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# AN ANALYSIS OF THE EFFECTS OF ALL-DAY PREKINDERGARTEN ON ACADEMIC ACHIEVEMENT AND SOCIO-BEHAVIORAL DEVELOPMENT

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AN ANALYSIS OF THE EFFECTS OF ALL-DAY PREKINDERGARTEN ON ACADEMIC ACHIEVEMENT AND SOCIO-BEHAVIORAL DEVELOPMENT

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# Dedication

This dissertation is dedicated to my students. I have had the opportunity to work with the most amazing, intelligent, and caring children throughout the state of Oklahoma as a teacher and as an administrator. I am so proud of the people you are and what the future holds for you. You are the reason I became an educator, even if I didn't know it at the time, and you are why I continue to do this work.

"The future belongs to those who believe in the beauty of their dreams."

~Eleanor Roosevelt

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## Abstract

Providing access to prekindergarten has been an important conversation in several states. Oklahoma has previously pioneered this effort, ensuring quality prekindergarten opportunities in nearly every district in the state. Over time, legislators and taxpayers have come to question the purpose and the effectiveness of prekindergarten, asking if this extra year of school is beneficial for the students who participate. This dissertation sought to identify long-term academic and socio-behavioral gains for students who attended a full academic year of an all-day prekindergarten program. Students who attended a full academic year of an all-day prekindergarten program were matched with like peers who attended no amount of prekindergarten through a propensity score matching design. Data was collected on measures of academic achievement and socio-behavioral development through the collection of reading and math fluency scores and discipline referrals over the students' elementary school years. A hierarchical linear model and a logistic regression were used to analyze the data collected to determine if enrollment in an all-day prekindergarten program made a statistically significant difference for the students who participated over their later elementary school years. Results indicated that students who participated in a full academic year of an all-day prekindergarten program had statistically similar scores of academic achievement but had statistically stronger scores of socio-behavioral development than their matched peers.



**Keywords:** educational leadership, early childhood education, education policy, universal prekindergarten, all-day prekindergarten

# Chapter 1

## Introduction

### Problem Statement

The state of Oklahoma has been on a trajectory to be a leader in the field of early childhood education within in the United States since the 1980s (Bornfreund, Cook, Lieberman, & Loewenberg, 2015; Gormley, 2008; Gormley & Phillips, 2005; Gormley, Phillips, Newmark, Welti, & Adelstein, 2011; Gormley & Gayer, 2005; Gormley, Gayer, Phillips, & Dawson, 2005). Yet in 2015, Oklahoma was ranked 48th within the nation on the state's report card due to decreases in funding for education and overall K-12 student achievement. In the same year, a national study ranked the state within the top five in providing early literacy opportunities in early childhood programs, and Oklahoma was considered a leader in overall early childhood opportunities (Bornfreund et al., 2015; Education Week, 2015). However, Oklahoma's legislators proposed bills to cut funding for prekindergarten by removing the grade from the state-aid funding formula and by removing the mandatory cap on prekindergarten classroom sizes in the 2016 state legislative session (Legislation Threatens States, 2016). Though the issue of defunding prekindergarten was tabled for the 2016 legislative session, it was done so with an understanding that it would be discussed in the future (Legislation Threatens States, 2016). Oklahoma has proven nationally that the state provides quality early childhood experiences, yet Oklahoma's prekindergarten has found itself at risk of being defunded. Rather than defunding prekindergarten, our K-12 system could develop improvement strategies rooted in effective prekindergarten programming.

While Oklahoma's prekindergarten program is considered by national standards to be succeeding, individuals and groups within the state support putting an end to this non-mandatory early childhood grade-level. This research study, in order to inform educational leaders, sought to establish the benefits of prekindergarten participation on academic achievement and socio-behavioral development of the students who had attended a state-funded prekindergarten program compared to students who had not attended prekindergarten programs throughout the students' later elementary school years.

**Context of Early Childhood Education in Oklahoma**

State-funded early childhood educational opportunities are conceptualized in two distinct and separate ways throughout the United States. In many states, prekindergarten is implemented as an intervention (Bornfreund et al., 2015**)**. Through this model, prekindergarten is offered based on household income, seeking to serve students of lower incomes as a priority. Prekindergarten as an intervention attempts to eliminate the educational gap that exists based on poverty (Bornfreund et al., 2015). In other states, a universal prekindergarten model is embraced. These states do not see prekindergarten as an intervention, but rather as a fully funded grade-level that is attended by all eligible students based on age at the time of enrollment (Bornfreund et al., 2015). The following sections will discuss the dichotomy of the two separate systems as well as how systems of universal prekindergarten operate to serve four-year-old students, specifically in the state of Oklahoma.

While the following discussion will be focused on prekindergarten, perceptions and misconceptions of the purposes of prekindergarten are similar to those originally

directed towards kindergarten when it was introduced as a normative feature of American public schools. Both Bornfreund et al. (2015) and the National Institute for Early Education Research (NIEER) (2016) concluded that kindergarten, once, faced much of the same criticism as present day prekindergarten, which it is still not considered a mandatory grade-level in every state. Kindergarten is thus perceived as an intervention model for preparing at-risk students for first grade rather than part of the larger school system. This has made it difficult for parents and stakeholders to understand the value and purposes of the earliest school grades. Empirical research suggests that both kindergarten and prekindergarten give students' quality early learning opportunities (Bornfreund et al., 2015; NIEER, 2016).

Early education in the state of Oklahoma is experiencing the same issue repeated with a new age and a new grade-level. Kindergarten once, like prekindergarten, began as a half-day program to promote school readiness (Bornfreund et al., 2015; NIEER, 2016). While many states have moved to an all-day model of kindergarten, several states still serve five-year-old students with a half-day model (Bornfreund et al., 2015, NIEER, 2016). Kindergarten itself has been under similar scrutiny and confusion about its purpose from legislators and early childhood stakeholders (Bornfreund et al., 2015). States such as Oklahoma have incorporated mandatory universal all-day kindergarten into the larger school system, yet much of the research on kindergarten mirrors prekindergarten by suggesting that kindergarten as a grade-level produces ambiguous results for the enrolled students. Making it important for stakeholders reviewing the research to remember that no two early childhood programs are created alike throughout the country.

**Two separate systems.** Prekindergarten as a system of intervention is used by many states. States using this system determine eligibility for prekindergarten based on risk-factors where poverty appears to be the most frequent one used. States with an income requirement for prekindergarten enrollment include: Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Nebraska, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Vermont, and Washington (NIEER, 2016). In these states, prekindergarten provides participating students with an early beginning to their educational careers. Students enrolled in a year of prekindergarten, whether it is a half- or all-day program, in these states are provided learning opportunities to support students considered to be at-risk of beginning kindergarten behind (NIEER, 2016). Since intervention-based prekindergarten participation is income-based, eligibility into these programs is established by application to the federal Free and Reduced Lunch Program (NIEER, 2016). States with an intervention-based prekindergarten program seek to close the achievement gap caused by income disparity, as states hope that this effort will improve students' academic outcomes in later school years (Bornfreund et al., 2015; NIEER, 2016).

Universal prekindergarten is used in few states. Oklahoma is one of these states. Other states considered to have true universal prekindergarten programs include Georgia and Florida; however, the District of Columbia, Massachusetts, New York, Vermont, and West Virginia are currently working towards universal status (Bornfreund et al., 2015; NIEER, 2016). Universal prekindergarten programs are an investment in early childhood by the states that work towards achieving access for all

students through state-funded prekindergarten programing. In universal prekindergarten programs, all families who desire to enroll their children in a prekindergarten program have the same opportunity and are able to attend prekindergarten. Programs are not mandatory and do not always serve all prekindergarten eligible students. Parents and guardians have the option to keep their children at home or to enroll them in another early childhood education program outside of the school district.

**Not an intervention.** In the state of Oklahoma, prekindergarten was not designed to be an intervention model, even from the beginning of the implementation process. Prekindergarten was intended to provide an early learning educational opportunity for all students. Districts had the autonomy to create their own prekindergarten models. Educational leaders were provided the authority to make choices on the type of program and implementation model that would best serve their students and their communities. Prekindergarten was then implemented as a half-day or an all-day program. Many districts started their programs as half-day prekindergarten, whereas 81% of Oklahoma's four-year-olds are now enrolled in an all-day prekindergarten program (Oklahoma State Department of Education, 2016; NIEER, 2016). Many districts include prekindergarten in the elementary school setting, while other districts have built early childhood centers or have developed partnerships with local childcare facilities to house their prekindergarten classrooms off the school district's campuses (NIEER, 2016). Collaborative partnership classrooms with Head Start have commonly been used in high poverty areas, helping districts to offset the costs of prekindergarten and providing families access to

comprehensive Head Start services. Prekindergarten implementation was and currently remains at the discretion of the school district. Long after the initial prekindergarten push throughout the state of Oklahoma, districts continue to redefine implementation of their prekindergarten programs. This ensures each district is serving the needs of their community and meeting their youngest students' needs.

According to the 2016 report from the Oklahoma State Department of Education (OSDE), school districts in Oklahoma began the prekindergarten implementation process with half-day programs (OSDE, 2016). As of the 2016-2017 school year, 99.4% of all Oklahoma school districts offer a prekindergarten program with a majority of classrooms offering an all-day program. It is important to note that many families appreciate the option of half-day programs, as prekindergarten is often viewed by families as a way to ease young children into school. However, school districts that offer all-day programing have identified the advantages prekindergarten has for students in terms of academic readiness and socio-behavioral development. Urban and suburban districts in the state of Oklahoma have ensured that high-need students have had first option of being in an all-day prekindergarten program as they transitioned from half- to all-day programming with high-need students – typically defined by income eligibility and disability classification (OSDE, 2016). Head Start or other affordable childcare options are not as easily accessible by parents and guardians in some Oklahoma districts, making all-day prekindergarten programs desirable for the community and the families the district serves. Therefore, prekindergarten has been an important program to make available for families with fewer childcare options.

Many stakeholders and policy makers in the state view prekindergarten as an intervention. Prekindergarten was not created as an intervention model for students in the state of Oklahoma, rather, it was created to serve all four-year-old students. Further, prekindergarten's purpose is not to create long-term gains for students, rather, prekindergarten in the state of Oklahoma was created to add an additional grade-level of preschool entry for Oklahoma's youngest students to prepare students for kindergarten. Many parents and community members mistakenly believe prekindergarten is intended to prepare at-risk students for long-term gains in school. This ideology surrounding prekindergarten leaves many parents and guardians confused about the purpose of prekindergarten participation.

The universal model of prekindergarten in Oklahoma provides a preschool opportunity to all students who participate, solely based on the age of the child (OSDE, 2016). Current legislation states that students must be four-years-old by September 1 to enroll their child in prekindergarten (OSDE, 2016). Participating students are exposed to developmentally appropriate and research-based curriculum, teachers with a minimum of a bachelor's degree and teacher's assistants, and clear and appropriate grade-level state standards. Oklahoma's model of prekindergarten provides early leaning opportunities for all students.

**Background of the Problem**

Oklahoma's prekindergarten model has shown substantial growth since it was first conceptualized. In 1995, House Bill 1657 provided state funding to school districts volunteering to implement a prekindergarten model and allowed the OSDE to establish academic standards for early childhood, making Oklahoma one of the few

states that has fully implemented academic standards of learning for four-year-old students to date (Hustedt, Jung, Barnett & Williams, 2015; OSDE, 2016). In 1998, state legislator Joe Eddins was able to make prekindergarten a fully funded grade-level by amending an education bill that would add prekindergarten to the state-aid funding formula (OSDE, 2016). Since then, Oklahoma's prekindergarten program has received support from several empirical studies including the Georgetown Research Study and the yearly NIEER Reports, which praises Oklahoma's commitment to early childhood and to preparing its students for later learning in subsequent school grades. Although not considered a goal of universal prekindergarten, the perception that prekindergarten improves academic achievement in later grades has strengthened Oklahoma policy makers' commitment to early childhood. In 2005, the Oklahoma legislature focused on improving prekindergarten programs by appropriating ten million additional dollars of state funds to match a twenty-million-dollar donation from The Early Childhood Pilot Program to serve children from birth to four years old identified as being at-risk. This allowed districts serving students and families of high poverty to have better access to prekindergarten opportunities with over 99% of all districts in Oklahoma offering a prekindergarten program today (OSDE, 2016).

While Oklahoma's legislative, regulatory, and budgetary support for early childhood education provided increased access and opportunity for greater numbers of students, policymakers' perceptions of prekindergarten's purpose and autonomy has shifted over time. It is clear that the definition and purpose of prekindergarten have been blurred by those who are making decisions about the future of prekindergarten. It is easy to understand how the confusion about prekindergarten began, as many

opportunities originally focused on students considered at-risk; however, the main goal of Oklahoma's state-funded prekindergarten program was to serve all students. Many families and legislators view prekindergarten in Oklahoma as an intervention model and not as a universal model as it is intended. Oklahoma policy makers often discuss prekindergarten as an ineffective intervention when including it in conversations about elementary and secondary academic achievement scores. Any conversation directed at prekindergarten's failure to close the achievement gap is superfluous and leads to blame towards prekindergarten classrooms and teachers. Conversation about the purposes of prekindergarten should focus on preparing a child for the next grade, as each grade builds on one another in academic and socio-behavioral expectations. Applying any type of "gap" language to prekindergarten in the state of Oklahoma is erroneous because it is not intended to serve as an intervention, rather it is intended to prepare students for kindergarten as part of the common K-12 education system.

Prekindergarten is considered a grade-level in the PK-12 system and is linked together in common education in the state of Oklahoma. Many of the features and practices commonly used in the K-12 system have found their way into how we have defined prekindergarten. The use of qualified teachers, academic standards, research-based curriculum, and all-day formatting are just some of the ways prekindergarten demonstrates its cohesiveness with the K-12 system (Bornfreund et al., 2015; OSDE, 2016). Public perception and the language used by policy makers encourages the ideology that prekindergarten is an intervention that should be reserved for students who are considered "at-risk" or in need of early interventions. During its inception,

prekindergarten was kept apart from the K-12 system of schooling. Prekindergarten was, and to some extent still is, a very protected grade-level (OSDE, 2016). However, as years have passed, prekindergarten has become a more integrated piece of the larger school system. The perception of practice is a key issue prekindergarten is facing.

Institutionalized knowledge tells us that practices come in to organizations and budget constraints can often cause them to leave as quickly as they arrived. As budgets are cut, programs and anything considered "extra" to the schooling core are at risk of being completely removed from the school day; including the optional year of prekindergarten. Examples of this practice in the state of Oklahoma include teacher mentorship programs, parent education programs, after school programs, among others (OSDE, 2016). With current turnover rates of school districts' employees and the Oklahoma legislature, core knowledge is often forgotten (Bolman & Deal, 2013). Due to this, prekindergarten programming is without a common understanding of purpose (Bolman & Deal, 2013). Because many in Oklahoma have come to think of prekindergarten as an intervention targeting students considered "at-risk" similar to Head Start programs, families who do not qualify as low-income believe that prekindergarten is not for their children.

Prekindergarten programs vary from state to state, and even within a single state, different versions exist. When reviewing the research on the benefits of prekindergarten, it is important to keep in mind that prekindergarten means different things and is applied in different ways throughout the country. Oklahoma state policy mandates prekindergarten teachers must hold a bachelor's degree, be highly qualified in the field of early childhood, and be teacher certified in early childhood education.

Oklahoma state policy mandates that every classroom must also staff a teacher's assistant who has earned an associate's degree in child development or passed an equivalency paraprofessional examination. Prekindergarten classrooms, until recent years, have been mandated to have a student-to-teacher ratio of ten students to one teacher; however, the moratorium on classroom sizes ended during the 2016 legislative session. Currently, the number of students has been increasing in prekindergarten classrooms to the levels school districts are able to afford (Legislation Threatens States, 2016; OSDE, 2016). Further, qualifications for teacher's entering the profession have also been lowered, allowing for individuals to enter the classroom with a bachelor's degree not necessarily in education and without teacher certification, expecting these individuals to complete teacher certification tests within their first two years as classroom teachers (OSDE, 2016).

Oklahoma is still unique in its high standards for teachers and teachers' assistants within the country, as well as a leader in its creation of academic standards for learning, and its consideration of prekindergarten as a fully state-funded grade-level (Bornfreund et al., 2015; Hustedt et al., 2015). School districts in Oklahoma have been devoted to reaching a universal prekindergarten model with half- and all-day classroom opportunities having access to developmentally appropriate learning standards and research-based curriculum (OSDE, 2016). Oklahoma school districts are purposeful at providing prekindergarten opportunities and yearly attempts to narrow the gap between students who attend prekindergarten and those who do not attend prekindergarten (OSDE, 2016).

Previous research on the effects of prekindergarten has focused primarily on the short-term results of prekindergarten participation. Scholars indicate there is a need for future research examining longer-term academic achievement and socio-behavioral development of students attending state-funded prekindergarten classrooms to identify if there is substantial difference between them and their similarly situated peers who did not attend prekindergarten. While there are many factors that might affect a students' growth during their later school years after prekindergarten, further research can help identify the transfer of skills over time as students move through the grade-levels (Fischer, Peterson, Bhatta, & Coulton, 2013; Hustedt et al., 2015). While some scholars have implied that prekindergarten leads to academic gains, others have argued that it does not make a significant difference, or any gains made by prekindergarten participation dissipate over time as students move through the elementary grades. These researchers assert that the gap between those who attended prekindergarten and those who did not becomes nonexistent over time (Cabell, Justice, Logan, & Konold, 2013; Fischer et al., 2013; Gomez-Velez, 2010).

