THE RELATIONSHIP OF SOCIOECONOMIC STATUS AND SCHOOL DISTRICT FUNDING TO STUDENT ACHIEVEMENT: A STUDY OF ILLINOIS ELEMENTARY SCHOOL DISTRICTS

BY

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DISSERTATION

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Abstract

In a democratic society that prides itself on equality, there has been much debate regarding the inequality latent within its public education system. Notably, where the U.S. achievement gap between rich and poor continues to persist (Kena et al., 2016), there has been continued focus on narrowing the gap, and as part of that discussion, school finance often surfaces as a controllable, systematic variable that has the potential reinforce or narrow the achievement gap. Of the states receiving the most attention for their education finance systems, Illinois has gained attention for having the heaviest reliance on local property wealth (Kena et al.). As a result, the state has received much scrutiny and criticism regarding its inequitable funding structure (Baker et al., 2017) and its subsequent achievement, employment, and income gaps (Martire, 2013).

Employing the Pearson Product Moment (PPM) correlation, this study examined the relationship between socioeconomic status (SES) and student achievement outcomes in 374 Illinois elementary school districts, exploring the relationship between the school district's percentage of low-income students and its effect on achievement as measured by the Illinois Standard Achievement Test (ISAT). Using multiple linear regression analyses, this study also examined the effect of a school district's low-income percentage and that effect irrespective of per pupil expenditure. In addition, this study evaluated the effectiveness of Illinois' funding structure—a foundation aid method—employing the Gini coefficient, in conjunction with Pearson Product Moment (PPM) correlation and multiple linear regression analyses, to analyze the effectiveness of Illinois' funding structure to mitigate for the effect that socioeconomic status (SES) has on achievement.

The findings of this study indicated that SES, Individual Low-Income status specifically, was highly correlated to Low-Income District Percentage and that both Individual Low-Income status and Instructional Expenditure Per Pupil (IEPP) had a significant effect on student achievement. In addition, the findings indicated that the distribution of school district funds was highly inequitable and that Illinois' funding structure systematically reinforced and exacerbated the effects of SES on achievement.

Acknowledgments

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Chapter 1

Introduction

“A democratic society depends upon an informed and educated citizenry,” proclaimed Thomas Jefferson, one of the instrumental founders of the United States of America. Given Jefferson’s emphasis that citizens be both informed and educated, it is not farfetched that some argue that the foundation of a democratic society is dependent upon its public education and its subsequent obligation to fund public education for all students to serve the greater good of the whole society (Alexander & Alexander, 2012). However, as school districts in the United States are currently funded, heavily reliant on local sources in many states (Kena et al., 2016) and thus inequitable by design, and as achievement gaps continue to persist among groups based on their income (Kena et al., 2016), it is difficult to argue that this democratic society is serving the greater good of *all* its citizens.

In our current educational system, it is estimated that nearly 15.3 million children between the ages of 5-17 (21%) are living in poverty, according to the most recent 2014 data from the National Center for Education Statistics (Kena et al., 2016), and there is no shortage of research to support that poverty negatively affects student achievement, resulting in lower than average performance as measured in kindergarten through high school (Sirin, 2005; White, 1982). These students, because of the reliance on local property wealth to fund education, often receive less spent on their PK-12 education than their non-low-income peers. For example, with an average state contribution of 45.2% and 28 states contributing less than 50% of dollars spent on public school students, low-income students attend school districts funded at disparately disproportionate levels (Kena et al., 2016). Such disparities, if examined by Jefferson’s standards for a democratic society, severely challenge our ability to maintain our democratic society—the core of the country's founding principles.

Statement of the Problem

Just as national trends indicate, there are vast disparities in the academic achievement levels of low-income and non-low-income PK-12 students in Illinois public school districts. As the state that contributes the *least* to public education in the country (Kena et al., 2016), there is significant inequity in the resources and opportunities provided for students given Illinois' funding structure of public school districts. As a state that contributes well below the national average of 45.2%, Illinois is most heavily reliant on local property wealth to fund its school districts. For example, in FY15, 67.4% of school district revenue was derived from local funding, 24.9% from state funding, and 7.7% from federal funding (Kena et al., 2016; Illinois School Report Card, n. d.).

Because of this heavy reliance on local wealth to fund education, per pupil expenditures vary significantly among school districts. For example, in FY16, while the average operational spending per pupil in Illinois, which includes instructional spending, was $12,821, the highest spending school district expended $31,412 per pupil, and the lowest spending school district expended $7,353. Differences in instructional expenditure per pupil (IEPP) alone were even more disparate, with the lowest spending school district expending $3,461 per pupil, and the highest spending school district expending $17,699 (Illinois State Board of Education [ISBE], 2016). As a result, in school districts that are in predominantly low-income communities where financial resources are scarce, IEPP is often considerably lower than in districts where financial resources are plentiful.

Although research indicates that the quality of educators within a school greatly influences student learning (Ferguson & Brown, 2000; McCaffrey, Lockwood, Koretz, & Hamilton, 2003; Rowan, Correnti & Miller, 2002; Wright, Horn, & Sanders, 1997), there other highly influential factors, both school-based and non-school based, that influence student achievement. Two factors often considered include students' socioeconomic status (SES) and often the respective school district funding that accompanies students of varying SES status. Given the disparities in achievement and in school district funding levels within the state of Illinois, there is a need to examine how Illinois' public school district funding structure affects the extent to which poverty and instructional spending per pupil influence academic achievement. Specifically, as achievement gaps remain persistent or have been shown to grow over time, it is important to identify the effects of both SES and IEPP in elementary school districts. Such an examination provides insight into achievement differences from the start of a student's formal education.

Purpose of the Study

The purpose of this quantitative study was to examine the academic achievement of low-income and non-low-income Illinois elementary public school students within varying socioeconomic contexts and its relationship to per-pupil expenditure by analyzing the school district demographic and academic achievement data of low-income students for the 2013-2014 school year. Specifically, the effect of a school district's overall poverty level on the academic achievement level of low-income students was examined. Further, the correlation between IEPP (IEPP) and student achievement levels within these varying socioeconomic contexts was also examined.

I approached this research and Illinois' funding formula through an educational equity framework, specifically purporting that the higher the percentage of low-income students in a school district, the greater the disparity in achievement and the greater the cost to equalize for each student's low-income status. Using Alexander, Salmon, and Alexander's (2015) horizontal and vertical equity frameworks, I examined the effectiveness of Illinois' funding structure to mitigate the effect of poverty on academic achievement, purporting a segregation theory: As school districts become more segregated—increasing the percentage of low-income students—they will be less likely minimize the effect of poverty on academic achievement with funding structures that do not spend disproportionately *more* on low-income students to equalize for differences in socioeconomic backgrounds.

Research Questions

1. To what extent are the Reading and Math ISAT scores of low-income students in Illinois elementary school districts correlated to the percentage of low-income students in a school district's population?

2. What is the relationship between IEPP and Illinois elementary school district students' academic achievement in Reading and Math on the ISAT based upon the proportions of low-income students within school districts of varying socioeconomic levels?

3. Does the concentration of poverty have an outsized effect on Illinois elementary school district students' achievement in Reading and Math on the ISAT irrespective of school district IEPP?

4. Does Illinois' funding structure effectively minimize the effect of SES on low-income students as measured by student achievement in Reading and Math on the ISAT?

Significance of the Study

Through this research I sought to glean insight regarding how to best serve low-income students and best minimize the effect of SES as a factor in achievement and thus provide an avenue to improve Illinois' efforts to close the gap in opportunity and achievement. Practically, these results can inform policy regarding public school districts are funded in the state of Illinois and inform the discussion regarding school district boundaries. In addition, the research can help address the gap in research that has examined school district funding by approaching the question of funding through a vertical equity framework.

Equity is not synonymous with equality. As a result, simply increasing funds slightly or even equalizing funds in areas with heavy concentrations of low-income students may not result in statistically significant improvements in achievement, as often argued by funding reform opponents (Cunningham, 2004; Evers & Clopton, 2006; Hanushek, 2006). Instead, to ensure equal opportunities for all students, there must be equal access to education (Crespo-Cuaresma & Sauer, 2012), and equal access cannot be ensured unless the significant financial inequity is addressed (Alexander et al., 2015; Odden & Picus, 2008; Odden, Picus & Goetz, 2008; Yinger, 2004).

Theoretical Framework

Many scholars, researchers, and policymakers discuss education in terms of *equality* and *equity* and have defined the two terms in several ways, often times using the two terms interchangeably (Espinoza, 2007). In media and public policy discourse regarding school district funding, for example, the terms have become synonymous. For example, as people seek or debate revising the school district funding formula in Illinois to ensure equity, the discussion never includes the proposal to spend disproportionately more on low-income students overall, nor do legislative proposals reflect a method to entirely equalize resources between low SES school districts and high SES school districts, but nevertheless, as a new funding formula or new legislation is proposed and discussed, the terms are undoubtedly used interchangeably in the name of making Illinois public school funding more "equitable."

However, the two terms are very different and inform two very different approaches to funding school districts. True “equality” or “equal education” is equitable in that it is what is fair or just for all, not what is the same. Accordingly, equal education requires “unequal” distribution of funds in order to account for the variance in backgrounds in order to truly be equitable (Alexander et al., 2015). When discussing funding for public school districts, many discuss the equalization of resources—horizontal equity—to help improve the equitability of a system and ensure all students have the *same* access to programming and the same funding to support student learning. The problem with such an approach, however, is that all students' needs are not the same. As a result, school district funding experts call for school district funding formulas to provide vertical equity—the allocation of more resources to disadvantaged students to account for the variance in backgrounds (Alexander et al., 2015).

Given the reliance on local sources to fund PK-12 school systems, with the average state contribution at 45.2% nationwide and 67.4% in Illinois, there are significant disparities in school district funding (Kena et al., 2016). School districts in communities with higher concentrations of commercial and residential wealth are able to leverage far more capital for education funding. As a result, many school districts' expenditures do not meet the standards of either horizontal or vertical equity. In this study, I conducted analysis and evaluation of horizontal and vertical equity within Illinois' funding structure to determine if Illinois' funding structure effectively mitigated the variance in achievement correlated to SES. Exploring the findings through these lenses will inform conclusions regarding whether or not it can be determined that school funding reform measures, particularly the increase in expenditures based on need, are needed and can be evaluated for effectiveness in producing higher achievement outcomes.

Limitations

For this study academic achievement outcomes were measured only by students' performance on the Illinois Standards Achievement Test (ISAT) for the 2013-2014 school year. These data were collected from the Illinois State Board of Education (ISBE). Although data were collected at the student level to avoid the use of averages, using one year of achievement data is a limitation in that it cannot provide a longitudinal analysis.

Furthermore, using standardized test data as a measure of academic achievement is also a limitation in any study; such data do not provide a complete picture of a student's mastery of the school district's curricular standards, nor can they measure a student's growth throughout a school year. Rather, standardized achievement data measure attainment on one measure and at one point in time only. However, for this study, it provided a standard of measurement for all groups of students and illustrated differences as they relate to the proposed research questions.

In addition, as outlined below in the *Definition of Terms* section, the definition of low-income can be limiting, as one way to qualify under the state's definition is by the classification of free or reduced lunch, a self-reported figure. Some students who may require free or reduced lunch may not seek it out. Similarly, students receiving free or reduced lunch may not qualify as low-income under other measures.

Delimitations

Just as there were limitations of this study, there were delimitations set forth by me, the researcher. Given the changing landscape of assessments in the state of Illinois, specifically, the relatively new and inconsistent administration of Illinois' new assessment system, the Partnership for Assessment of Readiness for College and Careers (PARCC), its adoption of the Common Core State Standards (CCSS), and its changing proficiency levels for its assessments, I found it important to analyze student achievement data prior to the implementation of PARCC, which was first implemented in 2014-2015. Given the varying implementation that occurred within the PARCC administration and because of PARCC's inability to establish validity and reliability early in the implementation process, prior data were more valid and reliable. Such data, although limiting by their nature (as noted in the limitations section), are valid and reliable measures to provide consistent and accurate representations among the different groups this study examined. Furthermore, this specific year, 2013-14, represented a more accurate picture of student performance levels relative to the state's standards, CCSS (Illinois State Board of Education, 2013). Prior to 2013-14, the proficiency levels did not reflect the rigor of the standards and thus presented a disproportionately higher rate of proficiency at the elementary levels and a substantial disconnect in readiness between the elementary assessment, the Illinois Standards Achievement Test (ISAT), and the high school readiness assessment at the time, the ACT. In addition, following the 2013-14 school year, a new assessment, the PARCC assessment, was adopted by the state of Illinois and replaced the ISAT.

In conjunction with the current assessment landscape, elementary districts were studied to ensure uniformity in the assessment metric. For example, high school districts assessed students on the Prairie State Achievement Exam (PSAE), a separate and different assessment reflective of different curricular standards and different proficiency levels. In addition, there had been recent research completed on the equity of Illinois' finance system at the high school level (Krause, 2017).

Definition of Terms

The following terms are defined to provide clarity and collective understanding of the study.

Academic achievement—Although academic achievement can be defined and measured by multiple measures, in this study, academic achievement was defined by students' performance on Illinois' elementary achievement exam, the Illinois Standards Achievement Test (ISAT), during the 2013-2014 school year.

Adequacy—Adequacy was defined using Odden and colleagues' (2010) framework for evidence-based funding, an approach that provides "a level of resources to schools that will enable them to make substantial improvements in student performance over the next 4 to 6 years as progress toward ensuring that all, or almost all, students meet their state's performance standards in the longer term" (p. 629).

At-risk—An *at risk* student was defined as a child who is in danger of academic failure due to one or more of the following characteristics: the child has special needs, is low income, or is an English Language Learner (ELL). This definition is consistent with public policy discourse and was used in school district funding analysis conducted by the Center for Tax and Budget Accountability (2016).

Equal education—Equal education was not defined as the "same" education for all students; rather, *equal education* was determined by whether or not all students have their needs met—that "every child is learning and that the conditions for learning are equal among students" (Alexander et al., 2015, p. 349).

Equity—Equity in this study was defined simply—what is fair and just for each individual to thrive, not what is equal (Alexander et al., 2015).

Income achievement gap—When discussing the income achievement gap, this study employed Reardon's (2011) definition: the difference between children who come from low SES families and high SES families.

Instructional expenditure per pupil (IEPP)—For the purposes of this Illinois-based study, IEPP was congruent with the Illinois School Report Card (2014) definition: "instructional expenditures divided by the nine-month daily attendance. 'Instruction' includes activities dealing with the teaching of pupils or the interaction between teachers and pupils."

High poverty school—For the purposes of this Illinois-based study, high-*poverty school* was congruent with the Illinois School Report Card (2014) definition: "schools are in the top quartile of low income rate in the state" (p. 12).

Horizontal equity—This study employed Alexander and colleagues' (2015) definition of horizontal equity for school district financing: the equalization of resources among all or the "equal treatment of equals" (p. 349).

Low-Income— For the purposes of this study, low-income was adopted from the Illinois School Report Card (2014, p. 7) definition:

> Low-income students receive or live in households that receive Supplemental Nutrition Assistance Program (SNAP) or Temporary Assistance to Needy Families (TANF); are classified as homeless, migrant, runaway, Head Start, or foster children; or live in a householder where household income meets the U.S. Department of Agriculture income guidelines to receive free or reduced-price meals.

Low poverty school— For the purposes of this study, *low poverty school* was adopted from the Illinois School Report Card (2014) definition: "schools are in the bottom quartile of low income rate in the state" (p. 12).

Non-at-risk—A non-*at-risk* student was defined as a child who has a "reasonable likelihood of academic success" and is not low income or classified as English Language Learner or Special Education. This definition is consistent with public policy discourse and was used in school district funding analysis conducted by the Center for Tax and Budget Accountability (2016).

Vertical equity—This study employed Alexander et al.'s (2015) definition of vertical equity for school district financing: the disproportionate allocation of resources based on student need or the “unequal treatment of unequals” in order to “achieve fairness or justice” (p. 349). In terms of financial spending, *vertical equity requires* spending more per student when the need is greater.

Summary

Achievement and funding disparities are grossly apparent across the country and within the state of Illinois, and as Alexander et al. (2015) note, “centuries of human experience in many lands has taught that only government has the capacity to address this embracing obligation is owed to the citizenry” (p. xvii). As a result, it is imperative to research the relationships among the variables that affect academic achievement in order to inform policy solutions to best address the disparities. This study examined the effect an individual’s SES and the school district’s SES had on the achievement of low-income students in Illinois public elementary school districts and to determine that effect irrespective of per pupil expenditure. In addition, this study aimed to evaluate Illinois’ funding structure by how it met horizontal and vertical equity standards in order to provide solutions to best address the funding and achievement disparities—the unequal education—between low-income and non low-income students.

This chapter included an introduction to the study, a statement of the problem, the purpose, the research questions, the significance of the study, the theoretical framework, the limitations, the delimitations, and the definition of terms to guide the research. The next chapter highlights the relevant literature pertaining to SES and student achievement and school finance and student achievement.

Chapter 2

Review of Literature

Socioeconomic disparities in academic achievement have been a pervasive reality in the U.S. education system throughout its recorded history (Kena et al., 2016). National, state, and local studies consistently document the pronounced and persistent achievement gap between low-income students and their peers throughout their educational careers, beginning in elementary school (Caldas & Bankston, 1997; Coleman et al., 1966; Dotson, 2014; Kena et al., 2016; Reardon, 2011; Reardon, Robinson-Cimpian, & Weathers, 2014; Sirin, 2005; White, 1982), although causes for such disparities remain inconclusive. Not surprisingly, proposed solutions also remain very much in debate among scholars. Among the debated solutions, researchers have tried to determine the relationship between school funding, that which is often directly tied to students' socioeconomic background (especially in the state of Illinois), and the effect of poverty—of both the individual and school district—on low-income students' academic achievement outcomes.

This review of literature explores the research as it examines the relationship between socioeconomic status (SES)—both individual and school district—and student achievement, the relationship between SES and school district funding, the relationship between school district funding and academic achievement, and the implications for achievement and funding disparities. When available, I examine those relationships within the context of the state of Illinois, the unit of study for this research.

SES and Academic Achievement

Although many factors influence student achievement, poverty is one of the most pervasive factors to influence academic achievement and subsequent employment opportunities and income. However, the extent to which an individual's poverty affects these outcomes can differ based upon other variables, such as parental level of education (Caldas & Bankston, 1997; Coleman et al., 1966; Kennedy, Jung, Orland, & Myers, 1986; Palardy, 2013; Rumberger & Palardy, 2005). Nevertheless, there has been a long established pattern of poverty's effect on student academic achievement since we have been able to measure academic achievement outcomes using clearly defined measures (Kena et al., 2016; Sirin, 2005; White, 1982).

Defining and measuring SES. Researchers have long been interested in the effect of one's social and economic background on any number of outcomes or measures throughout modern history. As a result, many have coined numerous definitions of SES over time. One of its earliest definitions came from Chapin (1928) who defined SES as "the position that an individual or a family occupies with reference to the prevailing average standards of cultural possessions, effective income, material possessions, and participation in group activity of the community" (p. 99). This definition, although not completely outdated, does not account for the complexity of variables that inform the term, which modern researchers identify and measure. Although there is still debate over the overarching conceptual definition, there is broad agreement regarding the factors that inform SES, including parental education, parental income, and parental occupation (Sirin, 2005). These three tenets reflect Duncan, Featherman, and Duncan's (1974) definition, and one or more is defined when researchers examine SES.

Because of the use of varying definitions of SES and the varying use of measures within research, it does remain difficult to interpret research findings since researchers define SES in different ways (Sirin, 2005; White, 1982). However, these factors, although they different than one another, do tend to produce relational results regardless of the combination of variables examined or the precise definition. For example, parental education, a stable SES indicator, tends to be a predictor of parental income because income and education are highly correlated (United States Department of Labor, 2016). And it is the achievement outcomes and academic and post-academic opportunity outcomes between those low SES and high SES students—between poor and wealthy—that have led researchers to study the relationship between SES and achievement.

SES and achievement on national assessments. Although achievement can be measured in many ways, national assessments have provided a consistent opportunity to measure achievement across the nation over time, and children from high socioeconomic backgrounds have consistently outperformed their peers from low socioeconomic backgrounds (Kena et al., 2016). Consequently, prior to looking at local research and the effects of SES, it is important to examine the national achievement data.

Nationally, a reliable source of data on the achievement gap among groups over time can be outlined by the National Assessment of Educational Progress (NAEP), the largest nationally representative assessment. Of the many content areas for which NAEP assessments measure achievement, mathematics and reading data have been historically used to inform discussion around the similar achievement gaps magnified in our schools. The Long-Term Trend NAEP (LTT), an assessment that has remained virtually unchanged since its initial implementation in the 1970s, is administered every four years to 9-, 13-, and 17-year-old students (Kena et al., 2016). NAEP's second national assessment, commonly referenced as the Main NAEP, measures student achievement in grades 4, 8, and 12, although each grade is not assessed each time (Kena et al., 2016). Unlike the LTT, the content of national assessments change based on curricular trends in schools. As a result, they have provided insight into what is currently being learned in school; however, given the changing nature of the test items, they also provide less conclusive trends over time.

Nonetheless, the NAEP assessment is one of the most stable assessments to national progress over time. Defining levels of proficiency in terms of *Basic* and *Proficient*, the assessment measures whether or not students have met partial mastery of the fundamental skills (*Basic*) or full “competency over challenging subject matter” (Kena et al., 2016, p. 143). Since its inception, a large percentage of U.S. students across the nation do not attain *Proficient* levels of performance, and the gaps in achievement are persistent and significant between Black and Hispanic students and White students.

For example, as the NCES’s most recent reading achievement data indicate, although reading achievement for fourth and eighth grade students has increased since the early 1990s (29% at or above *Proficient* to 36% at or above *Proficient* and 29% at or above *Proficient* to 34% at or above *Proficient*), there is still a large percentage of students who are not attaining proficiency in reading (Kena et al., 2016). NAEP data show similar trends in mathematics. Although overall student Math proficiency in 4th and 8th grade has improved dramatically (13% at or above *Proficient* to 40% at or above *Proficient* and 15% *Proficient* to 35% at or above *Proficient*), there is still a large percentage of students not meeting standards (Kena et al., 2016).

Among different racial subgroups, the data show similar trends. Although minority student performance has improved, there are still stark disparities among minority subgroups and White students. As the NCES’s data highlight, when examining the average scores of students by race, although all subgroups have improved since the early 1990s, for Hispanic and Black students there is still a 20+ test-score percentage point deficit on the fourth and eighth grade NAEP assessment in reading and mathematics between these students and their White and Asian peers, and such a gap is roughly equivalent to a two grade level achievement gap (Kena et al., 2016).

Unfortunately, the NCES has not explicitly examined the achievement trends based on SES, but in recent years, an increasing number of researchers have investigated the relationships using national assessment data or local school district data. Using NAEP data, for example, Reardon (2011) estimated that the achievement gap (i.e., the average test score gap between children from the 90th and 10th percentiles of the family income distribution) has grown an estimated 40% between the 1940s and the early 2000s.

Specific effects of SES on academic achievement. Because of how the data have been categorized by the National Center for Education Statistics, some researchers have sought to develop an estimate of the effects of SES based on the NAEP achievement data while others have studied the data at the state or school district level. For instance, because achievement data have not been parsed out by SES alone, Reardon, Robinson-Cimpian, and Weathers (2014) examined socioeconomic achievement gaps by using parental education level as an indicator of SES, and they compared students' performance on the NAEP LTT in math and reading from homes whose parents had only a high school diploma to those students whose parents had attained at least a 4-year college degree. They found that the gap, although always present, was relatively stable between students whose parents had only a high school diploma and those whose parents had at least a 4-year college degree; the difference hovered around the .5 standard deviation (SD) range in reading for 13- and 17-year-olds between 1978 and 2008 but increased to .69 in 2012, the largest gap recorded in the 30+ year history of the assessment. In math, the gaps were similar, although slightly more pronounced; gaps hovered around the .5 range (although more steadily) but reached an even greater high in 2012, marking a .73 SD for 13-year-olds and .84 SD for 17-year-olds (Reardon, Robinson-Cimpian, & Weathers, 2014).

Similarly, in studies conducted around the country, students from low-income families consistently score below average (Caldas & Bankston, 1997; Coleman et al., 1966; Dotson, 2014; Sirin, 2005; White, 1982). Of the plethora of studies that examine the relationship between achievement and SES, two major meta-analyses have found a statistically significant relationship between low SES and poor academic achievement: White's (1982) meta-analysis and Sirin's (2005) updated replication of White's research. Although researchers examining SES and its relationship to achievement often note the challenges in interpreting data due to the varying ways SES is measured, when examining the effect of SES, White found that the relationship between SES and achievement is so strong that researchers' difference in definition and subsequent measures (e.g., family income, parent's education, occupation of the principal breadwinner, or some combination of these variables) is largely irrelevant given the strength of the relationship. After examining almost 200 studies, he concluded that SES was the *most* powerful predictor of student achievement. In other words, the higher the SES of a student's family, the higher the student's academic achievement (White). White did note, however, that the standard deviation in individual studies varied from .1 to .8 depending on the type of achievement data, the type of SES measure, and the year the data were collected. Similarly, Sirin's meta-analysis, a study which sought to replicate White's study to see if the relationship had since changed, found a medium to strong correlation (r = .299) between SES and achievement, a slight decrease in the overall effect as determined by White but an overall effect accounting for the varying approaches used to define and measure the relationship between SES and achievement.

