White Students in Urban Schools: The Unheard Voice in the Achievement Gap

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Christopher E. Brady
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This dissertation titled

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by

CHRISTOPHER E. BRADY

has been approved for

the Department of Educational Studies

and The Patton College of Education by

John Hitchcock

Associate Professor of Educational Studies

Renée A. Middleton

Dean, The Patton College of Education
Abstract

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White Students in Urban Schools: The Unheard Voice in the Achievement Gap

Director of Dissertation: John Hitchcock

This study analyzes the academic performance of White students in urban settings, relative to Minority peers, and investigates structural variables that might exacerbate or attenuate differences. The investigation is motivated by and extends qualitative work investigating the experiences of middle school students in Texas (Morris, 2006). Research on the academic achievement of impoverished urban White students is limited. The present study investigates achievement gaps that are probably a function of student demographic characteristics, and achievement equity (i.e., the influence of school-level demographic and structural characteristics on student achievement and on distributions of student achievement among schools). The use of a multilevel regression model is appropriate for this type of study. The OAT data used in this study are hierarchical in nature because students are nested within schools. The use of a multi-level model (MLM) addresses the challenge of students nested within schools. The predictor variables of Ethnicity and Poverty exhibit a strong relationship with achievement linked to both of the dependent variables of reading and math. The analysis showed a significant relationship as evidenced by student Poverty was -9.42 for reading and -7.63 for math representing the average decrease in score for impoverished students from the average mean score. Ethnicity predictor variable showed the mean score for Minority students in math was 15.54 points lower than for White students and the reading for Minority students was 9.84 points lower than for White students. The gap for
impoverished White is larger than for economically disadvantaged Minority (7.34 points more than for economically disadvantaged Minority students- 22.41 points to 15.07 points) in the dependent variable of reading. This finding is consistent for the dependent variable of math also: the gap for economically disadvantaged White is larger than for impoverished Minority (6.59 points larger than for impoverished Minority students). As was hypothesized; the challenges appear to be parallel with the level of influence that is exerted on economically disadvantaged urban White students as has historically been given attention from educators, researchers and policymakers to impoverished urban Minority students. Based upon the study findings the researcher suggested several implications for practice and opportunities for future research. Early intervention for all children regardless of Ethnicity or SES status; teacher efficacy; the best teachers need to be with the most struggling students and student relationships need cultivated if students of poverty are to have an opportunity of academic success. Recommendations for further research studies are: conducting a qualitative study to be generalized over a larger group of students; extending this study to other urban districts in the state, possibly comparing with other types of school systems; developing a more comprehensive fully specified study; and extending Morris’ (2006) study researching more than one school through the use of ethnography would lead to an interesting comparison that can assist teachers and administrators in raising achievement of students of all ethnicities and socioeconomic backgrounds.
Dedication

This dissertation is dedicated to the Brady family; the utmost adoration to Mom and Dad, Najah, Sa’Tiah, Isaiah, and my Angel, Tina.
Acknowledgements

I am eternally thankful for this opportunity that God has blessed me with to complete my doctoral research at Ohio University. I know I have been blessed with many people along this journey that have made this dream a reality. I would like to thank Dr. Gene Harris for believing in me that I could handle this undertaking. Special praise to my classmates that made the weekends so enjoyable you almost forgot it was school (almost). Great appreciation to the friendships that were cultivated (Andy, Colin, Kevin (x 2), Rick, Steve, and Tamu -and so many others) during this experience.

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Last, but far from least, I must express the utmost praise and appreciation for my wife, Tina, who truly is my Angel. She was a Saint the last seven years during this process and I am so thankful that despite this massive undertaking we continued to grow in our love. She truly inspired me, encouraged me, and motivated me to keep going. Not once did she divert me from writing, no matter what the sacrifice she had to endure. Tina thank you for keeping our family together, you are nothing short of amazing.
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Chapter One: Introduction

Background of the Study

This dissertation explores factors influencing measured academic achievement among grade 3 students in a large urban district in Ohio, with an explicit focus on understanding the academic performance of impoverished White students in urban settings. The work also investigates contextual factors identified in the extant literature (such as school demographic and structural characteristics) that may exert influence over schooling outcomes, and explores whether such factors manifest differently for White and Minority students. The investigation is motivated by and extends qualitative work investigating the experiences of middle school students in Texas (Morris, 2006). The study proposed here offers a quantitative extension in a large urban district while Morris’ ethnographic study focused on one urban school.