Despite prekindergarten's explicitly stated purpose regarding preparation for kindergarten, with no promises for long-term gains or improved later academic achievement or socio-behavioral growth, the perceptions that have emerged about the prekindergarten system with expectations of long-term academic gains and socio-behavioral growth still persist (Legislation Threatens States, 2016). These beliefs about prekindergarten are inaccurate and should not be dictating the narrative about prekindergarten; however, this is the current context surrounding the prekindergarten debate (Legislation Threatens States, 2016). Current discussions based on perceptions,

though inaccurate, are still helpful for understanding how prekindergarten might supplement – not supplant – current strategies for strengthening students' skills and abilities. Currently, prekindergarten builds a strong foundation for students' academic achievement and socio-behavioral development. This dialogue is helpful for school leaders as decisions are being made about the future of prekindergarten enrollment across the state of Oklahoma.

It is important for educational leaders and policy makers to know about the short- and potential longer-term benefits of prekindergarten participation and the potential effects prekindergarten has on academic achievement and socio-behavioral development in order to make informed decisions about the future of prekindergarten. District leaders must be well-informed about the quality of prekindergarten being offered in Oklahoma and how the K-12 school system can build upon what the prekindergarten system is already doing, especially while looking at the national data demonstrating prekindergarten and K-12 schooling effectiveness in the state of Oklahoma. This begs the question; could our K-12 system learn something from how we educate our prekindergarten students? Clearly Oklahoma is doing something right, as most researchers would argue that the prekindergarten system is preparing students for the K-12 system even if that is *not* the goal of prekindergarten (Bornfreund et al., 2015; OSDE, 2016). Therefore, what can school leaders do to make sure they maximize student-learning opportunities building from the foundational blocks created by early childhood education?

**Study Purpose**

The purpose of this study was to examine the relationship that an all-day

prekindergarten program had on academic achievement and socio-behavioral development. The setting was a mid-size, urban school district in the Oklahoma City greater metropolitan area. A school district in Oklahoma was selected for this research because the effectiveness and utility of the state's historic legislative commitment to early childhood education, though prekindergarten programing has come under scrutiny within the state. The current legislative climate and budget shortfalls have threatened education funding impacting prekindergarten classrooms (Fischer et al., 2013; Hustedt et al., 2015; Legislation Threatens States, 2016). The participating Oklahoma City metropolitan school district was selected as the local school district setting for this research due to the districts' strong commitment to prekindergarten. The district currently provides universal access to all-day prekindergarten programming; employs developmentally-appropriate, research-based curriculum; and provides professional development and learning opportunities for all educators, including prekindergarten teachers, as well as strong vertical alignment across all grade-levels.

A quantitative research design was used for this study. This study determined the effects of an all-day prekindergarten program on students' academic achievement and socio-behavioral development over time through the application of a hierarchical linear model analysis and a logistic regression using a propensity score matching design. Through the completion of a hierarchical linear model and a logistic regression, this research study was able to determine if a relationship exists and if that correlation sustains over time for prekindergarten participants academic achievement and socio-behavioral development (Auger, Farkas, Burchinal, Duncan, & Vandell,

2014; Burger, 2010; Chew & Lang, 1990; Fischer et al., 2013; Fitzpatrick, 2008; Gormley, 2005; Mobbs, 2014; Nesbitt, Farran, & Fuhs, 2015; Neuman, 2003; Scott, 2012; van Kleeck & Schuele, 2010). Academic achievement and socio-behavioral development were chosen for this research study on prekindergarten due to the emphasis on these two areas in the prekindergarten classroom, in the curriculum and in the practice (Fischer et al., 2013; Hustedt et al., 2015).

For this study, the independent variable was prekindergarten participation defined as students who attended a full academic year of an all-day state-funded prekindergarten program and students who attended no amount of time in a prekindergarten classroom. This variable was selected because research suggests that prekindergarten prepares students for school and may be beneficial to students later academic achievement and socio-behavioral development (Fischer et al., 2013; Hustedt et al., 2015). In the participating school district, parents enrolled their children in prekindergarten on a first come, first served basis. Therefore, students were not randomly assigned to the treatment or the control group. The treatment group consisted of students who attended a full academic year of an all-day prekindergarten program. The control group was comprised of students who attended no state-funded prekindergarten programming at all. Students who attended the district's half-day prekindergarten model or did not complete a full academic year of an all-day prekindergarten program were not considered for participation in this study.

This study examined academic achievement and socio-behavioral development over time; therefore, data was collected from a sample of students in their kindergarten, first, second, third, fourth, and fifth grade years of schooling. The fifth

grade students, who attended an all-day prekindergarten program, for the 2010-2011 school year, actually attended an all-day prekindergarten program which was not the universal program that the district provides today. Rather, school sites were selected to host all-day prekindergarten classrooms based on the school's ability to accommodate classroom space. Families living in the participating school district could elect to enroll their four-year-old student in any school that provided an all-day prekindergarten classroom; therefore, enrollment was not necessarily based on a school's attendance boundary.

The dependent variables included academic achievement and socio-behavioral development. The dependent variable of academic achievement examined the relationship of prekindergarten attendance on math and reading fluency scores through the collection of the district's Response to Intervention (RtI) data using scores collected in second, third, fourth, and fifth grade at benchmarks set for the fall, winter, and spring of the school year. These assessments of grade-level fluency were chosen due to their near universal use in the district and their ability to test a variety of grade-level specific skills taught in the areas of reading and math.

Socio-behavioral development, a dependent variable, was examined to correlate the influence of prekindergarten on socio-behavioral development. Data about socio-behavioral development was collected through discipline referrals and recorded suspensions by a building-level administrator throughout the students' kindergarten through fifth grade years of schooling determining the likelihood a student was sent to the office and suspended. Discipline referrals were defined as an amount of time spent in the office. While being suspended included suspensions from

school or being placed in in-school suspension at school. Socio-behavioral development was chosen as a dependent variable due to social and behavioral skills being an important focus of the prekindergarten curriculum. Discipline referrals and in-school suspensions were chosen because they represent a behavior that is considered inappropriate for the classroom environment resulting in a student's removal from the classroom. While suspensions represent a behavior considered to be inappropriate for the school environment and results in the student being removed from the school setting. All of the elementary schools in the participating school district use a consistent form of discipline referrals to the office and record keeping for suspensions. A discipline referral is written at the discretion of the teacher in compliance with the school and school district's behavior plan. The disciplinary consequence student's receive is determined through the building-level administrator's discretion. Consequences can include suspension from school, in-school suspension, or other forms of appropriate consequences.

The controlling variables for students included demographic information of race, gender, socioeconomic status as reported by the free and reduced lunch program, special education status, age, and English language learner classification as reported in the student's fifth grade year of schooling. These controlling variables were chosen because this information is necessary for matching students with like peers in a propensity score matching design. Controlling variables allowed students in both groups, those who attended a full academic year of all-day prekindergarten and those who attended no prekindergarten, to be match paired together through propensity score matching. This provided a more accurate representation of the relationship

between prekindergarten participation and academic achievement and socio-behavioral development.

**Research Questions**

- Research Question 1: Does a full academic year of an all-day prekindergarten program correlate with academic outcomes on scores of reading and math fluency throughout elementary school years?

  $H_0$: A full academic year of all-day prekindergarten enrollment has no relationship on student performance in reading or math fluency scores throughout elementary school years.

  $H_1$: A full academic year of all-day prekindergarten enrollment has a positive relationship on student performance in reading and math fluency scores throughout elementary school years.

- Research Question 2: To what extent does a full academic year of all-day prekindergarten enrollment predict the likelihood of a student's office discipline referrals, suspensions, or in-school suspensions throughout elementary school years?

  $H_0$: A full academic year of all-day prekindergarten enrollment has no influence on the number of office discipline referrals, suspensions, or in-school suspensions throughout elementary school years.

  $H_1$: A full academic year of all-day prekindergarten enrollment has a positive influence on decreasing the number of office discipline referrals, suspensions, or in-school suspensions throughout elementary school years.

## Significance of Study

This study contributes to the literature about prekindergarten participation focused on longer-term relationships between all-day prekindergarten attendance and academic achievement and socio-behavioral development over time throughout the elementary school years. Though preparing prekindergarten students for later schooling is not the primary goal or outcome expectation of attending prekindergarten, this study seeks to identify if an extra year of schooling attributes to a difference between students attending an all-day prekindergarten program and those who do not attend prekindergarten. Prekindergarten gives enrolled students a full year of school participation before their formal education begins. This study identifies if the additional year of school participation sustains academic and social benefits for students attending prekindergarten or if the additional year's initial gains diminish as students continue to progress through the grade-levels. The state of Oklahoma is a prime location for this research due to the near universality of prekindergarten programs in districts across the state, the professional credentialing expectations for early childhood teachers and teacher's assistants, and the established academic standards for student learning in prekindergarten.

Further, the participating Oklahoma City metropolitan area school district has made a commitment to universal all-day prekindergarten, adopted a developmentally appropriate research-based curriculum, maintains strong vertical planning of all learning opportunities throughout the prekindergarten-twelfth grade schooling experience, and has had all-day prekindergarten programs in existence since the 2005-2006 school year. This makes the school district an ideal setting for research

examining the long-term relationship between prekindergarten participation and academic achievement and socio-behavioral development. This study is significant because it sought to determine if a longer-term correlation existed and was sustained over time between students attending an all-day prekindergarten program and both academic achievement and socio-behavioral development. This study provides policy makers and educational leaders empirical evidence to use when making important decisions about the future of prekindergarten education.

**Definitions**

**Universal Prekindergarten** in the context of this study refers to any prekindergarten program available to all four-year-old students. Students are guaranteed access to developmentally appropriate state standards, research-based curriculum, and highly qualified teachers who hold a bachelor's degree and a certification endorsement in early childhood education (Bornfreund et al., 2015).

**Prekindergarten Programs** refers to the way in which school districts set up their prekindergarten programs either all- or half-day schedule, research-based or home-grown curriculum, universal programs or limited space program, and first-come, first-serve or lottery enrollment.

**Full Academic Year** for the purposes of this study will include any student who enrolled and began attending within the first ten days of school. This was the definition used in the 2010-2011 school year, which was the year the sample of students attended prekindergarten, it has since been revised (OSDE, 2016).

**Discipline Referral** in the context of this study, refers to any time a student was referred to the office by a teacher for a behavioral concern.

**Developmentally Appropriate Practice** is an early childhood education perspective that encourages the fostering of adult-child relationships that nurture the child's social/emotional, physical, and cognitive development and it is established on research-based practices (NAEYC, 2009).

**School Readiness** refers to initiatives that would prepare students for learning before their first year of school (State of the Union, 1990). This includes but is not limited to prekindergarten programs.

**Whole Child Approach** is a school readiness initiative that refers to the effort to "transition from a focus on narrowly defined academic achievement to one that promotes the long-term development and success for all children" (ASCD, 2017, para. 1).

**Early Childhood** refers to a child's period of life between birth and age eight (NAEYC, 2009).

**Preschool** refers to any schooling that occurs prior to the kindergarten school year.

**Early Interventions** refers to multiple initiatives by the state and federal governments to provide early educational opportunities to students with disabilities, developmental delays, or at-risk of having a disability (Individuals with Disabilities Education Improvement Act, 2004).

## Theoretical Framework

The purpose of this theoretical framework is to explain the lens with which the researcher viewed the research and is woven throughout the study. The theoretical framework was used to guide the methods of the study and expound the results. The

results and evidence of this study were atheoretical rather the study's results focused on various outcomes and potential differences of prekindergarten participation. Therefore, the two theoretical frameworks guided this research due to the nature of the study, which examines early childhood practices for the purposes of informing educational leaders. Piaget's cognitive development theory (1972) informed the study due to its influence on the guiding principles of early childhood practices in prekindergarten classrooms and framed the implementation of prekindergarten education programming in the participating school district. Open systems theory framed the context of schools as systems operating within a broader socio-political environment. Open systems theory posits organizations are influenced by their environments (Scott, 2008). School districts are organizations that are strongly influenced by their surroundings. Educational leaders in Oklahoma are influenced by many competing forces when making decisions about the future of their prekindergarten programs due to the contentious political climate in the state. These two frameworks inform the study by integrating micro- and macro- perspectives that recognize schools as nested systems within a complex social environment.

Constructivist scholar Jean Piaget proposed the theory of cognitive development to explain how young children learn. Piaget created a developmental stage theory around human ability to acquire, construct, and use knowledge (1972). Young children obtain deeper understandings of the world around them through the sensorimotor, preoperational, concrete operational, and formal operational stages of this developmental theory (Piaget, 1972). Early childhood classrooms and programs

have been developed with consideration of Piaget's theory of cognitive development and his developmental stages.

Prekindergarten and early childhood classrooms focus on constructivist learning modeled after Piaget's learning theory. Prekindergarten children's stage of learning is typically preoperational. In this stage, children demonstrate intelligence through understanding symbolic representation of letters and numbers (Piaget, 1972). Children's language abilities mature while their memory and imagination are developing. A child's thinking in this stage is often not logical or reversible. Children in this stage are egocentric and cannot understand how others think or feel. Therefore, prekindergarten classrooms are designed around discovery learning and the use of concrete experiences to support thinking. Children at this age learn through using manipulatives, working in groups with other children, and having real experiences through field trips and other hands-on activities.

It is important to understand Piaget's theory and how it has formed and been maintained in early childhood classrooms. Due to high stakes testing and laws that encourage retention for students' lack of proficiency, push-down curriculum has become a common practice in public education. Expectations in early grades have substantially increased; however, prekindergarten classrooms have remained a safe haven for constructivist learning to exist. It is important to discuss cognitive development in relationship to prekindergarten participation because it explains the developmental stage and the learning experiences of young children attending prekindergarten. This learning environment is developmentally appropriate for young children and is optimal for later learning – two key reasons prekindergarten has been

considered successful in developing the whole child (ASCD, 2017). This practice is rarely observed in grades beyond the prekindergarten classroom.

Ludwig von Bertanlanffy first described open systems theory as systems in which interactions occur between internal elements of an organization and the external environment (Scott, 2008). Open systems are in contrast to closed systems, which are isolated from their surrounding environment. The theory of open systems posits organizations, such as school districts, consist of five basic elements: inputs, a transformation process, outputs, feedback, and the environment. These five elements create an open systems environment in the school district that takes in resources from the community; uses these resources to transform and create a learning environment; produces outputs in the form of proficient students and educated adults; uses external feedback to improve the learning experience; and is dependent on the social, political, and economical environment to make decisions about education (Lunenburg, 2010).

School districts constantly interact with their environments. The social, political, and economic contexts of their environments influence the classroom directly. School districts, as organizations, and educational leaders exist in a social context where parents, guardians, community members, and business owners express their opinions as taxpayers and concerned citizens about what and how the school and/or school district should operate. Public participation is an important feature of every school board meeting that allows the community to give the school district and its school board feedback. The school board is also held accountable by voting citizens, as elections can establish how the public feels about the school board members' ability to lead and represent the interests of the community.

Education has been a normative feature of the federal political landscape for over half a century, beginning with the Elementary and Secondary Education Act (ESEA) of 1965 (ESEA, 1965). Politics still plays a major role in educational leaders' decision-making: from classroom sizes to grade-level standards. Federal and state regulations define much of what happens in the daily life of every classroom. Economic contexts play a major role in education. Public schools' funding defines what school districts will be able to provide their students each year including what teacher-to-student classroom ratios will be acceptable. Budget constraints within a state can often mean larger classroom sizes and out-of-date curriculum.

Open systems theory is a necessary theoretical lens for the purposes of this study. Prekindergarten classrooms have been largely defined by the social, political, and economic environments surrounding them. In the state of Oklahoma, the social context of prekindergarten is defined by parents, childcare facilities, Head Start services, community members, and the legislature. Some stakeholders believe that four-year-olds should be at home or in childcare facilities while others see the value in public school education for four-year-olds. Some Oklahoma legislators have proposed defunding prekindergarten by removing the grade-level from the state-aid funding formula (Legislation Threatens States, 2016). These legislators believe that this will save money, asserting they have seen no empirical evidence that prekindergarten has lasting effects into later grades, despite the fact this is not the purpose or promise of prekindergarten in the state of Oklahoma (Legislation Threatens States, 2016). Legislators claiming prekindergarten should not be funded based on this argument may not understand that the purpose of prekindergarten was and is not to demonstrate

measurable longitudinal academic growth. Rather, the purpose of prekindergarten is to prepare students for learning once they formally enter school in kindergarten. These legislators have begun the discussion to defund prekindergarten as a cost savings measure, however other legislators see the value in providing access through universal prekindergarten. These legislators believe that prekindergarten is necessary to prepare students for school while also alleviating the financial burden on families because it provides parents and guardians the opportunity to reduce by one year the costs associated with a full day of childcare (Legislation Threatens States, 2016).

