purposes to assess if certain behaviors required additional intervention. Behaviors were examined collectively to assess the overall effectiveness of a full-day kindergarten on social and behavioral growth.

Results indicated significant behavioral growth across all items from the beginning of the year to the end of the year (Table 2). On average, students displayed significant growth on teacher ratings of their ability to follow the classroom rules between the beginning of the school year ($M = 1.87$, $SD = .88$) and the end of the school year ($M = 2.43$, $SD = .81$), $t(15) = -3.57$, $p < .0045$, $d = .90$; on ratings of focused attention between the beginning of the school year ($M = 1.5$, $SD = .73$) and the end of the school year ($M = 2.18$, $SD = .83$), $t(15) = -3.46$, $p < .0045$, $d = .86$; on ratings of their ability to follow one-step directions between the beginning of the school year ($M = 1.81$, $SD = .65$) and the end of the school year ($M = 2.68$, $SD = .47$), $t(15) = -5.65$, $p < .001$, $d = 1.46$; on ratings of following multiple-step directions between the beginning of the school year ($M = 1.43$, $SD = .62$) and the end of the school year ($M = 2.18$, $SD = .75$), $t(15) = -3.87$, $p < .0045$, $d = .98$; on ratings of conflict resolution between the beginning of the school year ($M = 1.5$, $SD = .63$) and the end of the school year ($M = 2.73$, $SD = .71$), $t(15) = 5.65$, $p < .001$, $d = 1.42$; on ratings of self-advocacy between the beginning of the school year ($M = 1.43$, $SD = .62$) and the end of the school year ($M = 2.5$, $SD = .73$), $t(15) = -4.97$, $p < .001$, $d = 1.26$; on ratings of independent problem solving between the beginning of the school year ($M = 1.25$, $SD = .57$) and the end of the school year ($M = 2.12$, $SD = .80$), $t(15) = -3.95$, $p < .001$, $d = 1.01$; on ratings of their ability to transition

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from one activity to the next between the beginning of the school year ($M = 1.56, SD = .62$) and the end of the school year ($M = 2.37, SD = .80$), $t(15) = -4.96, p < .000, d = 1.28$; on ratings of their ability to work collaboratively with peers between the beginning of the school year ($M = 1.43, SD = .62$) and the end of the school year ($M = 2.5, SD = .15$), $t(15) = -7.40, p < .001, d = 3.05$; on ratings of play skills between the beginning of the school year ($M = 1.81, SD = .75$) and the end of the school year ($M = 2.87, SD = .34$), $t(15) = -5.50, p < .001, d = 1.50$; and on ratings of their ability to complete independent seatwork between the beginning of the school year ($M = 1.43, SD = .62$) and the end of the school year ($M = 2.43, SD = .72$), $t(15) = -6.32, p < .001, d = 1.61$. In sum, significant growth emerged across all social and behavioral skills between the beginning and the end of the school year, as described in Table 2.

Table 2.

Pretest and posttest means, standard deviations, and t-tests for behavioral performance scores

Behavioral Skill	Pretest	Posttest	<i>t</i>	<i>df</i>
Follows Rules	1.87 (.88)	2.43 (.81)	-3.57*	15
Focused Attention	1.5 (.73)	2.18 (.83)	-3.46*	15
Follows One-step Directions	1.81 (.65)	2.68 (.47)	-5.65***	15

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Follows Multi-step	1.43	2.18	-3.87*	15
Directions	(.62)	(.75)		
Conflict Resolution	1.5	2.37	-5.65***	15
	(.63)	(.71)		
Self-advocacy	1.43	2.5	-4.97***	15
	(.62)	(.73)		
Independent Problem Solving	1.25	2.12	-3.95***	15
	(.57)	(.80)		
Transitions	1.56	2.37	-4.96***	15
	(.62)	(.80)		
Works Collaboratively	1.43	2.5	-7.40***	15
	(.62)	(.15)		
Play	1.81	2.87	-5.50***	15
	(.75)	(.34)		
Independent Seatwork	1.43	2.43	-6.32***	15
	(.62)	(.72)		

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

General Education Versus Special Education

The aim of the full-day kindergarten was to provide an academic and behavioral intervention for general education students who were academically deficient, as well as for special education students who presented with academic and behavioral deficits. To analyze whether educational status (i.e., general education or special education) was a

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significant variable in educational and behavioral functioning at both the beginning and the end of the school year, an analysis of variance was performed.