The study used data from the 2009 Ohio Achievement Test (OAT) to measure and describes the influence of salient student-level and school-level characteristics on schooling outcomes. The district of interest has 79 elementary schools and 4,215 students in the grade level of interest (grade three). Questions that motivated the inquiry and helped to inform the study design include:

- Do urban, economically disadvantaged White students show different levels of average achievement compared to urban, economically disadvantaged Minority students?
- Do student- and school-level factors influencing student achievement vary according to student race/ethnicity?
What demographic factors influence academic outcomes of White students in an impoverished urban setting? This focus is of interest because the achievement gap for minorities is saturated in the literature, however not for economically disadvantaged Whites.

Associations between student achievement and socially-ascribed characteristics of students have been examined since at least 1964 (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, & York, 1966). Considerable research and reform efforts have followed, yet gaps persist (e.g., Casserly, Petteruti & Williams, 2006; CEP, 2007; Clotfelter, Ladd, & Vigdor, 2006; Coleman, et al., 1966; Diamond, 2006; Dickens & Flynn, 2006; Ferguson, 2000; Fryer & Levitt, 2006; Gardner, 2007; Hanushek & Rivkin, 2006; Herman, 2009; Jencks & Phillips, 1998; Johnson, 2005; Lee, 2006; Morris, 2006; Moss, 2003; Oakes, 1985; Thompson & Barnes, 2007). The current study investigates the achievement gap issue with an explicit focus on economically disadvantaged White students, which has received scant attention in the extant literature (Diamond, 2006; Hanushek & Rivkin, 2006; Herman, 2009; Jencks & Phillips, 1998; Johnson, 2005; Morris, 2005; 2006).  

Scholars have argued that inequities result from the schooling institution itself and are maintained through structures and practices imbedded within the schooling process (Bourdieu & Passeron 1964; 1977; Lareau & Horvat, 1999; Morris, 2006; Oakes, 1985). This study hypothesizes that impoverished White students in urban settings face

---

1 An EBSCO search conducted on March 9, 2011 found few studies using secondary data analyses to examine achievement of economically disadvantaged White urban students. No contemporary studies were located; one study from the 1970s (St. John, 1970) was identified but not reviewed closely because of its datedness.
constraints that are similar to those of impoverished Minority urban students. The rationale is that challenges associated with those constraints are parallel in the level of influence they exert on all students, regardless of Minority status. As a result, such students merit a level of consideration and attention from educators, researchers, and policymakers that has historically not been present.

**Matthews Middle School.** Morris (2006) examined the achievement of White students at Matthews Middle School. White students’ assessment passage rate at Matthews, although somewhat high, did not consistently outperform their Minority peers. These passage rates also significantly trailed the overall rates for White students throughout the state (Morris, 2006). Despite these lower performing scores in comparison to other White students, strategies were discussed by the Matthews staff to assist lower performing Minority groups, with the assumption that White students are performing adequately (Morris, 2005; 2006).

The benefit to be gained from the current research project is to motivate a search for, and application of, strategies and policy change that might promote student achievement. Strategies that are related to school structure, such as grade-span configurations, school funding, school attendance, school size, school discipline, student socioeconomic status (SES), enrollment, single-grade schools, class size, and multi-age elementary schools offer an opportunity for improvement in student achievement that is easier to attain than through teacher instruction alone.

As noted above, very few research studies have considered economically disadvantaged urban White students (see also Morris, 2005; 2006). Yet the total number of impoverished urban White people is nearly two times the number of
impoverished Hispanic people and nearly 4 million more than the total number of impoverished Black people as displayed in Table 1 below (From US Census 2003 Data and NARPAC http://www.narpac.org/RCA.HTM).² An estimated 138,000 impoverished White people live in the Columbus Metropolitan area (U.S. Census Bureau: American Community Survey, 2008). The number of White people living below poverty in the United States is 24.4 million, which is 11 percent of the total U.S. White population and nearly 68 percent of the total 35.5 million economically disadvantaged people in the United States (Moss, 2003).