Parents and families of four-year-old children will bear the fiscal responsibility for providing for their children early childhood education services if prekindergarten is defunded and school districts are unable to sustain the costs of early childhood classrooms. The economic environmental context influencing schools as open systems is linked to the political context as legislators believe defunding will save money while Oklahoma's parents and guardians often use prekindergarten as a way to save money (Legislation Threatens States, 2016). This theoretical lens was used to explain the current climate of the prekindergarten debate in the state of Oklahoma with the understanding that school districts are open systems that must take into consideration the social, political, and economic context of every decision.

Cognitive development theory and open systems theory informed and directed this study by providing a context for how the researcher viewed the research study. Cognitive development theory describes what happens in prekindergarten classrooms and how development plays a key role in the curriculum and quality of prekindergarten classrooms. The curriculum of prekindergarten is based on cognitive

development theory that recommends creating an environment that will propel students into the formal years of their school experience ready to learn. Empirical evidence supports the claim that prekindergarten prepares students for learning through the use of cognitive development theory in prekindergarten classrooms (Fischer et al., 2013; Hustedt et al., 2015). Prekindergarten employs practices associated with cognitive development as a strategy for preparing students to learn and be in school - teaching with the whole child approach (ASCD, 2017). This theoretical lens explains what is happening within the prekindergarten classroom.

Open systems theory is used to describe the climate of school districts. Due to the nature of school districts, educational leaders receive data and make decisions based on input from social, political, and economic forces at play at the local, state, and federal levels. School districts make important decisions about prekindergarten using information from their environment coupled with feedback from their community members. Open systems theory posits that school districts are organizations susceptible to outside influences (Lunenburg, 2010; Scott, 2008). This theoretical lens explains what is happening outside of the prekindergarten classroom but directly impacts decisions made surrounding what is happening in the prekindergarten classroom.

These theoretical frameworks 1) position this study in examining the relationship prekindergarten has on student academic achievement and socio-behavioral development over time as it relates to the early childhood experiences they received (cognitive development theory) then 2) informs educational leaders about best prekindergarten practices and policy strategies that support early childhood

education (open systems theory). This research study adds to the current literature about early childhood education; more specifically, prekindergarten, as it not only examines the longer-term benefits of prekindergarten, it also considers continuity of growth that occurs for students who have attended prekindergarten over time when compared to students who did not attend prekindergarten.

# Chapter 2

## Literature Review

The emergence of prekindergarten throughout the United States has led to an abundance of scholarship and political discussions surrounding prekindergarten's effectiveness as a grade-level in producing long-term results for enrolled children. Policy makers and educational leaders are interested in ensuring quality early childhood experiences that lead to later academic achievement and socio-behavioral development gains in the wake of high-stakes testing, Oklahoma's third grade reading retention laws, and arduous standards placed on kindergarten through second grade-levels. Research on the effects of prekindergarten attendance has primarily focused on the immediate academic and socio-behavioral results (Fischer et al., 2013; Hustedt et al., 2015). While much of the research has implied that prekindergarten leads to academic gains and socio-behavioral development growth, other researchers have argued that prekindergarten attendance does not make a difference or that any gains made by participating in early childhood weaken as students move through the later grades (Cabell et al., 2013; Fischer et al., 2013; Gomez-Velez, 2010). Concerned researchers suggest that prekindergarten students may start their formal education in kindergarten with higher academic achievement and stronger socio-behavioral skills; however, that gap created by prekindergarten attendance between prekindergarten students and students who did not attend prekindergarten may close over time as students move through the grade-levels. These findings do not acknowledge that the purpose of prekindergarten is to prepare young children for the subsequent grade-level, not remedy systemic inequality that becomes evident as standardized test scores

reflect discrepancies between student groups as they progress. Much of the current research seeks to understand factors associated with prekindergarten that might contribute to narrowing the achievement gap (Cabell et al., 2013; Fischer et al., 2013; Gomez-Velez, 2010).

This research study adds to the current literature on prekindergarten by identifying the relationship between quality prekindergarten experiences and long-term growth in a students' academic and socio-behavioral development. The following sections provide a literature review of theoretical and empirical research on the topic of prekindergarten focused on the historic foundation of early childhood programs, prekindergarten enrollment, academic gains and socio-behavioral development, and the importance of educational leadership in prekindergarten decision-making.

## Background of Prekindergarten

**Non-state funded early childhood education programs.** The High/Scope Perry Preschool Project, the Abecedarian Project, the Chicago Child-Parent Center Program, and Head Start are programs that focused on early childhood and the benefits of early interventions for young children considered "at-risk." (Barbarin, McCandies, Early, Clifford, Bryant, Burchinal, Howes, & Pianta, 2006; Barnett, Jung, Yarosz, Thomas, Hornbeck, Stechuk, & Burns, 2008; Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Hillemeier, Morgan, Farkas, & Maczuga, 2012; Muenning, Schweinhart, Montie, & Neidell, 2009; Phillips, Gormley, & Lowenstein, 2009; Schaub, 2008). Research studies conducted on these preschool programs demonstrated

evidence that academic and socio-behavioral gains, even long-term, were possible with quality early childhood opportunities for young children.

In the High/Scope Perry Preschool Project beginning in the 1960s in Ypsilanti, Michigan, African American children whose parents had enrolled them in preschool were randomly assigned to receive the prekindergarten treatment (Bracey & Stellar, 2003). Children in the treatment group attended half-day prekindergarten for eight months at a time from between one to two years. The High/Scope Perry Preschool Project used curriculum shaped by Piaget's constructivist theory of early learning, which focused on creative representation, language and literacy, social relations and personal initiative, movement, music, classification, seriation, number sense, space, and time. While the control group participants remained at home with their parent or guardian. The prekindergarten treatment also included 90-minute home visits with participating families in the treatment group. Follow-up studies were completed on participants at ages 19, 27, and 40.

Children who had participated in the High/Scope Perry Preschool Project reported higher graduation rates and a reduction in special education enrollment by age 19. At age 27, 71% of participants had earned a high school diploma or General Educational Development (GED) graduation equivalency, compared to 54% of the control group. Participants were more likely to own a home, be married, and reported higher salaries (Bracey & Stellar, 2003; Schweinhart & Weikart, 1993). The control group was twice as likely to be arrested with 35% having multiple arrests (Bracey & Stellar, 2003; Schweinhart & Weikart, 1993). By age 40, participants had higher

educational attainments, access to health insurance, and reported higher incomes than the control group (Muennig, Schweinhart, Montie, & Neidell, 2009).

The High/Scope Perry Preschool Project demonstrated that the prekindergarten treatment led to potential long-term benefits for its participants (Bracey & Stellar, 2003; Muennig et al., 2009; Schweinhart & Weikart, 1993). Unlike many of the current models of state-funded prekindergarten, the High/Scope Perry Preschool Project began at younger ages, targeted only students considered to be "at risk" as determined by family income, and included a mandatory home-to-school connection. The High/Scope Perry Preschool Project was also a costly endeavor at $9,200 per student per year of participation. The High/Scope Perry Preschool Project reported evidence of long-term gains from high quality prekindergarten education, but proved to be a costly investment.

The Abecedarian Project provided additional evidence of preschool educational effectiveness. This program was located at the University of North Carolina, Chapel Hill beginning in 1972. The Abecedarian Project provided a full-day of care to students for 50 weeks a year beginning at birth until school entry at age five (Bracey & Stellar, 2003; Campbell et al., 2001; Campbell et al., 2002). Students were randomly assigned to the treatment group or the control group. The Abecedarian Project focused on child/adult interactions for young children in the treatment group, while in the control group, families had access to enriched baby formula, social workers, and crisis intervention services to reject the possibility of extraneous variables, such as nutrition, affecting the research study's findings.

Researchers followed-up with participants at ages 8, 12, 15, and 21. Findings indicated that participants in the Abecedarian Project demonstrated higher reading and math skills than the control group (Campbell et al., 2001; Campbell et al., 2002). During the follow-up at age 21, participants had completed more years of schooling with 42% still attending college. College attendees in the treatment group were more likely to be enrolled in a four-year college degree program. Forty-seven percent of the participants worked in skilled jobs at age 21 compared to 27% of the control group. Teenage pregnancies were lower for the treatment group and participants were also less likely to smoke or use marijuana, however, drinking alcohol had similar occurrences amongst both groups (Bracey & Stellar, 2003; Campbell et al., 2001; Campbell et al., 2002).

The Abecedarian Project, like the High/Scope Perry Preschool Project, began its focus on children at a younger age than state-funded prekindergarten programs offer today. The high level of care for the Abecedarian Project cost $13,900 per child (Bracey & Stellar, 2003). Though there is not a current prekindergarten program seeking to achieve the level or length of care the Abecedarian Project provided, it still serves as a model for the long-term benefits that are possible through the implementation of early education for young children.

The Chicago Child-Parent Center Program was a large study that did not include a random assignment of students. Instead, the program worked with childcare centers throughout the Chicago area to emphasize learning in body image and gross motor skills, perceptual/motor and arithmetic skills, and language (Bracey & Stellar, 2003). The program specifically focused on increasing parent involvement in their

child's educational experience. Through a follow-up study, researchers identified that at age 21 participants had lower crime rates, higher high school completion rates, and fewer retentions than matched peers. Therefore, the Chicago Child-Parent Center Program created a positive impact on participants' long-term achievement through preschool education and added evidence that prekindergarten programs of such caliber can be effective.

Head Start is an organization that began in 1965 as a part of President Lyndon B. Johnson's War on Poverty. Since its beginnings, Head Start has served students in poverty starting at age four. In 1995, Early Head Start began its campaign to serve children from birth to three years of age. High quality Head Start programs include low child/teacher ratios, highly qualified and well paid teachers, intellectually rich and broad curriculum, and parents engaged as partners in education (Bracey & Stellar, 2003; Crumm, 2011; Hillemeier et al., 2012; Phillips et al., 2009). Research suggests that high quality Head Start programs increase the likelihood of high school graduation and college attendance rates (Bracey & Stellar, 2003). Longitudinal research about Head Start participants indicates longer-term gains may exist for program enrollment. Head Start is a less expensive form of preschool education when compared to the other previously discussed programs, costing only $7,000 per student (Bracey & Stellar, 2003).

The High/Scope Perry Preschool Project, the Abecedarian Project, the Chicago Child-Parent Center Program, and Head Start programs provided early childhood education opportunities for young children. The research behind these studies supports the notion that early education is beneficial to later academic achievement and socio-

behavioral development. Though each of these programs served young children varying in forms of preschool education, their results still have implications for current state-funded four-year-old programs, indicating benefits to long-term academic and socio-behavioral development. With these results in mind, state governments turned to developing their own state-funded prekindergarten programs at a lesser cost per student to ensure that children were given the opportunity to start school "ready to learn" (State of the Union, 1990).

**Policy Solutions to Prekindergarten**

Research about participation in prekindergarten has focused on currently developed systems of prekindergarten and prekindergarten classroom quality (Barnett et al., 2008; Burger, 2010; Gormley, 2005; La Paro, Pianta, & Stuhlman, 2004; Mobbs, 2014; Neuman, 2003; van Kleeck & Schuele, 2010; Winsler, Tran, Hartman, Madigan, Manfra, & Bleiker, 2008). As prekindergarten classrooms were implemented across the country in their different forms, researchers have focused on how those programs were developed and how individual classrooms were set up to meet community needs. Many school districts initiated prekindergarten classrooms and programs similar to Head Start to close the achievement gap caused by poverty, while other districts began their prekindergarten programs based on family and community interest. Many states today use an income-based intake model, similar to Head Start, where prekindergarten programs focus on enrolling low-income students as a priority before opening enrollment to all students (Bornfreund et al., 2015). The state of Oklahoma offers a universal prekindergarten program that is open to any student whose family desires for them to participate in the grade-level. In many states

across the country, prekindergarten is viewed as a method of intervention to begin closing the achievement gap caused by income, however, Oklahoma's prekindergarten model focuses on responding to all Oklahoma's children's needs. State policy provides a universal early childhood program in districts aimed at giving students the opportunity to start school a year early. Further, research on prekindergarten enrollment focuses on early childhood leaders' responsibility to create quality early childhood experiences for young children. The next section reviews current literature on prekindergarten enrollment focused on systems of prekindergarten and classroom quality.

**Systems of prekindergarten.** President George H. W. Bush discussed his proposals to increase school readiness for children birth to five years of age in his 1990 State of the Union Address. His initiative, which has since been referred to as Goals 2000, called for all children to begin school "ready to learn" (State of the Union, 1990). He believed that by students entering school "ready to learn," high school graduation rates would increase, students would demonstrate competency at grade-level, the United States would be able to contend worldwide in science and mathematics, and all adults would be literate and able to compete in the global economy (State of the Union, 1990). Since President George H. W. Bush's call for students to enter school "ready to learn," states have begun early childhood initiatives to ensure this practice, including forms of state-funded prekindergarten, believing this grade to be key to preparing students before their formal education began (Gormley, 2005; Mobbs, 2014; Neuman, 2003; State of the Union, 1990; van Kleeck & Schuele, 2010).

Over time, states have developed a variety of prekindergarten programs. Many states began with targeted prekindergarten programs, focusing only on economically disadvantaged students, then working towards universal prekindergarten programs. Legislators and policy makers currently believe that the "system of PK is broken," even though one complete system does not currently exist (Neuman, 2009, p. 53). Since prekindergarten has been left to the individual states to mandate, prekindergarten has been implemented differently across states and districts. Variations occur in all- or half-day programing, level of teacher preparation, curriculum, and academic standards (Bushhouse, 2006; Casto & Sipple, 2011; Mobbs, 2014; Neuhartch-Pritchett, 2005; van Kleeck & Schuele, 2010; White, Davidson, Miller, Pandy, & Yi, 2015). It is important to keep this in mind when looking at the current empirical and theoretical research on prekindergarten: not all prekindergarten programs are created equally.

Bornfreund et al. (2015) looked at early childhood practices across the United States and developed a national report. This report looked at seven major quality indicators: educators, standards, equitable funding, access and quality of prekindergarten, access and quality of full-day kindergarten, supports for dual language learners, and third grade reading laws (Bornfreund et al., 2015; Magnuson & Waldfogel, 2005; Wong, Cook, Barnett, & Jung, 2008). The authors identified New York, Oklahoma, West Virginia, Connecticut, and Wisconsin as the top states for providing quality early childhood experiences for young children. With the exception of Oklahoma and West Virginia, these states are also considered leaders in K-12 education (Bornfreund et al., 2015; Morrissey, Lekies, & Cochran, 2007; Papelier,

2010). The primary, consistent indicator that made these states stand out as leaders in the area of early childhood education was their devotion to state-funded prekindergarten programs.

A combination of different indicators contributed to the success of each state in providing quality early childhood experiences. Oklahoma, West Virginia, and New York maintained the highest requirements for early childhood teachers. In these three states, prekindergarten teachers are required to hold a bachelor's degree specializing in early childhood, while other states require lead teachers to hold only an associate's degree or child development certificate equivalency (Bornfreund et al., 2015; Goble, Horm, Atanasov, Williamson, & Choi, 2015; Morrissey et al., 2007; Papelier, 2010). Further, Oklahoma's early childhood teachers must also hold a teacher certificate in early childhood education and be considered highly qualified in the field of early childhood (Bornfreund et al., 2015; OSDE, 2016). Recent Oklahoma legislation deregulation has allowed individuals with a bachelor's degree not specializing in early childhood to enter into the teaching profession, leading to lower teacher qualifications. Oklahoma has also led the nation in developing academic standards for learning in prekindergarten (Bornfreund et al., 2015; Hustedt et al., 2015).

Education funding contributed to these states rise to the top in early childhood. With the exception of Oklahoma, each of the leading states have strong education spending relative to their economy, often providing extra funding to their highest-poverty schools and school districts (Bornfreund et al., 2015; Boylan, 2007). Unique funding systems exist to compensate for the expense of prekindergarten programs. New York, for example, uses community partnerships to provide adequate funding to

their prekindergarten classrooms (Boylan, 2007; Casto, Sipple, & McCabe, 2014; Kirp, 2016; Morrissey et al., 2007). Oklahoma includes prekindergarten in the state-aid funding formula, making prekindergarten a fully funded grade-level (OSDE, 2016). Lastly, indicators of access to and quality of prekindergarten programs suggest few states have worked towards true universal programs. These states are Florida, Oklahoma, and Georgia (Bornfreund et al., 2015; Gormley & Phillips, 2005; Hustedt et al., 2015; Morrissey et al., 2007). All four-year-olds in these states have the opportunity to enroll though not all attend a prekindergarten program. In Oklahoma, more than 86% of all students currently attended some form of prekindergarten program (OSDE, 2016).

**Classroom quality.** Prekindergarten is offered through a variety of different approaches across the nation. Different ways of setting up prekindergarten can exist even within the same state, while different structures of prekindergarten can exist within a single school district. A specific area of current research about prekindergarten focuses on the effects of classroom design and practices on educating the whole child (ASCD, 2017; Barnett et al., 2008; Burger, 2010; La Paro et al., 2004; Piaget, 1972; Winsler et al., 2008). Several studies suggest that a focus on teacher-child relationships, positive classroom environments, and quality classroom practices in prekindergarten lead to greater academic and socio-behavioral success in later school years (La Paro et al., 2004; Piaget, 1972; Zhai, Raver, & Jones, 2015; Zucker, Cabell, Justice, Pentimonti, & Kaderave, 2013). However, several other researchers indicate that classroom practices devoted to educating the whole child only have small associations or limited effects on later achievement (Mobbs, 2014; Sachs, &

Yoshikawa, 2013; Weiland, Ulvestad, Sachs, & Yoshikawa, 2013). Regardless, empirical research reveals important aspects of prekindergarten classroom quality affecting student experiences, later academic achievement, and socio-behavioral development.