Academic Skills at the Beginning of the Year. The initial analysis focused on skills present at the start of the school year. In regard to academic levels (i.e., phonological processing, print recognition, early writing, and math concepts), there were no differences between general education and special education students at the beginning of the school year, $F(5,10) = 2.587$, $p = .094$, where significance probability was $p < .05$, as Table 3 describes.

Table 3.

Academic Skills, means and standard deviations at the beginning of the year

Academic Skill	Gen Ed.	Special Ed.	<i>F</i>	<i>df</i>
Phonological Processing	74.75 (12.55)	78.75 (10.95)	.461	1
Print Concepts	95.37 (5.57)	104.87 (14.00)	3.17	1
Writing	100.12 (11.08)	96.50 (14.61)	.312	1
Number Sense - Applied Problems	107.75 (11.88)	97.75 (10.11)	3.28	1
Number Sense - Problem Solving	91.62 (12.92)	91.25 (10.79)	.004	1

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

Social and Behavior Functioning at the Beginning of the Year. In regard to social and behavioral functioning, the comprehensive multivariate analysis indicated that there were no differences between the general and special educational students, $F(4.11) = 2.477$, $p = .198$, where significance probability was $p < .05$.

However, examining the individual comparisons revealed some significant differences between the two groups, as displayed Table 4. Any interpretation of these differences needs to be done with caution, however, because differences found in the comprehensive test were not significant.

More to the point, educational status was significantly related to the students' ability to sustain focused attention at the start of the school year, with general education students ($M = 2.00$, $SD = .75$) better able to attend than students with special needs ($M = 1.00$, $SD = .00$), $F(1, 14) = 14.00$, $p = .002$; to the students' ability to solve conflicts with peers, with general education students ($M = 1.87$, $SD = .74$) better able than students with special needs ($M = 1.12$, $SD = .35$), $F(1, 14) = 8.40$, $p = .012$; to the students' ability to self-advocate, with general education students demonstrating a higher level of skill ($M = 1.75$, $SD = .70$) than students with special needs ($M = 1.12$, $SD = .35$), $F(1, 14) = 5.00$, $p = .042$; to students' ability to transition successfully from one activity to the next, with general education students ($M = 2.00$; $SD = .53$) outperforming students with special needs ($M = 1.12$; $SD = .35$), $F(1, 14) = 14.91$, $p = .002$; to students' ability to demonstrate appropriate play skills, with general education students ($M = 2.37$, $SD = .51$) outperforming students with special needs ($M = 1.25$, $SD = .46$), $F(1, 14) = 21.00$, $p =$

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.000; and to student' ability to complete seatwork independently, with general education students ($M = 1.87, SD = .64$) outperforming students with special needs ($M = 1.00, SD = .00$), $F(1, 14) = 14.91, p = .002$. Table 4 displays the differences found between the individual performances of general and special education students.

Table 4

Social and Behavior Functioning--means and standard deviations at the beginning of the school year

Behavioral Skill	Gen Ed.	Special Ed.	<i>F</i>	<i>df</i>
Follows Rules	2.25 (.88)	1.50 (.75)	3.31	1
Focused Attention	2.00 (.75)	1.00 (.00)	14.00*	1
Follows One-step Directions	2.12 (.64)	1.5 (.53)	4.48	1
Follows Multi-step Directions	1.62 (.74)	1.25 (.46)	1.46	1
Conflict Resolution	1.87 (.64)	1.12 (.35)	8.40*	1
Self-advocacy	1.75 (.70)	1.12 (.35)	5.00*	1

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Independent Problem Solving	1.37 (.74)	1.12 (.35)	.737	1
Transitions	2.00 (.53)	1.12 (.35)	14.91*	1
Works Collaboratively	1.75 (.70)	1.12 (.35)	5.00*	1
Play	2.37 (.51)	1.25 (.46)	21.00****	1
Independent Seatwork	1.87 (.64)	1.00 (.00)	14.91*	1

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

Academic Skills at the End of the Year. Academic functioning was again examined at the end of the school year (and the completion of the full-day kindergarten) to determine whether there were any differences between general education and special education students (Table 5). The overall multivariate analysis indicated evinced no differences between general education and special educational students, $F(5,10) = 1.615$, $p = .243$, where significance probability was $p < .05$.