***The change in achievement gaps over time*.** In part, the varying effect of SES on achievement stems from the differences in student ages. The effect of SES on student achievement, although always negative for low-income students, changes at different points in students' academic careers; however, not all data have been able to capture these differences. For example, the NAEP LTT data were limited to 13- and 17-year-olds since the NAEP LTT does not report the level of parental education for 9-year-olds (Reardon et al., 2014), which makes that data helpful in highlighting some disparities but impossible to examine how the effect of SES changes based on age.

Still, researchers have long been interested in how SES affects achievement over time to determine when it has the greatest influence on achievement outcomes. Sirin's (2005) meta-analysis revealed some differences in correlations by examining age. Unlike research by White (1982) and Coleman et al. (1966), Sirin found that the relationship between SES and achievement increases across each grade level until high school, although Sirin noted that low achievement likely affects drop-out rates, which in turn likely affects that overall leveling off. Ultimately, data show that the magnitude of SES is exacerbated over time, although, as Sirin noted, the use of cross-sectional data are limited in providing longitudinal results (i.e., the impact on an individual student over time using only cross-sectional data).

Similar to Sirin's (2005) explanation and assertion that the effects of low SES continue to compound as low-income students progress through the education system, Caro, McDonald, and Willms (2009) found that the achievement gap between low-SES students and high-SES students is relatively stable between ages 7 and 11, but that it actually widens between ages 11 and 15. Like other studies on SES, this study also had its limitations: It examined the effect of SES on achievement of Canadian students, which is limiting in offering comparability with the effect of SES on U.S. student achievement.

Group SES and academic achievement. Given the amount of prior research—through individual studies and meta-analyses—the research appears clear that SES remains a powerful influence on achievement (Caldas & Bankston, 1997; Dotson, 2014; Sirin, 2005; White, 1982). However, due to this effect and the make-up of schools in the United States—how students are often segregated by wealth (Owens, Reardon, & Jencks, 2014)—researchers also have been interested in examining the effect of SES on achievement relative to the SES level of the entire school (Caldas & Bankston, 1997; Coleman et al., 1966, Palardy, 2013; Reardon, 2011; Reardon et al., 2014; Rumberger & Palardy, 2005). Often based on the proportion of students who receive free or reduced price lunch or qualify for other government assistance, researchers often determine individual schools' SES. Taking this group dynamic into account goes beyond the available resources students access from home when only individual SES is examined (Brooks-Gunn, Denner, & Klebanov, 1995).

Race and SES. Like SES, race is a mitigating factor that continues to correlate to student achievement. As indicated by the NCES (Kena et al., 2016), there is a persistent 20+ point achievement gap between Hispanic and Black students and their White peers. Although there have been a number of factors—both school-based and non-school-based—that have been explored to explain the gaps in achievement, research indicates that minority students are more likely to live in low-income homes, their parents are likely to have lower levels of education, and they often attend under-funded schools (National Commission on Children, 1991; Kena et al., 2016). Specifically, as outlined by the NCES, in school year 2012-2013, there were higher percentages of Black, Hispanic, and American Indian/Alaskan Native students who attended high-poverty schools than did Asian students, Pacific Islander students, students of two or more races, and White students. Of all groups, White students were the least likely to attend high-poverty schools (Kena et al., 2016).

School SES and individual academic achievement. Among many theories that have been advanced to explain the extent to which the peer population's characteristics can influence an individual's achievement is the influence of peer groups on individuals. For example, among adolescents, researchers have found that peer groups are strongly related to individual students' behaviors and attitudes in a variety of ways, from substance abuse (Bankston, 1995; Coleman, 1961; Hunter, Vizelborg, & Berneson, 1991; Walter, Vaughn, & Cohall, 1993) to academic achievement (Caldas & Bankston, 1997; Coleman et al., 1966; Kennedy et al. 1986; Hanushek, Kain, Markman & Rivkin, 2003; Palardy, 2013; Rumberger & Palardy, 2005).

The Coleman report (Coleman et al., 1966), a seminal piece of empirical research in achievement differences among groups, helped shape the research landscape with regard to how how school characteristics affect individual achievement. When seeking to understand the differences between Black and White student achievement, Coleman et al. (1966) found that "facilities and curriculum [matter] least, teacher quality next, and backgrounds of fellow students most" (p. 18). As a result of this finding, Coleman et al. argued that educational policy should include student integration across socioeconomic lines.

Since the Coleman report, other researchers have examined this relationship, specifically the effects of concentrated poverty on individual student achievement. For example, 20 years later, Kennedy et al. (1986) re-examined this topic, finding that the relationship between school poverty and student achievement is stronger than the relationship between an individual's family poverty status and his or her achievement. Specifically, they found that non-poor students who attend high poverty schools are more likely to suffer negative achievement effects than poor students who attend schools with a low concentration of poverty. Such a finding is significant in identifying the relationship between the culture of the school and the effect on the individuals.

Like Kennedy, other researchers have continued to explore this relationship (Caldas & Bankston, 1997; Hanushek et al., 2003; Palardy, 2013; Rumberger & Palardy, 2005), although researchers have chosen to use different measures for achievement and different measures to define low SES. For example, Palardy (2013) and Palardy and Rumberger (2005) found that SES segregation had as much of an effect on achievement as an individual student's SES, although Palardy measured achievement by graduation rates and college enrollment while Rumberger and Palardy used national assessment data. Similarly, Hanushek et al. (2003) found that high peer achievement has a positive effect on achievement growth and that students throughout the achievement spectrum benefit from being in school with higher achieving classmates.

Regardless of the measure, there have been many studies to confirm Coleman et al.'s (1966) conclusion that there are consequences to SES segregation, specifically that there can be positive effects when individuals of low SES are in schools with students of high SES and that there can be negative achievement effects when students of low SES are segregated in low SES schools. However, research has not consistently found the effect of segregation to be stronger or equal to an individual's own SES. For instance, Caldas and Bankston (1997) examined student achievement on the Louisiana exit exam and concluded that although school SES had a significant effect on achievement, individual SES had a slightly higher effect on SES. However, when examining the relationship of each, research has been mixed or closely related. For example, Kennedy et al. (1986) found school SES to have a slightly greater effect on student achievement.

School District Funding and Academic Achievement

As the research has identified a clear relationship between SES and achievement—both individual and group effects—the concern over school funding has caught researchers' attention given the pervasive resource gap that exists among states and within states. Generally speaking, school districts across the country are funded at very different, often highly disparate rates due to the reliance on local property wealth to fund schools, and in recent years, overall funding has decreased, leaving often low-income students on the receiving end of funding cuts (Kena et al., 2016).

Public school revenues. As a whole, from 2002-2003 through 2013, revenues for U.S. elementary and secondary public schools increased from $572 billion to $618 billion. From 2011-2012, however, revenues decreased by $4 billion dollars (Kena et al., 2016). Although this number (which is roughly 1% of total revenue) does not seem all that significant, for school districts that are already underfunded, a decrease in funding only exacerbates current fiscal and academic challenges for low-income school districts.

To understand the effect, it is important to understand how school districts are funded in the United States. According to Kena et al. (2016), total school district revenue comes from three sources: state, local, and federal. On average, states contribute 45.2% of total revenues. Not surprisingly then, of the 50 states and the District of Columbia, 28 states contributed less than 50% to public school revenues, with 13 states contributing less than 40%. As a result, many school districts across the country are highly dependent on local sources to fund public schools. For example, there are a few states whose funding structures for public schools exceed the national average significantly, such as Vermont and Hawaii, with both states contributing 89% and 84% of public school district revenues. However, in most states, as previously noted, local property wealth maintains a significant role in education funding. Among all 50 states, South Dakota and Illinois contribute the least to public schools, with South Dakota contributing 31% of its overall revenue for school districts and Illinois contributing 26% (Kena et al., 2016).

Public school expenditures. While revenues explain the sources of education funding, expenditures highlight spending per pupil, and it is not surprising that expenditure trends mirror revenue trends. From 2002-2003 to 2012-2013 U.S. expenditures per pupil in public elementary and secondary school districts increased by 5%, from $10,455 to $11,011 in constant 2014-15 dollars. Average per pupil expenditure in the United States peaked in 2008-2009 at $11,621 and decreased each subsequent year since through 2012-2013 (Kena et al., 2016). Likewise, instructional spending per pupil, which includes salaries and benefits of teachers and teaching assistants, instructional materials, and instructional services, was the largest component of expenditures in 2012-2013, with an average of $6,693 per student. However, like overall per pupil spending in the United States, it increased during the entire 10-year time period but peaked in 2009-2010 at $7,110 (Kena et al., 2016).

These averages, although they describe trends in the nation, do not show the disparities that result from the reliance on local sources throughout the country. As a result, school districts spend both much more and much less depending on the state and the zip code, and in states like Illinois where the primary source for revenue is based on local property wealth, the expenditure gaps are pervasive and large, with, for example, with the highest spending school district expending $31,412 per pupil and the lowest spending school district expended $7,353 in FY16 (ISBE, 2016).

School funding in the courts. As a result of current funding differences across states and the subsequent disparities within many states, many researchers, educators, and policymakers have been concerned about expenditure inequity and have looked at school funding measures as a way to mitigate for the effects of variables that affect student achievement (like SES) and have sought ways to close or shrink the achievement gap by addressing the funding disparities which exist by relying on local property wealth to fund education (Alexander et al., 2015; Odden & Picus, 2008; Odden et al., 2007; Odden et al., 2010; Yinger, 2004). This reliance has led to many challenges over public school education quality and many discussions regarding our moral obligation to fund public education. Of the many challenges, some have sought the courts' guidance on whether or not federal or state constitutions demand a certain level of education funding.

***School funding litigation in federal court*.** The constitutionality of unequal funding began within a highly publicized case in the early 1970s. In a 5-4 decision by the United States Supreme Court in *San Antonio Independent School District v. Rodriguez* (1973), members of the Edgewood Concerned Parent Association brought suit due to the highly inequitable rates at which schools were funded in the state of Texas. Originally filed in 1968 but decided by the Supreme Court in 1973, the court determined that education was not a fundamental right under the U.S. Constitution. As a result of this federal precedent, concerns over inequities did not desist, but litigation turned to the state level.

***School funding litigation in state courts*.** Beginning with the landmark 1971 court case, *Serrano v. Priest*, states began examining their funding structures to alleviate the heavy reliance on local property wealth. Serrano, a parent of a Los Angeles public school student, challenged the constitutionality of California's funding structure, alleging that the state failed to meet the equal protection clauses of the Fourteenth Amendment of the United States Constitution and the California Constitution. Serrano argued that he paid a higher tax rate than parents from other districts for fewer educational opportunities. The California Supreme Court agreed and found in favor of Serrano, which paved the way for other cases to follow in different states.

Unlike *Serrano v. Priest* (1971), however, cases that followed did not result in a similar holding. For example, in *Milliken v. Green* (1973), the Michigan Supreme Court reversed the lower court's initial ruling. The Supreme Court determined that the evidence did not prove that the equal protection of students in low-income districts was violated, noting the inadequate proof that financial support leads to achievement outcomes. Such logic would then pave the way for subsequent challenges in other states.

For example, in recent years, two notable cases in the area of school district funding have led to significant changes based on the courts' rulings. In *Rose v. Council for Better Education* (1989), similar to other school funding cases, the plaintiffs argued that it was the state's responsibility to provide an efficient system of schools, one that was uniform across the state, free to all Kentucky students, and provides equal opportunity regardless of geographic location. The Kentucky Supreme Court found in favor of the plaintiffs and declared the Kentucky school system unconstitutional, which paved the way for educational reform in Kentucky.

***School funding litigation in Illinois courts*.** In Illinois, however, the courts have not found equitable funding to be a fundamental constitutional right. Beginning with *Blase v. State of Illinois* (1973), several cases have been brought to the Illinois courts challenging the constitutionality of its funding structure on the grounds that Article X, Section 1 of the Illinois Constitution specifies that "[t]he State has the primary responsibility for financing the system of public education." For instance, in the Blase case, two taxpayers from different geographical locations argued that this phrase obligated the State to be the majority provider of funding for public education in Illinois. However, the Illinois Supreme Court disagreed, determining that the sentence in question is merely a statement of *aspiration*, not a concrete *obligation* to provide a minimum amount of funding. And such a ruling is significant. The *Blase* decision ultimately relieved the state of its obligation to ensure public schools are adequately and equitably funded. Instead, the Illinois Supreme Court concluded that school funding reform would need to be legislated if it were to become more equitable.

Although this precedent was set via the *Blase* case, several additional cases since *Blase* have challenged the constitutionality of Illinois' funding structure. Most notably to date, cases like the *Committee for Educational Rights v. Jim Edgar* (1996) and *Lewis E. et al., Appellees v. Joseph A Spagnolo* (1999) have received much attention and notoriety, although both resulted in the same outcome of *Blase* (1973): the court's determination that school funding is a legislative issue, not a judicial issue.

In the *Committee for Educational Rights v. Jim Edgar* (1996), The Committee for Educational Rights, an organization comprised of more than 60 school districts, represented 37 boards of education and a number of individually named students and parents to challenge the constitutionality of school funding in Illinois. The trial court dismissed, and the appellate and supreme courts affirmed. A similar case quickly followed, *Lewis E. et al., Appellees v. Joseph A Spagnolo* (1999), resulting in a similar holding based on the precedent set via the *Committee for Educational Rights v. Jim Edgar* (1996) case. In this case, Lewis, representing school children in East St. Louis District 189, sued the Illinois State Board of Education Superintendent for abhorrent school conditions, including concerns over sanitation and pest issues, cafeteria lunches, violence in schools, and inadequate security. Although the facts of the case and the plaintiffs were different from the *Committee for Educational Rights,* the majority ruling remained similar, with the court concluding that the *quality* of a public school education is an issue for the legislature to address, not the courts.

School finance reform efforts across the country: The impact of awareness. Although the courts have not historically provided the catalyst for reforms equitable funding advocates have sought, high profile cases have increased awareness and led to changes at the federal level. Policymakers recognize the stark disparities within and across states and have developed grants with the aim of contributing to equalization efforts (Alexander et al., 2015). In addition, such attention has led to many states amending their funding structures. However, the effectiveness of each of these structures, the research methodology behind each, and the level of adequacy and equity varies. For example, North Carolina, a state that utilized a flat grant system, to ensure more equalization from district to district "partially overcame the dis-equalizing effect of the flat grant by allocating from state sources a relatively high percentage of its total current expenditures, thus providing a relatively high level of fiscal equalization among schools," explained Alexander et al. (2015, p. 377). However, this effort has not been maintained, with North Carolina's esteem failing in recent years due to its decline in state funding for public schools and increased allocation for private charter schools.

Kansas, one of the many states to enact education funding reform in response to education funding litigation, took financing public schools away from local entities and placed the primary responsibility on the state, restricting local control over school budgets. As part of this approach, the state set a property tax rate to guarantee that every district spent the same after adjusting for district size, the primary adjustor, as well as at-risk factors for up to 10%. In other words, "at-risk" students could receive up to 10% more funding (Duncombe & Johnston, 2004).

As a whole, the state improved its horizontal equity, narrowing the spending gap among districts, by capping what wealthy districts could expend and attempting to equalize within property-poor districts, but their approach did not disproportionately unequalize education funding to ensure vertical equity.

Most popular, about 80% of states utilize some form of a foundation program—a formula that determines the minimum cost to educate students and defines state and local contributions needed to attain the minimum—in an attempt to equalize financial resources across their school districts (Alexander et al., 2015; Yinger, 2004). However, as result of state and national concerns regarding access equality, several states responded by adopting Guaranteed Tax Base (GTB) formulas, such as California. Only three states use a GTB formula exclusively while all others use some combination of foundation-GTB systems (Imazeki, 2007). Essentially, an effective GTB program guarantees districts a minimum level tax base, ultimately decreasing spending in higher wealth districts and increasing spending in lower wealth districts. For example, Kansas, Kentucky, Texas, and Vermont maintained their foundation programs but supplemented them with a GTB formula. Yinger (2004) describes this approach and its aims as follows:

> In states that use this type of approach, the foundation aid is given first, and the GTB applies to taxes above the minimum rate in the foundation formula, generally up to some maximum. Such an approach is designed to ensure that a minimum education level is achieved throughout the state via the foundation formula and then to place districts on an equal footing if they want to supplement the foundation level by raising additional taxes. In other words, it comes the adequacy standard with the access equality standard for supplementation. (p. 18)

Such measures across the country have led to decreased education funding inequality since the Serrano case, but as the NCES data highlight, there is still a disproportionate reliance on local property wealth within the education system, with significant variance among and within states (Kena et al., 2016), and reform efforts have not gone so far as to achieve vertical equity—the disproportionate education spending where there is the greatest need (Alexander et al., 2015; Yinger, 2004).

School funding in Illinois. Within the school funding debate, Illinois has found itself front and center of many discussions and reform efforts due to its current inadequate and inequitable funding structure. As the NCES data indicate (Kena et al., 2016), at the state level, Illinois contributes the least to public education with the heaviest reliance on local property tax wealth. Consequently, its schools are funded at highly disparate rates. For example, according to the ISBE Illinois State Report Card Data, in FY16, the lowest funded school district spent $7,353 per student while the highest funded school district spent $31,412. Likewise, disparities in instructional spending per student were even more discrepant; the lowest funded school district spent $3,461 while the highest funded school district spent $17,699. Although these figures include all three types of districts in Illinois, Table 1 outlines the variation in school district spending per student within each of Illinois' three district types, outlining differences in instructional spending per pupil.

Table 1

Descriptive Statistics of School Districts with the Highest and Lowest IEPP – 2013-2014

Statistics	IEPP	Total enrollment	% Low income
Unit School Districts			
Statewide Average	$7,602		
Three highest funded			
CUSD 201	$11,151	1,308	33.7
Lisle CUSD 202	$11,113	1,506	28.5
Scales Mound CUSD 211	$10,792	232	19.8
Three lowest funded			
Carterville CUSD 5	$3,871	2,131	36.0
Edinburg CUSD 4	$3,579	289	24.9
Crab Orchard CUSD 3	$3,461	521	43.0

(continued)

Table 1 (continued)

Statistics	IEPP	Total enrollment	% Low income
Elementary School Districts			
Statewide Average	$7,044		
Three highest funded			
Rondout SD 72	$17,699	141	8.5
Sunset Ridge SD 29	$16,494	477	2.1
Northbrook SD 28	$13,447	1,765	3.7
Three lowest funded			
St George CCSD 258	$4,037	462	27.3
Central City SD 133	$3,902	321	88.5
Bartonville SD 66	$3,803	250	60.8
High School Districts			
Statewide Average	$9,723		
Three highest funded			
Oak Park - River Forest SD 200	$14,944	3,309	19.5
New Trier Twp HSD 203	$14,927	3,991	3.4
Niles TWP CHSD 219	$14,240	4,726	32.4
Three lowest funded			
Fairfield Comm HS Dist 225	$5,165	436	45.0
St Joseph Ogden CHSD 305	$4,994	470	7.7
Illini West HS Dist 307	$4,915	382	42.4

Because local sources contribute the majority of funding to Illinois schools, different communities are able to fund their schools at vastly different rates. Districts with higher property valuations or greater property-rich districts are able to tax themselves at a low rate while amassing significantly more funding for the respective schools. Conversely, property-poor districts often must tax themselves at a significantly higher rate. As a result of this disparity in funding and this regressive system, many reform advocates vehemently protest Illinois' funding formula, citing its flaws and noting how this institutionalized inequity negatively affects student achievement and is bad for the state as a whole, leading to lower employment levels and income rates for low-income students (Martire, 2013).

Illinois: A school funding context. How is this marked disparity able to occur? Its problem is rooted in its reliance on local sources—local community wealth—to fund education. In general, school districts in the United States are funded by three sources: local, state, and federal. However, the distribution of those contributions is dependent upon each state's funding formula. In Illinois, schools are predominantly funded through local revenue sources (Fritts, 2012; Kena et al., 2016). According to the National Center for Education Statistics, as the state that contributes the least to public education (Kena et al., 2016), there is significant inequity in the resources and opportunities provided for students given Illinois' funding structure of public school districts. That national average for state contribution to public education is 45.2%. However, in Illinois—a state that contributes only 24.9%—Illinois is most heavily reliant on local property wealth to fund its schools. For example, in FY15, 67.4% of Illinois school district revenue was derived from local funding, 24.9% from state funding, and 7.7% from federal funding. Because of this heavy reliance on local wealth to fund education, per pupil expenditures vary significantly among school districts.

Illinois' General State Aid funding formula. In order to ensure all schools receive the minimum funds for operating, Illinois, in its attempt to minimize the burden, established a General State Aid (GSA) formula. Representing 66% of all state general funds expenditures on PK-12 education in Illinois, the GSA is comprised of two funding streams: the Equalization Formula Grant and the Supplemental Low-Income Grant. The primary grant, the Equalization Formula Grant, considers local wealth available to fund public education and determines the amount awarded per pupil accordingly. In essence, the more a school district is able to contribute to public education, the less the district receives from the state. In essence, the formula pays the difference between the Foundation Level set—a minimum level of funding that each school must receive per pupil to produce effective results for students (Education Funding Advisory Board [EFAB], 2017; Yinger, 2004). To determine the amount per pupil each district receives through the Formula Grant, there are three categories that are used to determine payment, and these categories change based on the percentage of the Foundation Level that is funded by districts through local sources. The three categories are as follows (EFAB):

Foundation	Wealth: Local Resources <93% of the Foundation Level Calculation (Foundation Level-Local Wealth per Pupil) X Students
Alternate Method	Wealth: Local Resources 93% or Greater and Less than 175% of Foundation Level Calculation: 5%-7% of Foundation Level X Students
Flat Grant	Wealth: Local Resources Greater Than or Equal to 175% of Foundation Level Calculation: $218 X Students

Within this formula, all schools, regardless of whether or not they fully fund the Foundation Level, receive some funding from the state. The fact that there are school districts that spend greater than or equal to 175% of the Foundation Level and that schools who spend greater than 100% still receive money illustrates that there are marked disparities between what schools are spending per pupil. For example, for FY17, of the 852 public school districts, 58 qualified for the Flat Grant and thus spent at least 175% of the Foundation Level, 180 qualified for the Alternative Method, and the remaining 614 qualified for the Foundation method. In other words, 72% of districts were not able to fund more than 93% of the Foundation Level through local sources alone, which means they are reliant on the state to help ensure even the minimum Foundation Level in FY 17 (EFAB , 2017).

In addition to a majority of school districts not being able to meet the Foundation Level by the primary method in Illinois (Local Sources), the current Foundation Level has not been adjusted for inflation and thus is no longer aligned with the methodology that established the funding level. The current Foundation Level is $6,119 per pupil and has been since FY10, with no adjustment for inflation. If adjusted for inflation, this minimum level should be $8,899 per pupil for FY17 and $9,204 per pupil for FY18, as recommended by Illinois' EFAB. This recommendation, if followed, would result in almost double the current appropriation, $4.6 billion more than the current $5.07 billion for a total of $9.7 billion.

Not only has Illinois failed to adjust its Foundation Level for inflation, but it also has not fully funded its existing outdated Foundation Level. Specifically, since 2012, it has funded between 87-89% of the current, outdated Foundation Level, resulting in fewer dollars for school districts that most heavily rely on the state for funding. In FY17, that equates to 614 districts or 72% that fund less than 93% of the Foundation Level via local sources (EFAB, 2017). As a result, these 614 districts experienced significant decreases in funding.

The Supplemental Low-Income grant: Illinois' attempt to equalize for local wealth differences. Like many other states, Illinois has attempted to support low-income communities through its finance system, although as noted, there are vast disparities in per pupil spending across the state due to Illinois' overall funding structure. Of the approaches states have employed, Illinois' formula reflects the most basic type of education equity formula: a foundation aid formula, defined by Yinger (2004) as an approach that sets an adequacy objective (i.e., the minimum deemed for an adequate education per pupil).

Although the primary funding formula is the Equalization Grant, the other state funding program—the second grant—is the Supplemental Low Income Grant, a formula that supplies additional revenue directly in proportion to a district's percentage of low-income pupils. This supplemental funding program can range between $355 and $2,994 per pupil and operates as a sliding scale: as the percentage of low-income students increases, the amount per pupil rises

(Illinois State Board of Education, 2017). Districts with 15% or less low-income students receive \$355 per pupil. Districts with more than 15% low-income receive an amount based on the following formula: (% of Low-Income Students) ^{2} X \$2,700 + \$294.25. This curvilinear formula ensures a greater amount per pupil as the percentage of low-income pupils increases within a district. However, it is important to note that the Supplemental Low-Income Grant is not equalized, which means it does not take into account the overall wealth of the school district. As a result, even some of the wealthiest districts—potentially those districts that only qualify for the Flat Grant—can receive funds through the Supplemental Low-Income Grant (EFAB, 2017). Although this supplemental grant exists as a way to provide more equity, Illinois' overall disproportionate reliance on local property wealth to fund its schools ensures that large revenue and expenditure gaps exist between low-income schools and high-income schools, and accordingly, instructional personnel, materials, services, and facilities, can vary significantly across the state.