Many researchers argue that classroom quality plays an important role in the findings on prekindergarten participation. Mira and Schwanenflugel (2013) focused on the impact of teacher's expressiveness during shared reading experiences. Their findings suggested that high quality, expressive teacher readings resulted in stronger comprehension skills (Mira & Schwanenflugel, 2013). Barnett et al. (2008) indicated that developmentally appropriate, play-centered curriculum demonstrated positive effects on learning and development, as well as social and academic success for all-day prekindergarten students. A comparative study by Zucker, Cabell, Justice, Pentimonti, and Kaderavek (2013) explored long-term associations between classroom reading experiences and prekindergarten students' language and literacy skills in kindergarten and first grade. Findings from this study about all-day prekindergarten quality indicated a significant and positive relationship on student's receptive vocabulary (Zucker et al., 2013).

Research has found that professional development for teachers also plays an important role in influencing classroom quality. LaFerney (2006) found early childhood practices were directly related to professional development completed by the lead teacher. In other research completed by Goble et al. (2015) about high-quality services in early childhood classrooms, found that knowledge and beliefs about child development had an association to teacher preparation when examining high-quality

services in early childhood classrooms. Participants included in this research study constitute four types of education students: 1) students completing Child Development Associate credential, 2) students completing an associate's degree in early childhood, 3) students completing a bachelor's degree in early childhood education, and 4) graduates who had obtained at least a bachelor's degree in early childhood education. Their research found that participants with higher level of degrees had a better understanding of child development and needs, including realistic expectations and increased empathy for children. The conclusions from this research study on the quality of care addresses reasons why prekindergarten teachers with a bachelor's degree in early childhood education, which is required in few states, leads to superior prekindergarten programs like those found in Oklahoma.

Other empirical studies completed by Bierman, Domitrovich, Nix, Gest, Welsh, Greenberg, Blair, Nelson, and Gill (2008), Burchinal, Vandergrift, Pianta, and Mashburn (2010), Duncan (2015), Ringhauser (2008), Welsch, Nix, Blair, Bierman, and Nelson (2010), Winsler, Tran, Hartman, Madigan, Manfra, and Bleiker (2008), and Woods (2013) indicated that students attending all- and half-day prekindergarten classrooms scored significantly higher on measures of early academic achievement than students attending no prekindergarten, especially for English language learning students and students from high poverty households. These research findings indicated gains in the prekindergarten students' abilities based on classroom environment and developmentally appropriate classroom experiences (Piaget, 1972).

Contradictory empirical findings from Garmon (2013) and McElroy (2007) have determined that quality prekindergarten programs do not positively impact

academic success in the later years of schooling. Both researchers found that third grade test scores showed no differences among students who had attended a developmentally appropriate prekindergarten program, all- or half-day, when compared with those who had not attended prekindergarten. Their research findings further the argument that the benefits of prekindergarten may dissipate over time – as early as third grade – as former prekindergarten students move through the later grade-levels (McElroy, 2007; Garmon, 2013). In 2013, Weiland, Ulvestad, Sachs, and Yoshikawa completed research examining the associations between high quality preschool experiences and later school gains. Their results implied that a small to null association existed between quality and outcomes of children's receptive vocabulary and executive functioning skills beyond the prekindergarten school year.

Further research has focused on social-emotional practices in quality prekindergarten classrooms. Zhai, Raver, and Jones (2015) examined the impacts of student-teacher relationships in both all- and half-day prekindergarten students and their impact on academic and social-emotional development through the subsequent grade-levels. The findings from their study indicated that positive student-teacher relationships in prekindergarten resulted in improved social-emotional and academic development through third grade. Cash, Cabell, Hamre, DeCoster, and Pianta (2015) examined teacher's beliefs about prekindergarten students' abilities and concluded the opposite. Specifically, their results denoted that teachers' beliefs were not predictive of students' skill development. Research on the social developmental practices in the early childhood classroom provides vital information on later development since

prekindergarten classrooms focus on behavior and socialization as much as they focus on academics (Leyva, Weiland, Barata, Yoshikawa, Snow, Trevino, & Rolla, 2015).

Other themes in the research about classroom quality focused on time in and access to prekindergarten classrooms. In 2010, Early and associates, examined a typical day in the prekindergarten classroom, finding that most of the day was spent in free choice, teacher assigned activities, and meals and routines (Early et al., 2010). Researchers identified more of the day was spent in literacy, social studies, and art with less time devoted to gross motor activities and math skills. They also noted that much of the day was coded as "no learning activity" identified.

Research about availability and access to prekindergarten has examined how different states and districts have expanded their reach to include more students in an attempt to reach universality (Boylan, 2007; Bushhouse, 2006; Fitzpatrick, 2010). For example, prekindergarten in New York has mainly focused on community partnerships to help fund and continue prekindergarten programs for all students (Casto et al., 2014). Research on the New York model has found that through community partnerships prekindergarten has vastly expanded and New York is able to reach more students through prekindergarten than any other state (Casto et al., 2014).

Classroom quality rating scales have been developed and used to ensure quality for students in early childhood classrooms. Rating scales, such as the Early Childhood Environment Rating Scale-Revised (ECERS-R) and the Classroom Assessment Scoring System (CLASS), focus on developmentally appropriate practices in early childhood classrooms based on classroom quality research (CLASS, 2016; ECERS-R, 2017). ECERS-R includes in its rating scale items such as space and

furnishings, personal care routines, language-reasoning, activities, interactions, program structure, and engagement of parents and staff and is focused on ages two through five-years-old (ECERS-R, 2017). The CLASS, prekindergarten-focused rating scale, includes indicators about how teachers foster a classroom environment of learning and exploration, language and cognitive development skills, and an environment where students can develop their abilities appropriately (CLASS, 2016).

Researchers examining early learning quality have used these rating scales to identify the level of care and quality in prekindergarten classrooms. La Paro et al. (2004) field tested the CLASS framework in prekindergarten classrooms throughout a variety of states. Their findings indicated a positive implication for classroom environment and teacher-child interactions. Leyva, Weiland, Barata, Yosikawa, Snow, Trevino and Rolla (2015) used the CLASS rating scale to determine the quality of teacher-child interactions in prekindergarten. Their study examined whether these interactions determined language abilities, academic achievement, and executive functioning skills at the end-of-prekindergarten. The research findings supported the validity of CLASS in identifying the quality of teacher-child interactions.

In a 2010 study, using ECERS-R, Burchinal, Vandergrift, Pianta, and Mashburn found that for students from low-income backgrounds, teacher-child interactions and instructional quality predicted academic achievement and socio-behavioral development. The researchers collected data from 11 states implementing prekindergarten classrooms, findings implied that quality classrooms were directly related to math and reading development as well as social competence. Mashburn, Pianta, Hamre, Downer, Barbarin, Bryant, Burchinal, Early, and Howes (2008) used

both the CLASS and ECERS-R rating scales to examine prekindergarten students' development of academic, language, and social skills. Results indicated that strong teacher-child interactions facilitated school readiness for prekindergarten students.

**Academic Achievement and Socio-Behavioral Development**

Research about academic achievement and socio-behavioral development resulting in prekindergarten enrollment has focused on the short-term gains, longer-term results, and socio-behavioral effects for young children attending prekindergarten (Auger et al., 2014; Burger, 2010; Chew & Lang, 1990; Curenton, Dong, & Shen, 2015; Fischer et al., 2013; Fitzpatrick, 2008; Gormley et al., 2011; Imig, 2011; Nesbitt et al., 2015; Rose, 2010; Scott, 2012; Yoshikawa, 1995). Much of the research is conflicting and few conclusions can be drawn about the difference prekindergarten has on the four-year-old students who enroll in the grade-level. Ultimately, further research is needed about a variety of prekindergarten programs in order to understand the difference the grade-level has for students who participate. The following literature discusses academic achievement and socio-behavioral development focusing on short-term gains, longer-term results, and the socio-behavioral effects of prekindergarten participation.

**Short-term gains.** The most prominent area of prekindergarten research focuses on short-term gains on academic skills (Auger et al., 2014; Burger, 2010; Chew & Lang, 1990; Fischer et al., 2013; Fitzpatrick, 2008; Imig, 2011; Nesbitt et al., 2015; Rose, 2010; Scott, 2012). Researchers have argued that the impact of prekindergarten can have a sizeable effect on school achievement, grade retention, placement in special education, and social adjustment (Barnett, 1995). While much of

the research has implied that prekindergarten leads to short-term academic gains as students move into kindergarten and first grade, other researchers have argued that it does not make a difference or that any gains made by early childhood enrollment quickly fade out as students continue through the grades. Magnuson and Waldfogel (2005) remind us that "we need to keep in mind that the benefits even of the best early childhood programs tend to fade over time…it is not realistic to expect a preschool program, however effective, to inoculate a child for life against the risk of low academic achievement" (p. 188). Policy makers, building-level administrators, school district leaders, and other instructional leaders should make attempts to impact the fade out trend claimed by some researchers on academic achievement through strong vertical alignment of grade-levels and professional development opportunities (Mashburn et al., 2008; Nesbitt et al., 2015; Scott, 2012).

Gains in early literacy and early numeracy is a common focus in prekindergarten research. Research completed on the Arkansas Better Chance Program and the Georgia Prekindergarten Program, both all-day prekindergarten programs, found gains in vocabulary, mathematics, and print awareness as students prepared for kindergarten and first grade. Research findings report Georgia believed that its universal model of prekindergarten led to long-term gains and included this as a stated goal of the program (Fitzpatrick, 2008; Fram, Kim, & Sinha, 2012; Fuhs, Farran, & Nesbitt, 2015; Henry & Rickman, 2009; Hustedt et al., 2015; Zhai, Waldfogel, & Brooks-Gunn, 2013). While other studies, researching a variety of prekindergarten programs, have found that attending a prekindergarten program resulted in increased overall achievement scores in the early grades for participating

students of low-income families, parents with lower education levels, and families speaking a language other than English in the home. However, these gains in achievement did not sustain overtime (Fischer et al., 2013; Gomez-Velez, 2010).

Focusing on academic skills, Fram et al. (2012) found increases in reading and math scores upon entering kindergarten for students who had attended prekindergarten. Barnett, Lamy, and Jung (2005) also focused on literacy and math development for students who had attended state-funded prekindergarten when examining a variety of different prekindergarten programs. Their findings indicated a statistically significant impact on early language, literacy, and math, with stronger benefits found for students from lower socio-economic backgrounds. Other research studies by Bedford and Casbergue (2012), Magnuson, Ruhm, and Waldfogel (2007) and Weiland and Yoshikawa (2013), found that all-day prekindergarten is associated with higher scores in language, literacy, and numeracy. Henry, Gordon, and Rickman's (2006) research on the Georgia all-day prekindergarten and Head Start programs found that the two groups of students scored statistically similar at the beginning of prekindergarten, but by kindergarten, students who had attended state-funded prekindergarten had statistically significant gains over their Head Start peers.

Research that has focused on a variety of educational childcare opportunities has also found increases in students' math and reading scores, but has reported negative effects on behavior (Leyva et al., 2015; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007). However, Howes, Burchinal, Pianta, Bryant, Early, Clifford, and Barbarin (2008) found that quality instruction and close teacher-child relationships had the strongest impact on gains created by all-day prekindergarten. In another study

conducted by Zhai et al. (2015), findings indicated strong academic achievement in third grade by students who had attended prekindergarten. Concluding, based on current empirical research, enrollment in prekindergarten is associated with short-term gains in academic skills.

A number of studies completed by Gormley and his colleagues have suggested that impacts exist for prekindergarten programs in the state of Oklahoma. Research from Gormley and Gayer (2005) about all- and half-day prekindergarten participation suggested that the impacts are greater for Hispanic students, African American students, and students from high poverty backgrounds. Gormley, Gayer, Phillips, and Dawson (2005) reported similar findings and concluded that Hispanic, African American, Caucasian, and Native American students all benefited from prekindergarten enrollment, with students from all income brackets demonstrating an increase in short-term academic achievement. Their findings argued that Oklahoma's prekindergarten model demonstrated an ability to enhance early achievement for students from all backgrounds (Gormley et al., 2005). Gormley and Phillips (2005) found in another study, positive effects of prekindergarten participation on language and cognitive measures. The study also showed that Hispanic students benefitted the most and African American students gained greatly from prekindergarten attendance in both half- and all-day programs.

Gormley, Phillips, and Gayer (2008) reported that Tulsa's prekindergarten and Head Start programs impacted short-term student success. Findings demonstrated gains on test scores for early literacy, writing, and numeracy in a variety of prekindergarten programs. The study also showed larger impacts on literacy skills.

Students from high poverty backgrounds demonstrated the largest gains from both early childhood settings. Another study completed in 2008, found that Hispanic students who spoke Spanish in the home, or students who were born in Mexico, benefitted from prekindergarten enrollment the most (Gormley et al., 2008). These studies led Gormley (2005; 2011) to conclude that properly funded prekindergarten programs with high quality teachers and sufficient resources lead to learning gains, acquisition of important cognitive skills, and school readiness.

Other studies have indicated that participation in prekindergarten does not appear to make a difference on student achievement before school entry. Rather, prekindergarten might substantiate achievement gaps of race and income for further schooling (Cabell et al., 2013; Magnuson et al., 2007; Weiland et al., 2013). Magnuson et al. (2007) found that although prekindergarten is associated with an increase in reading and math skills at the beginning of kindergarten, with larger gains found for students living in poverty, it was also associated with increased behavioral problems by the end of first grade. The academic gains dissipated but the behavioral differences persisted (Magnuson et al., 2007). In another study completed by the same authors in 2007, findings indicated that the academic gap created by prekindergarten quickly disappeared, whereas longer-term effects of prekindergarten participation were associated with quality early childhood classroom experiences (Magnuson et al., 2007).

**Longer-term results.** Limited research has focused on the longer-term results from prekindergarten enrollment. Other researchers have cited this as an area in need of future research, especially with the recent increases in access and quality of early

childhood programs. Researchers who have completed studies on this issue have mostly ventured into later elementary grades to identify the impact of all-day prekindergarten enrollment or have been able to discuss longer-term gains affected by half-day prekindergarten programs (Curenton et al., 2015; Fitzpatrick, 2008; Gormley et al., 2011; Yoshikawa, 1995). One reason for this lack of research may be attributed to the length and stability with which prekindergarten programs have endured in most states. If this is the case, researchers are entering into a season in which investigating the longer-term effects of prekindergarten participation is a viable possibility, especially for all-day prekindergarten programs. The current research on longer-term results of prekindergarten enrollment primarily focuses on gains in academics for the upper elementary grades.

In earlier studies completed by Irvine (1980) and Barnett (1998), prekindergarten participation succeeded in reducing grade repetition, special education referrals, and increasing high school graduation rates where high continuity of academics throughout prekindergarten to twelfth grade-levels existed. Muennig's (2015) found that students who had attended prekindergarten programs were more likely to grow into physically healthier adults. On a similar note, the research conducted by Magnuson, Ruhm, & Waldfogel (2007), found longer term effects of half-day prekindergarten enrollment depended on the students' classroom experiences in the first years of schooling, suggesting that prekindergarten enrollment is not enough to create a long-term academic or behavioral advantage. Therefore, the authors imply that multiple years of quality early educational experiences may be necessary for the positive educational outcomes. In another study completed by Magnuson,

Ruhm, and Waldfogel (2007), the researchers found that the advantages of prekindergarten enrollment had larger and longer gains for students from disadvantaged backgrounds. Even a study conducted three decades ago by Tsushima and Stoddard (1986) found that gains were identified in listening and math well into first grade and in listening and writing into second grade for students who had attended prekindergarten.

Effects from prekindergarten enrollment have further been identified in the later years of elementary school. Hill, Gormley and Adelstein (2015), found that though a cohort prekindergarten group showed no evidence of consistent early gains, in third grade the former prekindergarten students had statistically significant gains in math. Fitzpatrick (2008) found a positive effect on math and reading scores for fourth grade students who had previously been enrolled in all-day prekindergarten through Georgia's universal prekindergarten program. The study also found that prekindergarten students were more likely to be on grade-level than their peers who had not attended prekindergarten. Curenton, Dong, and Shen (2015) identified fifth grade gains and confirmed longer-term effects from prekindergarten in academic achievement. However, Bedford and Casbergue (2012) stated that there is "little impact of the structural components of high-quality preschools on later achievement" (p. 336).

**Socio-behavioral effects.** Prekindergarten research also focuses on socio-behavioral effects of prekindergarten participation. Research completed by Leyva et al. (2015) and Magnuson et al. (2007) identified that prekindergarten enrollment had negative effects on behavior, the later stating that behavior effects persisted into later

grades. Further research completed by Fram et al. in 2012 and Loeb, Bridges, Bassok, Fuller, and Rumberger in 2007 found subsequent evidence of increased behavioral consequences on later schooling for students enrolled in early childhood programs.