However, examining the individual comparisons revealed one difference between the two groups. Any interpretation of these differences, however, needs to be done with caution, because the comprehensive test results were not statistically significant. On the Math Problem Solving subtest from the WIAT-III, general education students performed significantly better ($M = 103.62$, $SD = 9.41$) than students with special needs ($M = 91.12$,

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$SD = 8.47$), $F(1, 14) = 7.79$, $p = .014$. No other academic variable was significantly related to educational status. The end-of-year academic testing results appear in Table 5.

Table 5.

Academic Skills--means and standard deviations at the end of the school year

Academic Skill	Gen Ed.	Special Ed.	<i>F</i>	<i>df</i>
Phonological Processing	97.25 (7.92)	90.00 (15.85)	1.33	1
Print Concepts	106.87 (7.23)	108.87 (13.53)	.136	1
Writing	107.62 (4.27)	111.62 (13.77)	.615	1
Number Sense - Applied Problems	99.50 (11.46)	100.00 (10.48)	.008	1
Number Sense - Problem Solving	103.62 (9.41)	91.12 (8.47)	7.79*	1

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

Social and Behavior Functioning at the End of the Year. In regard to social and behavioral functioning at the end of a year of full-day kindergarten, a slight yet significant overall difference emerged between the two groups, $F(4,11) = 97.909$, $p < .001$, where significance probability was $p < .05$. Examining the individual comparisons

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disclosed that educational status was significantly related to the student's ability to sustain focused attention at the end of the school year; general education students ($M = 2.62, SD = .51$) demonstrated a higher skill level than students with special needs ($M = 1.75, SD = .88$), $F(1, 14) = 5.81, p = .03$. In students' ability to follow one-step directions, general education students ($M = 3.00, SD = .00$) a demonstrated higher skill level than students with special needs ($M = 2.37, SD = .51$), $F(1, 14) = 11.66, p = .004$. In students' ability to follow multi-step directions, general education students ($M = 2.62, SD = .51$) demonstrated a higher skill level than students with special needs ($M = 1.75, SD = .70$), $F(1, 14) = 7.97, p = .014$. In students' ability to transition successfully from one task to another, general education students ($M = 3.00, SD = .00$) demonstrated a higher skill level than students with special needs ($M = 1.75, SD = .70$), $F(1, 14) = 25.00, p = .000$. In students ability to work collaboratively with their peers, general education students ($M = 2.87, SD = .35$) demonstrated a higher skill level than students with special needs ($M = 2.12, SD = .64$), $F(1, 14) = 8.4, p = .01$. In students' ability to complete seatwork independently, general education students ($M = 2.87, SD = .35$) demonstrated a higher skill level than students with special needs ($M = 2.00, SD = .75$), $F(1, 14) = 8.79, p = .010$. A display of these results appears in Table 6.

Table 6

Social and Behavioral Functioning--means and standard deviations at the end of the year

Behavioral Skill	Gen Ed.	Special Ed.	<i>F</i>	<i>df</i>
Follows Rules	2.62 (.74)	2.25 (.88)	.840	1

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Focused Attention	2.62	1.75	5.81*	1
	(.51)	(.88)		
Follows 1-step Directions	3.00	2.37	11.66*	1
	(.00)	(.51)		
Follows Multi-step Directions	2.62	1.75	7.97*	1
	(.51)	(.70)		
Conflict Resolution	2.62	2.12	2.07	1
	(.74)	(.64)		
Self-advocacy	2.50	2.50	.000	1
	(.75)	(.75)		
Independent Problem Solving	2.50	1.75	4.20	1
	(.75)	(.70)		
Transitions	3.00	1.75	25.00***	1
	(.00)	(.70)		
Works Collaboratively	2.87	2.12	8.40*	1
	(.35)	(.64)		
Play	3.00	2.75	2.33	1
	(.00)	(.46)		
Independent Seatwork	2.87	2.00	8.79*	1
	(.35)	(.75)		

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

Chapter 5: Discussion

In an effort to support students who present with poor school readiness skills, the purpose of the present study was to demonstrate the effectiveness of a full-day kindergarten as an intervention to foster academic and behavioral gains. The study's sample included students from low SES families, as well as students with deficient academic skills. Moreover, because special education students are also viewed as an at risk population, the study intended to determine if academic and behavioral skills varied depending on students' educational status (i.e., general education or special education).