Recent funding trends. In addition to the vast disparities among districts, those school districts that rely on state funding as a necessity for their programming have received even less in recent years because state contributions have declined. According to Martire (2013), 34 states—including Illinois—have reduced school funding since 2008. Specifically, in Illinois, per-pupil expenditure is down 8.6% from FY08 to FY14, resulting in an average loss of \$202 per student annually. If recent statewide trends are any indication, it is unlikely that schools will be fully funded anytime soon. This trend is of particular significance because funding does not appear to have rebounded in many states, including Illinois, even though the Great Recession officially ended in 2009.

For example, according to Illinois' EFAB (2017), in the last three fiscal years, FY15, FY16, and FY17, there has been a decline in the Supplemental Low-Income grant because the low-income population has decreased and the concentration of low-income students has improved, resulting in a decrease of $237 million. However, even with these savings, Illinois has still failed to fully fund its Foundation Level (EFAB), and it has failed to increase the Foundation Level to keep pace with inflation, resulting in an even greater loss of revenue to local school districts to the tune of billions of dollars.

Not only has Illinois failed to adjust its Foundation Level since the establishment of the $6,119 minimum in 2009, but the state also has contributed less than 100% of its portion to meet the Foundation Level since 2002, with recent funding shortfalls ranging between 87-89%. Overall, the state underfunded school districts by hundreds of millions of dollars annually in recent years, resulting in billions below the established General State Aid Formula (EFAB, 2017). Although efforts have been made to increase funding in FY16 and FY17—a $4.6 billion dollar allocation in FY16 with an increased $85 million to help districts incur the funding deficit and $313 million in "stop/loss" funds to ensure districts at least maintain FY16 funding levels—these increases reflect the current, outdated Foundation Level, a funding formula many experts would deem less than adequate even when funded to its fullest (EFAB) and certainly not equitable by any standard. Based on the calculations and recommendations of the EFAB, the consequence for those districts reliant on this revenue is much greater than the few hundred dollars less per student school districts receive as a result of the current prorated appropriations which are based on the $6,119 Foundation Level. If the Foundation Level had been adjusted to the $8,899 the EFAB (2017) recommended and was paid in full (as it is also supposed to be), Illinois' poorest school districts would be receiving at least $2,780 more per pupil annually.

Illinois' funding structure: How experts assess its access equality. In addition to Illinois' EFAB, other non-partisan groups examine Illinois' funding and subsequent achievement disparities and offer recommendations to improve it. For example, in a 2016 brief, the Center for Tax and Budget Accountability (CTBA) urged the state of Illinois to reform its funding formula, like plaintiffs who have sought legal intervention, citing the state's goals for public education as defined in the Illinois Constitution. Article 10, Section 1 of the Illinois Constitution outlines the goal of free schools and the state's role in achieving this goal:

> SECTION 1. GOAL - FREE SCHOOLS
>
> A fundamental goal of the People of the State is the educational development of all persons to the limits of their capacities.
>
> The State shall provide for an efficient system of high quality public educational institutions and services.
>
> Education in public schools through the secondary level shall be free. There may be such other free education as the General Assembly provides by law.

The State has the primary responsibility for financing the system of public education.Although the courts have deemed the above goals as "aspirations" rather than "obligations," CTBA argues that the constitution requires that Illinois is obligated to continue to pursue these goals (2016).

How Illinois' current formula provides for all students. As the courts have determined and as Illinois' funding structure dictates, the state does not have the primary responsibility for funding public education (Blase v. Illinois, 1973; Committee for Educational Rights v. Jim Edgar, 1996; Lewis et al. Appellees v. Joseph A. Spagnolo, 1999). Likewise, its Foundation Level, which is outdated and does not reflect a level of adequacy, does not ensure that all students can meet performance expectations outlined by the state. Instead, the Foundation Level, the minimum set by law annually, was never developed to account for *all* children, only the basic costs for a “non-at-risk” student, a student “who has a reasonable likelihood of academic success” (“Why Illinois Should Adopt an Evidence-Based Education Funding Model,” 2016, p. 1). As a result, even if adjusted for inflation and funded at its fullest rate, the formula was never devised based on any adequacy standard. As Yinger (2004) puts it, the entire method—foundation aid—is entirely inadequate because it is not based on educational cost indexes. “Unless it [the formula] adjusts for differences in educational costs from district to district, a state education aid program simply is not compatible with performance objectives,” argues Yinger (p. 11).

Others have recognized this great disparity, particularly as it relates to Illinois, calling Illinois one of the most regressive public education funding systems in the country, one that advantages the wealthy in multiple ways. For example, Baker, Farrie, Johnson, Luhm and Sciarra (2017) assessed all 50 states on fairness principles and fairness measures: funding level, equitable distribution, funding effort (i.e., funding level as it relates to a state’s capacity to fund), and funding coverage (i.e., the number of students attending public, rather than private, schools). For its measure on funding distribution, the distribution of funding across districts relative to student poverty, Illinois earned a failing grade based on the disparity between funding between high-poverty and low-poverty schools, and was one of only four states, including North Dakota, Wyoming, and Nevada, to be ranked below average with regard to all indicators measured, and was deemed a regressive state—one that provides at least 5% fewer dollars to schools that have 30% or more poverty than those schools with 0% poverty.

As a result of similar findings in the Education Law Center’s 2010 report—its first edition—the Chicago-based social justice organization, Business and Professional People for the Public Interest challenged the constitutionality of Illinois’ funding system by filing a lawsuit, *Carr v. Koch*, in 2010 on behalf of taxpayer plaintiffs in which they heavily criticized the state of Illinois, arguing that the state's financial structure forces residents in poorer communities to pay higher property tax rates for local schools than those in similarly valued homes in more affluent communities. In this case, they argued, not only does the advantaged, wealthier group receive more educational spending per pupil, but their property tax bills are often lower as well. As in previous cases, the Illinois Supreme Court dismissed the case on the grounds that the defendants in the case—the Governor and the ISBE—do not control local property tax rates.

Education funding reform efforts. As a result of findings and pressure from those like the Center for Budget and Tax Accountability and Illinois' EFAB and pressure from funding reform advocates, such as the plaintiffs in the court cases like *Blase v. the State of Illinois* (1973), the *Committee for Educational Rights v. Jim Edgar* (1996), and *Lewis E. et al., Appellees v. Joseph A Spagnolo* (1999) and outside advocacy groups, it seems Illinois policymakers recognize the state's funding structure has detrimentally contributed to gross funding disparities among students. As a result, several recent bills have been proposed to help mitigate some of the inequities, such as Senate Bill 16 and Senate Bill 1.

According to the Illinois State Board of Education (2014), Senate Bill 16 would have created a single funding formula that seeks to provide more equitable means to distribute funds to Illinois schools, prioritizing those resources where there is greater student need—those school districts with higher poverty rates, Special Education students, and English Language Learners, to name a few. This proposed funding approach would have increased the portion of funding that takes into consideration local property wealth from 44% to 82%. However, within the proposed legislation, the Foundation Level does not change; districts with some of these additional weights, though, would receive additional revenue, and those funds which would come from those school districts with more financial resources to be redistributed by the state. If implemented, Senate Bill 16 proposed gradual changes, phasing in the formula over 4 years. It also capped district losses at $1,000 per student to try to minimize any district's loss.

Although Senate Bill 16 stirred a lot of debate and publicity in the media, among scholars, and among Illinois politicians, Senate Bill 16 was never assigned to a House committee to consider it for a vote. As a result, it appeared to be more of an attempt to show Illinois politicians are committed to funding reform without having to actually make any changes and create any winners and losers.

Given all the attention, however, funding reform is currently at the forefront of Illinois politics, and there are many who continue to hold out hope for a change to Illinois' funding structure. For example, a similar bill, Senate Bill 1, *The Illinois School Funding Reform Act of 2015*, has adopted many of the principles from Senate Bill 16. Passed by both houses of the legislature as of May 31, 2017, Senate Bill 1, commonly known as the Evidence-Based School Funding bill, provides the first legitimate chance at education funding reform in Illinois. This evidence-based model proposes to distribute state funds based on an adequacy target that would be calculated on a district-by-district basis and is based on what research has deemed most effective in producing positive academic outcomes. Adjusted to account for differences in regional operating costs and demographics (i.e., the recognition that low-income and limited English proficient students require more to educate), Senate Bill 1 was designed to significantly help the poorest districts—those districts that most often serve students who cost more to educate—more funding. It is particularly significant given that the Illinois' 2017-18 budget passed in July 2017 requires an "evidence-based" school funding model. Although passed by both houses, the Governor issued an amendatory veto, stipulating several changes to the bill, including major appropriation cuts to Chicago Public Schools.

Rather than amend Senate Bill 1, lawmakers returned to the negotiating table, developing and passing Senate Bill 1947, a similar bill as Senate Bill 1 that provides $430 million in new funding to Chicago Public Schools and increased funds to those districts most in need. Signed into law on August 31, 2017, Senate Bill 1947 provides the blueprint for Illinois' new evidence-based funding formula for FY 18 once the specific details of the formula and law are finalized.

Recommendations to improve adequacy and equity. But even with increased funding efforts to make school funding more equitable, will this recent legislative effort do enough to establish adequacy and equity across the state's 852 school districts? The answer will remain to be seen in the implementation and level of funding Illinois provides. The outside policy groups and other researchers who support an evidence-based model articulate both the level of funding and practices that need to be incorporated within an evidence-based model, those principles that Senate Bill 1947 was designed to reflect. As pioneers in the field, Odden and Picus (2008) sought to research and provide recommendations to inform policy on how to improve student performance across the country, ultimately developing their Evidence-Based approach to school funding. Defining adequacy as "providing a level of resources to schools that will enable them to make substantial improvements in student performance over the next 4 to 6 years as progress toward ensuring that all, or almost all, students meet their state's performance standards in the longer term," Odden, Picus, and Goetz (2010, p. 629) provided not just an approach to allocating the appropriate amount of resources to ensure an adequate education for all students but also a framework outlining best practices—the strategies that lead to higher academic achievement.

Although measuring *adequacy*, they note, is difficult given the range of variables, they believe their approach is supported by research, as funding reflects the projected cost for strategies and practices that have been empirically proven to positively impact achievement. Their approach includes the following 13 components of an evidence-based model that includes research-based efforts that lead to improved academic achievement (Odden et al., 2010, pp. 632-633):

1. Full-day kindergarten.

2. Core class sizes of 15 for Grades K-3 and class sizes of 25 for Grades 4-12. Core is defined as the regular classroom teacher in elementary school and teachers of mathematics, science, reading, English or writing, history, and world language in secondary schools. With these ratios, class sizes average about 18 in the elementary school and 25 in middle and high schools.

3. Specialist teachers to provide instruction in art, music, physical education, career technical education, and other electives and in numbers adequate to cover a six-period day in middle schools with teachers teaching for just five periods and 90-minute block schedules in high schools. This resource also provides all teachers with time during the day for collaborative planning and to work on the instructional program. The formula provides specialist teachers at the rate of 20% of core teachers for elementary and middle schools and 33% of core teachers for high schools.

4. At least one period (usually an hour) of planning and preparation time each day for all teachers in elementary, middle, and high schools.

5. Pupil support staff including guidance counselors (1 full-time equivalent [FTE] position for every 250 students in middle and high schools) and nurses as well as additional pupil support to include social workers and family liaison personnel, the latter provided on the basis of 1 FTE position for every 100 at-risk students.

6. A full-time librarian and principal in every prototypical school as well as two secretarial positions in the prototypical elementary (432 students) and middle school (450 students) and three secretaries in the prototypical high school (600 students).

7. An ambitious set of professional development resources including one instructional coach for every 200 students (e.g., 3.0 FTE positions in a 600 student high school), at least 10 pupil-free days for professional development, which usually means extending the school year for teachers by 5 additional days, and $100 per pupil for trainers and other expenses related to professional development.

8. Supervisory aides to cover recess, lunch, hall monitoring, and bus loading and unloading.

9. Funds for instructional materials, formative assessments, and supplies ($165 per pupil for elementary and middle schools and $200 per pupil for high schools); $250 per pupil for technology and equipment; and $250 per pupil for student activities (sports, clubs, etc.).

10. Funding of $25 per pupil to provide extra strategies for gifted and talented students.

11. A comprehensive range of "extra help" strategies for students who need additional instructional assistance and extra time to achieve to rigorous state proficiency standards, including, a. Resources to provide one-to-one tutoring at the ratio of 1 FTE teacher tutor position for every 100 at-risk students. b. Extended-day resources to provide academic help for 2 hours of before or after school programming, at the ratio of 1 FTE position for every 30 at-risk students, assuming about 50% of at-risk students would participate. c. Summer school resources to provide up to a 6-hour day and 8-week summer program and academic help for two thirds of the time, at the ratio of one FTE position for every 30 at-risk students, assuming 50% of at-risk students would need such extra help and would attend the program. d. One additional FTE teacher position for every 100 English language learner (ELL) students (the bulk of whom also are at risk and trigger the first three extra help resources), primarily to provide instruction in English as a second language. e. One teacher FTE and 0.5 aide position for every 150 students to provide services for high-incidence but lower cost students with disabilities (3 teacher and 1.5 aide positions at the prototypical elementary and middle schools and 4 teacher and 2 aide positions at the prototypical high schools). The model also advocates full state funding of the entire costs of the high-cost special need students (assuming 2% of those with disabilities are in the "high-cost" category).

12. Substitute teacher resources at 10 days for each teacher and instructional facilitator position.

13. Central office staff covering the superintendent's office, the business office, curriculum and pupil support, technology personnel, and an operations and maintenance director configured on a prototypical district.

This approach also helps address critics of adequacy reforms efforts, those opponents who cite increased spending in states including Missouri; New Jersey; and Washington, DC that have not yielded the achievement gains promised (Cunningham, 2004; Evers & Clopton, 2006; Hanushek, 2006). Such opponents argue that politics, ideologies, or other institutional structures tend to result in diverting funds to initiatives that do not improve achievement. In essence, opponents have argued that there have been sufficient examples of high-spending and low-achieving school districts to prove that financial resources will not provide the path to increased achievement for disadvantaged students. Likewise, they argue that increased spending will not necessarily lead to improved achievement.

However, funding advocates including Odden et al. (2010), Alexander et al. (2015), and Yinger (2004), among others, find that argument shortsighted. They, too, recognize that funding alone cannot ensure increased achievement; however, they believe funding is necessary to ensure school districts serving low-income students have the opportunity to finance the kinds of research-based practices needed, including full-day kindergarten; appropriate teacher and support staff salaries; instructional support services, such as specialists and instructional aides; professional development; and so on—the research-based instructional programming wealthier school districts are able to afford and provide for their students that poorer school districts simply cannot. In addition, reformers argue that past funding failures do not relieve us of the moral (and constitutional) imperative to ensure we are providing an education that allows all students the opportunities to succeed (Alexander et al., 2015).

For example, under Odden et al.'s (2010) model, they are able to estimate the costs of school finance adequacy in each state by incorporating the characteristics of the evidence-based model to the student demographics within each state. Ultimately, they use two different factors, national average teacher salaries and individual state teacher salaries, to help estimate the per pupil expenditure required for adequacy within each state. Using this method, Odden et al. calculate that in total the country would need a 13% increase in overall education funding (if there is no redistribution from states spending above the adequacy level for their state), and Illinois would need to spend an estimated additional $1,555 more per student in order to ensure adequacy. This estimate was based on 2005-2006 projections, so that cost would be more if calculated for the current school year. Likewise, that estimate is based on averages and would thus require a significant redistribution of funds, as the average per pupil expenditures in FY 05-06 was $9,456 and the projected adequacy cost was $11,011. This amount is significant given the significant variation in per pupil expenditure within the state, with many school districts spending far less or far more than that average.

Likewise, advisory, non-partisan groups in the state of Illinois such as the Center for Tax and Budget Accountability (CTBA) concur with Odden and colleagues and advocate for an evidence-based education funding model in order to ensure adequacy and improve equity in school funding. For example, the CTBA notes Illinois funding has continued to decrease since 2003, resulting in a nearly $5 billion dollar shortfall needed to meet the EFAB's's recommendation in 2016—over $2,780 per student, and within an inequitable system, the CTBA argues for more than the EFAB's adjusted Foundation Level. Instead, it recommends Odden and Picus's (2008) evidence based model. The CTBA (2016) notes that this model identifies and costs-out practices that lead to the following outcomes (p. 3):

- Actually enhance student achievement over time;
- Reduce drop-out rates;
- Improve school climate while reducing disciplinary problems;
- Enhance high school graduation rates;
- Enhance college enrollment and completion;
- Meet the social/emotional needs of students from varied backgrounds; and
- Help create a K-12 system with the capacity to provide an education of sufficient quality for all students to graduate High School college and career ready, irrespective of income, race, or ethnicity.

In other words, the CTBA argues for an evidence-based model to help eliminate the effect of background of educational and post-educational inequities that persist beyond K-12.

School funding and the effects on student achievement. But would such a change in Illinois or in other states around the country make a difference (Hanushek, 2006)? This is what has been the million dollar question among educational scholars seeking a way to close the achievement gap between low-income and non-low income students. As illustrated, there is significant research to support that SES affects student achievement. Schools with high SES students have higher outcomes than schools with low SES (Caldas & Bankston, 1997; Coleman et al., 1966; Dotson, 2014; Kena et al., 2016; Kennedy et al., 1986; Palardy, 2013; Rumberger & Palardy, 2005). However, there is still much debate about how to "close" or shrink that achievement gap—how to mitigate SES as a primary contributing factor—and one controversial solution revolves around the inequitable funding structures which exist in many states, and in Illinois particularly, a state whose reputation is as one of the worst in the nation (Baker et al., 2017; Martire, 2013).

Per pupil expenditure and academic achievement. Of the literature that explores the relationship between school funding and achievement, there is a positive correlation between higher spending districts and higher academic achievement. For instance, in the state of Illinois, research, although limited, shows that those districts that typically spend more per pupil have maintained higher academic achievement (Krause, 2017; Oberhaus, 2008). When specifically examining high school districts, Krause (2017) found that as Equalized Assessed Valuation (EAV), a property's valuation after the county and state equalization are performed, increased so did high school students' achievement data as measured by the ACT. As the students identified as low-income increased, the ACT score decreased.

However, the relationship established by both Krause and Oberhaus does not empirically prove that spending more per pupil is the silver bullet to improving achievement for all students. Instead, because school funding in Illinois is heavily based on local property taxes—on wealth—such data conclude more about the demographics of the student population (Caldas & Bankston, 1997; Coleman et al., 1966; Kennedy et al., 1986; Palardy, 2013; Oberhaus, 2008; Rumberger &

Palardy, 2005; Sirin, 2005; White, 1982) than the relationship between funding and student achievement.

As a result of the differences in students' backgrounds and their subsequent achievement levels, many researchers have been interested in the extent to which education funding could mitigate some of these circumstances. Thus far, scholars have reached conflicting conclusions, with some researchers finding that total expenditure has not resulted in improved achievement for at risk students (Cunningham, 2004; Evers & Clopton, 2006; Hanushek, 2006; Oberhaus, 2008), and many who found that it does or can if done appropriately (Alexander et al., 2015; Baker, 2016; Greenwald, Hedges & Laine, 1996; Odden et al., 2010; Yinger, 2004).

Those scholars skeptical of increased spending efforts often argue that there are plenty of school districts that produce student achievement results for less (Hanushek, 2006; Walberg, 2006). However, what they often fail to note is how easily replicable those examples of high-poverty, high-achieving schools are or how indicative performance is of student background rather than how indicative it is of per pupil expenditure. For example, Hanushek (2006) argued that private schools yield better academic results at nearly half the cost of their public school counterparts. Lubienski and Lubienski (2014) examined this question and found that when variables that influence achievement are examined, public school students actually maintain a slight advantage. Alexander et al. (2015) would concur, arguing that such a result reflects the principles of horizontal and vertical equity. In other words, the students who typically attend private schools require much less cost to educate. As a result, Alexander et al. (2015), along with other funding reform advocates (Baker, 2016; Odden et al. 2010; Yinger, 2004), would argue that such differences in backgrounds are precisely why adequate and equitable funding are absolutely necessary if there is to be a chance to equalize for background characteristics. Those scholars would argue that benefits have not yet been experienced because states often implement political solutions that do not cover the costs of educating "at-risk" students. In that way, they would be in agreement with Evers and Clopton's (2006) assessment of states that have tried to increase funding but have not yet produced marked academic improvement. The difference, however, is that they still believe there is a moral imperative—a responsibility—to ensure all students receive an equitable, high quality education and that increased financial contributions are required to achieve that goal on large scale.

Such arguments confirm Greenwald and colleagues' (1996) meta-analysis of the relationship between a number of school inputs and student achievement. Their analysis found that resources were positively related to student achievement outcomes, with statistically significant effect sizes to "suggest that moderate increases in spending may be associated with significant increases in achievement" (p. 361). In more recent research, Baker's (2016) analysis for the Albert Shanker Institute confirms this finding. In his review, Baker examined whether per pupil spending is positively associated with improved or higher student outcomes, whether school resources that cost money matter (e.g., smaller class sizes, additional supports, early childhood programs, and more completive teacher salaries), and whether or not school finance reforms matter, and for all three questions, he found the answer to be "yes"—that per pupil spending is positively associated with higher student outcomes, that spending money on the kinds of research-based practices (those which all schools currently cannot afford) is positively associated with higher student outcomes, and that finance reform can lead greater improvement. Like other reform advocates (Alexander et al., 2015; Odden et al. 2010; Yinger, 2004), Baker argues that money alone cannot ensure higher achievement, but it is a necessary, fundamental prerequisite for schools to improve adequacy and equity of outcomes.

Implications: Gaps that extend beyond academic achievement. Although the debate continues regarding the extent to which school funding can be a catalyst to mitigate for differences in student background and academic readiness, there is no debate that the achievement gap between low SES and high SES students exists (Caldas & Bankston, 1997; Coleman et al., 1966; Dotson, 2014; Kena et al., 2016; Sirin, 2005; White, 1982), and there is no debate that schools are funded at vastly disparate rates (Alexander et al. 2015; Kena et al., 2016; Yinger, 2004). However, scholars must continue to debate and seek reforms to the current system that perpetuates these disparities because the school achievement gap stems beyond students' performance on any one standardized test. Its implications are far-reaching, and achievement disparities in school districts affect individuals, low-income and often minority, and society due to the subsequent gaps that manifest beyond the school walls.

Subsequent gaps in employment and income. According to research, gaps in academic achievement have far-reaching implications beyond the classroom, resulting in gaps in employment and income, gaps that negatively affect individuals and the overall U.S. economy. For example, according to the Economic Policy Institute, while college graduates earned significantly more than those with a high school diploma (23.5%) in 1979, education is more important than ever, with the gap growing 23 percentage points (46.9%) by 2011. Likewise, unemployment rates vary dramatically based on education rates. For example, in its most recent 2015 estimates, the United States Department of Labor (2016) found that the unemployment rate for those workers over 25 with a bachelor's degree is 2.8% and an even smaller 1.5% for those with a professional degree. However, it is 5.4% —1.1% above the national average of 4.3%— for those with a high school diploma only and 8.0%—nearly twice the national average—for those with less than a high school diploma. Similarly, income gaps among education levels are just as stark. For example, workers over 25 without a high school diploma averaged $493 per week—just less than half of the national average of $860 per week—in 2015 while those with a high school diploma averaged $678 per week and those with a bachelor's degree averaged $1,137 per week. As a whole, only weekly earnings for workers with a bachelor's degree or higher were above the national average of $860 (United States Department of Labor). Such data are significant given that nearly 95% of jobs created since the Great Recession of 2008 have been fulfilled by people with at least some college education (Carnevale, Jawaysundera, & Gulish, 2016).

Employment, income, and racial disparities in Illinois. In the state of Illinois, gaps are similar and even more glaring. For example, when examining the detriment to the inequitable funding structure and academic achievement gap, Martire (2013) found subsequent vast disparities in employment and income. Residents in poorly funded school districts tended to have less education, leading to fewer jobs and lesser paying jobs. For example, individuals without a high school diploma had a 20.7% unemployment rate, while those with a bachelor's degree or more experienced a 5.7% unemployment rate, and since wealthy school districts are disproportionately White—those school districts that receive more in funding and have higher academic achievement rates—there is also a wage gap. According to Martire's estimate, the wage gap is 6% between Whites and Hispanics and an even more alarming 93% between Whites and African Americans (Martire).

More recently, the Illinois Department of Employment Security (IDES, 2016) found that while that the Illinois unemployment rate decreased to 5.9% by 2015, it still remained higher than pre-Great Recession levels, and African-Americans had the lowest labor participation rates of all races in Illinois (60.2%). In addition, the IDES found that African-Americans had the highest unemployment rate by race (12.2%) compared to 7.2% for Hispanics and 5.0% for whites. When examining job patterns, the IDES found that minority workers are also employed in occupational categories that tend to pay lower wages, although the IDES noted that no statewide data by racial group is published.

Gaps in Literature

As a whole, there is significant research to support the effect of SES—on student background—and its role on academic achievement (Caldas & Bankston, 1997; Coleman et al., 1966; Dotson, 2014; Kena et al., 2016; Kennedy, Jung, Orland & Myers, 1986; Palardy, 2013; Rumberger & Palardy, 2005; Sirin, 2005; White, 1982). As noted, there is also significant research that shows that school districts are financially supported at widely disparate rates, often resulting in low SES students receiving fewer financial resources due to the reliance on local property wealth (Alexander et al., 2015; Kena et al., 2016; Odden & Picus, 2008; Odden et al. 2010; Yinger, 2004). However, gaps remain in the literature with regard to school funding reform that is truly equitable and achieves vertical equity, that which Alexander et al. (2015) describe as the financial allocation to effectively mitigate for background factors or the redistribution of resources to educate at risk students.