Conversely, Eggum-Wikens, Fabes, Castle, Zhang, Hanish, and Martin (2014) found that preschool children in all-day programs, engaging in peer play opportunities led to higher school competence in kindergarten. Their results concluded that engagement with peers in prekindergarten experiences fostered skills that helped students transition into their formal years of school. These research findings infer that students with quality prekindergarten play experiences would lead to the students' ability to adapt to the demands of formal schooling in kindergarten.

Guss, Jones-Harden, Stein, Yazejian, and Forestieri (2016) examined social emotional outcomes for students who had experienced adversity at a young age. The authors found that students who had experienced a family hardship at an early age and enrolled in a high quality early childhood program had a positive association with later socio-behavioral and emotional outcomes. More time in the program indicated a stronger correlation, while less time in a program led to mixed findings.

Research findings have indicated that prekindergarten programs have impacts on students' executive functioning and emotional regulation, while other findings have suggested a decrease in student impulsivity (Weiland & Yoshikawa, 2013; Zhai et al., 2015). Ultimately, research on the topic of social and behavioral effects are mixed and not thorough enough to reach strong conclusions. Further research is necessary to determine the impacts of prekindergarten enrollment on socio-behavioral effects beyond the prekindergarten year of school.

## Educational Leadership

The topic of prekindergarten participation is important to educational leaders and policy makers. Though research exists about prekindergarten practices, its impact on short-term and longer-term academic success, and social and behavioral effects are still debated. Some policy makers do not believe that prekindergarten has academic and socio-behavioral benefits for students based on the research findings or their own experiences, causing the programs in place to be viewed as a waste of taxpayer dollars (Legislation Threatens States, 2016; Ruhm, 2011; Sall, 2014). If states begin to defund prekindergarten, educational leaders will have to make decisions about the future of their four-year-old programs (Scott, 2008). Some districts may desire and have the ability to continue to support prekindergarten programing. Others will be completely unable to afford the cost of their prekindergarten classrooms forcing districts to close their prekindergarten programs or search for alternative forms of funding. Educational leaders must be familiar with the most current empirical and theoretical research in order to make informed decisions for their districts as many Oklahoma districts have made large investments in their early childhood programming.

Throughout the decision making process, it is crucial for educational leaders to remember important details about the topic of prekindergarten research. First, the majority of research on prekindergarten focuses on short-term gains. While much of the research is in support of prekindergarten programs, it does not tell the full story. What we know and understand about prekindergarten is that it is likely to increase short-term academic achievement, but the impact appears to be inconsistent over time. Educational leaders need to be able to explicitly state the influence prekindergarten

has had on their own districts by using school-wide data to make decisions about the short- and longer-term effects of their own prekindergarten programs. Next, research studies such as the Abecedarian and the High/Scope Perry Preschool Projects were funded at a much higher levels than current state-funded prekindergarten programs. These studies suggest that early childhood education and intervention is effectual but does come at a high cost, something Oklahoma has not been afforded. Educational leaders must be aware of what it takes to run successful prekindergarten program, including the financial effects on a district and its tax base (Ruhm, 2011; Sall, 2014).

Educational leaders must also understand that prekindergarten programs have different specificities in the research. Much of the research speaks to prekindergarten in vague terms, while some studies are very explicit about the type of prekindergarten classroom investigated. It is important to discern the type of program examined when looking at the research. Is it half-day or all-day? Does it include a developmentally appropriate curriculum? Do the teachers hold a bachelor's degree or an early childhood certification? Different types of prekindergarten programs will have different results based on the investment into the program. Since a uniform model of prekindergarten does not exist, educational leaders must be aware of the fact that when policy makers make claims about prekindergarten in the research, they may not be speaking the same language as practitioners and they may not be aware of the intricate differences between prekindergarten programs (Scott, 2008). Research about prekindergarten participation is evolving; therefore, knowing the latest research and the quality of practice in prekindergarten programs will be helpful for educational

leaders to make informed decisions and to advocate for their school districts and their community (Scott, 2008).

Prekindergarten enrollment has indicated mixed reviews regarding the effectiveness of prekindergarten on making a difference on academic achievement or socio-behavioral development prior to school entry throughout the literature base (Barbarin et al., 2006; Campbell et al., 2002; Campbell et al., 2001; Hillemeier et al., 2012; Muenning et al., 2009; Phillips et al., 2009). Ultimately, more research has demonstrated that prekindergarten and early interventions help students enter school prepared (Auger et al., 2014; Barnett, 1995; Barnett et al., 2005; Bedford & Casbergue, 2012; Chew & Lang, 1990; Fischer et al., 2013; Fitzpatrick, 2008; Fram et al., 2012; Fuhs et al., 2015; Henry & Rickman, 2009; Hustedt et al., 2015; Imig, 2011; Magnuson et al., 2007; Rose, 2010; Weiland & Yoshikawa, 2013; Zhai et al., 2013).

Building-level educational leaders, many of whom directly supervise prekindergarten classrooms and teachers, have invested time, space, and money into prekindergarten. Principals and assistant principals more often see the direct results of students attending a prekindergarten program. Since a uniform model of prekindergarten does not exist, building-level administrators can observe the differences between their students who attended their prekindergarten and those who did not throughout the grade-levels. Building-level administrators and elementary teachers see the effects of prekindergarten participation on their individual students. Furthermore, as they see the participation of prekindergarten positively effecting their students' growth and development, building-level administrators can also examine ways to improve practice throughout the grade-levels, building to the educational base

already created by prekindergarten participation. Therefore, building-level leaders must relate to the issues surrounding prekindergarten enrollment as they look at their students enrolled and whether prekindergarten made a substantive difference in the lives of their students. Further, building-level administrators' insights can inform district-level leaders and policy makers as they report on what prekindergarten means to their school's academic success and the socio-behavioral development of their students (Scott, 2008).

District-level educational leaders can report on what prekindergarten participation means to their school district. Though many district-level leaders do not see the direct impact of prekindergarten participation on an individual student level, they can speak to the larger picture of the whole school district. Ultimately, district-level leaders will be making the decisions about whether they will be able to sustain prekindergarten programs, if prekindergarten programs are defunded, and are responsible for making decisions about expanding prekindergarten programs to reach universality status. District-level leaders must know and understand the research available but it is also vitally important that district-level leaders can report on how prekindergarten has directly affected their district. This is especially true when discussing students' academic success and socio-behavioral development with policy makers and community stakeholders. District-level leaders can and must be a voice to policy makers, as they are keenly aware of the effect that prekindergarten classrooms have on their own school district (Scott, 2008).

The current research about prekindergarten is vast and conflicting. While much of the focus has been on short-term academic achievement, there is a gap in the

literature where longer-term implications and socio-behavioral development is concerned (Cabell et al., 2013; Fischer et al., 2013; Gomez-Velez, 2010; Hustedt et al., 2015). Further, the current literature is often contradictory with claims to prekindergarten impacting student achievement and other assertions that it is ineffective at making a lasting impression on four-year-old students (Gormley, 2005; Mobbs, 2014; Neuman, 2003; van Kleeck & Schuele, 2010). Further research about prekindergarten is also necessary because of the multiple variations of prekindergarten programs that currently exist. All-day prekindergarten programs are a newer concept and as students who have attended these programs are moving through the grades it becomes necessary to examine the differences caused by attending this type of prekindergarten program, especially in the state of Oklahoma. As a result of this, continued research is necessary in addressing the concerns associated with the relationship prekindergarten has on students' academic achievement and socio-behavioral development and to determine if that correlation sustains over time. This research study investigates and addresses this gap in the literature through analysis of quantitative data. This quantitative study compares students who have previously attended a full academic year of an all-day state-funded prekindergarten program with students who have attended no prekindergarten program on measures of academic achievement and socio-behavioral development.

Since research about prekindergarten has mainly focused on short-term gains preparing young children for school, longer-term results on academics, and the impacts of prekindergarten on socio-behavioral development, the results from this study will combine these areas of prekindergarten classroom focus and observe the

influence of prekindergarten over time. Though prekindergarten has been researched since the 1980s, there is still much to be investigated and discussed about the different types of prekindergarten programs and the long-term implications for prekindergarten participation. Educational leaders must be well informed and cognizant about prekindergarten programs, policies, and their own prekindergarten practices.

# Chapter 3

## Method

This study was a multilevel, longitudinal quasi-experimental quantitative research design using a hierarchical linear model and a logistic regression. Adding to the current literature about prekindergarten, this dissertation tests the relationship between participation in a full academic year of an all-day prekindergarten program on later academic achievement and socio-behavioral development during students' later elementary school years. Secondary data was collected from the participating school district. In order to answer the first research question, reading and math fluency data was collected from AIMs Web, the school district's chosen Response to Intervention (RtI) model. The second research question was answered through the collection of discipline referrals on students. These data were chosen for collection because prekindergarten curriculum and classroom practices focus not only on early literacy and numeracy but on the learning of routines and procedures of school (Fischer et al., 2013; Hustedt et al., 2015; Leyva et al., 2015; Piaget, 1972).

The results from this research study may inform the state's legislative body and educational leaders. If Oklahoma legislators decide to remove prekindergarten from the state-aid funding formula or defund prekindergarten, districts will have to make informed decisions about whether they will maintain their prekindergarten programs through other funding sources where possible. Due to increasing budget constraints, many school districts will have no choice but to end their prekindergarten programs. The results from this study will add to the conversation about the future of prekindergarten. Though the context of this study is specific to a district in the state of

Oklahoma, the intent of the study is to broaden the analysis to any district or state interested in the long-term correlations of prekindergarten on student academic achievement and socio-behavioral development.

**Participants**

The sampling procedures of the students uses a propensity score matching design to ensure that the student population groups were evenly represented and any confounding variables were controlled for to determine that the effect of the prekindergarten treatment can be attributed to attending all-day prekindergarten. In a propensity score matching design, participants are typically paired based on blocking variables that determine the probability that a participant will be a part of the treatment group and then the participants receive the treatment (Holmes, 2014). However, propensity score matching can be used in quasi-experimental designs where the treatment has already occurred, as in this study, by matching participants in the treatment and control groups on exogenous covariates (Holmes, 2014). The students selected for this research study were fifth grade students in the participating school district that would have attended prekindergarten in the 2010-2011 school year. This class was selected due to the participating district's dedication to expanding prekindergarten throughout the district's schools and its ability to provide an appropriate sample size of students that had attended an all-day prekindergarten program (Cohen, 1992).

Students were selected for the all-day prekindergarten treatment through parent option. The school district provided all-day prekindergarten on a first come, first served basis while allowing the parent(s) to opt their child(ren) into a half-day

prekindergarten program or to not enroll, attending no prekindergarten at all. Students whose parents chose the half-day prekindergarten option were not included in this study nor were students who attended a partial year of an all-day prekindergarten program. By studying the group of students who attended all-day prekindergarten, this study identified the relationship a full academic year of an all-day prekindergarten program has on academic achievement and socio-behavioral development as well as determine if that correlation persists over time for these students throughout their later elementary school years.

Since the treatment had already been received in the form of all-day prekindergarten participation during the 2010-2011 school year, students who attended a full academic year of an all-day prekindergarten program were matched with like peers who did not attend prekindergarten on exogenous characteristics of race, gender, socioeconomic status as reported by enrollment in the free and reduced lunch program, special education status, age, and English language learner classification as reported in their fifth grade year of school. These six variables were used to fit the model for the propensity score matches. The sample size of the 2016-2017 class of fifth grade students was 407 students, this meets the requirement based on a medium effect size setting the $\alpha$-level at .05 (Auger et al., 2014; Cohen, 1992). Of the 407 students, 156 students were in the treatment group having attended a full academic year of an all-day prekindergarten program and 251 were in the control group having attended no form of prekindergarten program in the school district. Participants were selected based on their enrollment in either a full academic year in an all-day prekindergarten program or their not being enrolled in district provided prekindergarten programming

and their consistent enrollment in the school district through their fifth grade school year.

A 1-to-many propensity score matching design was completed for the sample to reflect the population, as more students did not attend all-day prekindergarten than had attended all-day prekindergarten for the 2010-2011 school year resulting in uneven groups in the treatment and control groups (Holmes, 2014). When matched, using R for statistical programing, an optimal match was used. Optimal matching allowed for the best fit match to be made. To ensure that each group had a sufficient sample size, matches were collapsed into fewer groups without compromising the quality of the matches created. To remain in the model, covariates needed to be a predictor for either participation in an all-day prekindergarten program, the treatment, or a predictor for either of the outcomes, reading or math fluency. Covariates of race, socioeconomic status as determined by enrollment in the free and reduced lunch program, special education status, age, and English language learner classification were considered to determine the strongest matches. Gender was ultimately removed as it was not identified as a predictor for the treatment of all-day prekindergarten participation nor a predictor for either outcome of reading or math fluency.

A caliper of .25 standard deviation was considered using Mahalanobis distances as an acceptable distance for each match, a smaller standard deviation would have dropped more cases including treatment cases and a larger standard deviation would have resulted in a decreased strength of match for the cases. The optimal match initially created 14 strata and dropped 28 cases from the control group in which no suitable match was identified. No cases were dropped from the treatment group. The

groups were further collapsed to accommodate larger sample sizes in each stratum into five strata. As the groups were collapsed the balance of the groups was maintained to ensure that the matches were appropriate and strong. Propensity score stratification improved the balance between the treatment group and the control group and reduced the bias that can be caused by missing data. The results of this quasi-experiment will indicate the extent to which a statistically significant difference occurs academically or behaviorally for students who attended a full academic year of an all-day prekindergarten program when matched with students who did not attend a prekindergarten program.

**Variables**

The independent variable being studied was prekindergarten attendance and the dependent variables were student academic achievement and socio-behavioral development. The independent variable was examined in two groups, the treatment group and the control group. The treatment group consisted of students who attended a full academic year of an all-day prekindergarten program in the 2010-2011 school year, while the control group was comprised of students who attended no district provided prekindergarten programming during that same school year. The treatment of prekindergarten participation has already occurred for students who had been enrolled in an all-day prekindergarten program in the participating school district. The variable of prekindergarten attendance has been selected due to the interest in testing the relationship of prekindergarten participation with later academic achievement and socio-behavioral development over time (Bushhouse, 2006; Casto & Sipple, 2011;

Gormley, 2005; Mobbs, 2014; Neuhartch-Pritchett, 2005; Neuman, 2003; van Kleeck & Schuele, 2010; White et al., 2015).

The dependent variables selected to be studied were student academic achievement and socio-behavioral development. These variables have been chosen as they are an important emphasis of the curriculum and pedagogy in the prekindergarten classroom (Piaget, 1972). The continuous dependent variable of academic achievement over time was measured through RtI scores in reading and math fluency as collected in the AIMs Web database used by the participating school district (Curenton et al., 2015; Fitzpatrick, 2008; Gormley et al., 2011; Yoshikawa, 1995). Academic achievement over time as a dependent variable identified if a relationship existed between prekindergarten attendance and grade-level proficiency for students who attended a full academic year of all-day prekindergarten. Socio-behavioral development, the discrete dependent variable, was measured through discipline referrals collected on the student information system of Power School. Socio-behavioral development over time determined if prekindergarten participation predicts the amount of discipline referrals and suspensions a student receives during their elementary school years (Leyva et al., 2015; Magnuson et al., 2007). Procedures and routines are a major focus of the prekindergarten classroom. Therefore, measuring discipline referrals gives indicators of whether the soft skills taught in prekindergarten were sustained throughout elementary school years.

**Data Sources**

Data sources used in this study included Response to Intervention (RtI) data collected through AIMs Web database and discipline referrals collected through the

Power School database, a student information system. The data collected and analyzed from the RtI reading and math fluency scores of students in their second through fifth grade years of school informed the first research question and determined if prekindergarten participation has a correlation to academic achievement over time. The data collected and analyzed in the Power School database on discipline referrals and suspensions determined the likelihood a student had a behavioral incident throughout their years in elementary school informing the second research question.

The first research question was answered through the data collected from the school district's Response to Intervention (RtI) process. For the RtI process, the participating school district uses the program AIMs Web. AIMs Web provides three benchmarks a year, in the fall, winter, and spring in the following screeners: Reading Curriculum-Based Measurement (R-CBM), Reading Maze, Mathematics Concepts & Applications (M-CAP), Mathematics Computation (M-COMP), Spelling, Written Expression, Tests of Early Literacy (TEL), and Tests of Early Numeracy (TEN). For the purposes of this research, R-CBM and M-COMP were used. These assessment screeners were chosen because they test reading and math fluency, they are written for second through fifth grade, and they have been consistently used throughout the participating school district in elementary schools for the last five school years.

R-CBM is a reading fluency screener. Students individually read three separate passages for one minute to their assessor, while the words read correctly are recorded. The passage length, based on word count, is 250 words for second grade, 300 words for third grade, and 450 words for fourth and fifth grades (AIMs Web, 2012). After reading the three passages, the students scores are averaged and recorded in the AIMs

Web database. Passages for AIMs Web were developed by educators and were then field tested with 24 students per grade from suburban/rural school districts across the Midwest. Alternate-form reliability was used, calculating an overall .972 score of reliability. While criterion validity was examined, which identified that the R-CBM scores correlated approximately .7 of the state's reading tests in third through fifth grades.