Achievement measures. Research on the short-term effectiveness of a full-day kindergarten on academic achievement has been consistently favorable (De Costa, 2005; Zvoch, Reynolds, & Parker, 2008). The present study confirms previous studies in terms of literacy achievement but not mathematics. In regard to literacy achievement, the present study measured phonological processing, print recognition, and early writing skills at the beginning and the end of the kindergarten school year. Its intent was to demonstrate that a full-day kindergarten was an effective intervention to cultivate the necessary academic foundation for successful future learning at risk for populations. The literature has established early reading and language abilities as fundamental school readiness skills (Duncan et al., 2007).

Dependent-samples *t*-tests were conducted for each academic skill. Results indicated significant growth between the beginning and the end of the school year for phonological processing, print recognition, and early writing skills. These findings implied that the full-day kindergarten served as an effective intervention for building literacy skills in at risk populations. Of particular interest, mean phonological processing

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scores from September ($M = 76.75$) and June ($M = 93.62$) increased 16.87 points, evidence that students achieved a considerable level of growth in this domain. This finding is exceptionally exciting in light of research conducted by Noble, Farah, & McCandliss (2006), noting that higher levels of phonological awareness had helped mediate the impact of low-SES on reading development. Essentially, a strong foundation in phonological processing functioned as a protective factor, which makes growth in this area extremely important for future learning.

Possible causes for this level of growth in literacy skills include the supportive nature of the kindergarten program (i.e., two full-time paraprofessionals, push-in supports with the speech and language therapist, push-in supports with the reading specialist, academic consultation with the school psychologist and the learning consultant), as well as the extra time afforded by the full-day program for increased instruction time. The full-day kindergarten devoted 90 minutes to literacy instruction, but students were also provided additional time for phonics and word study, additional opportunities to read aloud during snack, and in morning circle, the frequent introduction of literary topics and the further development of language skills. In contrast, the half-day program offered 90 minutes of literacy instruction, with little time for extended curriculum opportunities. The significant level of flexibility afforded to the full-day kindergarten teacher for literacy instruction likely fostered literacy growth.

In contrast to the marked literacy growth, the present study found no significant growth in mathematics. It is worthy of note that on the Applied Problems subtest of the Woodcock-Johnson Test of Achievement--Third Edition, students performed lower in June ($M = 99.75$) than they did in September ($M = 102.75$). An additional subtest from

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the Wechsler Individual Achievement Test--Third Edition was administered in which students' demonstrated growth, but the change was not statistically significant. In contrast, recent research on the effects of full-day kindergarten has noted comprehensive achievement growth in both literacy and mathematics (Lee, Burkam, Ready, Honigman, & Meisels, 2002; Walston & West, 2004). In the present study, however, the mathematics data did not conform to current research trends.

The absence of statistically significant growth in mathematics may have resulted from variables pertaining to the specificity of the measure utilized, instructional quality, time spent on instruction, and student characteristics. Limitations of the measure itself may have affected how students performed. For example, the two measures employed (WIAT-III and the WJ-III) may not have adequately measured the math content taught to the students in the kindergarten year. Both measures primarily assess application of mathematical concepts, which may have been more difficult than basic mathematical computation, which is the primary skill taught in kindergarten. Secondly, students' baseline scores were average in September for the Applied Problems subtest ($M = 102.75$), which left less room for growth for reassessment in June ($M = 99.75$). In contrast, Math Problem Solving scores in September were in the lower end of the average range ($M = 91.43$), which left additional room for growth in June ($M = 97.37$); however, despite the lower baseline score, the increase was still not statistically significant.

On reflection, math progress may have been evaluated more accurately using curriculum-based measurement (CBM). Marston (1989) observed that traditional tests have been criticized as content-invalid and insensitive to change. Marston (1989) further noted that a number of research studies have attained technical adequacy and practical

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utility by continually monitoring progress using CBM; it allowed the evaluator to monitor progress in the students' natural environment over the course of the year, using measures that fully reflect the skills being taught. VanderHeyden, Witt, Naquin, & Noell (2001) found specific technical adequacy of CBM for monitoring kindergarten students' reading, math, and writing readiness skills, and so measuring students' academic growth throughout the year. Indeed, evaluating students' academic progress via CBM may not only have better assessed the skills being taught, but also may have been more sensitive to skill growth over the course of the school year. Moreover, using students' raw scores, which are more sensitive to change, may have been beneficial in demonstrating student skill growth, particularly in areas in which the baseline data was already within the average range.