As a result, work by Oberhaus (2008) on Illinois funding draws a conclusion it cannot accurately make—that increased funding will not help improve achievement, and Krause's (2017) recent analysis, although it supports Baker's (2016) findings that spending does matter, is limited to high school districts and does not reveal how much might be needed to mitigate for Illinois' woefully inequitable, underfunded formula. As a result, it seems premature to argue that achievement levels would not increase if reform included funding levels to equalize for student backgrounds, and more research needs to be conducted to determine more precisely how to mitigate for variance in student backgrounds. However, that exact dollar amount, too, has been a challenge to pinpoint in the research, as Odden et al. (2010) note; it is difficult to measure adequacy, and there are a number of ways to determine a financial projection for adequacy.

Theoretical Framework

Based on past and emerging research—the fact that we have both wide achievement gaps and wide disparities in school funding between low SES and high SES students—I examined the effect of SES and school funding in elementary school districts and their relationship to student achievement utilizing multiple frameworks. First, as it relates to school funding, I examined the disparities in funding and subsequent achievement utilizing a horizontal and vertical equity framework, purporting that the greater the need, the more funding required to equalize for the need (Alexander et al., 2015; Yinger, 2004). Operating under this theory and within the context of Illinois' school funding structure, that which is predicated on property wealth and where poverty tends to exist in heavier concentrations within specific geographic locations, it would cost more to account for the financial disparities existing in a school system when the majority of the student body is also impoverished.

In addition, as it relates to the effect of such variables that create need, such as the effect of SES in this study, I continue the work of prior research to examine the relationship between school SES and individual academic achievement within Illinois' widely disparate funding structure, approaching the research with the assumption that reflects a theory established through the Coleman report: "The social composition of the student body is more highly related to achievement, independent of the student's own social background, than is any school factor" (Coleman et al., 1966, p. 325).

Summary

We know there are consistent achievement gaps that continue to persist between low-income and non low-income, often minority, students. Although data show that efforts in recent decades have led to a slight decrease in those attainment gaps, minority students, those students who are disproportionately low-income, still remain two plus grade levels behind their white peers (Kena et al, 2016). Although the solution to shrinking achievement disparities among different groups will likely involve a multi-faceted approach that spans beyond the structures of our school systems, there is a need to examine solutions within our public education system that exacerbate the opportunity and achievement gap or do not do anything to address it.

A most pivotal and urgent glaring inequity lies within our school finance system, a system that heavily provides local control for financing schools and has led to vast differences in funding across 50 states and inequitable funding structures that heavily rely on local property wealth. In Illinois especially, the funding and subsequent opportunity gaps between the "haves" and the "have nots" are so great due the state's structure being the most heavily reliant on local property wealth in the country, one scholars argue is one of the most inequitable in the country (Baker et al., 2017; Martire, 2013).

If the gross inequality is not enough for some to believe solutions must continue to be pursued vehemently and consistently, the Illinois Constitution should also provide the impetus. As Article X, Section 1 of the Illinois' constitution declares, the goal of education is to ensure the "educational development of all persons to the limits of their capacities," and to ensure that goal is met, "the State has the primary responsibility for financing the system of public education." While these statements may be deemed as *aspirations,* rather than *obligations*, as aspirations outlined in the constitution, financial justice needs to be continuously pursued until equity is a reality. As a result, for the goal to be met—for all to be educationally developed to their full potential—we must continue to examine the relationship between concentrated SES and achievement and school funding and achievement in order to seek solutions for the appropriate allocation of resources to ensure each person is educationally developed to his or her capacity and that the State's constitutional aspiration becomes a reality.

Chapter 3

Methodology

There has been much research to support the claim that SES affects student achievement (Coleman et al., 1966; Sirin, 2005; White, 1982). Similarly, some research has shown a correlation between the level of school funding, which is most often positively correlated and thus tied to SES, and student achievement. However, researchers debate the effects funding can have on improving academic outcomes, with some scholars arguing that financial resources do not affect academic outcomes (Cunningham, 2004; Evers & Clopton, 2006; Hanushek, 2006; Oberhaus, 2008) and some arguing the contrary (Alexander et al., 2015; Baker, 2016; Greenwald et al., 1996; Yinger, 2004). In order to explore the extent to which SES—an individual's SES and the school district's SES—affects academic achievement in the state of Illinois and the possible solutions to address such disparities, it was important to examine the relationship between these variables. In addition, within a funding structure that is so heavily reliant on local wealth, it was also important to examine whether or not Illinois' current funding formula reinforces, exacerbates, or mitigates for the achievement differences between low-income and non low-income students in its public school districts.

Specifically, it is important to examine the difference in academic outcomes for low-income students within varying socioeconomic and instructional spending level contexts and the effectiveness of Illinois' funding structure in equalizing for variance in student backgrounds. This chapter begins with the specific research questions that guided this study. Following the research questions, the chapter will include the research design to explain how the questions will be able to be measured, the participant/sample selection, the data collection procedures, and the data analysis procedures.

Research Questions

The following research questions were explored to determine the relationship between SES and academic achievement within varying contexts and the assessment of how well Illinois' funding structure was able to successfully mitigate variance in student backgrounds.

1. To what extent are the Reading and Math ISAT scores of low-income students in Illinois elementary school districts correlated to the percentage of low-income students in a school district's population?

2. What is the relationship between instructional spending per pupil and Illinois elementary school district students' academic achievement in Reading and Math on the ISAT based upon the proportions of low-income students within school districts of varying socioeconomic levels?

3. Does the concentration of poverty have an outsized effect on Illinois elementary school district students' achievement in Reading and Math on the ISAT irrespective of school district IEPP?

4. Does Illinois' funding structure effectively minimize the effect of SES on low-income students as measured by student achievement in Reading and Math on the ISAT?

Research Design

The study was quantitative in nature and incorporated multiple statistical methods to answer the proposed research questions. The first question examining the relationship between individual student achievement and school district SES was determined using the Pearson Product Moment (PPM) Correlation, also known as Pearson's *r*. Rooted in Francis Galton's 1888 discovery of the concept of correlation (Stigler, 1989), Pearson's *r* measures correlation between two variables (Alexander et al., 2015; Sirkin, 2006). In this study, Pearson's *r* measured the degree to which individual student achievement was correlated with school district SES. Although there are other correlational tests, such as Spearman's rho, Pearson's test is a parametric procedure—it conducts its calculations on original scores collected, not ranks. As a result, although both tests determine correlation, Pearson's test provided a more precisely accurate correlation (Walker, 2010).

The second and third questions were measured using a multiple linear regression model. Regression analysis provides a process by which to examine the relationship among multiple variables and specifically develop predictive equations where there is more than one variable present (Bates & Watts, 1988; Sirkin, 2006). In this study, the dependent variable was student achievement as measured by student test scores on the Illinois State Achievement Test (ISAT) while the independent variables included Instructional Expenditure Per Pupil (IEPP), Individual Socioeconomic Status (SES), and School District SES. Unlike the first question that sought to examine the relationship between student achievement and school district SES, the second and third questions sought to explain the relationships between the continuous dependent variable, Math and Reading ISAT Scores, and three independent variables: IEPP, Individual SES, and School District SES.

The fourth question examining the effectiveness of Illinois' funding structure in mitigating achievement disparities based on variance in SES was assessed through the use of the Gini coefficient. Employing one of Alexander et al.'s (2015) recommendations to measure a state's equity in its funding structure, the Gini coefficient is a statistical method that can measure the disparity in funding per pupil. In this study, it was used to measure whether or not Illinois effectively mitigated for the variance in students' SES via its funding structure. In this study, the Gini was determined via student-level analysis, providing the IEPP for each student within each school district.

SES

In this study SES was defined in terms of "low-income" and "non low-income." To determine an individual student's SES status as either "low-income" or "non low-income," the definition for "low-income" employed reflected the Illinois State Board of Education's definition as defined in the 2013-2014 school report card. Accordingly, "non low-income" was categorized as all other students. Using this definition was crucial to maintain a consistent baseline for data collection and analysis, as students were either categorized as low-income or non low-income, and this indicator informed the data collection and analysis for each research question.

Participant/Sample Selection

Although it would have been preferable to examine multiple years of student achievement data, the scope of this study focused on the 2013-2014 school year only. Prior to the 2013-2014 school year, proficiency criteria for the ISAT were lower and did not reflect the rigor of the Common Core State Standards or closely align to the college and career readiness scores of 11th graders (Illinois State Board of Education, 2013). As a result, there was a large discrepancy in the percentages of student readiness on the two assessments. As such, proficiency levels prior to 2013-2014 do not provide an accurate picture of the gap between varying SES levels and do not provide an accurate picture of the readiness for the next grade level or high school. As the Illinois State Board of Education notes, working with its "expert advisory committee," it worked to establish proficiency levels in 2013-14 to more accurately reflect the state's standards and to shrink the gap in readiness determined by the 11th grade assessment (the Prairie State Achievement exam) and the elementary assessment (ISAT). Accordingly, this study employed data from the 2013-14 school year only to ensure data were more consistent between assessments and provided a more accurate picture of the differences in performance among students. Following the 2013-2014 school year, the state implemented a new assessment system, the Partnership for Assessment or Readiness for College and Career (PARCC). Given the implementation of this new assessment system and the time it would take to ensure validity and reliability, assessment data following the 2013-2014 school year were not included.

In 2014, Illinois maintained 863 public school districts, including 375 elementary districts. Because the achievement metric utilized was at the elementary level only, only elementary districts were examined. Specifically, the 374 elementary districts with complete district-level data available were examined. Although unit districts include elementary students and thus assess students using the ISAT, to maintain uniformity for all questions related to both achievement and expenditure, elementary districts were employed as the unit of study. In addition to uniformity, there was also little current research related to education finance equity and SES that specifically assessed Illinois' elementary school districts, only its high school districts (Krause, 2017). Likewise, Illinois is unique in that it is one of the few states to maintain elementary, unit, and high school districts.

Although the school funding landscape had remained consistent in Illinois since its adoption of the Foundation Level, with only decreases due to varying proration rates, to maintain consistency throughout the study, financial data were limited to the school year being examined: 2013-2014. However, to effectively answer the four research questions assessing the effectiveness of Illinois' current funding structure to mitigate achievement disparities based on variance in SES, education finance data from a decade prior (2003-2004) were collected in order to have a base year to apply the Gini coefficient analysis. Within the 2003-2004 school year, Illinois maintained the same funding formula, only with 2003-2004 levels of funding. This base year offered an opportunity to assess if inequality had worsened, improved, or remained the same within the state's funding structure.

Data Collection

The data collected in this study were based on the unique data sets obtained from the ISBE. The first, a de-identified student level dataset from the 2013-2014 school year, included a variety of demographic and achievement measures for each student. The second and third, school district level data sets from 2013-2014 and 2003-2004, included similar measures to the first dataset but were aggregated at the school and district level. The following outlines the precise data elements obtained from the ISBE:

Data Elements

Dataset #1 – Students

Math ISAT Score	Gender
Race	School Name
Low –Income Status	District Name
Reading ISAT Score	Grade Level

Dataset #2 – School Districts, 2013-2014

School ID	District Type Code
City	School ISAT Math Score
Low-Income District %	District Size Name
School Name	District Size Code
District Name	Low-Income School %
School ISAT Reading Score	School Total Enrollment
School Type Name	IEP School %
School Type Code	LEP School %
Overall Average Class Size	IEPP-District
District Type Name	

Dataset #3 – Gini Base , 2003-2004

Race	District Size Name
School ID	District Size Code
City	Low-Income Status
Gender	School Total Enrollment
School Name	IEP School %
District Name	School ID
Age/Grade Level	LEP School %
School Type Name	Low-Income School %
School Type Code	Low-Income District %
IEP Status	Overall Average Class Size
District Type Name	School ISAT Math Score
District Type Code	Low-Income State %
LEP Status	IEPP-District

Although aggregate data were available via the Illinois School Report Card website or through the Illinois State Board of Education’s website, using data in the aggregate form is problematic because averages cannot offer the same level accuracy and specificity. Specifically, in this case, such data would not have allowed me to control for the other variables, such as race. Although student-level data were collected, these data were de-identified student-level data. Accordingly, I could not include Individual Education Plan (IEP) status, Age/Grade Level, and Limited English Proficiency (LEP) as part of the request since small group sizes could reveal certain students in certain schools or districts. Once received, the data were categorized, labeled, and edited for accuracy.

Data Analysis

Once the data were ready for analysis, they were entered into R, a programming language for statistical computing. A PPM correlation analysis was performed to assess the relationship between individual student achievement (ISAT test scores for grades 3-8 in Math and Reading) and Low-Income District Percentage as outlined in research question one. In addition to calculating the overall PPM coefficient, separate PPM coefficients were calculated by Low-Income District Percentage quartiles and IEPP quartiles. Furthermore, other significant correlations were also revealed and outlined.

A Multiple Linear Regression model was developed to answer research question two, with Individual Math and Reading ISAT Scores as the dependent variable and IEPP-District and Low-Income District Percentage as the primary regressors. Additional regressors, such as gender and race were also considered. As with the PPM analysis, separate analyses were performed for the stratified groupings of Low-Income District Percentage in addition to the overall coefficients.

In order to isolate the effect of concentration of poverty—of low-income students—on achievement as posed in research question three, an instrumental variable was incorporated into the Multiple Linear Regression model described for research question two. In this analysis, individual test scores on the ISAT were the dependent variable, Low-Income District Percentage was the primary independent variable, Gender was the instrumental (exogenous) variable, and IEPP–District was held constant.

Instrumental variable regression is largely based on the Multiple Linear Regression Model, but it includes “instrumental variables” not contained in the equation of interest to estimate the unknown parameters of that equation (Stock & Trebbi, 2003). By adding an exogenous variable, the omitted variable bias inherent in the Multiple Linear Regression Model was minimized. In this study, gender influences achievement but is not correlated to SES. As a result, it was used as an instrumental variable. Again, separate analyses were performed for stratified groupings of Low-Income District Percentage in addition to overall coefficients.

To answer question four, a two-stage approach was employed to assess the effectiveness of Illinois’ funding structure. The first was a PPM Correlation analysis to establish a relationship between Low-Income District Percentage and IEPP–District. The second was to calculate the Gini coefficients, comparing the relative percentiles of students and IEPP–District. Within each district, the student level of analysis was used. Specifically, the IEPP–District provided the overall figure to be multiplied by the number of students for each district. This method ensured the student level of analysis required for an accurate Gini. Taken together, along with the results from research questions 1-3, it was established whether the disparity that exists in educational funding diminishes or enhances the effect of students’ SES on achievement.

Summary

This chapter outlined the research questions and provided the explicit research design to explain how the questions will be measured. Following the research questions, the chapter included the research design to explain how the questions will be able to be measured, the participant/sample selection, the data collection procedures, and the data analysis procedures. The next chapter outlines the findings for each research question.

Chapter 4

Results

This chapter presents the results of the statistical analysis outlined in Chapter 3. First, a description of the procedures will be provided, including a discussion of the data collection methods for student-level and district-level data and a discussion of the student-level and district-level descriptive statistics to be included. Next, the primary research questions are analyzed using graphical and inferential statistics. Preliminary analysis will be included within the data presentation of each research question.

Procedures

Data required to address the four research questions were obtained from the Illinois State Board of Education (ISBE) for school year 2003-2004 (question four only) and 2013-2014. Data required for student-level analysis was requested and received from ISBE personnel directly. District-level data required were publicly available and downloaded from the ISBE website and included general school report card information. After obtaining the data requested from ISBE and downloading the remaining district-level data, the data were entered into R, a programming language for statistical computing. In order to maintain student anonymity and thus ensure de-identified student-level data, any combination of elements in which the *N* was less than 10, data were not included. For example, if there were only five Black, Low-Income students in a given school, they would not be included in the data set for that district because the data could no longer remain de-identifiable.

Descriptive statistics: District-level data. Table 2 provides the district-level descriptive statistics, including the total number of elementary school districts (374) and the demographic descriptive statistics for all 374 elementary school districts, including the overall Low-Income Percentage, the Total Enrollment, the Average Class Size, and the IEPP.

Table 2

Descriptive Statistics of Elementary School Districts – 2013-2014

Demographic characteristics	Min.	Max.	Mean	SD
Low-income %	0.0	100	43.9	25.9
Total enrollment	45	14,432	1,431	1,848
Average class size	5.0	30.5	19.9	4.4
IEPP	\$3,788	\$17,568	\$6,476	\$1,805

Note. *N* = 374 districts.

Of note, there was a large range in district size, from the smallest district enrolling as few as 45 students to the largest district enrolling 14,432 students. In addition, there was a wide range socioeconomic stratification among districts, ranging from 0% to 100% low-income depending on the district, with a 25.9% Standard Deviation to indicate an abnormal distribution. In other words, the mean of 43.9% Low-Income was derived from an abnormal distribution due to the number of districts with high or low percentages of Low-Income students enrolled. Similarly, there was a wide range in IEPP among districts, ranging from \$3,788 as the minimum and \$17,568 as the maximum. Such a range was not surprising due to Illinois' funding structure thoroughly outlined in Chapter 2, but it will be addressed within the research question analysis.

Descriptive statistics: Student-level data. Table 3 outlines the student-level data from the 2013-2014 school year used in the analysis. The table provides student-level descriptive statistics for demographic (Gender, Low-Income, and Race) and achievement (Math and Reading ISAT scores) data. All demographic variables will be examined and analyzed for their relationship to student achievement as measured by the Reading and Math ISAT scores in grades 3-8.

Table 3

Descriptive Statistics of Elementary School District Students – 2013-2014

Assessment data	Academic warning (1)	Below standards (2)	Meets standards (3)	Exceeds standards (4)	# of N/A
Math ISAT (*n* = 287,495)	5.9%	29.7%	48.3%	16.1%	1,955
Reading ISAT (*n* = 286,476)	5.4%	32.3%	43.7%	18.7%	2,974

Note. *N* = 289,450 students; 51.5% male; 42.5% Low-Income, 57.8% White, 23.9% Hispanic, 12.9% Black, 4.6% Asian, .7% Two or More Races.

From the 374 elementary districts, 289,450 total students were included in the data set, of which roughly half (51.5%) were male and 42.5% were Low-Income. This overall Low-Income Status percentage was slightly different than the district-level data set because the student-level data set represented the percentage of elementary students in the state that were Low-Income whereas the district-level data provided the average percentage of low-income among districts. Of the 289,450 students, 57.8% identified as White, 23.9% as Hispanic, 12.9% Black, 4.6% Asian, and .7% Two or More Races. Although additional indicators would have been preferable to analyze, including IEP and LEP status, to ensure student-level data remained de-identified and as complete as possible while remaining de-identified, those two factors were eliminated from the data request and subsequent analysis.

Table 3 also included the overall sample by test score, providing the *N* for both the Math ISAT and Reading ISAT scores. Although the vast majority of students had both a Math and Reading ISAT score, a small number did not have both scores, resulting in slightly smaller sample sizes when data were examined at the test score level. Of the sample size, 64.4% of all students met or exceeded standards in Math while 62.4% met or exceeded standards in Reading.

Figures 1 and 2 present similar data but in a visual form. Generally, similar percentages of students performed at the various achievement levels within each grade level.

Figure 1. Math ISAT performance levels by grade level – 2013-2014,

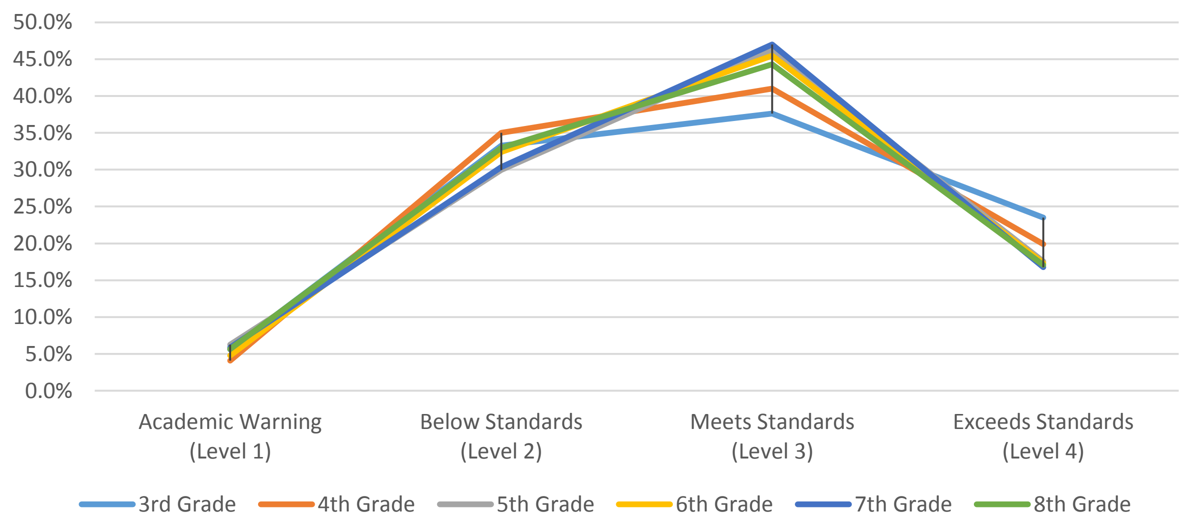


Figure 2. Reading ISAT performance levels by grade level – 2013-2014.

Similar to ISAT Math score distribution, students performed at comparable levels across grade levels and thus improving incrementally within each grade level during the 2013-2014 school year.

Descriptive statistics: Low-income and non-low income student-level data. When comparing student performance by SES (Low-Income compared to Non Low-Income), Figure 3 outlines the differences in elementary students' Math performance by income status—Low-Income and Non Low-Income.

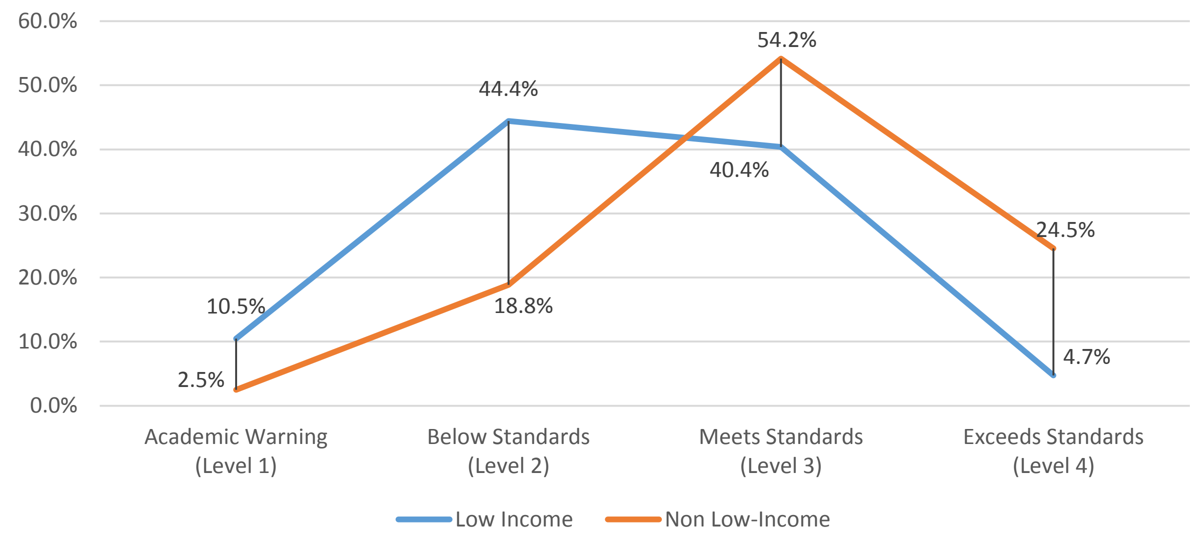


Figure 3. Math ISAT performance levels by income – 2013-2014.

As illustrated by Figure 3, 45.1% of Low-Income students met or exceeded standards compared to 78.7% of Non Low-Income students. As a whole, there was a higher percentage of Low-Income students identified at Level 1 (Academic Warning) and Level 2 (Below Standards) and a lower percentage of Low-Income students identified as Level 3 (Meets Standards) and Level 4 (Exceeds Standards).

Similarly, when Reading performance was examined by income level, there were comparable results. Figure 4.4 outlines elementary students' Reading performance on the ISAT by income.