M-COMP is a math fluency screener that was developed by experienced mathematic question writers (AIMs Web, 2012). Students complete a seven-minute test independently. It is scored and recorded in the AIMs Web program. Once written, reviewers determined that no question errors occurred, the items were solvable by the intended grade-level, and the answer key was accurate. Thus, alternate-form reliability was tested and a median reliability score of .88 was achieved. Criterion validity was conducted in third grade, receiving a score of .73. Hierarchical linear models was used to analyze the data collected for reading and math fluency from the school district's RtI model.

Data was collected on student participants' second through fifth grade school years, comparing students who attended a full academic year of an all-day prekindergarten program to those who attended no prekindergarten programming on measures of reading (R-CBM) and math (M-COMP) fluency. Data was collected on participants as second graders enrolled in 2013-2014 school year, and then with the same group of students in their third grade year of the 2014-2015 school year, fourth grade year of the 2015-2016 school year, and fifth grade year of the 2016-2017 school year with three benchmarks documented each year in the fall, winter, and spring. A

hierarchical linear model was used to analyze the data collected from reading and math fluency scores. This was done to answer the first research question, identifying if a full academic year of all-day prekindergarten program correlates with academic achievement, and if that achievement is sustained over time as has been suggested by some researchers (Mashburn et al., 2008; Nesbitt et al., 2015; Scott, 2012).

The second research question was answered through the gathering of information on discipline referrals and student suspensions collected in the school district's Power School database, comparing students who had attended a full academic year of an all-day prekindergarten program with those who had attended no prekindergarten programming. Research completed on the correlation between discipline referrals and socio-behavioral development has indicated that discipline referrals are a valid and efficient source of information for research on the topic (Pas, Bradshaw, & Mitchell, 2011; Rusby, Taylor, & Foster, 2007). In the participating school district, discipline referrals are collected by each school site and are recorded in a school database, Power School. In Power School, building-level administrators are able to record log entries. While log entries can be recorded on a variety of different concerns that have occurred during the school day, building-level administrators mainly focus its use on recording consequences for discipline referrals to the office. Power School logs the entries made from the building-level administrators and holds the information throughout the time the student is enrolled in the participating school district. Counts were collected on office referrals, suspensions, both short- and long-term, and in-school suspensions from schools. The data collected from discipline referrals were used to determine to what extent prekindergarten enrollment predicts

socio-behavioral development of students throughout their elementary school years, specifically focusing on discipline referrals to the office and suspensions, both in- and out-of-school.

The collection of discipline referrals, gave a picture of how students who have attended a full academic year of an all-day prekindergarten program compared to those who have not attended a prekindergarten program in following procedures and using conflict resolution strategies taught in the early years of school. The research study specifically narrowed in on suspensions for two reasons. First, suspensions are always reported to the district. Minor discipline referrals can be handled within a school and are not always reported, often left to the discretion of the building-level administrators. Second, suspensions are consequences that result in time spent out of the classroom, which can directly affect a student's academic progress. Therefore, suspensions should only be used as a last resort and often for the most extreme behaviors such as fighting or harm to self or others. A logistic regression was used to analyze the collected data on discipline referrals for students' kindergarten through fifth grade years of elementary school answering the second research question.

**Research Design**

Through the use of a hierarchical linear model and a logistic regression, the same students' data was analyzed throughout their elementary school years. This was done to examine the relationship of students who attended an all-day prekindergarten program on academic and socio-behavioral outcomes throughout their elementary school years, while also considering how these students performed compared to their matched peers who did not attend a prekindergarten program provided by the

participating school district (Cabell et al., 2013; Fischer et al., 2013; Gomez-Velez, 2010; Hustedt et al., 2015). Collecting this data provides feedback on academic achievement and socio-behavioral developmental differences identified by a 2-level hierarchical linear model on RtI data answering the first research question, and by the logistic regression on discipline referrals and suspensions answering the second research question. The analysis of this data determines if a significant difference exists between students who attended a full academic year of an all-day prekindergarten program and those who attended no prekindergarten program throughout their elementary school years on measures of academic achievement and socio-behavioral development for the participating school district.

Academic achievement was followed through the collection of RtI scores. In the participating school district, all students were assessed on reading and math fluency in three set increments throughout the school year identified as the fall benchmark, the winter benchmark, and the spring benchmark. The fall benchmark is set for the beginning of the school year, the winter benchmark in the middle of the school year, and the spring benchmark is set for the end of the school year. Each benchmark was a two-week assessment window.

Hierarchical linear models examine the differences within-individual development patterns and between-individual differences in those patterns. Further, using hierarchical linear models assessed the individual growth of students attending a full academic year of an all-day prekindergarten program over time and then contrasted that growth to like peers who attended no prekindergarten program. Hierarchical linear models measured the academic growth of students. In this

hierarchical linear model, data are organized at the student level, with this two-level analysis, level 1 was set at responses of student outcomes and level 2 was set at the student level and compared groups of students. This model identified if a relationship existed between this particular cohort of prekindergarten students on their reading and math fluency scores when compared with matched peers controlling for confounding variables answering the first research question.

The final 2-level hierarchal linear model structure is represented in the following equations:

Level 1 (student growth):

$$ACHIEVEMENT_{ti} = \pi_{0i} + \pi_{1i} * (TIME_{ti}) + \pi_{2i} * (TIME_{ti}^2) + e_{ti} \quad (1)$$

where $ACHIEVEMENT_{ti}$ represented the fluency scores of math and reading reported by RtI data and $\pi_{0i}$ represented the initial status of student scores, centered on Time 1 of 12. Students were assessed in 12 increments over four years of school, second through fifth grades. The initial status centered on the fall benchmark of second grade. Further, $\pi_{1i} * (TIME_{ti})$ and $\pi_{2i} * (TIME_{ti}^2)$ represented the linear and quadratic rate of change in achievement scores that occurred for each individual student *i* over time *t*. Lastly, $e_{ti}$ represented the within student random error in achievement with respect to time.

Level 2 (between students):

$$\pi_{0i} = \beta_{00} + \beta_{01} * (PK_i) + \beta_{02} * (LOGODDS_i) + \beta_{03} * (STR1_i) + \beta_{04} * (STR2_i) + \beta_{05} * (STR3_i) + \beta_{06} * (STR4_i) + r_{0i} \quad (2)$$

$$\pi_{1i} = \beta_{10} + \beta_{11} * (PK_i) + \beta_{12} * (LOGODDS_i) + \beta_{13} * (STR1_i) + \beta_{14} * (STR2_i) + \beta_{15} * (STR3_i) + \beta_{16} * (STR4_i) \quad (3)$$

$$\pi_{2i} = \beta_{20} + \beta_{21} * (PK_i) \quad (4)$$

where $\beta_{00}$ represented the average initial status of fluency scores for students who did not attend prekindergarten and $\beta_{01}$ was the average linear change in math and reading fluency scores for students who did not attend prekindergarten. $\beta_{02}$ was the quadratic term representing the average change in math and reading with respect to time for students who did not attend prekindergarten. The term $r_{0i}$ represented the random error associated with the average initial status with respect to all-day prekindergarten, log-odds of prekindergarten membership, and the propensity strata. $\beta_{10}$ represented the average linear growth in fluency scores for students who did not attend prekindergarten and $\beta_{11}$ was the average linear change in math and reading fluency scores per time point for students who attended all-day prekindergarten. $\beta_{12}$ was the quadratic term representing the average quadratic change in math and reading scores with respect to time for students who did not attend prekindergarten.

A one-level logistic regression was used to measure the socio-behavioral development of students. Logistic regressions are used to predict probability. A one-level logistic regression identifies the likelihood that an observation will be linked to two different categories. In this study, the observation was the probability of a student receiving a discipline in the form of an office referral and the probability that the office referral resulted in a school suspension. Data was collected in dichotomous groups; 1) the student did or did not receive an office referral from kindergarten through fifth grade, and 2) the student's office referral did or did not result in a suspension from school during kindergarten through fifth grade. The analyzing of discipline referrals and school suspensions answered the study's second research question determining if participating in an all-day prekindergarten program resulted in

a decrease in office referrals and school suspensions throughout the student's elementary school years for the participating school district.

**Potential Threats to Validity**

Potential threats to validity to be considered included maturation of subjects, instrumentation, and attrition. Maturation occurs when subjects naturally change during the passage of time rather than due to the treatment, in this case due to their participation in all-day prekindergarten. Subjects may perform better or worse as maturation occurs, this is considered a potential threat to validity in this research study. The participants, students who attended a full academic year of an all-day prekindergarten program and those who attended no prekindergarten program, may perform better on measures of academic achievement or socio-behavioral development because of their natural growth and development over time and not due to their participation or lack of participation in the treatment. This study attempts to decrease the impact of this potential threat to validity through using a matched pair subject design, which matches subjects based on student similarities in exogenous characteristics, such as socioeconomic status, gender, race, special education category, age, and English language learner classification as reported during the students' fifth grade year of schooling. The study also limits this threat to validity through the use of hierarchical linear models which will test students' academic achievement over time, allowing for multiple measures to be considered on each student.

Instrumentation was considered as another potential threat to validity. Instrumentation should be objective, reliable, and valid. The instrumentation being used for this research study was AIMs Web's RtI data. Information on the validity and

reliability of these screeners has been researched, published, and previously discussed; however, instrumentation was still considered as a potential threat to validity (AIMs Web, 2012). As with any classroom administered assessment, issues of teacher training, measures of assessment administrator reliability, and testing environment can all impact student outcomes. However, by collecting data from RtI over multiple measures through multiple years of school addressed this limitation as multiple sources of data collected over multiple years decreases this threat to validity.

Lastly, attrition was considered a potential threat to the validity of this research study. Attrition refers to bias that occurs based on which subjects remain in the study and which subjects leave the study. Attrition of either the control group or the treatment group can cause a threat to the validity of this study. Therefore, attrition has been and will be addressed throughout the study, as it has the potential to greatly impact the results based on which and how many students may drop throughout the data collection. Attrition is reported on to verify that it does not effect the results of the study. Overall five cases were dropped due to attrition, three participants from the control group and two from the treatment group. The small number of cases dropped throughout the study did not impact the results.

**Limitations of Study**

A few potential limitations exist for this study. First, for several years now the states' academic standards have been in flux. Oklahoma has gone from Priority Academic Student Standards (PASS) to Common Core Curriculum Standards (CCCS), back to PASS, and then to the recently developed Oklahoma Academic Standards (O-AS) within the last seven years impacting the first research question.

While CCCS was never fully implemented, many districts, including the participating school district, had already began the process of transitioning to the national standards. The inconsistency in standards has also led to challenges to fully prepare students for academic success. However, the participating school district has consistently called for rigor and relevance in every classroom. The school district has continued to have updated curriculum, master teacher created units of study, and learning rubrics that lead to consistency across the district of high-levels of teaching and student learning.

Another potential limitation to this study was the use of discipline referrals as a measure of socio-behavioral development effecting the second research question. Each school and building-level administrator handles discipline referrals differently. While some teachers might send a student to the office on a discipline referral for talking back, another teacher might only send a student to the office for fighting or extreme behavior. Though this might prove a limitation, the participating school district has a record keeping system in place for student discipline referrals, collecting data on the students throughout their school years. Through the use of the program Power School, log entries on student behavior can be viewed to determine the amount of times the student was sent to the office and the amount of time the student spent suspended, collecting information over several years of the participants' school experience, kindergarten through fifth grade. Behaviors warranting office referrals, for the purposes of this study included but was not limited to failure to comply, unsafe behavior to self or others, disruptive conduct, weapon, obscenity or profanity, harassment or open defiance.

Lastly, matching students as a sampling procedure of this study was important to ensure that the results were valid and reliable. Many students might have strong academic and behavior success in later grades that did not attend an all-day prekindergarten program. Likewise, students who attended an all-day prekindergarten program might be struggling to reach academic and behavioral expectations for fifth grade. Therefore, matching on demographics ensured that collected data fairly represent the student participants through the use of the following exogenous characteristics of race, gender, socioeconomic status, special education category, age, and English language learner classification as reported in their fifth grade year of school.

# Chapter 4

## Results

Data was collected and analyzed using a hierarchical linear model and a logistic regression. Data was collected on the same group of students throughout their school years in the areas of academic achievement and socio-behavioral development to identify if a correlation existed between the dependent variables and student participation in the school district's all-day prekindergarten program. Students were matched with like peers who did not receive the treatment of an all-day prekindergarten program on blocking variables of exogenous characteristics for the students using propensity score matching. The exogenous characteristics, reported during the students' fifth grade year of school, included gender, race, socioeconomic status based on enrollment in the free and reduced lunch program, special education status, age, and English language learner classification. Academic achievement data was collected on indicators of math and reading fluency through the use of the districts RtI data collection to answer the first research question. While socio-behavioral data was collected in the form of discipline referrals to the office and suspensions in- and out-of-school to answer the second research question.

### Research Questions

For the purposes of this study, data was collected in order to answer two research questions. The collection of RtI data informs the first research question: Does a full academic year of an all-day prekindergarten program correlate with academic outcomes on scores of reading and math fluency throughout elementary school years? The hypothesis stated that a full academic year of all-day prekindergarten enrollment

has a positive relationship with student performance on reading and math fluency scores throughout elementary school years. The null hypothesis stated that a full academic year of all-day prekindergarten enrollment has no relationship with student performance on reading and math fluency scores throughout elementary school years. Data collection and analysis explained the extent to which a full academic year of an all-day prekindergarten program influenced students' academic achievement in reading or math fluency scores throughout elementary school years for the participating students in the research study.

The second research question was answered through the collection of discipline referrals and suspensions from school. The second research question asked: To what extent does a full academic year of all-day prekindergarten enrollment predict the likelihood of a student receiving office discipline referrals, suspensions, or in-school suspensions throughout elementary school years? With the hypothesis stating that a full academic year of all-day prekindergarten enrollment has a positive influence on decreasing the number of office discipline referrals, suspensions, or in-school suspensions throughout elementary school years. The null hypothesis stated that a full academic year of all-day prekindergarten enrollment has no influence on the number of office discipline referrals, suspensions, or in-school suspensions throughout elementary school years. Collecting discipline referrals from the school sites revealed the extent to which a full academic year of an all-day prekindergarten program was able to predict a behavioral difference for students throughout elementary school years for the participating students in the research study. This research study sought to determine the extent a full academic year of an all-day prekindergarten program

correlated with later academic achievement and socio-behavioral development for the participating school district's prekindergarten program.

**Descriptive Statistics**

The participants in the treatment group of this study were students in the participating school district who attended a full academic year of the school district's all-day prekindergarten program while the control group consisted of the school district's students who did not participate in any amount of time in the district's prekindergarten program for the 2010-2011 school year. Students who participated in this research study were in kindergarten during the 2011-2012 school year, first grade during the 2012-2013 school year, second grade during the 2013-2014 school year, third grade during the 2014-2015 school year, fourth grade during the 2015-2016 school year, and fifth grade during the 2016-2017 school year. Of the students participating in the research study 38% ($n$ =156) received the treatment, attending a full academic year of the school district's all-day prekindergarten program while 62% ($n$ = 251) did not attend a district provided prekindergarten program (see Table 1).

Table 1 and the following summary provides a representation of the demographic data for the research study's sample of fifth grade students enrolled in the participating school district. The sample used was a portrayal of the larger school district and reflected similar demographics. Further, the demographic data was used to match students for the propensity score matching design. Of all the students participating in the study 24% ($n$ = 98) were reported as black or African American, 24% ($n$ = 97) were reported as Hispanic or Latino, 37% ($n$ = 149) were reported as white, and 15% (n = 60) were reported as another race or ethnicity, most often Asian

or Native American and encompassed students who identified as being a part of multiple races (see Table 1). This data are consistent with the overall school districts ethnic and racial demographics. Further, 49% ($n$ =199) identified as male and 51% ($n$ = 208) identified as female (see Table 1). Age was also considered as a variable and has been reported on in six-month increments, students born before September 1, 2005 being identified as older students, students born between September 1, 2005 and February 28, 2006 identified as being in the middle age bracket, and students born after March 1, 2006 identified as being younger students. Older students made up 12% ($n$ = 47) of the participants, students born in the middle-age bracket made up 41% ($n$ = 164) of the student participants, and 47% ($n$ = 191) of students were identified as being a part of the younger age bracket (see Table 1). The cut off for age enrollment of this student population was September 1, meaning students had to be 4-years-old by September 1, 2010 to enroll in the school district's all-day prekindergarten program.

Students participating in the Free and Reduced Lunch Program, a national program provided to families in lower income brackets, represented 65% ($n$ = 263) of the participants (see Table 1). This is consistent with the participating school district's larger student population. While students receiving a specialized form of education were identified as 16% ($n$ = 64) on an Individualized Educational Plan (IEP) or a section 504 plan for the classroom, 30% ($n$ = 121) were enrolled in gifted programming, and 27% ($n$ = 109) had received English Language Learning (ELL) services at some point in their schooling careers as English was not their first language or the language most often spoken in their home (see Table 1).