Table 1

*Urban Poverty by Race/Hispanic Origin (central city only)*

<table>
<thead>
<tr>
<th>Race/Origin</th>
<th>Number</th>
<th>Percentage</th>
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<tr>
<td>White</td>
<td>10,232,550</td>
<td>44%</td>
</tr>
<tr>
<td>Black</td>
<td>6,264,720</td>
<td>28%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>5,357,990</td>
<td>24%</td>
</tr>
<tr>
<td>Asian</td>
<td>854,250</td>
<td>4%</td>
</tr>
</tbody>
</table>

This introductory chapter provides an overview of the study. The following section discusses the achievement gap construct and social reproduction theory in the context of schooling processes. The subsequent section discusses the background of

² It is of course the case that the relative percentage of Minority peoples who live in poverty is higher compared to Whites. That is, the chance of having to contend with poverty is higher if one is in an ethnic Minority group.
standardized testing in America with a focus on the federal law, *No Child Left Behind* (NCLB). White poverty and key factors that are considered to impact student achievement are discussed in the next sections. The remainder of the chapter presents the problem statement and discusses the significance of the study, as well the delimitations and limitations of the study.

**Achievement Gaps.** Achievement gaps are typically defined as the measured difference (and variation) in the educational performance of two groups of students categorized by a socially-ascribed factor not directly related to their schooling experience—e.g., impoverished students as compared to more affluent students, Minority students and non-Minority (Fu & Repo, 2006), etc. Some studies have compared the academic performance of different groups of students, most notably African-American and Hispanic students, and their non-Hispanic White peers. Achievement gaps additionally allow researchers to consider the academic disproportion among students from low-income families and their well-off counterparts, which is the primary focus of this study. Achievement gaps appear in academic grades and in standardized testing data (EPE Research Center, 2004). Of particular relevance to the current work is the fact that achievement gaps related to high poverty Minority student populations have received considerable attention in the literature (e.g., Thompson & Barnes, 2007; CEP, 2007; Clotfelter, et al., 2006; Ferguson, 2000; Hanushek & Rivkin, 2006; Herman, 2009; Gardner, 2007; Jencks & Phillips, 1998; Johnson, 2005; Morris, 2006; Oakes, 1985). As noted above, there is little work that specifically considers achievement gaps related to impoverished urban White students: “Poor whites are the silences we speak least of in political and academic debates about poverty, illiteracy, and many other common social
ills. Instead two *Minority* groups are usually presented: Blacks and Latinos” (Moss, 2003, p. 3). The impoverished White students in the present study are homogeneous in that they have similar characteristics in attending a school in the urban district of interest, similar socio-economic status, and similar learning outcomes. Differences exist in the national population of White students, but not extensively in the study group.

Social stressors exert tremendous influence over student academic performance (Hodgkinson, 1995; Israel, Beaulieu, & Hartless 2001, Jencks & Phillips, 1998; Kozol, 1991; Mandara, Greene & Varner, 2006; Margolin, 2007; Mistry, Stevens, Sareen, De Vogli, & Halfon, 2007; Saporito & Sohoni, 2007; Sing & Kogan, 2007; Small, 2006; Small & McDermott, 2006; Small & Stark, 2005), and the academic performance of individuals exerts substantial influence over life choices and opportunities (Diamond, 2006; Eccles, Jodl, & et al., 2001; Jeynes, 2005; Matthews, 2006; Morris, 2006; Tyler, Boykin, Miller, & Hurley, 2006). Understanding the ways in which various social stressors manifest in the educational experience of White economically-disadvantaged urban students thus offers the potential for better understanding—and perhaps even addressing—factors that impact on their long-term quality of life.

**Social Reproduction.** An extensive literature describing reproduction theory (discussed below) supports the position that inequities in educational outcomes are due in large part to the schooling institution itself, and that these inequalities are preserved through the organization and operation of schools (Bourdieu & Passeron 1964; 1977; Bowles & Gintis, 1976; Johnson, 2005; Lareau & Horvat, 1999; Morris, 2006; Oakes, 1985). The research done by Morris (2006) studied whiteness as a hegemonic system and viewed how cultural capital works in an urban school setting. Typically, the hidden
curriculum pulled White students in Morris’ study into hegemonic way of whiteness, which is a view that White students are normal, strong, intelligent, and different from nonwhites (Morris, 2006).