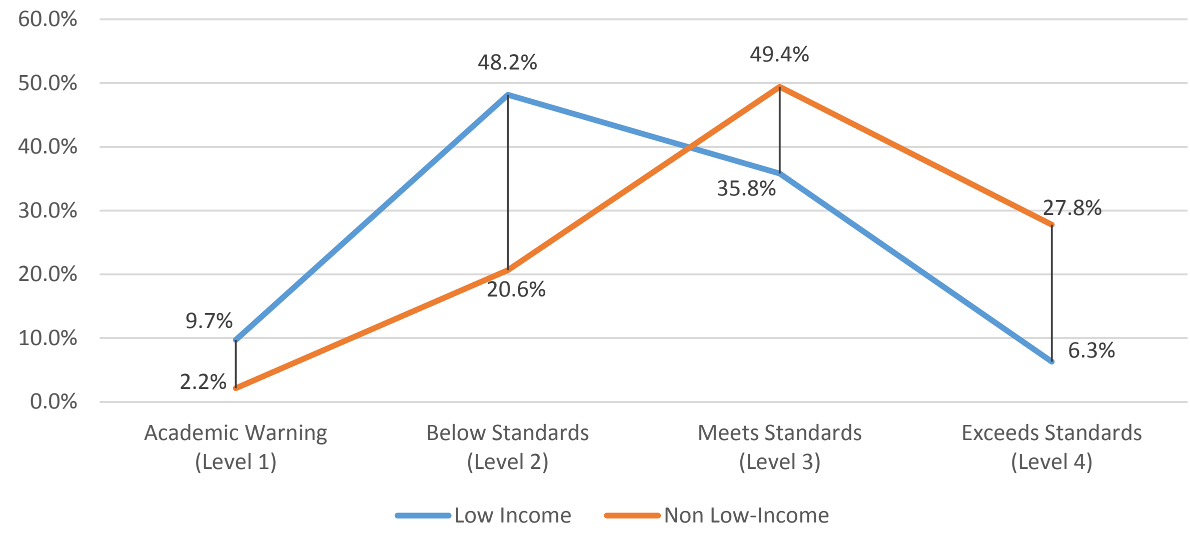


Figure 4. Reading ISAT performance levels by income – 2013-2014.

As Figure 4 illustrates, 42.1% of Low-Income students met or exceeded standards compared to 77.2% of Non Low-Income students. Likewise, 57.9% of Low-Income students were Below Standards or in Academic Warning territory compared to only 22.8% of Non Low-Income students.

Examining both the Reading and Math disparities in performance between Low-Income and Non Low-Income students, it was clear that a greater percentage of Low-Income students performed at lower levels than Non Low-Income students. To examine the impact of income status at a deeper level, the effect of income segregation will be analyzed by examining the correlation between achievement and a district's percentage of low-income students.

Data Analysis

In order to conduct the analysis for the specifically articulated research questions, data were loaded into Microsoft Excel; VLOOKUP Functions were used to add district characteristics to the student-level data set, which included Math ISAT Score, Reading ISAT Score, Race, Gender, Low-Income status, Student ID, District Name, and District ID. Specifically, IEPP, Low-Income District Percentage, District Total Enrollment, District Type, and Overall Average Class Size–District were added to the student-level data set. Irrelevant data elements from the school report card data set—the district-level data set—were removed. Once the data were complete and maintained identical fields where required (e.g., District Name), the data were entered into R. As noted in Tables 2 and 3, descriptive statistics of minimum, maximum, mean, and standard deviation were calculated for each relevant field, and *p* values measuring statistical significance were included for every analysis conducted.

Research Questions

Research question 1. Research question 1 sought to explore the extent to which Math and Reading ISAT scores of low-income students in Illinois elementary school districts correlated to the percentage of low-income students in a district's population. To answer this question and thus determine the relationship, a PPM Correlation was conducted to examine the direction and strength of the relationship between a student's low-income status and the percentage of low-income students in a district's population. To provide additional context to the relationship, District Low-Income Percentage was stratified into Low-Income Quartiles (0-22.05%, 22.06%-42.35%, 42.36%-62.88%, and 62.89%-100%). Districts were placed into respective quartiles based on the percentage of low-income students and are displayed on Table 4; it outlines the direction and strength of the relationship between Individual ISAT achievement in Math and Reading and Low-Income District Percentage.

Table 4

Pearson Product-Moment Correlation of Individual ISAT levels and Low-Income District Percentage - 2013-2014

	Math ISAT (n=287,495)		Reading ISAT (n = 286,476)	
	Correlation	*P* value	Correlation	*P* value
Overall Correlation (N=374)	-0.3553	< 0.0001	-0.3518	< 0.0001
1st Quartile %Low Inc. (0%-22.05%)	-0.139	< 0.0001	-0.125	< 0.0001
2nd Quartile %Low Inc. (22.06%-42.35%)	-0.103	< 0.0001	-0.078	< 0.0001
3rd Quartile %Low Inc. (42.36%-62.88%)	-0.002	< 0.66	-0.045	< 0.0001
4th Quartile %Low Inc. (62.89%-100%)	-0.093	< 0.0001	-0.121	< 0.0001

A test of statistical significance is displayed by the p values for each variable outlined in the output, and the p values indicated that all variables, with the exception of the 3rd Quartile Math ISAT correlation, were statistically significant. Any value less than .05 ($p \leq .05$) is statistically significant (Sirkin, 2006), and in this case, all quartiles, with the exception of the third quartile, were statistically significant. As a result, no conclusion can be drawn regarding the third quartile.

Overall, the PPM Correlation indicated that there was a negative correlation between Individual Student Achievement in both Math (r = -0.3553) and Reading (r = -0.3518) as measured by the ISAT and the overall Low-Income District Percentage. This finding is congruent with Sirin's (2005) meta-analysis; he found a medium to strong correlation between SES and achievement (r = 0.299). In this study, however, because the aim was to examine the relationship between low-income SES within a group context and academic achievement, the correlation is negative, demonstrating an inverse relationship between a district's low-income percentage and student achievement.

Within each quartile, there was also a slight negative correlation within three of the four quartiles, although substantially smaller than the overall correlation between a district's low-income percentage and student achievement outcomes as measured by the ISAT. Although there was a small negative effect within three of the four quartiles as the percentage of low-income students increases within the range, it was not nearly as large as the overall correlation when all districts of varying socioeconomic levels were examined. In other words, within each quartile, there was not a strong correlation when examining school districts within the quartile. However, when examining all quartiles together—the overall correlation—school districts' percentage of low-income students was much stronger and practically significant.

Although the research question did not explicitly seek to examine the relationship between other independent variables and student achievement, other correlations were run to help frame the strength and significance of the correlation between Low-Income District Percentage and Student Achievement. Accordingly, a variable that will enter the analysis explicitly within research questions 2 and 3, IEPP, was also examined by quartile within the correlation between Student Achievement and Low-Income District Percentage. Table 5 outlines the relationship between Individual ISAT achievement in Math and Reading and Low-Income District Percentage stratified by IEPP quartile, with the first quartile representing the 25% of districts that maintained the lowest IEPP and the fourth quartile representing the 25% of districts that maintained the highest IEPP.

Table 5

Pearson's Product-Moment Correlation Individual ISAT Achievement and Low-Income District Percentage Stratified by IEPP Quartile – 2013-2014

	Math ISAT (N = 287,495)		Reading ISAT (N = 286,476)	
Pearson's Product-Moment	Correlation	P value	Correlation	P value
Overall Correlation (N = 374)	-0.3553	< 0.0001	-0.3518	< 0.0001
1st Quartile IEPP ($3,788-$5,225)	-0.265	< 0.0001	-0.252	< 0.0001
2nd Quartile IEPP ($5,226-$6,100)	-0.321	< 0.0001	-0.339	< 0.0001
3rd Quartile IEPP ($6,101-$7,293)	-0.312	< 0.0001	-0.309	< 0.0001
4th Quartile IEPP ($7,294-$17,568)	-0.354	< 0.0001	-0.344	< 0.0001

Since the overall relationship between achievement on the ISAT and the district's percentage of low-income was not changed, the subsequent overall correlations for Math and Reading remain the same. However, when stratified by IEPP, there was a medium to strong correlation within every quartile (all within the -0.3 range), indicating that even within a given quartile, there were notable differences in the achievement of students as IEPP changed. The largest correlation occurred within the 4th Quartile, which also had the greatest range in IEPP among the highest spending districts ($10,274 between the lowest and highest spending districts within the quartile). These higher correlations indicate that even smaller amounts of spending differences per student (i.e., those within a given quartile) do correlate to student achievement and can make a difference in achievement. Specifically, the negative correlations indicated that the less instructional expenditure per pupil spent on a student within a given quartile, the more likely the student was to achieve at lower levels on the ISAT.

Examining additional notable correlations, Table 6 outlines relevant correlations that surfaced in the analysis that provide context for the study. Again, all correlations were statistically significant, with $p \leq .05$.

Table 6

Other Notable Pearson Product-Moment Correlations –2013-2014

Pearson Product-Moment	PPM cor.	*P* value
Individual Low-Income to Low-Income District %	0.654	<0.0001
Individual Low-Income to District IEPP	-0.195	<0.0001
Low-Income District % to District IEPP	-0.314	<0.0001
Individual Low-Income to Math ISAT	-0.382	<0.0001
Individual Low-Income to Reading ISAT	-0.389	<0.0001

The first notable correlation, Individual Low-Income to Low-Income District Percentage, examined the likelihood of a low-income student attending a low-income district. Of the correlations run, this correlation was the strongest, indicating that low-income students more often attended low-income school districts.

The second notable correlation, Individual Low-Income to District IEPP, examined the connection between low-income students and school district funding. This correlation (r = -0.195) suggests there is a small correlation between income status and funding. In other words, it indicated that low-income students were more likely to be in districts that were funded at lower rates than non low-income students. Although this correlation appeared to be somewhat weaker, resting around -0.2, the previous correlations, those that examined the interquartile differences in IEPP and student achievement, demonstrated that small differences in IEPP made a difference in achievement, with all correlations within each quartile residing in the -0.3 range.

This lower correlation also accounts for the fact that, although there was a strong correlation between Individual Low-Income and a Low-Income District Percentage (.654), not all low-income students attended low-income school districts. As a result, it can be expected that the correlation between Individual Low-Income and District IEPP would be lower than Low-Income District Percentage and District IEPP. When examining the school district effect in the third correlation of note, the correlation increased to 0.38.

The third notable correlation, Low-Income District Percentage to District IEPP, examined the relationship between IEPP and the district's percentage of low-income students. Not surprisingly, given the state's reliance on local sources to fund education, there was a -0.314 correlation between instructional expenditures and the district's percentage of low-income students. Examining this correlation in the context of the relationship between Individual Low-Income and District Percentage of Low-Income, it can be concluded that low-income students were both more likely to attend districts with higher percentages of low-income students, and districts with higher percentages of low-income students likely spent less per pupil on instructional expenditures.

The fourth and fifth notable correlations examined the correlation of Individual Low-Income status to Math and Reading ISAT scores. In conjunction with research on SES and achievement, both Individual Low-Income and Low-Income District Percentage had medium to strong correlations on achievement (Coleman et al., 1966; Sirin, 2005; White, 1982). In this analysis, Individual Low-Income had a slightly stronger correlation (r = -0.382 and r = -0.389) than Low-Income District Percentage (r = -0.355). However, these differences were mathematically small, which explains why the prior research has resulted in conflicting conclusions about which has a stronger effect—the individual student or the school district. Ultimately, however, it can be concluded that low-income status in any context affects achievement, and perhaps the correlations themselves reflect the likelihood that low-income students also tend to attend low-income school districts, with lower IEPP.

Research question 2. The second research question sought to determine the relationship among multiple variables, specifically examining elementary district students' achievement in Reading and Math on the ISAT, the percentage of low-income students in a school district, and

IEPP. As explained in chapter 3, regression analysis provides a process by which to examine the relationship among multiple variables and to develop predictive equations when more than one variable is present (Bates & Watts, 1988; Sirkin, 2006). In this case, while the correlation analysis provided insight into the relative strength and direction of income status and its effect on student achievement and offered a glimpse into the effect of how changes in expenditure affected student achievement, multiple linear regression analysis provided an avenue to more specifically determine the relationship among the variables.

The first regression analysis examined how multiple independent variables affected the dependent variable, Math ISAT achievement. Table 7, ISAT Math Regression, outlines how the following independent values, Individual Low-Income, Race, IEPP, Gender, and IEP District Percentage affect individual student achievement as measured by the Math ISAT score.

Table 7

Math ISAT Regression – 2013-2014

Independent variables	Coefficient	Standard error	*P* value
Constant	2.909	0.009	< 0.0001
Low Income – Individual	-0.380	0.004	< 0.0001
Race			
Asian	0.293	0.007	< 0.0001
Black	-0.385	0.005	< 0.0001
Hispanic	-0.253	0.004	< 0.0001
Two or More Races	0.133	0.004	< 0.0001
White	0.000	0.016	< 0.0001
IEPP ($ thousands)	0.049	< 0.001	< 0.0001
Gender			
Female	0.023	0.003	< 0.0001
Male	0.000	0.000	< 0.0001
I.E.P. – District %	-0.019	< 0.001	< 0.0001
R^2 / Adjusted R^2	0.195		

As displayed in Table 7, all variables displayed were statistically significant, with values much less than .05, and did have an impact on student achievement as measured by the Math

ISAT score. However, the influence of some variables was more pronounced than others, with some variables producing stronger effect sizes than others. In this analysis, the Constant provided a base prediction for the analysis and represented the typical score a White Male who was not Low-Income would expect to receive in a school district with $0 IEPP and 0% I.E.P. This 2.9 served as a base, not an actual score typical of a Non Low-Income, White Male.

Accordingly, in comparison, the other coefficients demonstrated how other demographics—other regressors—affected students' performance on the Math ISAT assessment. For example, in this analysis, Individual Low-Income had a significant effect on achievement, negatively affecting achievement performance levels by nearly half a performance level (-0.38). Just by being low-income, the analysis indicated that a student can expect to experience a 0.38 decrease in performance level. Given that ISAT performance levels ranged between 1 and 4, such a decrease for one regressor indicated a significant change in achievement.

Similarly, although comprising various effect sizes, Race had a significant effect on ISAT Math achievement. Non Low-Income, Black, Male students could expect to achieve a score .385 less than the typical Non Low-Income, White, Male student. Similarly, but slightly less of a negative correlation, Non Low-Income, Hispanic, Male students could expect to perform -0.253 points lower. Conversely, Asian students saw a positive effect on ISAT Math achievement, with Non Low-Income, Asian, Male students expecting to score 0.293 points higher, an effect size that came closer than any other variable examined in mitigating for low-income status.

Although Race and Low-Income status revealed the greatest impact, there were other variables that were statistically significant, albeit providing smaller impact. For example, Gender had an impact. Specifically, being female resulted in a slightly higher level of performance (.023). Likewise, IEP District Percentage had a small effect (-0.019) but again, well below -0.1.

Significantly, what this model helped to determine with the inclusion of IEPP, was the potential effect IEPP can have on student achievement. With a small effect size (0.049) when set in increments of $1,000, it suggests that for every $1,000 in IEPP, a student could expect a 0.049 increase in score. Consequently, it suggests that an additional $7,755 expenditure per Low-Income student (.38/.049 x 1,000) could erase that -.38 deficit in achievement. In other words, increased IEPP could begin to mitigate for the low-income background. If, however, students have other negative regressors, the model suggested that even more funds would need to be allocated to mitigate achievement differences. In the case of Math ISAT achievement, the model suggested that a Low-Income, Black, Male student would require an additional $7,857 expended per student (.385/.049 x 1,000), a total of an additional $15,612 ($7,755 + $7,857), just to near performance levels of a Non Low-Income, White, Male student funded at $0 IEPP. This distinction is important to note given that the overall constant score, due to the base IEPP of $0, was lower than Non Low-Income, White, Male students' typical scores when you factor in for the actual IEPP.

When examining the Math model's overall ability to predict student achievement, the Coefficient of Determination (R^2) can be analyzed to determine how well the model predicts each individual student's scores. On a scale of 0-1, with 1 being the most predictive, this model resulted in a 0.195 R^2. Although seemingly low, in social science research, where there are multiple variables can affect a dependent variable's outcome (like student achievement), a 0.195 R^2 is actually significant (Abelson, 1985). Ultimately, this model could not predict what each individual student within a particular demographic (e.g., Low-Income White Male, Black

Female, etc.) attained, but it could predict how particular variables generally affected the achievement outcomes of particular groups of students.

Similar to the Math Regression, the second regression analysis examined how multiple independent variables affected the dependent variable, Reading ISAT achievement. Table 8, ISAT Reading Regression, outlines how the following independent values, Individual Low-Income, Race, Gender, IEPP, and IEP District Percentage affected individual student achievement as measured by the Reading ISAT score.

Table 8

Reading ISAT Regression – 2013-2014

Independent variables	Coefficient	Standard error	P value
Constant	2.679	0.007	< 0.0001
Low Income – Individual	-0.424	0.004	< 0.0001
Race			
Asian	0.182	0.007	< 0.0001
Black	-0.336	0.005	< 0.0001
Hispanic	-0.286	0.004	< 0.0001
Two or More Races	0.111	0.016	< 0.0001
White	0.000	0.000	< 0.0001
IEPP ($ thousands)	0.042	< 0.001	< 0.0001
Gender			
Female	0.148	0.003	< 0.0001
Male	0.000	0.000	< 0.0001
R^2 / Adjusted R^2	0.192		

Although slightly different impacts resulted from the Reading regression analysis, Low-Income status, followed by Race surfaced as the major independent variables that affected achievement outcomes in Reading as measured by the ISAT. All variables displayed were statistically significant, with values much less than 0.05, and did show an impact on student achievement as measured by the Reading ISAT score. However, like the Math regression analysis, the degree of impact for each independent variable indicates that some independent variables affected achievement more than did others. Similar to the Math analysis, in this analysis, the Constant provided a base prediction for the analysis and represented how the White Male who is not Low-Income would expect to perform on the Reading ISAT if funded at $0 IEPP.

Accordingly, in comparison, the other coefficients demonstrated how additional regressors affected students' performance on the Reading ISAT. For example, in this analysis, Low-Income had the greatest effect on achievement, negatively affecting achievement levels by nearly half a performance level (-0.424), which is a slightly greater effect than its effect on Math ISAT achievement (-0.38). Again, such an impact is practically significant given that the range of performance levels is small, between 1 and 4.

Although slightly less impactful than Low-Income status, Race had a significant effect on ISAT Reading achievement. Non Low-Income, Black Male students could expect to achieve a score .336 less than the typical Non Low-Income, White, Male students. Slightly less impactful than Math (-.385), Race still had a significant effect on achievement, but being Low-Income had the greatest influence. Similarly, but slightly less of a negative correlation, Non Low-Income, Hispanic, Male students could expect to also perform "Below Standards" (2.86). Conversely, once again, Race for Asian students yielded a positive effect size, with Asian Male students seeing a positive effect size (0.182), although not nearly as large as it was for ISAT Math achievement (0.293).

Although Race and Low-Income status had the greatest impact, there were other variables that were statistically significant for Reading, although they showed a smaller impact. For example, Gender again influenced outcomes. Specifically, being Female resulted in a slightly higher level of performance (0.148). This impact, although smaller than Race and Low-

Income status, was greater than the impact Gender revealed on Math ISAT performance (0.023), indicating that being female more significantly affected Reading achievement than Math achievement as measured by the ISAT. However, unlike the Math regression, there was no meaningful effect of IEP District Percentage. As a result, it was not included in Table 8.

Similar to the Math regression model, the Reading regression model highlighted practical significance regarding the effects of Low-Income status and Race, but it also provided significant practicality in predicting the effect IEPP can have on student achievement. With the effect size of 0.042 for IEPP when set at $0 and increased in increments of $1,000 per student, the model suggested that a Low-Income student would require an additional $10,095 per pupil to mitigate for being Low-Income (0.424/0.042 x 1,000). Again, the model revealed additional expenditures that would be required to equalize to the constant. For example, a Low-Income, Black, Male student would require $10,095 for the effect of Low-Income status and another $8,000 (0.336/0.042 x 1,000) for effect of Race, totaling $18,095 in additional funds to equalize to a Non Low-Income, White, Male student being funded at $0 IEPP. Similar to the Math regression model, this distinction is once again important to note given that the overall constant score, due to the base IEPP of $0, is lower than Non Low-Income, White, Male students' typical scores would be when you factor in for the actual IEPP.

When examining the Reading model's overall ability to predict student achievement, the Coefficient of Determination (R^2) can be analyzed to determine how well the model predicts each individual student's scores. Very similar to the Math regression model, on a scale of 0-1, with 1 being the most predictive, this model resulted in a 0.192 R^2. Again, although seemingly low, in social science research, where there are multiple variables that affect an independent variable's outcome (like student achievement), approximately 20% predictability is significant (Abelson, 1985).

Ultimately, as noted previously, the regression model cannot predict what each and every student within a particular demographic attains, but it can predict how particular variables generally affect the outcome of particular groups of students.

Research question 3. Similar to research question 2, research question 3 also employed a multiple linear regression model. Seeking to examine the effect of concentrated poverty (i.e., the various levels of income segregation based on a district's low-income percentage), this question sought to take research question 1 to a deeper, more specific level, determining the effect a district's low-income percentage has on student achievement irrespective of instructional expenditure. Although the first question examined how a district's low-income percentage correlated to achievement, it did not examine the effect size of Low-Income District Percentage irrespective of IEPP. After approaching the regression from multiple avenues, there was no meaningful coefficient for Math and no statistically significant coefficient for Reading. Table 9 outlines the Math regression examining Low-Income District Percentage and IEPP.

Table 9

Math ISAT Regression: Low-Income District Percentage Irrespective of IEPP – 2013-2014

Dependent variable	Coefficient	Standard error	*P* Value
Constant	2.974	0.010	< 0.0001
Low Income – District %	-0.016	< 0.0001	< 0.0001
IEPP	0.002	0.001	.04
Race	Instrumental		
Gender	Instrumental		
R^2 / Adjusted R^2	0.0732		

Although there was a slight correlation that is statistically significant for Low-Income District Percentage (-0.016, $p \leq 0.0001$), this correlation was very small.

Similarly, when examining the effect of Low-Income District Percentage irrespective of IEPP for Reading, the relationship was neither meaningful nor statistically significant. Table 10 displays this relationship and shows this result.

Table 10

Reading ISAT Regression: Low-Income District Percentage Irrespective of IEPP – 2013-2014

Dependent variable	Coefficient	Standard Error	*P* Value
Constant	n/m	n/m	0.182
Low Income – District %	n/m	n/m	0.171
IEPP	n/m	n/m	0.165
Race	Instrumental		
Gender	Instrumental		
R^2 / Adjusted R^2	n/m		

Note. n/m : not meaningful.

Although the largest correlation found was between Individual Low-Income and Low-Income District Percentage ($r = 0.654$) and the independent variable to affect student ISAT achievement in both Math and Reading was determined to be Low-Income status (-0.41 in Math and -0.45 in Reading), because school districts' IEPP largely reflects the student body's income status ($r = -0.314$), there was no meaningful effect size irrespective of IEPP. In other words, district spending is highly linear and reflects the income status of its students. Since question 1 determined that low-income students generally attended low-income school districts ($r = 0.654$) and that both Individual Low-Income status ($r = -0.38$ in Math and Reading) and Low-Income District Percentage ($r = -0.35$ in Math and Reading) were highly correlated to achievement, low-income school districts spent less per pupil.

In terms of the regression model, because the model separated out for factors that contribute to achievement that also affect a district's percentage of low-income students (e.g., Individual Low-Income, IEPP, and Race), it is likely that once those factors were removed, the significance had already been established via one or all three of those variables. Such a finding is significant because it indicates that the funding structure highly limited school districts with low-income students, resulting in the students most in need often receiving consistently less than their non low-income peers.

Research question 4. Research Question 4 sought to determine the overall effectiveness of Illinois' funding structure as a means to minimize the effect of SES on low-income students' academic achievement as measured by their Math and Reading achievement on the ISAT. To answer this question, a two-stage approach was employed to assess the effectiveness of Illinois' funding structure. The first was an analysis of the first three research questions, which included a PPM Correlation analysis and Multiple Linear Regression analysis to determine the relationships among SES (District and Individual), IEPP, and Student Achievement. Based on the previously discussed results, it can be concluded that student achievement performance as measured by Illinois' state assessment, the ISAT, was negatively affected by and/or correlated to Individual Low-Income status, Low-Income District Percentage, and IEPP. The first three research questions also helped establish that modest changes in IEPP affected student achievement and that significant changes in IEPP would be needed to counteract a student's or district's low-income status.

Although these initial questions helped establish both the disparities in academic achievement outcomes between Low-Income and Non Low-Income students and the relationship between IEPP and SES and IEPP and Student Achievement, the Gini coefficient calculation added a metric to statistically measure the level of inequality in Illinois' funding structure to provide further evidence to fully answer the research question and offer conclusions regarding whether or not Illinois' funding structure mitigates the effects of independent variables that negatively affect student achievement, exacerbates these effects, or has no effect.

The Gini coefficient measurement. The Gini coefficient is a measure of statistical dispersion that is used to represent the degree of inequality in a data set. Typically used in the analysis of income distribution, the Gini index (G), a number ranging between 0 and 1, provides the degree of inequality in how wealth is distributed, with 0 representing the most equal distribution—where the wealth or income is perfectly distributed among all—and with 1 representing the most unequal distribution of wealth—where wealth or income is entirely unevenly distributed—with one member of a population maintaining all the wealth or income and all others maintaining zero wealth or income (Alexander & Alexander, 2015).

To understand the index and what it reveals, examining income or wealth inequality—a common application—provides some perspective. For example, according to the U.S. Census Bureau, in 2014, the Gini index for income distribution in the United States was .480, an increase of 5.9% since 1993. Such a Gini index represents the significant unequal distribution of wealth throughout the country and the significant increase in income inequality over the last 50 years. In concrete terms, in 2014, the top 1% earned more than 20% of all U.S. income, averaging $1.3 million per person, while the bottom 50% earned only 12% of total income, averaging $25,000 per person. This disparity results in the top 1% earning 27 times the amount of the bottom 50% of earners (Long, 2016). As a result of these vast disparities in wealth—or a lot of income going to a very small percentage of the population—the Gini for income distribution in the U.S. is trending upward and is considered very high/very unequal at 0.480.