Table 1

*Demographic Data*

| *Participant characteristics* | *N* | % |
|---|---|---|
| Prekindergarten | 156 | 38 |
| No Prekindergarten | 251 | 62 |
| Race | | |
| Black | 98 | 24 |
| Hispanic | 97 | 24 |
| White | 149 | 37 |
| Other | 60 | 15 |
| Gender | | |
| Male | 199 | 49 |
| Female | 208 | 51 |
| Meal Plan | | |
| Free/Reduced Pay | 263 | 65 |
| Special Education Status | | |
| IEP/504 | 64 | 16 |
| Gifted Programming | 121 | 30 |
| Age | | |
| Born before 9/1/2005 | 47 | 12 |
| Born between 9/1/2005 and 2/28/2006 | 164 | 41 |
| Born after 3/1/2006 | 191 | 47 |
| Home Language | | |
| ELL | 109 | 27 |

**Results**

This section discusses the effect of the treatment, prekindergarten attendance, on the outcomes of academic achievement and socio-behavioral development through the use of a hierarchical linear model and a logistic regression. The statistical program R was used to create propensity scores, 14 strata were initially 1-to-many matched, which was then collapsed into five strata to create larger sample sizes within each match. Strata were 1-to-many matched due to the uneven sample sizes of the treatment and control groups. Optimal matching was used to ensure that the closest matches occurred. At this point, the degree to which the matches could have diminished the

covariates' differences were examined as these matched covariates predicted each participants' likelihood to receive the treatment, enrollment in district provided all-day prekindergarten program, and the outcome of academic achievement. Covariates included race, socioeconomic status as determined by enrollment in the free and reduced lunch program, special education status, age, and English language learner classification. Gender was initially considered as a covariate but was removed as it was not a predictor for participants receiving the treatment nor was it a predictor for the outcomes, in summary gender had no influence on math or reading scores of fluency. Ultimately, 28 cases from the control group were dropped from the analysis as no sufficient match was identified.

Next, an independent sample t-tests, or a Mann-Whitney U tests, for sample sizes under 30, were used to examine and count the strata's statistically significant covariate differences after matches were identified and collapsed. Mann-Whitney U tests were used due to the smaller sample sizes of many of the strata, identifying if any of the collapsed strata achieved statistical significance. At a type 1 error rate of .05, approximately 95% of the strata needed to be considered not significant. Balance of 0.981 was achieved on all collapsed strata and all were considered not statistically significant (see Table 2). Therefore, an analysis was run on the data of the five strata. The following table is an explanation of the results of the post-stratification balance checking of covariates within the multilevel propensity model that predicted prekindergarten for the participating students.

Table 2

*Post-Stratification Balance Checking Analysis of Covariates in the Multilevel Propensity Model Predicting Prekindergarten for Participating Students*

| Variable | Corr. w/ PK | #non-sig strata |
|---|---|---|
| Student characteristics | | |
| Race | | |
| Black | .041 | 5/5 |
| White | -.032 | |
| Hispanic | .033 | 5/5 |
| Other | -.012 | 5/5 |
| Gender | | |
| Male | -.368*** | 4/5 |
| Meal Plan | | |
| Free/Reduced Pay | -.009 | 5/5 |
| Special Education Status | | |
| IEP/504 | -.056 | 5/5 |
| Gifted Programming | -.029 | 5/5 |
| Age | | |
| Born before 9/1/2005 | -.049 | 5/5 |
| Born between 9/1/2005 and 2/28/2006 | -.003 | 5/5 |
| Born after 3/1/2006 | .003 | 5/5 |
| Home Language | | |
| ELL | .053 | 5/5 |
| | | 54/55= 98.1% |

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

As a final check of balance, the log-odds of the prekindergarten treatment were examined. This was done to ensure that the collapsing of the original 14 strata into five strata with larger sample groups created equilibrium in the final model. As the groups were collapsed, balance was maintained, and the matches remained appropriate and strong. Table 3 indicates that no statistical difference occurred for each of the strata's average log-odds. The final five strata created larger sample sizes in each stratum while maintaining the integrity of the model (see Table 3).

Table 3

*Balance of the Logit of the Propensity Score for Prekindergarten Attendance*

| | Prekindergarten Attendance (PK=1) | | | No Prekindergarten Attendance (PK=0) | | | |
|---|---|---|---|---|---|---|---|
| Stratum | N | M | SD | N | M | SD | $\lvert M_1 - M_0 \rvert$ $(p)$[a] |
| 1 | 30 | .194 | .397 | 7 | .031 | .175 | .163 (.984) |
| 2 | 94 | .610 | .489 | 87 | .395 | .490 | .215 (.596) |
| 3 | 19 | .123 | .329 | 48 | .218 | .413 | .095 (.722) |
| 4 | 7 | .045 | .208 | 34 | .154 | .362 | .109 (.861) |
| 5 | 4 | .026 | .159 | 44 | .200 | .400 | .174 (.544) |

$^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$

Note. [a]$p$-values for strata with less than n=30 in treatment/control were calculated by means of non-parametric test. The original 14 strata generated by the match were collapsed into the five seen here.

**Research question 1.** Research question 1 sought to identify if a full academic year of a district provided all-day prekindergarten program correlated with academic outcomes on scores of reading and math fluency throughout a student's later elementary school years. To analyze the data a hierarchal linear model was used. Level 1 of the model focused on student outcomes and represented what was happening within groups. Level 2 of the model focused on the individual student and represented what was happening between groups of prekindergarten and non-prekindergarten students. For this particular hierarchical linear model, data was analyzed separately for reading and math fluency scores. The full hierarchical linear model analysis is displayed in Table 4. The following discussion reviews the reading results and then the math results for the hierarchical linear model completed in this research study.

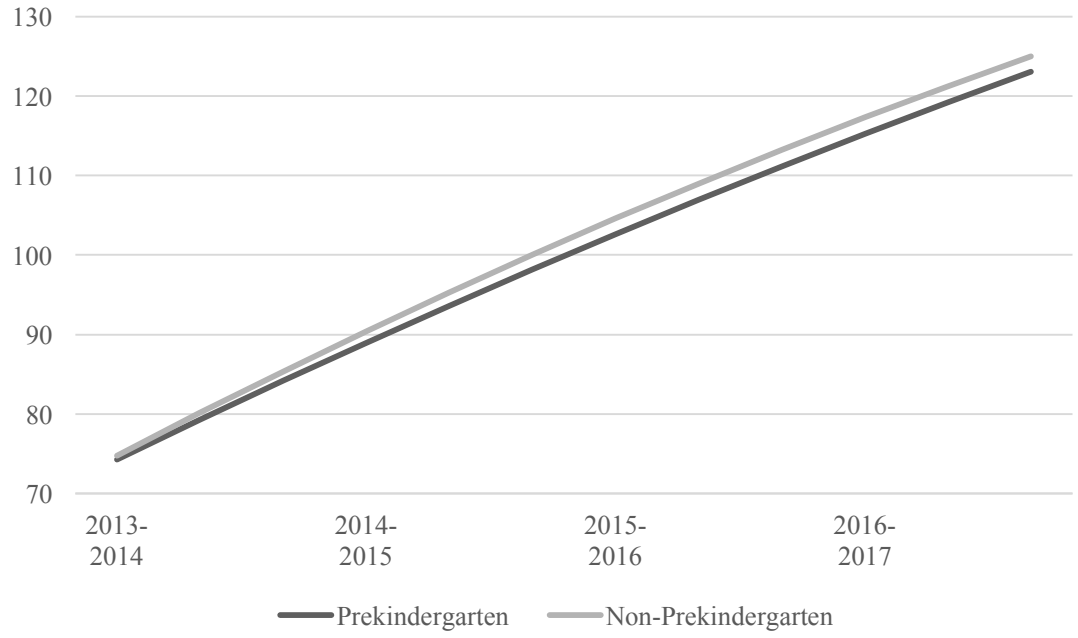
As indicated in Table 4, the robust standard errors were used on the final estimation of fixed effects. Robust standard errors were used due to the smaller sample size of each stratum. Strata five was removed as a hold out group to compare with

other strata. The initial status was identified as second grade fall benchmark for reading fluency scores, the first time period in which data was collected and analyzed. Students who had attended a full academic year of an all-day prekindergarten program provided by the participating school district had a similar initial status as non-prekindergarten students ($\beta_{00} = 74.74$, SE = 6.02). Further, both the control and the treatment groups increased at a similar rate from second grade throughout fifth grade and that growth over time decelerated at a similar rate ($\beta_{01} = -.46$, SE = 3.84; $\beta_{02} = 15.34$, SE = 2.72).

Students who had attended a full academic year of an all-day prekindergarten program provided by the participating school district had similar scores than those who did not attend a prekindergarten program in initial status and rate of change. Research indicates that when measuring academic achievement over time a decrease in the rate of change can be found, this was consistent with pervious research on prekindergarten achievement (Bedford & Casbergue, 2012; Fischer et al., 2013; Gomez-Velez, 2010). While both the treatment and the control group had a decrease in their rate of change over time, students who attended a full academic year of an all-day prekindergarten program declined at a slower rate than those who had not attended prekindergarten ($p < .001$). Figure 1 represents the initial status and the rate of change experienced throughout the students' second through fifth grade years of school on reading fluency scores over time.

Figure 1

*Initial Status and Rate of Change of Students' Reading Scores Over Time*



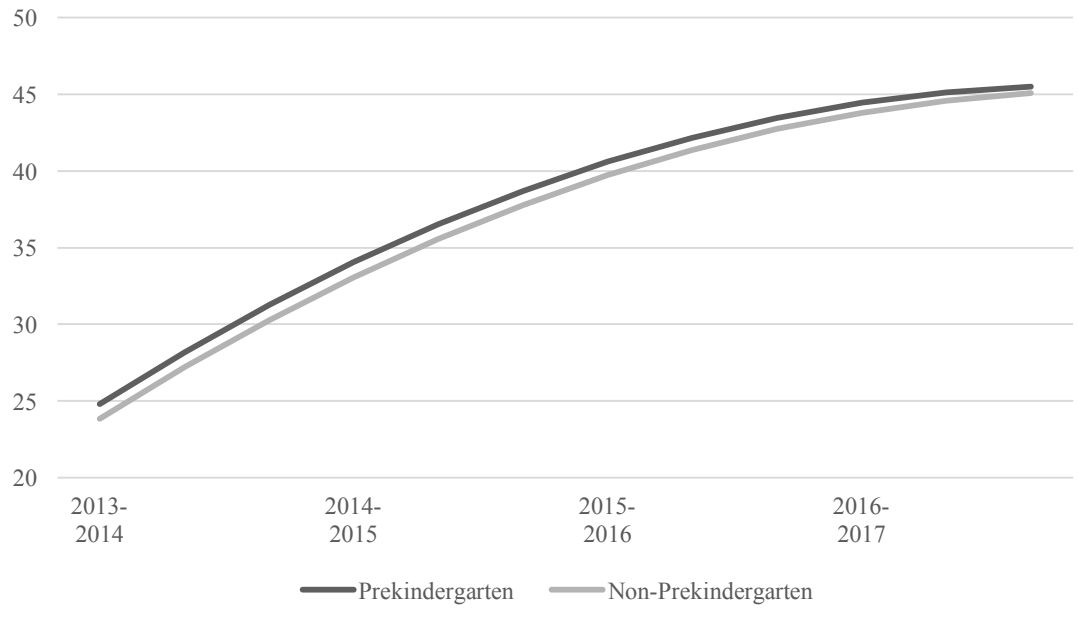

Since, data was collected in three increments throughout each school year, differences between each time period were smaller increments than what might have been for a year-to-year analysis. The null hypothesis stated that a full academic year of all-day prekindergarten enrollment has no relationship on student performance of reading fluency scores throughout elementary school years; therefore, we accept the null hypothesis, as the analysis indicated that a significant difference did not occur for the initial status or the rate of change over time for student's who had attended a full-academic year of all-day prekindergarten on outcomes of reading fluency (see Table 4, see Figure 1).

A fixed effects model was completed for the math results and did not indicate a significant difference in the initial status of math fluency scores, however, students who attended a full academic year of an all-day prekindergarten program did begin

second grade at the fall benchmark with higher scores than students who had not attended a prekindergarten program ($\beta_{00}$ = 23.84, SE = 1.54). Second grade was chosen as the initial status for math fluency as it is the first time period in which data was collected and analyzed. The rate of change for both the treatment group and the control group of students was consistent and not significantly different ($\beta_{01}$ = .09, SE = 1.06; $\beta_{02}$ = 4.21, SE = .88). Figure 2 represents the initial status and rate of change for students' math scores over time. While students' scores in the initial status was not significant, the figure demonstrates that a difference does occur for students who attended a full academic year of an all-day prekindergarten program when compared to those who did not attend prekindergarten.

Figure 2

*Initial Status and Rate of Change of Students' Math Scores Over Time*




For math fluency, data was also collected in increments of three scores each school year and the range of scores a student could receive on any given test was less

than in the R-CBM. The null hypothesis stated that a full academic year of all-day prekindergarten enrollment has no relationship on student performance of math fluency scores throughout elementary school years; therefore, we accept the null hypothesis as there was no significant difference over time for the participating students' math fluency (see Table 4).

Table 4

*Final Estimation of Fixed Effects*

| | Reading | | Math | |
|---|---|---|---|---|
| *Student Fixed Effects* | *coef* | *SE*[a] | *Coef* | *SE*[a] |
| Intercept $\pi_0$ | 74.74 | 6.02*** | 23.84 | 1.54*** |
| Prekindergarten Attendance (PK) $\beta_{01}$ | -0.46 | 3.85 | .96 | 1.06 |
| Student Log-odds of PK $\beta_{02}$ | 15.34 | 2.72*** | 4.21 | .88*** |
| Stratum 1 $\beta_{03}$ | -6.68 | 9.48 | -4.04 | 2.80 |
| Stratum 2 $\beta_{04}$ | -5.73 | 7.08 | -3.31 | 1.77~ |
| Stratum 3 $\beta_{05}$ | -9.33 | 7.47 | -7.59 | 2.02*** |
| Stratum 4 $\beta_{06}$ | -15.56 | 7.76~ | -5.17 | 1.95~ |
| TIME slope for Rate of Change $\pi_1$ | 10.933 | .61*** | 7.01 | .30*** |
| Prekindergarten Attendance (PK) $\beta_{11}$ | -.80 | .69 | .06 | .35 |
| Student Log-odds of PK $\beta_{12}$ | .20 | .21 | -.08 | .09 |
| Stratum 1 $\beta_{13}$ | -.39 | .71 | .48 | .32 |
| Stratum 2 $\beta_{14}$ | -.03 | .54 | .30 | .23 |
| Stratum 3 $\beta_{15}$ | .08 | .59 | .18 | .24 |
| Stratum 4 $\beta_{16}$ | .76 | .61 | .41 | .26 |
| TIME2 slope for Rate of Change $\pi_2$ | -.32 | .03*** | -.57 | .02 |
| Prekindergarten Attendance (PK) $\beta_{21}$ | .09 | .05~ | -.02 | .03 |
| *Random Effects* | | | | |
| Intercept $r_0$ | | 32.09*** | | 8.05*** |
| TIME slope for Rate of Change $r_1$ | | 3.85*** | | |
| TIME2 slope for Rate of Change/ $r_2$ | | .26*** | | |
| Level 1 Student Growth $e$ | | 15.66 | | 14.78 |

***$p < .001$, **$p < .01$, *$p < .05$, ~$p < .10$

*Note:* Stratum 5 is the comparison group. [a]Robust standard errors reported.

**Research question 2.** Using a one-level logistic regression, counts were created for each student indicating whether or not they had been referred to the office for behavior. A separate logistic regression was conducted to identify whether or not the office referral resulted in a school suspension, both in- and out-of-school

suspensions were considered. Data was collected throughout the student's elementary school years including kindergarten through fifth grades to identify if a significant difference occurred between students who had attended a full academic year of an all-day prekindergarten program and those who did not attend prekindergarten. For the analysis the variable was dichotomous, the propensity scores from the previous analyses were employed, and the remaining differences of the groups were controlled. The results indicated that the odds of a student in the control group being sent to the office on a discipline referral was statistically significant with log-odds = .542. Therefore, students who had attended a full academic year of an all-day prekindergarten program were approximately 50% less likely to be sent to the office on a referral for behavior (SE = .284, $p < .05$). Further, the odds of a student in the control group being suspended from school following an office referral was statistically significant with log-odds = .496. Hence, prekindergarten students were approximately 50% less like to be suspended from school for behavior (SE = .351, $p < .05$). The null hypothesis stated that a full academic year of all-day prekindergarten enrollment has no influence on the number of office discipline referrals, suspensions, or in-school suspensions throughout elementary school years. Therefore, the null hypothesis was rejected as the analysis implies that a statically significant ($p < .05$) difference occurred on measures of socio-behavioral development for students who attended a full academic year of an all-day prekindergarten program compared to students who attended no amount of prekindergarten program in the participating school district (see Table 5).

Table 5

*Logistic Regression of Student Office Referrals and Suspensions during Kindergarten through Fifth Grade*

| | Office Referrals | | | | Suspensions | | | |
|---|---|---|---|---|---|---|---|---|
| *Variable* | B *Coef* | SE | log-odds | *T* | B *Coef* | SE | log-odds | *t* |
| PK | -.612 | .284 | .542* | 4.634 | -.700 | .351 | .496* | 3.988 |
| Log odds | -.228 | .180 | .796 | 1.599 | -.031 | .207 | .970 | .022 |
| Stratum 1 | -.773 | .745 | .462 | 1.075 | -1.94 | 1.177 | .144 | 2.718 |
| Stratum 2 | -.172 | .461 | .842 | .139 | -.414 | .524 | .661 | .624 |
| Stratum 3 | .087 | .455 | 1.091 | .037 | .099 | .506 | 1.104 | .038 |
| Stratum 4 | -.813 | .569 | .444 | 2.043 | -.788 | .646 | .455 | 1.489 |
| Constant | -.785 | .447 | .456 | 3.091 | -1.10 | .500 | .331 | 4.887 |
| $r^2$ | 54% | | | | 49% | | | |

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

*Note:* Stratum 5 is the comparison group.