The quality of instruction in mathematics also may have affected student growth. According to Jung (2014), teachers' instructional practices influenced students' mathematical learning outcomes. Furthermore, unlike literacy instruction, which was guided by Readers and Writers Workshop, a well-known curriculum model, the district did not utilize a structured math curriculum when the present study was conducted. Kindergarten teachers were responsible for compiling materials to support instruction that aligned with the New Jersey Common Core Standards. This lack of a structured and uniformed approach to teaching math may have impacted student growth. The amount of time spent on instruction greatly affects student growth (Wolgemuth et al., 2006). In the half- and full-day kindergarten programs, teachers spent less time on math instruction (60 minutes) than they spent on literacy instruction (90 minutes). Moreover, mathematics is typically taught in isolation, with little opportunity for cross-subject integration. A final

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consideration is that student characteristics also may have influenced math achievement growth. Jung (2014) observed that children enter kindergarten with varying levels of mathematical skills and aptitudes, which in turn affect future learning.

Social and Behavioral Measure. Children in the full-day kindergarten demonstrated significant social and behavioral growth between the beginning and the end of the school year. Results were significant across all items on the Teacher Behavior Survey. The interpretation of the results, however, needed to consider a number of limitations in the measure employed. First, the Teacher Behavior Survey was conceptualized and developed by school-based employees for the sole purpose of measuring pertinent kindergarten behaviors. As a result, no data on reliability and validity are available for this measure. Second, the classroom teacher was asked to rate behaviors retrospectively, which may have limited the accuracy of her ratings. Nevertheless, the results from the present study indicate significant social and behavioral growth overall for students educated in a full-day kindergarten.

These findings contribute to the existing research on the impact of a full-day kindergarten on social and behavioral growth, whose quantity is currently limited and results inconsistent (Cooper et al., 2010). Consistent with the present study's findings, Cryan, Sheehan, Wiechel, & Brandy-Hedden (1992) found support for full-day kindergarten's beneficial influence on children's independent learning, originality, and productivity with peers. In contrast, Cooper et al. (2010) found no clear positive affect on nonacademic measures in their meta-analysis of the effectiveness of a full-day kindergarten. From a more specific perspective, measures of a child's independence

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were inconclusive, and a small positive association emerged in measures of a child's self-confidence and ability to work and play among other students.

A number of factors may have contributed to the positive behavioral results. Baseline behavior ratings revealed a general lack of social and behavioral skills, leaving considerable room for growth on posttest assessments. Behavior management was a primary focus of the classroom teacher and support staff. Given the demographic make-up of the classroom, in which 50% of the population was students with special needs, it was imperative that the classroom teacher utilized both class-wide behavioral incentive programs, as well as individually based programs. In order to assist the teacher in developing behavioral support programs, the district behaviorist and school psychologist consulted regularly. Moreover, the guidance counselor and school psychologist provided group instruction, teaching the children positive social and behavioral skills.

According to Finn and Pannozzo (2004), class size is a mediating factor in students' academic and behavioral growth. It is therefore likely that the small class size, as well as the increased staff-to-student ratio, spurred the growth of prosocial and behavioral skills. Although its inclusion was not empirically assessed in the present study, the yoga program (Get Ready to Learn), which was implemented daily and supervised by the occupational therapist, may have also contributed to the growth in self-regulation behaviors. Research conducted by Koenig, Buckley-Reen, & Garg (2012) revealed that Get Ready to Learn was an effective means of reducing overall maladaptive behaviors. Despite the lack of an empirical assessment, the inclusion of the yoga program may well have contributed to the comprehensive increase in positive behaviors between the beginning and the end of the school year.

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A number of factors likely contributed to the significant social growth observed in the present study. More to the point, the full-day program afforded the students the opportunity to engage in structured social interactions during lunch and recess with the support of two paraprofessionals, who were available to model appropriate language, facilitate play opportunities, and assist with problem-solving peer conflict. The speech and language therapist also led a weekly morning group to foster language development, with a focus on teaching the pragmatic skills required to work cooperatively with peers. Moreover, the increased length of the school day afforded students more opportunities to engage in social interactions and receive feedback from adults. As a result, students' play skills, self-advocacy, and conflict resolution sufficiently developed throughout the school year.