In addition to the numerical Gini index, the Gini distribution can also be portrayed visually via the Lorenz curve, a graphical representation of the Gini index (Alexander et al., 2015). The Lorenz curve displays the cumulative percentage of a variable (e.g., total wealth or income) that is plotted against the cumulative population. A perfectly equal distribution results in a straight diagonal line. The extent of the line's curve below the perfect line represents the degree of inequality of the distribution; the greater the curve, the greater the inequality.

The Gini index, although historically developed and used to measure income or wealth inequality, has become a popular index to measure distribution inequality in many arenas. As discussions remain at the forefront regarding how to raise achievement for underperforming groups, the debate regarding how schools are funded in the United States often becomes an integral part of the conversation due to the reliance on local property wealth to fund education and the subsequent disparate funding among and within many states. As Illinois has been described as one of the most inequitably funded states, with the highest percentage of funding resulting from local sources (Kena et al., 2016), the Gini surfaced as an important, relevant statistical measure to employ in this study to determine the degree of expenditure inequality perpetuated by the state's adopted funding structure. However, as previously articulated by the definition and the United States of America's income distribution Gini, it is important to note the relativity of the scale. Because a Gini of 1.0 represents a scenario where one school district would have the entirety of the state's education funding and the other 373 in the study receive none, when using the Gini index to measure inequality in distribution of school funding in the United States, it is not expected to see indexes nearing 1.0 since all schools are funded at a minimum level, and ceilings for spending do not have the kind of infinite scale that income earnings do.

The Gini coefficient results. To calculate the Gini index and Lorenz curve for 2003-2004 (the base year) and 2013-2014 (the year of analysis), district IEPP was entered for each school district (n = 379 for 2003-2004 and n = 373 for 2013-2014) and multiplied by the number of number of students per district. Specifically, the IEPP for each district was entered into R to reflect the number of students. If a school district enrolled 32 students, the IEPP was entered 32 times; if a school district enrolled 14,948 students, the IEPP was entered 14,948 times. Tables 11 and 12 summarize the school district data, the minimum and maximum enrollment demographics, the minimum and maximum IEPP, the median and mean IEPP, and IEPP by quartile for school years 2003-2004 and 2013-2014. It should be noted that, although there were 381 elementary school districts in 2003-2004 and 375 in 2013-2014, the total number of districts included in the Gini analysis was slightly lower for each school year (2 districts eliminated in both years) due to incomplete IEPP data secured from the ISBE's website.

Table 11

Gini Index Summary – 2003-2004

(N = 379)	IEPP	Total enrollment
Minimum	$2,572	32
1st Quartile	$3,861	277
Median	$4,378	798
Mean	$4,615	1,419
3rd Quartile	$5,150	1,836
Maximum	$11,364	14,948

Table 12

Gini Index Data Summary – 2013-2014

(N=373)	IEPP	Total Enrollment
Minimum	$3,788	45
1st Quartile	$5,225	286
Median	$6,100	810
Mean	$6,476	1,434
3rd Quartile	$7,293	1,816
Maximum	$17,568	14,432

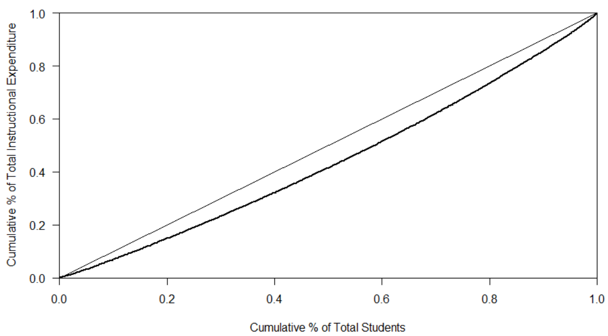
In both school years, there was a wide range of IEPP while the enrollment—minimums, maximums, averages, and quartiles—remained comparable over the 10 year span. However, the distribution range was wider in 2013-2014. In the base year, 2003-2004, there was a range of IEPP of $2,572 to $11,364, with a mean of $4,615. Although such figures indicated that the average was well below the maximum and thus indicates inequality in distribution, 2013-2014's base data indicated an even larger range and potentially signal even more inequality, with the minimum IEPP at $3,788, the maximum at $17,568, and the mean at $6,476. As a result, the increase in the Gini—the increase in the distribution/funding inequality—appeared to have worsened in the 10-year period at first glance.

Such an initial speculation was confirmed by the actual Gini indexes that resulted from the data input. Table 13 and Figure 5 display the Gini Coefficient and Lorenz curve for 2003-2004 and 2013-2014.

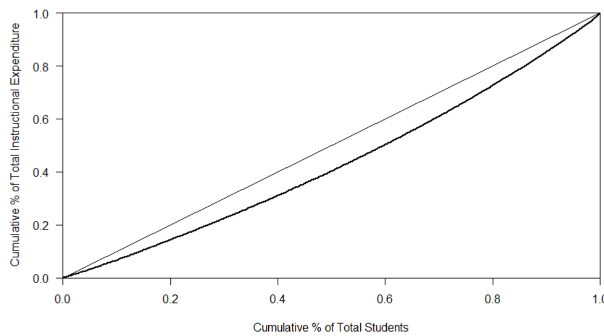
Table 13

Gini Coefficient Calculation for IEPP – 2003-2004 and 2013-2014

School year	IEPP
2003-2004	0.118
2013-2014	0.133



2003-2004 school year



2013-2014 school year

Figure 5. Lorenz curves for IEPP – 2003-2004 and 2013-2014.

As evidenced by the indexes above and the respective Lorenz curves, the wide range in expenditures from elementary district to elementary district resulted in a significant level of inequality, with both years climbing above .1. In addition, as the summary data indicated, the inequality worsened over the 10-year period, increasing from .118 to .133. While such a "low" Gini might indicate relative equality since the index was closer to 0 than it is to 1, it must be noted again that 1 represents total inequality, with one entity maintaining the entire distribution and all the others maintaining 0. In the school funding arena, all schools are funded at some level, and the range does not reflect the large ranges that typical wealth or income analyses reflect. Consequently, a .133 index is actually quite significant given the education funding context.

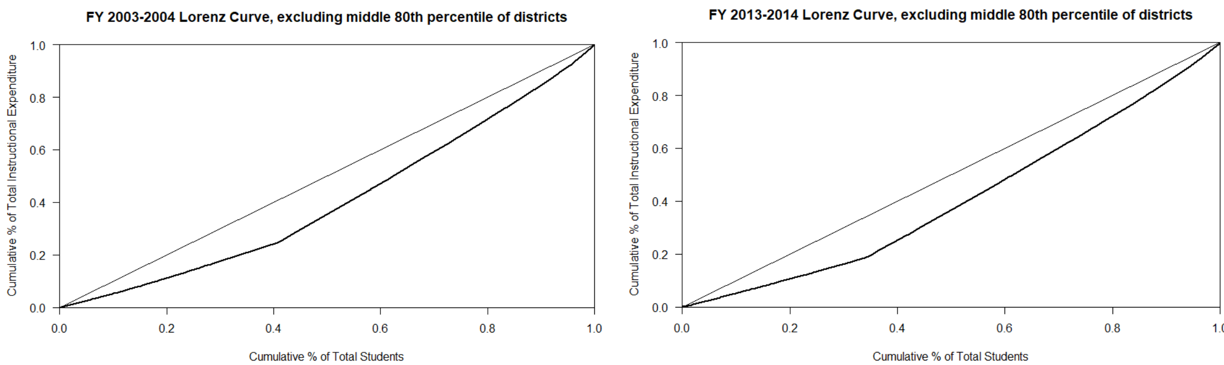
As a point of comparison, similar analyses in other states, those with a significantly lower reliance on local property wealth, have resulted in much lower Gini indexes. For example, Gini indexes calculated for Tennessee and Texas came in at .05 and .03 respectively (Bingham, Jones, & Jackson, 2007; Roehrich-Patrick et al., 2016). Both states have some reliance on local property wealth but not nearly as much as Illinois, resulting in variability in IEPP but not nearly as drastic as Illinois. It should also be noted that the Gini, although a measure of distribution and inequality, does not provide insight into overall instructional expenditure across the country, so it is only relevant to each state. In other words, a state that spends significantly less on education overall can have equality while still underfunding education.

In addition to finding the Gini for the state's elementary districts, a separate Gini calculation was completed to more thoroughly answer the extent to which the state's funding formula mitigates or exacerbates the inequality between Low-Income and Non Low-Income students. Because Illinois school district funding has been more reliant on local sources (i.e., local wealth) than any other state (Kena et al., 2016), it was important to see the disparities between the most vulnerable—the school districts with the lowest IEPP and thus higher percentages of low-income students—compared to school districts with the highest IEPP and lower percentages of low-income students. As a result, a purposeful sample of the 374 elementary districts was used to calculate a separate Gini, comparing the lowest spending 10% of school districts compared to the highest spending 10% of school districts. Table 14 and Figure 6 outline the Gini coefficient and Lorenz curve for 2003-2004 and 2013-2014.

Table 14

Gini Coefficient Calculation for Top and Bottom IEPP Quintiles – 2003-2004 and 2013-2014

School year	IEPP
2003-2004	0.189
2013-2014	0.183



2003-2004 school year 2013-2014 school year

Figure 6. Lorenz Curves for Top and Bottom IEPP Quintiles –2003-2004 and 2013-2014.

As the Gini coefficient and Lorenz curve for both years show, when examining the highest spending districts compared to the lowest spending districts, the Gini increased significantly during both years examined when comparing the whole state's Gini compared to the Gini of the top and bottom 10% of IEPP. In 2003-2004, the increase from 0.118 for the entire state to 0.189 for the top and bottom 10% of IEPP revealed 60% greater inequality between the highest IEPP and the lowest IEPP. Similarly, when examining the difference between the whole state and the top and bottom 10% for 2013-2014, there was an increase from 0.133 to 0.183, revealing 38% more inequality between the highest IEPP and the lowest IEPP.

Such results were not surprising given the state's overwhelming reliance on local property wealth to fund schools. As local revenue comprises the largest source for education funding, there is most disparity between the communities that amass the least local wealth and the communities that amass the most local wealth. As a result, local wealth was positively correlated to district wealth and inversely correlated to student poverty. Unsurprisingly then, the IEPP Gini coefficient for both the state and the top and bottom 10% indicated that Illinois' funding structure inherently did not equalize for socioeconomic differences; conversely, it exacerbated it as the gap in wealth increased among communities.

Not only is the disparity in funding from district to district and thus for student to student significant because the findings revealed that the funding structure reinforces inequality, but it is also significant given the results from research questions 1-3 and the wealth of research on SES and academic achievement. Illinois' growing funding inequality coupled with the results from questions 1-3 indicated that its funding structure not only did not mitigate for the effect of SES on achievement, but it exacerbated it and is counterproductive to what can make a difference—greater instructional spending per pupil for the poorest, most disadvantaged students. And, as the data indicated, the problem has continued to worsen over time.

Summary

This chapter presented the results of the statistical analysis for the study, beginning with a description of the procedures and a discussion of the data collection methods for student-level and district-level data. To help provide context for the analysis of the research questions, a discussion of the student-level and district-level statistics was also provided. The chapter concluded with the analysis of each research question, including results presented through tables and figures coupled with preliminary analysis.

Chapter 5

Summary, Discussion, Conclusions and Recommendations

This chapter reviews the study's purpose, discussing relevance as it relates to review of literature and the theoretical framework employed to inform the analysis and the remaining sections in the chapter, including the results and conclusions of the executed research questions, the implications of the study's findings, and the recommendations for future practice and future study.

Purpose

The purpose of this quantitative study was to determine the extent to which SES and school district funding affects student achievement in the state of Illinois for elementary school district students. As noted in the review of literature, there had already been a significant relationship established between SES and student achievement summarized in the literature (Sirin, 2005; White, 1982) and examination regarding individual low-income status and group SES (Caldas & Bankston, 1997; Coleman et al., 1966, Palardy, 2013; Reardon, 2011; Reardon et al., 2014; Rumberger & Palardy, 2005). Although research had also established that peer groups are strongly related to individual students' behaviors and attitudes regarding academic achievement (Caldas & Bankston, 1997; Coleman et al., 1966; Kennedy et al. 1986; Hanushek, Kain, Markman & Rivkin, 2003; Palardy, 2013; Rumberger & Palardy, 2005) and had overwhelmingly indicated a significant relationship between SES and student achievement (Sirin, 2005; White, 1982), whether or not an individual's low-income status or the school district's low-income percentage was the greater factor remained debatable.

Likewise, as it relates to the topic of school funding—the other variable examined—there was significant research to support that evidence-based funding and modest increases in IEPP positively affect achievement (Baker, 2016; Greenwald et al., 1996; Krause, 2017; Odden et al., 2010), although debate and conflicting research remains regarding the effectiveness of how much is required and whether or not increases have made a difference in other settings (Cunningham, 2004; Evers & Clopton, 2006; Hanushek, 2006; Oberhaus, 2008).

In this study, these same questions were explored within the state of Illinois among public elementary school districts. Student achievement was measured by student Math and Reading performance on the Illinois State Achievement Test (ISAT) for elementary school district students in grades 3-8 during school year 2013-2014, and all district- and student-level data were collected from the ISBE. Student-level data were obtained from personnel at ISBE while district financial data were obtained from the Illinois State Board of Education website. These data were used to determine the relationships among multiple variables, including Individual Low-Income Status, Low-Income District Percentage, and IEPP. An additional base year of financial data (2003-2004) was employed to examine changes in school funding distribution and shifts in funding inequality over a 10-year period within the same formula.

Theoretical Framework

This study employed a theoretical framework that supports the need to examine the effectiveness of school funding structures (including school funding reform efforts and subsequent increases in funding) through either a horizontal or vertical equity framework models. Purporting that conflicting research regarding the effectiveness of IEPP to raise student achievement for disadvantaged groups, employing a horizontal and vertical equity frameworks requires the researcher to set a standard of when it is reasonable to expect changes in expenditure to minimize for variance in student backgrounds. There must be a minimum standard ensured before being able to confidently draw a conclusion regarding how funding can and does affect achievement. The first, horizontal equity, refers to the equalization of resources—ensuring all students are funded at the same level. The second, vertical equity, a higher bar, demands that even this equalization is not enough and that schools would need to allocate more resources to disadvantaged students to account for the variance in backgrounds successfully mitigate those effects on achievement outcomes (Alexander et al., 2015). This study used these standards to draw conclusions about whether or not changes in IEPP can or do affect achievement outcomes.

Developing these lenses was important in establishing the problem in Illinois' funding structure and its subsequent significant reliance on local sources to fund PK-12 school systems. These lenses also provided a theory to assess Illinois' ability to minimize the effects of variance in student backgrounds. In addition to helping establish the problem, these lenses also helped to inform the research questions, the significance of the study, and practical policy applications.

Based on both the standard Alexander et al. defines for both horizontal and vertical equity, the research findings indicate that Illinois' funding structure does not ensure horizontal equity or vertical equity given the system's reliance on local property wealth and its inability to make up for those disparities in state allocations. The Gini index for the state's elementary districts and the disparities in its top and bottom IEPP quintiles support this conclusion. Moreover, the findings for the first three research questions support the need for the school district funding structure to do so if the state hopes to minimize the effect of variance in student backgrounds.

Discussion of Findings

The data in the study included de-identified student-level data for the 2013-2014 school year, including Math ISAT score, Reading ISAT score, Race, Gender, Low-Income Status, School ID, and Grade Level. Other school district-level data employed included Low-Income

District Percentage, Total Enrollment, Average Class Size, District IEP Percentage, District LEP Percentage, and IEPP for 2003-2004 (the base Gini year) and 2013-2014. Although additional student-level data would have been ideal to employ to isolate more regressors further, to maintain student anonymity and a representative data set, independent variables were limited to the variables explicitly being studied, potential collinear variables (e.g., Race), and an additional exogenous variable (i.e., Gender)

When examining the relationship of independent variables (SES variables, IEPP, Race, and Gender) to student achievement as measured by the Reading or Math ISAT scores, statistical measures employed helped establish patterns and trends regarding the relationships among the variables examined in the four research questions. The initial descriptive statistics revealed that Low-Income students performed at lower levels than Non Low-Income peers, with 45.1% of Low-Income students meeting or exceeding standards on the Math ISAT compared to 78.7% of Non Low-Income students and 42.1% of Low-Income students meeting or exceeding standards on the Reading ISAT compared to 77.2% of Non Low-Income students. Likewise, descriptive statistics also revealed the large range in IEPP for elementary school districts in 2013-2014, with the lowest school district spending $3,788 and the highest school district spending $17,568. Given Illinois' funding structure and long-established test score analysis between Low-Income and Non Low-Income students, neither set of statistics revealed any surprises.

However, when examined within the context of the four research questions and at a micro level to be discussed, these statistics developed specific strength and significance. Ultimately, the four research questions determined that both Low-Income status and low IEPP negatively affect achievement, and in the case of Illinois students within Illinois' current school funding structure and school district boundaries, students likely have both factors reinforcing and contributing to the achievement disparities between Non Low-Income students and Low-Income students.

Research question interpretations. When examining the significance of these descriptive statistics and the relative impact of each variable on its own, several different methods were employed to help frame conclusions regarding the significance of school funding, the impact of SES, the effectiveness of Illinois' funding structure to support disadvantaged students, and the subsequent recommendations.

Research question 1. The first research question incorporated a PPM Correlation to determine the strength and relationship between Low-Income District Percentage and Student Achievement as measured by the Math and Reading ISAT. When examined using the data fields provided, other notable significant correlations also surfaced.

The various PPM correlations run determined that there was a negative correlation between a Low-Income District Percentage and Student Achievement on both the Reading and Math ISAT (r = -0.35, $p \leq 0.0001$). Within each quartile, these effects were much smaller ($r = \leq$-0.1, $p \leq 0.0001$), with the first quartile (0%-22.05% Low-Income) maintaining the highest correlation as the percentage of Low-Income increases (r = -0.1, $p \leq 0.0001$). These smaller correlations revealed that there were not as significant of differences for low-income students *within* each quartile but that there was a significant correlation between Low-Income District Percentage and Student Achievement.

When stratified by IEPP, this PPM correlation did, however, indicate that modest changes in funding did make a difference within quartiles. Interquartile correlations were all greater than .3 (r~ -0.30, $p \leq 0.0001$), suggesting that districts in the first quartile spending anywhere from $3,788 per pupil to $5,225 per pupil did see significant differences in achievement—a negative impact the less spent—as funding allocations changed within the quartile. Although IEPP was not the initial focus of the first research question, this notable correlation did begin to inform the analysis of IEPP within the study and subsequently does serve as a data point in supporting the research that even modest increases in IEPP can make differences in achievement (Baker, 2016; Greenwald et al., 1996).

In addition to the overall effect of low-income status on achievement, this question specifically sought to examine the correlation between Individual Low-Income and Low-Income District Percentage. Accordingly, another PPM Correlation test found the most significant correlation of all the correlations when examining relationships between variables, determining a very strong correlation between Individual Low-Income and Low-Income District Percentage ($r = 0.654$, $p \leq 0.0001$). Such a high correlation suggests that Illinois school district boundaries reinforce income segregation and ensure low-income students often attend low-income schools that are funded at lower rates. Such a finding supports prior research that has cited Illinois' funding structure as a catalyst to reinforce inequality and inequity between low-income students and non low-income students (Baker et al., 2017; Krause, 2017; Martire, 2013).

Lastly, another notable correlation revealed relates to the continued conflicting research regarding which is more powerful, individual SES or group SES. According to this analysis, Individual Low-Income ($r = 0\text{-}0.38$, $p \leq 0.0001$) was comparable or slightly more impactful than Low-Income District Percentage ($r = -0.35$, $p \leq 0.001$). Such close correlations provide one explanation as to why research is mixed. Depending on the study—the metric for SES and achievement—with such close correlations, different studies produce slightly different outcomes, with some studies concluding that individual SES had a stronger relationship to student achievement (Caldas & Bankston, 1997), some studies determining a highly similar relationship

(Palardy, 2013; Palardy & Rumberger, 2005), and some studies revealing a stronger group effect (Kennedy et al., 1986). Although this study may not help inform that particular debate, it does reinforce that SES is highly correlated to achievement outcomes (Sirin, 2005; White, 1982), and the close relationships established for individual SES and school district SES likely illustrate why studies are mixed—both variables illustrated strong, similar correlations.

Research question 2. Expanding beyond simple correlation, the second research question employed a multiple linear regression model to examine the relationship among independent variables—IEPP, Individual Low-Income, and Low-Income District Percentage—and the dependent variables—Math and Reading ISAT achievement. Although many independent variables were included in both the Math and Reading regression models to effectively isolate the variables being examined, the model revealed consistently that Individual Low-Income, Race, IEPP, and Gender were practically meaningful and statistically significant ($p \leq 0.0001$). In both models, the Constant, the base prediction for outcomes in Math and Reading, was leveled as a Non Low-Income, White, Male funded at $0 IEPP. The model then indicated the effect sizes of the other regressors.

Most notably, Individual Low-Income had a negative effect on achievement in Math (-0.380, $p \leq .0001$) and Reading (-0.424, $p \leq 0.0001$), marking the highest effect sizes on achievement, other than Race (), which had a slightly higher, although statistically comparable, effect size on Math (-0.385, $p \leq 0.0001$). Similarly, in both models, Race also had a significant effect, with Asian students seeing a positive effect on Math scores (0.293, $p \leq 0.0001$) and Reading (0.182, $p \leq 0.0001$), although smaller, and with Black and Hispanic students seeing negative effects on Math scores (-0.385, $p \leq 0.0001$ and -0.253, $p \leq 0.0001$) and Reading scores (-0.336, $p \leq 0.0001$ and -0.286, $p \leq 0.0001$).

Such findings reflect the national trends regarding the relationship between SES and achievement (Reardon, Robinson-Cimpian, & Weathers, 2014). When they examined national assessment data by SES, Reardon et al. found the gap among low-income and non low-income students to be continuously pervasive throughout NAEP's history, with the greatest gap in the assessment's 30+ year history being recorded in the most recent NAEP data. As a result, this research, coupled with prior research on SES and its relationship to student achievement (Sirin, 2005; White, 1982), continues to show the need for targeted solutions that can help begin to narrow the achievement gap.

In addition, these findings highlight the national trends regarding the relationship between race and achievement, illustrating a significant gap between Black and Hispanic students and White students (Kena et al., 2016). As a social construct, differences in performance by racial groups likely reflect other variables that contribute to the variance among different racial groups. As a result, exploring race further will be discussed in the recommendations for future study section.

Because research has continued to highlight student achievement differences based on the variance in student backgrounds, researchers and policymakers often discuss school district funding as one method to try to mitigate for variance in student backgrounds. Within this research and the regression model specifically, such an avenue was explored for its ability to account for differences in students' backgrounds. As identified and discussed as part of the Constant, IEPP was also factored into both regression models, with a base of $0 per pupil and a coefficient based on increments of $1,000 per pupil. The findings yielded by the model are potentially most practically significant, as they offer insight into how to account for the variance in student backgrounds. Within both subject area models, the positive effects of IEPP (0.049 in

Math, $p \leq 0.0001$ and 0.042 in Reading, $p \leq 0.0001$) reflect the base of \$0. Accordingly, to account for regressors that yielded negative effects on achievement outcomes and to predict what the expected score could be (i.e., to see how the Constant, a Non Low-Income, White, Male student's expected score, could increase with spending increases in increments of \$1,000), this prediction model provided insight into both the significance of IEPP and how IEPP changes can help mitigate for the variance in student backgrounds. For example, in Math, a Low-Income student would have needed an additional \$7,755 (0.380/0.049 x 1,000) spent to attain the Non Low-Income White student's expected score at \$0 IEPP. If the student was also Black, the model predicted that he would need an additional \$7,857 (0.385/0.049 x 1,000), a total of \$15,612, to reach the Constant performance level, which does not yet meet standards (2.909) and does not account for the typical Non Low-Income, White, Male student's actual IEPP. Likewise, for Reading, those figures revealed were even higher, suggesting \$9,047 in funding would be required to mitigate for Low-Income status (0.336/0.042 x 1,000), and an additional \$8,000 in funding if the student was also Black (0.336/0.042 x 1,000), a total of \$17,047 in funding to reach the Constant (2.679).

Such findings regarding IEPP support the research that shows that changes in spending do matter and can positively affect student achievement (Alexander et al., 2015; Baker, 2016; Greenwald, Hedges & Laine, 1996; Odden et al., 2010; Yinger, 2004). However, as Alexander et al. note, this model revealed that significant changes in IEPP may be needed to see significant changes in achievement. As a result, as Alexander et al. explain through the principles of horizontal and vertical equity, it is not an appropriate claim for researchers to argue that funding cannot make a difference in achievement if states are not willing make significant increases in allocation where there is most need.

As a whole, while the regression models did not (and cannot) provide precise scores for individual students, they provided a base for predicting based on multiple variables. According to each model's Coefficient of Determination ($R^2 = 0.195$ in Math, $R^2 = 0.192$ in Reading), both models were comparable, producing approximately 20% predictability, and both coefficients are generally considered strong within social science research (Abelson, 1985).