**Summary of Results**

In summation, there was no statistically significant difference in the reading fluency scores at the initial status and the rate of change when comparing students who had attended an all-day prekindergarten program when compared to students who had not attended a prekindergarten program. However, as the students progressed through their elementary school years and their rate of change gradually decreased overtime, by the final data point, students' spring benchmark in fifth grade, students who had attended a full academic year of an all-day prekindergarten program had a slower decrease in their rate of change than students who had not attended prekindergarten on outcomes of reading fluency (see Figure 1; see Table 4). However, on scores of math fluency no statistical significance was identified for either the initial status, second grade fall benchmark, or the rate of change (see Figure 2, Table 4). Although students did begin their year in second grade with higher initial math scores, initial status was not statistically significant. A statistical significance did occur on

measures of socio-behavioral development with participating students being less likely to be sent to the office on a discipline referral and were less likely to receive a suspension for inappropriate school behavior from an office discipline referral (see Table 5).

# Chapter 5

## Conclusions

The research study presented in this dissertation sought to identify if a statistically significant difference occurred for students who had attended a full academic year of a district provided all-day prekindergarten program when compared to students who had not attended prekindergarten on measures of academic achievement and socio-behavioral development. A hierarchical linear model was employed to determine if a statistical significant difference existed for students' initial status of scores as well as the rate of change over time in scores for both reading and math fluency. A logistic regression was used to identify if students' behavioral performance was statistically different in the form of office referrals and suspensions during a students' later elementary school years. The focus on academic achievement and socio-behavioral development were chosen due to the emphasis of both areas in the prekindergarten classroom (Fischer et al., 2013; Hustedt et al., 2015; Leyva et al., 2015; Piaget, 1972).

This study ascertained that for the students in this mid-sized, urban participating school district, attending a full academic year of the district provided all-day prekindergarten program did not correlate with academic achievement, though preparing prekindergarten students for later academic achievement is not a goal nor the purpose of the universal prekindergarten program provided by this participating school district or the state of Oklahoma. Students who had previously attended the all-day prekindergarten program had similar reading fluency scores upon entering second grade and had a slower decrease in the rate of change in their reading fluency scores

over time when compared to students who had not attended prekindergarten. The math fluency initial status for students who had attended an all-day prekindergarten program began second grade with higher scores; however, it was not statistically significant and the rate of change was similar between the treatment and the control groups of students who had attended all-day prekindergarten and those who did not attend any amount of prekindergarten. Students growth at similar rates throughout the students' later school years made evident the high expectations and academic performance of the participating school district. Though a statistically significant difference between the two groups did not occur, high achievement between both groups was evident.

A statistically significant difference did occur on measures of socio-behavioral development, as students who had attended the school district's all-day prekindergarten program were less likely to receive an office referral or a suspension during their elementary school years. Students who had participated in the school district provided all-day prekindergarten program were approximately 50% less likely to receive an office referral or suspension from an office referral. This made evident that students who had attended the all-day prekindergarten program had strong socio-behavioral development, having learned the soft-skills of school (Pas et al., 2011; Rusby et al., 2007). This resulted in more time spent in the classroom, engaging with peers, and participating in learning opportunities throughout their elementary school years.

The evidences of this study was atheoretical as the purpose was to present outcomes and potential differences of students' academic achievement and socio-behavioral growth; however, it was conducted under the lens of two theories serving

as a guiding framework to the research study, cognitive development theory and open systems theory. Cognitive development theory provided a basis for what happening in the classroom environment of early childhood, including all-day prekindergarten (Piaget, 1972). The academic and socio-behavioral results from this study correlated with evidences from Piaget's cognitive development theory that purports that the early childhood should classroom is focused around discovery and cooperative learning (Piaget, 1972). The students who had attended the district provided all-day prekindergarten program demonstrated strong academic growth and socio-behavioral development throughout their school years.

While open systems theory provided a guiding framework by explaining how a school district makes decisions and responds to its larger community about programs, such as all-day prekindergarten (Scott, 2008). It is the basis for what is happening around the school district. The study sought to identify how what is happening in the all-day prekindergarten classroom correlated with later learning in an attempt to provide information to the school district as decisions are being made that greatly affect the functionality of the all-day prekindergarten classroom. Many voices have entered the conversation about how four-year-old students will be educated and who should bear the responsibility for providing early childhood education services. Policymakers are in the most authoritative decision-making roles. Consequently, educational leaders and parents should make efforts to develop relationships with individuals and groups of legislators. Educational leaders and parents can build relationships with legislators giving them the opportunity to voice their informed opinions about the merits of prekindergarten as an important grade-level. This practice

may impact future decisions about prekindergarten programming by building a strong base of support. Results from this study suggests that all-day prekindergarten has some important longer-term benefits for students who had participated in the program.

**Interpretation of Results**

Results suggest that for students who attended an all-day prekindergarten program scores in reading decreased at a slower rate than students who had not attended any prekindergarten program, while for math, fluency scores were slightly higher at the beginning of second grade but there was no difference in the rate of change between the students who attended an all-day prekindergarten program and those who had not attended a full academic year of an all-day prekindergarten program. Previous research has indicated that it is common for students to steadily decrease in their overall rate of change as they move through the grades beyond prekindergarten (Cabell et al., 2013; Fischer et al., 2013; Gomez-Velez, 2010). Research on the connection between socio-behavioral development and reading outcomes have indicated that a strong correlation exists between classroom climate and student performance (Jennings & Greenberg, 2009; Ning, Van Damme, Van Den Noortgate, Yang, & Gielen, 2015; Wehby, Falk, Barton-Arwood, Lane, & Cooley, 2003). Though a statistical difference did not occur between the control and treatment groups, strong growth was apparent for all students throughout their later school years, as the participating school district has a consistently high rate of academic achievement.

The results on measures of socio-behavioral development, matches other similar research findings on the effects of behavior on prekindergarten participation

(Eggum-Wikens et al., 2014; Guss et al., 2016; Weiland & Yoshikawa, 2013; Zhai et al., 2015). It is evident that the participants in the school district's all-day prekindergarten program demonstrated self-control and fewer negative behaviors in the classroom throughout their elementary school years. This resulted in students who had attended all-day prekindergarten being sent to the office for a discipline referral and being suspended for behavior infractions in lower numbers than their peers who had not attended all-day prekindergarten. The results indicated that attending a district providing all-day prekindergarten program had a positive correlation with students' later socio-behavioral development throughout their elementary school years.

The results from this study align with Piaget's cognitive development theory that explains learning in the early childhood classroom as concentrated on a child's understanding of symbolic representation of letters and numbers with a focus on cooperative learning (Piaget, 1972). These tenants are an important part of the prekindergarten classroom and are the foundation of the practice and curriculum of the early childhood classroom. The intent of the prekindergarten classroom is providing students concrete experiences in groups with others; building the base for later learning and cooperation. In this study, the measure of later academic achievement focused on reading and math fluency, with the measure of socio-behavioral development collected through discipline referrals to the office. These measures identified that a difference occurred in academic achievement and socio-behavioral development over elementary school years for students who had attended a full-academic year of an all-day prekindergarten program.

As previously discussed, Oklahoma has drawn national attention for its commitment to strong early childhood practices (Georgetown Research Study, 2016; NIEER, 2016). The research has indicated that access and quality are evident through Oklahoma's prekindergarten model. This research study adds to the current literature about the topic of prekindergarten and indicates that the developmentally appropriate practices of the prekindergarten model provides a benefit to students' later socio-behavioral development. Therefore, the K-12 grade-levels could learn from the developmentally appropriate learning experiences prekindergarten provides students; such as, hands-on learning experiences, exploration-based learning, and cooperative style learning opportunities (Fischer et al., 2013; Hustedt et al., 2015; Leyva et al., 2015; Piaget, 1972).

Some limitations existed for the results of this research study. First, due to the size of the participating school district and the number of students who had attended a full academic year of an all-day prekindergarten program for the 2010-2011 school year, the sample size of the participants was relatively small. While the analyses that were used can accommodate for the sample size provided, a larger sample size might have provided stronger results, especially for the academic achievement scores in reading and math fluency. Further, the results lacking statistical significance in the math fluency data could be attributed to the smaller range of scores the math fluency assessment provided. On any given assessment, the highest score a student can receive is a score of 75. This made the range of scores much smaller than other assessments, including the reading fluency assessment analyzed in this research study.

Another possible limitation to this study is not having academic data for kindergarten and first grade school years. It was observed in the math assessments that the students who had attended an all-day prekindergarten program began their second grade fall benchmark with higher scores than the students who had attended no prekindergarten programing. This aligns with earlier research about prekindergarten suggesting students attending a prekindergarten program have higher achievement scores in grades kindergarten through second (Cabell et al., 2013; Fischer et al., 2013; Gomez-Velez, 2010). At the time the data was collected for the research study, no Response to Intervention (RtI) data was being collected on AIMs Web for kindergarten or first grade in the participating school district. This has since changed, with data being collected in AIMs Web for grades kindergarten through middle school. A gap in the data collection did not hinder this research study, as the objective was to identify a difference in later academic achievement.

**Recommendations for Further Study**

Further research on all-day prekindergarten should be conducted as the limitations of this research study could be rectified in other study designs using a similar analysis, identifying academic achievement and socio-behavioral development over a student's later school years. More research is recommended on the later elementary and secondary school years for students who have attended an all-day prekindergarten program. It is clear, based on previous empirical research, that there are benefits for the immediate early years and there is evidence that there are potential benefits for the post-school years; however, it would be beneficial to continue to follow students who have attended an all-day prekindergarten program to identify

differences in academic achievement and socio-behavioral development. Many early childhood programs that are not state-funded have seen progress through the lifetime of their former students. As access to all-day prekindergarten programs continues to increase, it would be beneficial for researchers to follow the growth and development of enrolled students.

This research study used a hierarchical linear model in this research study for an analysis of what was happening within and between student participants. However, further analysis of prekindergarten outcomes should examine the classroom-level and the school-level within a hierarchical linear model. By using multilevel models to analyze the practice of prekindergarten, issues of quality of and access to the prekindergarten classroom may be explored. As previous research has indicated that quality and access are meaningful when evaluating prekindergarten practices (Barnett et al., 2008; Burger, 2010; Gormley, 2005; La Paro et al., 2004; Mobbs, 2014; Neuman, 2003; van Kleeck & Schuele, 2010; Winsler et al., 2008).

This group of all-day prekindergarten students was chosen because they were the first group in the participating school district with a large enough sample size to run the analysis and to have the data run over multiple years as the students moved through the grade-levels. Further research about the topic of all-day prekindergarten would be useful for examining future cohorts in order to expand their sample size, allowing for the interpretation of stronger results than what this study was able to provide. Further research using larger sample sizes and following groups of students who have attended all-day prekindergarten through their later school years and post-

school experiences would be beneficial for understanding the importance of this essential grade-level within the school districts that provide it.

**Recommendations for Practice**

Recommendations for practice based on results from this study go beyond the prekindergarten classroom. With some students having received a full year of schooling before others and research indicating that they begin kindergarten, first grade, and second grade with higher academic achievement and stronger socio-behavioral development than their peers who did not attend any amount of prekindergarten programming, the data would indicate that the common practice of teaching to the middle has resulted in a potential decrease in the differences between groups in academic achievement over time (Bedford & Casbergue, 2012; Fischer et al., 2013). With more students attending some form of prekindergarten every year and many districts offering more options for all-day prekindergarten in the state of Oklahoma, it would be beneficial for states to rethink their academic standards for learning and vertical planning to ensure that growth is possible throughout the early grades preparing them for their later school years. Schools should be building off of what their prekindergarten program has started by focusing on meetings students' individual needs in academics and socio-behavioral development. In Oklahoma, for example, state standards for learning in prekindergarten and kindergarten have previously had few differences as prekindergarten is not yet a mandatory grade-level. The effects of prekindergarten on student's academic achievement and socio-behavioral development is a problem of practice in need of further research as we

begin to understand more about how the grade-level impacts later student achievement and development, even beyond elementary school years.

It is important that education leaders continue to review and analyze students' data who have attended all-day prekindergarten throughout their school careers. Context is important, especially considering that all prekindergarten programs are unique. Continued investment in early childhood programming benefits our youngest learners as they progress through their school careers. As funds are cut from education and programs that are considered accessories to the core of public education are at risk of being defunded or removed from funding formulas, it becomes even more vital that school leaders effectively articulate the meaningfulness of programs like prekindergarten for their overall investment in student achievement and development. School administrators have an important role as advocates for prekindergarten programs. They must know and understand what quality early childhood instructional practice looks like and how that practice benefit their districts as well as the difference they makes for individual students' academic and socio-behavioral success.

**Recommendations for Policy Makers**

Currently, national implementation of prekindergarten is not consistent with funding for prekindergarten varying in each state. In Oklahoma, access to and quality of prekindergarten have been a previously stated state-wide priority with 99% of school districts offering some form of prekindergarten programming and 75% of all age eligible children being served in a prekindergarten classroom (NIEER, 2016; OSDE, 2016). Further, prekindergarten in Oklahoma offers comprehensive early learning standards, access to teacher and a teacher's assistant in a classroom with a 1

to 10 teacher to student ratio (NIEER, 2016; OSDE, 2016). Oklahoma spends $148,690,138 a year on educating prekindergarten students, in terms of per-pupil spending $3,709 per child. Though Oklahoma's program is considered a universal prekindergarten program, meaning all who are eligible to attend prekindergarten have the option of doing so, many students in the state are still missing out on this pivotal grade level or are not given the option to participate in an all-day program.

Prekindergarten funding issues have been an important topic in recent years with legislators and policy makers claiming prekindergarten is not worth the cost. While this research study was not a cost benefit analysis, other non-state funded prekindergarten programs have determined that participation in a quality early childhood program resulted in $4 saved for every $1 spent cost return for the Abecedarian Project and a $7 to $1 cost return for both the High/Scope Perry Preschool Project and the Chicago Child-Parent Center Program (Bracey & Stellar, 2003). Children participating in each of these early childhood programs earned approximately $143,000 more over their lifetimes than their peers. Participation led to higher education attainment and earnings for the participants and for their children (Bracey & Stellar, 2003). This previous research provides a strong argument for cost savings of all-day prekindergarten.

Defunding prekindergarten as a solution to funding common K-12 education is counter intuitive to both individual student success and overall educational programing success. This and many other research studies have indicated that enrollment in a prekindergarten program has led to benefits in academic achievement and/or socio-behavioral development. For this particular study, students who had

attended a full academic year of an all-day prekindergarten program in this study demonstrated high academic achievement throughout the later school years and more pronounced they were 50% less likely to receive office referrals or to experience school suspensions. Students who participated in an all-day prekindergarten program ultimately spent more time in the classroom potentially leading to similar success that has been demonstrated in other programs, such as the Abecedarian Project or the High/Scope Perry Preschool Project (Bracey & Stellar, 2003).

**Conclusions**

The research study presented identified some of the benefits of a full academic year of an all-day prekindergarten program on later academic achievement and socio-behavioral development confirming past research on the effects of prekindergarten (Cabell et al., 2013; Fischer et al., 2013; Gomez-Velez, 2010). Prekindergarten throughout the nation is changing and growing, but a common theme throughout is that it is not the same in any two states. Many states are looking to Oklahoma's model of prekindergarten education as they seek to develop their own forms of universal prekindergarten programs. While Oklahoma has struggled in recent years to compete with other states in general K-12 education, its model of prekindergarten has been nationally recognized (Bornfreund et al., 2015; Gormley, 2008; Gormley & Gayer, 2005; Gormley & Phillips, 2005; Gormley et al., 2005; Gormley et al., 2011). Continued research and conversation about prekindergarten should still heed the advice of Magnuson and Waldfogel that reminds us that even the highest quality early childhood programming cannot protect a child for life from the risk of low achievement or development (2005). As the nation's practice of increasing access to

prekindergarten continues to grow, continued research about the topic and its quality is important in order to improve practices for prekindergarten and beyond.

Educational leaders play an important role in their district's early childhood programming. Curriculum and instruction leaders should engage in the practice of collecting and reviewing data for even the youngest grades in order to benefit practices of and beyond the grade-level. With current mandates on high-stakes testing that have led the way to push down curriculum, educational leaders largely focus on preparing students for third grade – the first year of formal standardized testing – instead of considering that the initial grade levels are a vital component for building foundational skills and helping students develop into future contributing members of the community. Prekindergarten has remained a safe haven of constructivist learning, with many practitioners arguing that it is what kindergarten was 10 years ago. Despite this claim, an important take away for educational leaders should be considering their initial grades as an important part of the continuum of learning, involving themselves in vertical planning throughout the grade-levels, and ensuring that developmentally appropriate practice is occurring in order to prepare students for their next phases in life.

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