The present study provides evidence that full-day kindergarten is an effective intervention for fostering literacy growth, as well as social and behavioral functioning, in at risk populations. This finding is consistent with the current body of literature for low-income populations (De Costa, 2005; Schroeder, 2007; Zvoch, Reynolds, & Parker, 2008). However, populations at risk also include students with low academic and behavioral skills stemming from diagnosed disabilities. To address the needs of such students, the present study also explored whether academic and behavioral functioning would vary in relation to educational status (i.e., special education eligibility). Results indicated no significant differences in all domains of academic performance at the start of the school year between students with or without diagnosed disabilities. At the conclusion of the school year, no significant differences in overall academic functioning were found. It is noteworthy that the subtest-level analysis indicated significantly

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different results in the Math Problem Solving subtest from the WIAT-III between general and special education students at the end of the school year. General education students ($M = 103.62$) scored higher than the special education students ($M = 91.12$). The overall analysis was not significant; therefore, this result should be viewed with caution. As a whole, these results indicate that both subgroups equally benefited academically from participation in the full-day program, which is consistent with research conducted by Gottfried and Vi-Nhuan (2016), who found a similar relationship between full-day kindergarten and academic achievement for both general and special education students.

The present study also intended to assess whether social and emotional functioning would vary with educational status. Overall, multivariate analysis indicated no differences in social and emotional functioning at the start of the school year for students with and without disabilities. Although individual-level analysis indicated that general education students demonstrated greater levels of focused attention, conflict resolution skills, self-advocacy, ability to transition from one activity to the next, collaborative work, play skills, and performance of independent seatwork, these findings should be viewed with caution; the comprehensive analysis was not significant. In contrast, end-of-year multivariate analysis of social and behavioral functioning was, on the whole, significantly different for each subgroup. General education students demonstrated greater levels of social and behavioral functioning than special education students in ratings of focused attention, following one-step direction, following multi-step directions, accomplishing transitions, working collaboratively, and completing independent seatwork. These findings indicate differences in behavioral functioning for the study's subgroups. This finding was not completely surprising to the investigator; the

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specific diagnoses for the students in the classroom included ADHD, Autism Spectrum Disorder and Communication Impaired, disorders that affect behavioral functioning.

Limitations

Although these findings were significant and add to the existing body of research on the impact of full-day kindergarten, there are a number of limitations that must be weighed when interpreting these results. The data in the study were correlational; without a control group for comparison, no causal inferences can be made from the findings. The growth that was observed may have been a product of the full-day intervention, or it may have arisen from extraneous variables. In regard to the assessment of social and behavioral functioning, the teacher was required to evaluate student behavior retrospectively at the end of the school year. It is possible that the accuracy of her recollections of student behavior at the start of the school year was compromised by the months that had elapsed. Furthermore, the teacher may have unintentionally rated student behavior in September lower than in June to demonstrate student growth. The present study did not specifically consider the types of literacy and math instruction, nor the teacher/school characteristics, which could have affected the delivery of the intervention. The final limitation is that the sample size ($N = 16$) was relatively small, which limits the power of the data and our ability to generalize to other populations. Nevertheless, the data presented does support the benefit of a full-day kindergarten program for academic, behavioral, and social growth.

Implications

For many children, kindergarten is the first formal educational experience. Children who enter kindergarten with adequate readiness skills are confident in their

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learning capabilities (Duncan et al., 2007) and tend to have a more successful long-term school experiences (Wildenger & McIntyre, 2012). In contrast, students who enter kindergarten with deficient academic and behavioral abilities are at an immediate and long-term disadvantage (Duncan et al., 2007; Justice, Bowles, Peirce Turnbull, & Skibbe, 2009; Magnuson & Shager, 2010). Considering the significant importance placed on the kindergarten year, as well as the abundance of research adducing significant academic and behavioral growth to a full-day kindergarten (Wolgemuth et al., 2006; De Costa, 2005; Zvoch, Reynolds, & Parker, 2008; Schroeder, 2007; Saam & Nowak, 2005; Votruba-Drzal, Li-Grining, & Maldonado-Carreno, 2008; Cooper et al., 2010), districts should implement full-day kindergarten programs.