Research question 3. Explicitly examining the district effect on achievement, question three continued to employ a multiple linear regression model seeking to isolate the effects of Low-Income District Percentage irrespective of IEPP. Low-Income District Percentage in the Math and Reading regression models developed for research question two did not reveal outstanding significance once other variables that correlated to Low-Income District Percentage (e.g., Individual Low-Income status, Race, and IEPP) were accounted for within the analysis. As a result, as an independent variable, there was no meaningful significance found. One explanation relates to the idea described above, which suggests that once the variables that correlate to Low-Income District Percentage (i.e., Individual Low-Income status, Race, and IEPP) were accounted for, there was no longer a practically significant enough independent variable remaining. This conclusion reflects a statistical concept called collinearity, a situation where two or more predictor variables in a multiple regression model are highly correlated (Bates & Watts, 1988). In this study, since there is a strong correlation between Individual Low-Income and Low-Income District Percentage ($r = 0.654$, $p \leq 0.0001$) and because Low-Income District Percentage can predict IEPP, the measures were collinear. As a result, this finding does not suggest that Low-Income District Percentage does not matter; it is simply predicted by other variables.

Such conclusions are supported by descriptive statistics and research in Illinois. Because Illinois is most heavily reliant on local property wealth to fund its public school districts (Kena et al., 2016), it makes sense that IEPP—the amount expended per pupil in each district—would reflect the local property wealth of the district. In other words, in districts where there is a high percentage of low-income students, IEPP reflects that statistic, and as a result, once IEPP is removed from the equation, there is not a statistically or practically significant district effect on student achievement.

Research question 4. After assessing the relationships among SES, IEPP, and Student Achievement, the fourth question sought to examine the overall effectiveness of Illinois' funding structure to minimize the effect of Low-Income status on Student Achievement. To answer this research question, there was no single statistical method employed. Rather, analysis and subsequent conclusions were based on the results from the first three research questions and one new statistical test—The Gini coefficient—a measure of statistical dispersion to determine the inequality in funding.

The first stage of the question required analysis of the previous research questions when taken together. As noted within the first research question, there was a medium to strong correlation between Low-Income District Percentage and Student Achievement as measured on the ISAT ($r = -0.35$, $p \leq 0.0001$). When stratified by IEPP, there was just as notable of a correlation within quartiles ($r \geq -0.3$, $p \leq 0.0001$), indicating that even modest changes in IEPP (changes within quartiles) can have medium to strong correlation to achievement outcomes. In addition, the regression models employed for question two also helped solidify the effect IEPP has on Student Achievement. In essence, the model could predict that $7,000-$8,000 IEPP could at least minimize for the effect of Low-Income status. However, what it also revealed was that such a number represents *additional* funding needed to equalize elements of background differences and should be added to an adequate level of education funding, not the base of $0 provided for the constant in the model.

The second stage of this analysis examined Illinois' funding structure for its ability to minimize for the effects of Low-Income status, and it attempted to quantify the degree of inequality through a statistical test and subsequent scale developed to measure inequality. Descriptive statistics, including the percentage of school district funding derived from local property wealth—the highest in the nation at 67.4% (Kena et al., 2016)—and the subsequent variance in school district funding (a minimum of $3,788 IEPP and maximum of $17,568), helped inform the need for this additional statistical test of inequality, the Gini. As noted within chapter 4, the Gini index provides a level of inequality within a dataset, with 0 being the most equal (i.e., all funds are entirely equally distributed) and 1 being the most unequal (i.e., with one entity maintaining all funds, and the others maintaining none). Accordingly, that scale and its implications needed to be taken into account when evaluating the strength of the Gini coefficient rendered within the study. In the case of school districts and the students within them, all school districts are funded at some level, so the expectations for a Gini near 1—with one school district distributing all education funds to all of its students, and the other 373 school districts distributing no funds to students—is not the kind of inequality to be expected.

To obtain the Gini, the IEPP per district was entered for the number of students within each district, resulting in the same number of entries in the index as the number of public elementary school students in the sample. The test was run for both a base year (2003-2004) and the year of study (2013-2014) to evaluate Illinois' level of inequality and its change over a ten year period within the same system. The calculation determined that Illinois maintained a G of

0.118 in 2003 and 0.133 in 2013-2014, indicating significant disparities in funding among school districts and an increase in inequality over the 10-year period.

In addition, when calculated by the top and bottom quintiles, the inequality worsened, resulting in a G of 0.189 for 2003-2004 and a 0.183 in 2013-2014. These calculations show 60% greater inequality between the highest IEPP and the lowest IEPP in 2003-2004 and a 38% increase in inequality between the highest IEPP and the lowest IEPP in 2013-2014. When comparing both years, there was more expenditure inequality in 2013-2014 but slightly less inequality between the top and bottom quintiles. However, the fact that the Gini index indicated significant inequality and that inequality is even greater among the wealthiest communities and the poorest communities revealed that the funding structure does not effectively address disparities between disadvantaged school districts and wealthier school districts. As a state with the largest reliance on local property wealth and great disparities among district spending and achievement, the Gini Index, coupled with the analysis from the first two research questions, strongly supports the conclusion that the state's funding structure not only does not minimize for the variance in student backgrounds, but it structurally reinforces inequality.

Such findings support the research and analysis of what Illinois school district funding experts such as the CTBA (2016), the EFAB (2017), and Martire (2013) have argued—that Illinois' foundation funding structure and level of funding are highly inequitable, resulting in woefully underfunded districts that often serve students with the most economic need. Such conclusions were also supported by national analyses (Baker et al., 2017) and noted via reform advocates through litigation (Blase v. Illinois, 1973; Committee for Educational Rights v. Jim Edgar, 1996; Lewis et al. Appellees v. Joseph A. Spagnolo, 1999).

Conclusions and Implications

Based on the analysis from the four research questions, both SES and school funding were found to be factors that affect student achievement outcomes as measured by Illinois' standard assessment, the ISAT, for the 2013-2014 school year. The most significant independent variables of those being studied included Individual Low-Income Status and IEPP.

This study has both practical and academic implications, as it revealed that students who are economically disadvantaged require additional IEPP than what is required for those students who are not classified as Low-Income and that increases in IEPP can help mitigate for the effects of being Low-Income. Such a conclusion is congruent with Alexander et al.'s (2015) argument for horizontal equity to minimize the effect on achievement and vertical equity to overcome the effect on student achievement and research that supports increased funding to improve achievement. These findings also support research regarding increases in IEPP as a specific avenue to increase achievement and, as importantly, counteract the additional structural inequality and subsequent disadvantages that the state's already disadvantaged students experience (Baker, 2016; Greenwald et al., 1996). Not only do these outcomes plague students within the school district walls but they also plague students beyond school walls; these disparities in academic outcomes transcend education, negatively affecting students' subsequent employment opportunities and leading to greater income inequality (IDES, 2016; Martire, 2013).

Recommendations for Policy

Given the results of the analysis and Illinois' disproportionate reliance on local property wealth to fund education, it is recommended that Illinois move to a need-based, equitable funding system that requires school districts to also incorporate evidence-based practices. To accomplish such a funding structure, the state would need to entirely revise its funding structure to ensure the most disadvantaged school districts receive more and that all education funds are collected and distributed by the state. The recently passed Senate Bill 1947 has incorporated evidence-based requirements and authorizes some reallocation of school district funds, ensuring the state provides more funding to districts in economic need. By providing more funding to districts most in need, Senate Bill 1947's funding structure is designed to provide improvements over the highly inequitable funding structure it replaces, but local tax payer dollars still fund education (i.e., the state does not distribute all funds) and are distributed locally. As indicated by the regression model in this study, if Illinois would like to truly shrink the achievement gap, a complete revision to the state's funding structure and the disproportionate distribution of more instructional spending per student based on need would be the most ideal way to measure the effectiveness of increased funding to close the achievement gap and to ensure greater student achievement levels of all Illinois students. Senate Bill 1947's revisions may not ensure the most vulnerable and disadvantaged receive enough funding to significantly result in higher achievement for all children in the state of Illinois, although the revision provides a first step and may result in some improvement, as the interquartile IEPP changes revealed in the study.

In addition, as the analysis indicated, there was a significant correlation between Individual Low-Income and Low-Income District Percentage (r = 0.658), which suggests that school districts reinforce income segregation. Another practical approach to ensuring more equitable IEPP within a funding structure (if local wealth remains significant in the funding structure) could be to examine how to ensure more economic diversity within school districts. It may be difficult in some areas, as there may not be economic diversity within some geographical locations, making the idea of "neighborhood" schooling an impossibility. However, there are districts where this integration could be feasible, districts that are currently drawn to maintain income segregation. In the Northern suburbs, for example, there is one of the richest and poorest school districts, both with a lack of economic diversity, within minutes of one another, resulting in highly segregated school districts and communities deeply segregated by race and income.

Recommendations for Practice

In addition to recommendations for policy, there is also practical value for school district leaders. As school district leaders make decisions regarding how to allocate financial resources within their school districts, this research reinforces the need to allocate resources to support low-income students. Similarly, the research revealed the potential effect race has on student achievement. Knowing this information, school district leaders can be mindful of the possible effect race has on achievement irrespective of income status; explore further how race influences student identity, confidence, and student achievement; and provide professional development to help their staff meet diverse learning needs within their school district.

Recommendations for Further Study

To continue to increase awareness and support action in policy and practice, it is important that academic research continue to explore the impact of SES and school district funding on student achievement outcomes. Specifically, in the state of Illinois, it would be beneficial to explore unit and high school districts, applying similar statistical treatments to the various variables and examining the outcomes using potentially different achievement metrics. Although Krause (2017) examined high school districts with regards to school district funding and its effect on achievement, generating similar conclusions regarding the relationship between school district funding and low-income status, a study that employs this study's same treatments to the exact same variables would offer more support in the field. In addition, studies that include unit school districts would be beneficial in order to ensure Illinois' largest school district—Chicago Public Schools—is examined.

Since much attention has been paid to the inadequate and inequitable funding structure in Illinois, the state did adopt a funding formula effective for FY18. Senate Bill 1947, passed on August 31, 2017, employs an evidence-based approach to school district funding, ensuring greater funding equity coupled with evidenced-based practices. Consequently, it would be beneficial to replicate this study to see how the new evidence-based funding approach affects achievement outcomes. However, it would be advisable to approach such a study with caution, through a framework that recognizes that changes in IEPP have to be targeted and significant enough to ensure horizontal equity to raise achievement or vertical equity to mitigate the effects of that arise from the variance in backgrounds (Alexander et al., 2015). These frameworks would need to be employed to evaluate the new funding allocations before drawing conclusions about whether increased IEPP makes a difference in educational outcomes. As Alexander et al. recognizes, research cannot definitively determine increased funding would not improve outcomes if equity is not achieved.

In addition to SES and IEPP, race surfaced as significant factor that contributed to math and reading achievement for students within the study. Specifically, race negatively affected achievement for Hispanic and Black students, revealing both practical and statistical significance. As a result, further research exploring the effect of race would be important in future research. For example, employing Critical Race Theory, a framework developed from the work of legal scholar Derrick Bell that seeks to understand and explain slow racial reform in the United States (Ladson-Billings, 1998), to explore race and racism in the state of Illinois and its relationship to student achievement for Illinois students irrespective of SES would add value to the field. Exploring race could help raise awareness of the achievement disparities through a racial lens and provide policymakers and practitioners recommendations to improve achievement for students of all races and eliminate the significance of race as an achievement factor.

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Appendix A

Illinois Elementary School Districts Identified in Study

Table 15

Elementary Districts, 2013-2014 School Year

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Addison SD 4	4,374	64.5	5,439	4th	2nd
Akin CCSD 91	101	50.5	6,173	3rd	3rd
Albers SD 63	190	21.1	4,418	1st	1st
Allen-Otter Creek CCSD 65	89	32.6	8,512	2nd	4th
Alsip-Hazlgrn-Oaklwn SD 126	1,597	50.8	7,409	3rd	4th
Anna CCSD 37	740	50.4	5,333	3rd	2nd
Antioch CCSD 34	3,065	24.2	5,820	2nd	2nd
Aptakisic-Tripp CCSD 102	2,090	10.3	9,045	1st	4th
Arbor Park SD 145	1,466	37.1	5,531	2nd	2nd
Arlington Heights SD 25	5,347	4.4	7,107	1st	3rd
Armstrong-Ellis Cons SD 61	73	58.9	7,403	3rd	4th
Ashley CCSD 15	173	63	5,271	4th	2nd
Atwood Heights SD 125	716	45	5,564	3rd	2nd
Aviston SD 21	391	17.6	4,341	1st	1st
Avoca SD 37	711	7.9	9,556	1st	4th
Bannockburn SD 106	187	12.8	10,484	1st	4th
Bartelso SD 57	155	12.3	4,811	1st	1st
Bartonville SD 66	245	61.6	3,789	3rd	1st
Beach Park CCSD 3	2,384	50.1	6,385	3rd	3rd
Belle Valley SD 119	992	63.4	4,468	4th	1st
Belleville SD 118	3,901	64.8	5,987	4th	2nd
Bellwood SD 88	2,476	87.4	5,324	4th	2nd
Benjamin SD 25	717	6.1	8,171	1st	4th
Bensenville SD 2	2,196	64.3	8,496	4th	4th
Benton CCSD 47	1,192	63.9	6,416	4th	3rd
Berkeley SD 87	2,829	84.1	4,533	4th	1st
Berwyn North SD 98	3,415	85.3	6,038	4th	2nd
Berwyn South SD 100	3,975	73.4	6,291	4th	3rd
Bethel SD 82	186	75.3	5,415	4th	2nd
Big Hollow SD 38	1,816	24	5,154	2nd	1st
Bloomingdale SD 13	1,238	6.8	7,352	1st	4th
Bluford CCSD 114	323	53.9	6,959	3rd	3rd

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Bourbonnais SD 53	2,453	46.3	4,829	3rd	1st
Braceville SD 75	163	56.4	4,631	3rd	1st
Bradley SD 61	1,634	51.8	6,305	3rd	3rd
Breese ESD 12	651	35.3	4,783	2nd	1st
Brookfield Lagrange Park SD 95	1,113	21.3	6,120	1st	3rd
Brookwood SD 167	1,270	71.4	4,996	4th	1st
Buncombe Cons SD 43	67	61.2	4,781	3rd	1st
Burbank SD 111	3,453	53.1	5,936	3rd	2nd
Burnham SD 154-5	196	90.8	6,497	4th	3rd
Butler SD 53	461	0.7	10,193	1st	4th
Calumet City SD 155	1,196	70.6	6,263	4th	3rd
Calumet Public SD 132	1,192	90.4	4,313	4th	1st
Carbon Cliff-Barstow SD 36	309	90.9	6,991	4th	3rd
Carbondale ESD 95	1,497	59.7	7,019	3rd	3rd
Carthage ESD 317	446	42.8	4,709	3rd	1st
Cary CCSD 26	2,535	20.7	5,351	1st	2nd
Cass SD 63	757	12.8	8,470	1st	4th
CCSD 146	2,391	39.6	8,939	2nd	4th
CCSD 168	1,526	73.8	5,992	4th	2nd
CCSD 180	671	58.7	8,907	3rd	4th
CCSD 204	170	40	5,033	2nd	1st
CCSD 62	4,839	57.2	9,123	3rd	4th
CCSD 89	1,972	20.1	7,738	1st	4th
CCSD 93	3,616	40.4	8,658	2nd	4th
Center Cass SD 66	1,007	9.2	7,202	1st	3rd
Central City SD 133	278	51.4	4,502	3rd	1st
Central SD 104	586	57.2	5,408	3rd	2nd
Central SD 51	1,294	16.5	4,153	1st	1st
Central Stickney SD 110	448	65.4	5,724	4th	2nd
Centralia SD 135	1,326	99.3	6,247	4th	3rd
Chaney-Monge SD 88	450	74.7	6,221	4th	3rd
Channahon SD 17	1,359	15.9	4,804	1st	1st
Cherry SD 92	45	22.2	6,214	2nd	3rd
Chester-East Lincoln CCSD 61	265	39.6	6,635	2nd	3rd
Chicago Heights SD 170	3,351	94.9	8,356	4th	4th
Chicago Ridge SD 127-5	1,485	63	6,467	4th	3rd
Cicero SD 99	13,124	92.5	5,342	4th	2nd
Colona SD 190	498	58.2	4,739	3rd	1st

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Comm Cons SD 59	6,835	53.5	8,195	3rd	4th
Cook County SD 130	3,606	88.1	6,636	4th	3rd
Cornell CCSD 426	113	43.4	7,401	3rd	4th
Country Club Hills SD 160	1,264	72.1	6,646	4th	3rd
County of Union Sch Dist No43	435	52.4	4,202	3rd	1st
Creston CCSD 161	113	33.6	6,709	2nd	3rd
Creve Coeur SD 76	669	75.6	5,353	4th	2nd
Crystal Lake CCSD 47	7,892	29.5	5,746	2nd	2nd
Cypress SD 64	144	55.6	5,965	3rd	2nd
Dallas ESD 327	207	68.1	6,282	4th	3rd
Dalzell SD 98	57	36.8	6,636	2nd	3rd
Damiansville SD 62	124	33.9	4,940	2nd	1st
Darien SD 61	1,631	39.9	6,092	2nd	2nd
Deer Park CCSD 82	106	21.7	7,915	1st	4th
Deerfield SD 109	3,105	0.6	10,792	1st	4th
DeSoto Cons SD 86	264	62.5	7,281	3rd	3rd
Diamond Lake SD 76	1,077	59.3	7,455	3rd	4th
Dimmick CCSD 175	114	7.9	7,750	1st	4th
District 50 Schools	778	63.2	4,617	4th	1st
Dodds CCSD 7	131	48.1	6,289	3rd	3rd
Dolton SD 148	2,232	89.8	6,694	4th	3rd
Dolton SD 149	3,130	98.6	7,643	4th	4th
Downers Grove GSD 58	5,183	11.8	6,737	1st	3rd
Dwight Common SD 232	602	32.9	5,480	2nd	2nd
East Alton SD 13	725	65.4	6,514	4th	3rd
East Coloma - Nelson CESD 20	311	49.8	-	3rd	N/A
East Maine SD 63	3,633	59.8	6,613	3rd	3rd
East Moline SD 37	2,775	68.1	6,112	4th	3rd
East Peoria SD 86	1,703	48.8	6,008	3rd	2nd
East Prairie SD 73	553	40.3	7,906	2nd	4th
Elwood CCSD 203	385	28.8	5,245	2nd	2nd
Emmons SD 33	308	9.4	8,059	1st	4th
ESD 159	1,920	67.4	7,649	4th	4th
Eswood CCSD 269	93	35.5	7,030	2nd	3rd
Evanston CCSD 65	7,191	38.3	8,445	2nd	4th
Evergreen Park ESD 124	1,774	41.8	7,283	2nd	3rd
Ewing Northern CCSD 115	223	52	5,740	3rd	2nd

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Fairfield PSD 112	713	59.9	5,420	3rd	2nd
Fairmont SD 89	304	92.4	6,308	4th	3rd
Fairview SD 72	667	33.1	8,493	2nd	4th
Farrington CCSD 99	64	45.3	3,788	3rd	1st
Field CCSD 3	315	35.2	4,059	2nd	1st
Flossmoor SD 161	2,374	41.5	6,908	2nd	3rd
Ford Heights SD 169	430	95.3	7,383	4th	4th
Forest Park SD 91	916	34.6	10,476	2nd	4th
Forest Ridge SD 142	1,600	41.3	4,903	2nd	1st
Fox Lake GSD 114	802	48	5,509	3rd	2nd
Fox River Grove Cons SD 3	512	16.8	6,947	1st	3rd
Frankfort CCSD 157C	2,491	4.5	5,531	1st	2nd
Franklin Park SD 84	1,284	56.5	7,984	3rd	4th
Freeburg CCSD 70	774	11	4,363	1st	1st
Fremont SD 79	2,230	8.9	5,980	1st	2nd
Gardner CCSD 72C	219	50.2	4,720	3rd	1st
Gavin SD 37	877	59.9	5,363	3rd	2nd
Geff CCSD 14	113	44.2	4,789	3rd	1st
Gen George Patton SD 133	306	99	5,897	4th	2nd
Germantown Hills SD 69	878	13.1	4,964	1st	1st
Germantown SD 60	268	16.4	4,365	1st	1st
Giant City CCSD 130	265	35.1	5,419	2nd	2nd
Gifford CCSD 188	215	48.4	4,649	3rd	1st
Glen Ellyn SD 41	3,621	23.9	7,699	2nd	4th
Glencoe SD 35	1,243	2.3	9,741	1st	4th
Glenview CCSD 34	4,923	20.3	8,170	1st	4th
Golf ESD 67	616	22.7	7,980	2nd	4th
Gower SD 62	854	14.5	8,938	1st	4th
Grand Prairie CCSD 6	78	87.2	5,123	4th	1st
Grand Ridge CCSD 95	273	32.2	5,913	2nd	2nd
Grant CCSD 110	683	54.5	5,963	3rd	2nd
Grass Lake SD 36	171	31.6	9,688	2nd	4th
Grayslake CCSD 46	3,932	27.9	6,383	2nd	3rd
Gurnee SD 56	2,212	15.5	6,122	1st	3rd
Hampton SD 29	224	33	4,348	2nd	1st
Harmony Emge SD 175	843	66.1	5,464	4th	2nd
Harrison SD 36	440	50.9	6,372	3rd	3rd
Harvey SD 152	2,166	98.1	5,206	4th	1st

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Hawthorn CCSD 73	3,914	23.5	6,874	2nd	3rd
Hazel Crest SD 152-5	954	99.8	6,550	4th	3rd
High Mount SD 116	440	57.7	5,490	3rd	2nd
Hillside SD 93	531	73.1	6,285	4th	3rd
Hinsdale CCSD 181	4,008	4	8,844	1st	4th
Hollis Cons SD 328	171	14	5,105	1st	1st
Homer CCSD 33C	3,652	18.8	7,565	1st	4th
Homewood SD 153	1,901	32.9	6,673	2nd	3rd
Hoover-Schrum Memorial SD 157	939	75.5	5,080	4th	1st
Hoyleton Cons SD 29	58	62.1	7,521	3rd	4th
Ina CCSD 8	107	100	6,457	4th	3rd
Indian Springs SD 109	2,850	62.4	4,534	3rd	1st
Irvington CCSD 11	71	70.4	5,758	4th	2nd
Itasca SD 10	965	6.5	6,275	1st	3rd
Iuka CCSD 7	228	53.5	5,199	3rd	1st
Jasper CCSD 17	148	45.3	5,892	3rd	2nd
Joliet PSD 86	11,647	97.8	5,475	4th	2nd
Keeneyville SD 20	1,560	46.7	6,601	3rd	3rd
Kell Cons SD 2	110	51.8	5,026	3rd	1st
Kenilworth SD 38	522	0	12,348	1st	4th
Kildeer Countryside CCSD 96	3,133	9.6	7,705	1st	4th
Kings Cons SD 144	96	37.5	8,317	2nd	4th
Kinnikinnick CCSD 131	1,904	20.6	5,372	1st	2nd
Kirby SD 140	3,667	3.2	6,937	1st	3rd
Komarek SD 94	513	31	7,009	2nd	3rd
La Grange SD 102	3,183	13.3	6,979	1st	3rd
La Grange SD 105 South	1,465	48.4	8,203	3rd	4th
La Harpe CSD 347	224	59.4	6,514	3rd	3rd
La Salle ESD 122	932	79.1	6,229	4th	3rd
Ladd CCSD 94	237	37.1	4,457	2nd	1st
LaGrange Highlands SD 106	865	5.8	9,960	1st	4th
Lake Bluff ESD 65	840	9.9	9,446	1st	4th
Lake Forest SD 67	1,932	1.3	8,948	1st	4th
Lake Villa CCSD 41	2,902	24.2	5,420	2nd	2nd
Lansing SD 158	2,437	64.2	6,095	4th	2nd
Laraway CCSD 70C	425	85.9	8,566	4th	4th
Lemont-Bromberek CSD 113A	2,266	11	4,927	1st	1st
Libertyville SD 70	2,476	5.1	6,245	1st	3rd

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Lick Creek CCSD 16	126	37.3	5,890	2nd	2nd
Limestone Walters CCSD 316	184	15.2	4,286	1st	1st
Lincoln ESD 156	1,075	94.8	5,403	4th	2nd
Lincoln ESD 27	1,269	72.3	5,843	4th	2nd
Lincolnshire-Prairieview SD 103	1,671	1.3	8,785	1st	4th
Lincolnwood SD 74	1,257	14.2	10,979	1st	4th
Lindop SD 92	459	74.7	5,913	4th	2nd
Lisbon CCSD 90	121	19.8	4,578	1st	1st
Lockport SD 91	665	31.6	5,447	2nd	2nd
Lombard SD 44	3,136	29.5	8,415	2nd	4th
Ludlow CCSD 142	111	98.2	6,164	4th	3rd
Lyons SD 103	2,536	74.1	7,113	4th	3rd
Maercker SD 60	1,334	38.2	9,659	2nd	4th
Malden CCSD 84	88	48.9	7,087	3rd	3rd
Manhattan SD 114	1,353	12.3	4,411	1st	1st
Mannheim SD 83	2,696	83.7	9,486	4th	4th
Marengo-Union E Cons D 165	1,102	56.4	4,542	3rd	1st
Marquardt SD 15	2,773	67.5	7,678	4th	4th
Marseilles ESD 150	607	62.4	5,671	3rd	2nd
Matteson ESD 162	3,076	67.8	5,961	4th	2nd
Maywood-Melrose Park-Broadview 89	5,412	93.3	5,383	4th	2nd
Mazon-Verona-Kinsman ESD 2C	330	31.8	5,718	2nd	2nd
McClellan CCSD 12	61	49.2	5,290	3rd	2nd
McHenry CCSD 15	4,725	43.7	6,794	3rd	3rd
Medinah SD 11	672	32.9	6,208	2nd	3rd
Mendota CCSD 289	1,252	63.3	5,303	4th	2nd
Metamora CCSD 1	862	17.7	5,040	1st	1st
Midlothian SD 143	1,882	71.4	5,553	4th	2nd
Milford CCSD 280	467	59.5	4,847	3rd	1st
Millburn CCSD 24	1,394	3.7	5,356	1st	2nd
Miller Twp CCSD 210	218	27.1	5,663	2nd	2nd
Millstadt CCSD 160	791	18.2	5,968	1st	2nd
Minooka CCSD 201	4,167	29.2	4,095	2nd	1st
Mokena SD 159	1,659	23	4,463	2nd	1st
Monroe SD 70	316	27.8	4,555	2nd	1st
Montmorency CCSD 145	326	24.5	5,258	2nd	2nd
Morris SD 54	1,197	41.9	4,246	2nd	1st

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Morton Grove SD 70	880	18.4	7,973	1st	4th
Mount Prospect SD 57	2,231	11.7	5,596	1st	2nd
Mount Vernon SD 80	1,398	82	6,661	4th	3rd
Mundelein ESD 75	1,691	33.1	5,082	2nd	1st
N Pekin & Marquette Hght SD 102	692	50.4	4,678	3rd	1st
Nashville CCSD 49	549	33.5	4,711	2nd	1st
Nettle Creek CCSD 24C	88	8	6,978	1st	3rd
New Holland-Middletown ED 88	110	52.7	5,765	3rd	2nd
New Hope CCSD 6	195	26.2	4,259	2nd	1st
New Lenox SD 122	5,306	18.2	4,727	1st	1st
New Simpson Hill SD 32	246	53.7	5,382	3rd	2nd
Newark CCSD 66	237	21.5	4,369	1st	1st
Niles ESD 71	496	37.3	10,205	2nd	4th
Nippersink SD 2	1,270	24.8	5,700	2nd	2nd
Norridge SD 80	1,051	40.6	5,903	2nd	2nd
North Palos SD 117	3,202	61.8	7,087	3rd	3rd
North Shore SD 112	4,180	23.7	9,424	2nd	4th
North Wamac SD 186	131	87.8	4,255	4th	1st
Northbrook ESD 27	1,202	2.8	12,303	1st	4th
Northbrook SD 28	1,683	2.9	12,765	1st	4th
Northbrook/Glenview SD 30	1,128	2.7	9,498	1st	4th
Norwood ESD 63	458	56.8	4,461	3rd	1st
O Fallon CCSD 90	3,490	21.1	4,790	1st	1st
Oak Grove SD 68	372	39.2	4,859	2nd	1st
Oak Lawn-Hometown SD 123	3,060	42.2	7,481	2nd	4th
Oak Park ESD 97	5,922	24.7	7,716	2nd	4th
Oakdale CCSD 1	80	42.5	5,342	3rd	2nd
Odell CCSD 435	168	44	6,483	3rd	3rd
Oglesby ESD 125	620	52.9	5,134	3rd	1st
Ohio CCSD 17	78	51.3	10,525	3rd	4th
Opdyke-Belle-Rive CCSD 5	208	66.3	4,899	4th	1st
Orland SD 135	5,090	13.6	8,391	1st	4th
Ottawa ESD 141	2,127	49.9	6,297	3rd	3rd
Palatine CCSD 15	12,812	42.2	7,293	2nd	3rd
Palos CCSD 118	1,926	28.5	7,269	2nd	3rd
Palos Heights SD 128	763	12.2	6,422	1st	3rd
Park Forest SD 163	2,028	89.4	6,443	4th	3rd

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Park Ridge CCSD 64	4,351	4.9	9,807	1st	4th
Pekin PSD 108	3,493	65.4	5,206	4th	1st
Pembroke CCSD 259	275	96.4	6,875	4th	3rd
Pennoyer SD 79	427	28.3	6,723	2nd	3rd
Peru ESD 124	978	42.5	6,152	3rd	3rd
Pinckneyville SD 50	568	45.8	4,735	3rd	1st
Pleasant Hill SD 69	251	76.9	4,412	4th	1st
Pleasant Valley SD 62	527	85.6	3,820	4th	1st
Pleasantdale SD 107	810	7.5	8,567	1st	4th
Pontiac CCSD 429	1,288	54.2	5,641	3rd	2nd
Pontiac-W Holliday SD 105	773	43.1	7,051	3rd	3rd
Posen-Robbins ESD 143-5	1,726	80.2	4,981	4th	1st
Prairie Crossing Charter School	384	0.5	5,244	1st	2nd
Prairie Du Rocher CCSD 134	176	54	5,545	3rd	2nd
Prairie Grove CSD 46	850	16.7	7,230	1st	3rd
Prairie Hill CCSD 133	750	13.9	5,109	1st	1st
Prairie-Hills ESD 144	2,704	92.8	6,228	4th	3rd
Prairieview-Ogden CCSD 197	244	20.1	5,535	1st	2nd
Princeton ESD 115	1,077	46	5,959	3rd	2nd
Prospect Heights SD 23	1,549	24.9	6,895	2nd	3rd
Queen Bee SD 16	1,981	64	6,567	4th	3rd
Raccoon Cons SD 1	241	68	6,233	4th	3rd
Rankin CSD 98	221	41.2	4,428	2nd	1st
Rantoul City SD 137	1,635	98.7	5,359	4th	2nd
Rhodes SD 84-5	672	72.3	9,727	4th	4th
Richland GSD 88A	966	43.1	5,819	3rd	2nd
Ridgeland SD 122	2,375	59.8	6,064	3rd	2nd
Riley CCSD 18	301	29.2	6,812	2nd	3rd
River Forest SD 90	1,371	5.5	8,746	1st	4th
River Grove SD 85-5	657	57.4	5,480	3rd	2nd
River Trails SD 26	1,423	37	9,660	2nd	4th
Riverside SD 96	1,668	15.8	7,509	1st	4th
Riverview CCSD 2	244	49.6	6,047	3rd	2nd
Robein SD 85	156	31.4	6,222	2nd	3rd
Rochelle CCSD 231	1,738	65.5	5,555	4th	2nd
Rock Falls ESD 13	993	82.3	4,655	4th	1st
Rockdale SD 84	292	79.8	6,803	4th	3rd

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Rockton SD 140	1,504	24.3	4,764	2nd	1st
Rome CCSD 2	342	38.3	5,006	2nd	1st
Rondout SD 72	151	6	17,568	1st	4th
Rooks Creek CCSD 425	49	22.4	7,853	2nd	4th
Roselle SD 12	751	20.4	7,097	1st	3rd
Rosemont ESD 78	286	41.3	9,414	2nd	4th
Rutland CCSD 230	77	29.9	10,956	2nd	4th
Salem SD 111	1,078	58.5	4,942	3rd	1st
Salt Creek SD 48	503	39.2	11,064	2nd	4th
Sandridge SD 172	402	76.6	5,638	4th	2nd
Saratoga CCSD 60C	777	32.6	4,486	2nd	1st
Saunemin CCSD 438	127	51.2	6,110	3rd	3rd
Schaumburg CCSD 54	14,432	23.5	8,662	2nd	4th
Schiller Park SD 81	1,406	61.4	7,100	3rd	3rd
SD 45 DuPage County	3,399	29	7,158	2nd	3rd
Selmaville CCSD 10	218	34.9	4,784	2nd	1st
Seneca CCSD 170	506	34	8,858	2nd	4th
Shiloh Village SD 85	608	33.6	4,902	2nd	1st
Shirland CCSD 134	125	2.4	5,860	1st	2nd
Signal Hill SD 181	357	50.4	5,671	3rd	2nd
Silvis SD 34	610	63.6	5,861	4th	2nd
Skokie SD 68	1,824	54.8	9,407	3rd	4th
Skokie SD 69	1,752	56.2	6,963	3rd	3rd
Skokie SD 73-5	1,034	33.7	7,761	2nd	4th
Smithton CCSD 130	504	10.7	4,279	1st	1st
South Holland SD 150	940	54	5,221	3rd	1st
South Holland SD 151	1,610	85.1	5,383	4th	2nd
South Pekin SD 137	217	65	5,034	4th	1st
South Wilmington CCSD 74	104	19.2	4,115	1st	1st
Spring Lake CCSD 606	92	52.2	5,225	3rd	1st
Spring Valley CCSD 99	791	60.8	4,678	3rd	1st
St Anne CCSD 256	344	64.8	5,589	4th	2nd
St George CCSD 258	476	18.9	3,965	1st	1st
St Joseph CCSD 169	900	18.2	5,004	1st	1st
St Libory Cons SD 30	89	34.8	3,955	2nd	1st
St Rose SD 14-15	181	17.7	5,536	1st	2nd
Steger SD 194	1,497	76.2	6,017	4th	2nd
Steward ESD 220	63	33.3	8,043	2nd	4th

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Streator ESD 44	1,850	69.4	7,713	4th	4th
Summersville SD 79	290	51.4	5,404	3rd	2nd
Summit Hill SD 161	3,353	2.2	5,109	1st	1st
Summit SD 104	1,898	80.3	6,447	4th	3rd
Sunnybrook SD 171	1,050	68.8	5,097	4th	1st
Sunset Ridge SD 29	480	3.3	14,233	1st	4th
Taft SD 90	338	41.1	4,993	2nd	1st
Tamaroa School Dist 5	107	75.7	6,365	4th	3rd
Thomasboro CCSD 130	156	67.9	5,962	4th	2nd
Thornton SD 154	225	20	7,152	1st	3rd
Tonica CCSD 79	222	27.5	6,115	2nd	3rd
Troy CCSD 30C	4,505	37.5	5,009	2nd	1st
Union Ridge SD 86	642	37.4	7,954	2nd	4th
Union SD 81	102	67.6	8,624	4th	4th
Unity Point CCSD 140	680	57.6	6,309	3rd	3rd
Vienna SD 55	449	64.1	5,292	4th	2nd
W Harvey-Dixmoor PSD 147	1,368	97.7	5,511	4th	2nd
Wallace CCSD 195	327	31.2	7,022	2nd	3rd
Waltham CCSD 185	234	15.8	5,311	1st	2nd
Washington SD 52	984	12.6	4,195	1st	1st
West Chicago ESD 33	4,182	61.3	7,102	3rd	3rd
West Lincoln-Broadwell ESD 92	172	17.4	7,969	1st	4th
West Northfield SD 31	886	22	8,762	1st	4th
Westchester SD 92-5	1,249	33.5	6,047	2nd	2nd
Western Springs SD 101	1,475	0	5,706	1st	2nd
Wheeling CCSD 21	6,973	60.4	9,287	3rd	4th
Whiteside SD 115	1,395	47.3	5,182	3rd	1st
Will County SD 92	1,697	19.8	7,106	1st	3rd
Willow Grove SD 46	188	66	5,273	4th	2nd
Willow Springs SD 108	391	69.3	6,769	4th	3rd
Wilmette SD 39	3,699	3.5	8,419	1st	4th
Winfield SD 34	317	18.3	8,229	1st	4th
Winnetka SD 36	1,795	0.3	10,990	1st	4th
Winthrop Harbor SD 1	573	32.1	4,963	2nd	1st
Wolf Branch SD 113	896	18.3	5,139	1st	1st
Wood Dale SD 7	1,079	60.4	6,909	3rd	3rd
Wood River-Hartford ESD 15	757	66.1	5,343	4th	2nd
Woodland CCSD 50	6,372	30.7	6,005	2nd	2nd

(continued)

Table 15 (continued)

District	Total enrollment	Low-income district %	IEPP	Low-income district % quartile	IEPP quartile
Woodlawn CCSD 4	352	48.3	9,023	3rd	4th
Woodridge SD 68	3,103	52.7	7,824	3rd	4th
Worth SD 127	1,075	33.4	6,100	2nd	2nd
Zion ESD 6	2,561	87.6	6,183	4th	3rd

Appendix B

R Script

```
library(readr)
library(reldist)
library(ppcor)
library(IC2)
library(ineq)
library(lawstat)
library(rpivotTable)
library(sem)
library(AER)
setwd("C:/rdir/")

####Q0 - Load datasets, transform data as necessary, and obtain basic stats

#load student-level dataset with select district data
stud14 <- read.csv("Stud14.csv", strip.white=TRUE, header = T)

#force recognition of numeric vectors and transform low income from (2,1) to (0,1)
stud14$Math.Scale.Score<-as.numeric(as.character(stud14$Math.Scale.Score))
stud14$Reading.Scale.Score<-as.numeric(as.character(stud14$Reading.Scale.Score))
stud14$Math.Level<-as.numeric(as.character(stud14$Math.Level))
stud14$Reading.Level<-as.numeric(as.character(stud14$Reading.Level))
stud14$Low.Income<-as.numeric(as.factor(stud14$Low.Income))
stud14$true.LI<-abs(stud14$Low.Income - 2)

#Filter student set for Elementary Districts and create separate sets for reading and math that
    exclude "NA" data points
elemstud14<-subset.data.frame(stud14,stud14$District.Type=="ELEMENTARY")
math<-subset.data.frame(stud14,stud14$District.Type=="ELEMENTARY" &
    !is.na(stud14$Math.Level))
read<-subset.data.frame(stud14,stud14$District.Type=="ELEMENTARY" &
    !is.na(stud14$Reading.Level))

#load District-level dataset with select distric data
Dist14 <- read.csv("Dist14.csv", strip.white=TRUE, header = T)
summary(Dist14)
#Filter for district set Elementary Districts elemdist14<-
    subset.data.frame(Dist14,Dist14$DISTRICT.TYPE.NAME=="ELEMENTARY")
```

```
####Q1 - Correlations and other descriptive statistics
summary(elemdist14)

#Correlation of Math Score and District Low Income
cor.test(math$Math.Level, math$LOW.INCOME.DISTRICT.PCT)

#Correlation of Math Score and District Low Income, stratified by Low Income quartile
cor.test(~Math.Level + LOW.INCOME.DISTRICT.PCT,data=math,
    subset=(math$LOW.INCOME.DISTRICT.PCT <=22.05))
cor.test(~Math.Level + LOW.INCOME.DISTRICT.PCT,data=math,
    subset=(math$LOW.INCOME.DISTRICT.PCT >22.05 &
    math$LOW.INCOME.DISTRICT.PCT <=42.35))
cor.test(~Math.Level + LOW.INCOME.DISTRICT.PCT,data=math,
    subset=(math$LOW.INCOME.DISTRICT.PCT >42.35 &
    math$LOW.INCOME.DISTRICT.PCT <=62.88))
cor.test(~Math.Level + LOW.INCOME.DISTRICT.PCT,data=math,
    subset=(math$LOW.INCOME.DISTRICT.PCT >62.88))

#Correlation of Math Score and District Low Income, stratified by IEPP
math.iepp<-subset.data.frame(math[-c(1,2,4,5,8,9,10)],!is.na(math$IEPP))
math.iepp$IEPP <- math.iepp$IEPP/1000
cor.test(math.iepp$Math.Level, math.iepp$LOW.INCOME.DISTRICT.PCT)
summary(math.iepp)

cor.test(~Math.Level + LOW.INCOME.DISTRICT.PCT,data=math, subset=(math$IEPP <=
    5225))
cor.test(~Math.Level + LOW.INCOME.DISTRICT.PCT,data=math, subset=(math$IEPP > 5225
    & math$IEPP <= 6100))
cor.test(~Math.Level + LOW.INCOME.DISTRICT.PCT,data=math, subset=(math$IEPP > 6100
    & math$IEPP <= 7293))
cor.test(~Math.Level + LOW.INCOME.DISTRICT.PCT,data=math, subset=(math$IEPP >
    7293))

#Correlation of Reading Score and District Low Income
cor.test(read$Reading.Level, read$LOW.INCOME.DISTRICT.PCT)

#Correlation of Reading Score and District Low Income, stratified by Low Income quartile
cor.test(~Reading.Level + LOW.INCOME.DISTRICT.PCT,data=read,
    subset=(read$LOW.INCOME.DISTRICT.PCT <=22.05))
```

```
cor.test(~Reading.Level + LOW.INCOME.DISTRICT.PCT,data=read,
    subset=(read$LOW.INCOME.DISTRICT.PCT >22.05 &
    read$LOW.INCOME.DISTRICT.PCT <=42.35))
cor.test(~Reading.Level + LOW.INCOME.DISTRICT.PCT,data=read,
    subset=(read$LOW.INCOME.DISTRICT.PCT >42.35 &
    read$LOW.INCOME.DISTRICT.PCT <=62.88))
cor.test(~Reading.Level + LOW.INCOME.DISTRICT.PCT,data=read,
    subset=(read$LOW.INCOME.DISTRICT.PCT >62.88)

#Correlation of Reading Score and District Low Income, stratified by IEPP
read.iepp<-subset.data.frame(read[-c(1,2,3,4,8,9,10)],!is.na(read$IEPP))
read.iepp$IEPP <- read.iepp$IEPP/1000
cor.test(read.iepp$Reading.Level, read.iepp$LOW.INCOME.DISTRICT.PCT)
summary(read.iepp)

cor.test(~Reading.Level + LOW.INCOME.DISTRICT.PCT,data=read, subset=(read$IEPP <=
    5225))
cor.test(~Reading.Level + LOW.INCOME.DISTRICT.PCT,data=read, subset=(read$IEPP >
    5225 & read$IEPP <= 6100))
cor.test(~Reading.Level + LOW.INCOME.DISTRICT.PCT,data=read, subset=(read$IEPP >
    6100 & read$IEPP <= 7293))
cor.test(~Reading.Level + LOW.INCOME.DISTRICT.PCT,data=read, subset=(read$IEPP >
    7293))

#Other correlations
e.stud14.iepp<-subset.data.frame(elemstud14[-c(9,10)],!is.na(elemstud14$IEPP))
cor.test(elemstud14$Low.Income,elemstud14$LOW.INCOME.DISTRICT.PCT)
cor.test(e.stud14.iepp$true.LI,e.stud14.iepp$IEPP)
cor.test(e.stud14.iepp$LOW.INCOME.DISTRICT.PCT,e.stud14.iepp$IEPP)

####Q2 - Regressions
#math score regression
math$LID.pct <- math$LOW.INCOME.DISTRICT.PCT/100
summary(math.r1 <- lm(Math.Level ~ LOW.INCOME.DISTRICT.PCT , data = math))
summary(math.r2 <- lm(Math.Level ~ LOW.INCOME.DISTRICT.PCT + Low.Income + Race +
    Gender, data = math))
summary(math.r1l <- lm(Math.Level ~ log(LOW.INCOME.DISTRICT.PCT + .001), data =
    math))
loglid<-log(math$LID.pct)
summary(math$Math.Level)
```

```
math.null <- lm(Math.Level ~ 1, data=math.iepp)
math.f1 <- lm(Math.Level ~ . , data=math.iepp)
n <- nrow(math.iepp)
summary(math.r3 <- step(math.null, scope=formula(math.f1), direction="forward", k=log(n)))
math.f2 <- lm(Math.Level ~ . + .^2 , data=math.iepp)
summary(math.r4 <- step(math.r3, scope=formula(math.f2), direction="forward", k=log(n)))

summary(math.r5 <- lm(Math.Level ~ true.LI + IEPP + relevel(Race, ref = "White") +
    IEP.DISTRICT.PCT + relevel(Gender, ref = "M"), data = math.iepp))

#reading score regression
read.null <- lm(Reading.Level ~ 1, data=read.iepp)
read.f1 <- lm(Reading.Level ~ . , data=read.iepp)
rn <- nrow(read.iepp)
summary(read.r3 <- step(read.null, scope=formula(read.f1), direction="forward", k=log(rn)))
read.f2 <- lm(Reading.Level ~ . + .^2 , data=read.iepp)
summary(read.r4 <- step(read.r3, scope=formula(read.f2), direction="forward", k=log(rn)))
summary(read.r5 <- lm(Reading.Level ~ true.LI + IEPP + relevel(Race, ref = "White") +
    relevel(Gender, ref = "M"), data = read.iepp))

####Q3 - Instrumental variable regression
#Test for relevance and exogeneity

print(cor(math$Math.Level,as.numeric(as.factor(math$Gender=="F"))))
print(cor(math$LOW.INCOME.DISTRICT.PCT,as.numeric(as.factor(math$Gender=="F"))))
print(cor(read$Reading.Level,as.numeric(as.factor(read$Gender=="F"))))
print(cor(math$LOW.INCOME.DISTRICT.PCT,as.numeric(as.factor(math$Gender=="F"))))

summary(ivreg(Math.Level ~ LOW.INCOME.DISTRICT.PCT + IEPP | Race + Gender + IEPP ,
    data = math.iepp))
summary(ivreg(Reading.Level ~ LOW.INCOME.DISTRICT.PCT + IEPP | Race + Gender +
    IEPP , data = read.iepp))

####Q4 - Gini coefficient, weighted by total enrollment
Dist14.gini<-
    subset.data.frame(Dist14,!is.na(Dist14$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT),
    select =
    c("INSTRUCT.EXPEND.PER.PUPIL..DISTRICT","DISTRICT.TOTAL.ENROLLMENT",
    "DISTRICT.TYPE.NAME"))
```

```
Gini14 <-
    gini(Dist14.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT,Dist14.gini$DISTRICT.TO
    TAL.ENROLLMENT)

Dist04 <- read.csv("Dist04.csv", strip.white=TRUE, header = T)
Dist04.gini<-
    subset.data.frame(Dist04,(!is.na(Dist04$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT)) &
    !(is.na(Dist04$DISTRICT.TOTAL.ENROLLMENT)), select =
    c("INSTRUCT.EXPEND.PER.PUPIL..DISTRICT","DISTRICT.TOTAL.ENROLLMENT",
    "DISTRICT.TYPE.NAME"))
Gini04 <-
    gini(Dist04.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT,Dist04.gini$DISTRICT.TO
    TAL.ENROLLMENT)

summary(Dist04.gini)

#Gini coefficient for district, unweighted
gini(Dist14.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT)
gini(Dist04.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT)

#elementary only
e.dist14.gini<-
    subset.data.frame(Dist14.gini,Dist14.gini$DISTRICT.TYPE.NAME=="ELEMENTARY")
e.dist04.gini<-
    subset.data.frame(Dist04.gini,Dist04.gini$DISTRICT.TYPE.NAME=="ELEMENTARY")
print(e.Gini14 <-
    gini(e.dist14.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT,e.dist14.gini$DISTRICT.
    TOTAL.ENROLLMENT))
print(e.Gini04 <-
    gini(e.dist04.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT,e.dist04.gini$DISTRICT.
    TOTAL.ENROLLMENT))

summary(e.dist04.gini)
summary(e.dist14.gini)

plot(Lc(e.dist14.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT, n =
    e.dist14.gini$DISTRICT.TOTAL.ENROLLMENT ), main = "FY 2013-2014 Lorenz
    Curve",xlab="Cumulative % of Total Students" , ylab="Cumulative % of Total Instructional
    Expenditure")
```

```
plot(Lc(e.dist04.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT, n =
    e.dist04.gini$DISTRICT.TOTAL.ENROLLMENT ), main = "FY 2003-2004 Lorenz
    Curve",xlab="Cumulative % of Total Students" , ylab="Cumulative % of Total Instructional
    Expenditure")

#Calculation of 10% extreme gini
quantile(e.dist04.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT, probs = c(0, 0.10, 0.5,
    0.90, 1))
quantile(e.dist14.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT, probs = c(0, 0.10, 0.5,
    0.90, 1))
e.dist04.gini.extr<-
    subset.data.frame(e.dist04.gini,e.dist04.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT
    < 3486 | e.dist04.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT > 6068)
e.dist14.gini.extr<-
    subset.data.frame(e.dist14.gini,e.dist14.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT
    < 4620 | e.dist14.gini$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT > 8855)

print(e.Gini14.extr <-
    gini(e.dist14.gini.extr$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT,e.dist14.gini.extr$DIS
    TRICT.TOTAL.ENROLLMENT))
print(e.Gini04.extr <-
    gini(e.dist04.gini.extr$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT,e.dist04.gini.extr$DIS
    TRICT.TOTAL.ENROLLMENT))

print((e.Gini14.extr-e.Gini14)/e.Gini14)
print((e.Gini04.extr-e.Gini04)/e.Gini04)

plot(Lc(e.dist14.gini.extr$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT, n =
    e.dist14.gini.extr$DISTRICT.TOTAL.ENROLLMENT ), main = "FY 2013-2014 Lorenz
    Curve, excluding middle 80th percentile of districts",xlab="Cumulative % of Total Students"
    , ylab="Cumulative % of Total Instructional Expenditure")
plot(Lc(e.dist04.gini.extr$INSTRUCT.EXPEND.PER.PUPIL..DISTRICT, n =
    e.dist04.gini.extr$DISTRICT.TOTAL.ENROLLMENT ), main = "FY 2003-2004 Lorenz
    Curve, excluding middle 80th percentile of districts",xlab="Cumulative % of Total Students"
    , ylab="Cumulative % of Total Instructional Expenditure")
```