The extended school day affords teachers the opportunities to provide more individual instruction at a pace that meets the students' needs (Saam & Nowak, 2005). The present study found students experienced significant literacy growth, which was likely the result of the extended class time, which enabled the teacher to flexibly implement literacy instruction and intervention throughout the school day. The increased time and flexibility also likely alleviated the stress that covering the wide range of curriculum topics required by the Common Core State Standards in New Jersey caused the teacher

Those who oppose implementing full-day programs may cite fears that students are not developmentally ready for a full-day program and may consequently develop negative attitudes about school. However, Cooper et al. (2010) did not find evidence to support this assumption. Policy makers and district administrators also cite additional cost and limited space as significant barriers to implementing full-day programs. The

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district in which the present research was performed attempted, according to anecdotal evidence, to implement a new full-day kindergarten across the district after the conclusion of the pilot program. When a tax increase to cover the budgetary requirements of a new full-day program was put to the town's voters, the referendum was, unfortunately, voted down. As a result, the district maintained the current full-day program supported by Title I funding, but also established a tuition-funded full-day kindergarten based on the pilot program. The tuition-based full-day program, however, does not benefit low-SES families, whose children are typically in need of full-day kindergarten interventions. If districts make creative use of Title I funding to support a full-day program, then the needs of those students can be met. A tuition option for families can also help defray some of the additional cost to the district.

In the present study, specific program components were beneficial in creating a successful program. One such component was the monthly staff meeting. In the year following the pilot full-day kindergarten program, the district, unfortunately, did not continue the monthly staff meetings with the full-day model. These staff meetings were regarded as extremely beneficial, giving the large number of professionals who supported the program the opportunity to monitor student growth as a team, as well as to collaborate and to reflect on whether procedures and practices were working and why. This practice permitted the team to make changes during the year as needed. Other districts that implement the full-day program model should consider establishing regular opportunities for staff members to collaborate and to reflect on successes and/or challenges of the program.

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Future Recommendations

The present study showed that a full-day kindergarten promotes literacy skills acquisition, as well as social and behavioral growth for at risk populations. However, the present study failed to demonstrate significant growth on measures of early number sense. Future research should evaluate the effectiveness of a full-day kindergarten in supporting math growth. The extent of math instruction is likely less than literacy instruction, which is reinforced throughout the day. Perhaps full-day programs should increase time spent on math concepts, or investigate strategies for integrating the reinforcement of math instruction throughout the school day.

The conclusions reached by research about the long-term impact of a full-day kindergarten on academic achievement have varied. According to Saam and Nowak (2005) and De Costa (2005), the academic benefit achieved from a full-day program fades with time. The authors of both studies hypothesized that a full-day program provided additional educational supports for students, which is particularly important for students from low-income families, who may lack a wide range of educational experiences and learning-related materials in the home. Without additional instructional programs after the completion of a full-day program to compensate for the existing achievement gap created by a lack of home support, then the benefit from the full-day program will inevitably fade with time. Future research should investigate means to effectively implement continuing supplemental enrichment programs to support students identified as at risk.

The present study demonstrated that at the end of the school year, the teacher ratings of general education students for social and behavioral functioning were

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significantly higher than ratings of the special education students. Future research should consider specific factors that mediate the differential impact of the full-day kindergarten on various groups of students. Discovering the specific social and behavioral interventions needed to bridge the gap between the general education and special education populations is vital. For example, students in the present study were not provided targeted social skill-supports utilizing a research-based curriculum, which was found to be beneficial during kindergarten (January, Casey, & Paulson, 2011).

Conclusion

The effectiveness of a full-day kindergarten on academic, social, and behavioral functioning has been an important area of study. The present study built upon previous research and investigated the affect of a full-day program on at risk populations. The present study's findings indicated that a full-day kindergarten is an effective intervention to foster literacy gains. Stating these results more specifically, students significantly increased performance on measures of phonological processing, print recognition, and early writing skills. Social and behavioral growth also significantly increased as a result of the full-day kindergarten intervention. In relation to early number sense, the present study failed to demonstrate significant growth as a result of the full-day kindergarten. Educational status was examined in relation to academic performance, and no significant difference emerged between special education and general education students at either the beginning or the end of the school year. In contrast, social and behavioral functioning significantly varied at the end of the school year for the different subgroups. The data revealed that students with diagnosed disabilities were rated more poorly on measures of

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social and behavioral functioning than their general education counterparts, despite receiving similar full-day kindergarten intervention.

The need to address academic underachievement and problematic learning-related behaviors in at risk populations is acute. The full-day kindergarten has proved its positive association with growth in both academic and learning-related behaviors. Therefore, educational policy must continue to advocate programs that extend the length of the school day for students in need. Furthermore, given the efficacy of a full-day program, policy makers should also focus on implementing programs that continue beyond kindergarten to consolidate academic, social, and behavioral gains.

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