Social reproduction has been described in terms of two primary models: economic reproduction and cultural reproduction. Economic reproduction argues that schools are modeled in ways that parallel the capitalist economy in which they operate. Bowles and Gintis (1976) portray school structures and processes as contributing to societal inequities by offering differential educational experiences that mirror the distribution of other societal goods—i.e., the educational experience provided to the children of the affluent prepares them for continued affluence, while the educational experience of working class children prepares them to assume a place among the working class. Further, (Bowles & Gintis, 1976) state:

Economic status is transmitted from parents to offspring. The perpetuation across generations of a family’s social class, or their position in the distribution of income, is generally thought to….contribute to economic success, as well as the inheritance of income-enhancing group memberships and property. The superior education enjoyed by the children of higher status families contributes to this process of economic inheritance. (p. 1)

Jean Anyon (1980) described four school settings illustrating social classes using empirical support of a hidden curriculum in academic institutions: ‘working class school, middle class school, affluent professional school, and executive elite school’ (Anyon, 1980, p. 68). Similar to Bowles and Gintis (1976), Anyon (1980) suggested schools function and implement a hidden curriculum in conjunction with the economic
background of their students. Besides family and socioeconomic status, institutions play a role in determining aspirations and producing achievement. Researchers have long debated whether schools break down class barriers or instead reinforce existing disparities (Lareau, 2003; Olivares, 2007).

Cultural reproduction builds on the concept of cultural capital as described by French scholars Pierre Bourdieu and Jean-Claude Passeron, who contended that disparities in educational attainment of children from different social classes was related to the ways in which schools and other formal institutions privilege certain cultures over others (Lareau & Weininger, 2003). Robbins (2005) examined the early work of cultural or “linguistic” capital and found that individuals have a dual cultural capital: one part natural or familial and the other part acquired or public culture. The dual cultural capital of “life-world and system-world” is reinforced institutionally (Robbins, 2005). In the case study of Matthews Middle School (Morris, 2006), the cultural capital of White students depended on how being White was perceived as being intertwined with social class. White students at Matthew’s Middle School maintained a dual cultural system within the institution: the actual culture they brought with them from their socioeconomic background and the school culture teachers placed on them based on perceptions gleaned from student dress, interactions, and visual impact of race (Morris, 2006). In other words, the study found that White students were influenced by poverty, but were also influenced by teacher expectations that were influenced by race: perceptions of how teachers perceived a student’s social status was how they perceived a student’s academic ability.
History of Standardized Assessments and Concerns about Equity in 
Outcomes. Standardized tests were introduced into schools in America during the period
1880 – 1920. The combination of substantial school programs and improved efficiencies
in the testing industry combined to encourage schools to validate their performance to
taxpayers in a quantitative way (Callahan, 1962). Multiple choice and short answer
assessments were seen as cost effective and as objective measures that could help with
public confidence (DePascale, 2004). The second era of testing occurred in the 1960s as
theories in administration were emphasizing redesigning systems towards a goal.
Legislatures passed laws and policies to hold schools accountable for raising student
achievement. Between 1963 and 1974 at least 73 laws were enacted to attain the
educational goal of raising student achievement (DePascale, 2004; Mathews, 2006). The
demand for testing continued to grow into the 1980s and to the present era of high stakes
testing (Rothman, 1995).

In the 1980s, A Nation at Risk warned of the rise of mediocrity that threatened
America. The report urged schools to adopt more measurable and rigorous standards as
well as higher expectations for student achievement (Mathews, 2006; Rothman, 1995).
By 1984, 39 states were administering at least one testing program. In the 1990s state
and federal officials created a national progress toward the six national goals (DePascale,
2004; Rothman, 1995).

Fifteen years ago, few questioned the widespread use of standardized
achievement tests in schools. Tests were thought to exhibit the following characteristics:

- time efficient;
- inexpensive;
- measured results for the student, classroom, school, or district;
- were unaffected by personal values or biases of the test scorer (Allen, 1996).

During the next two decades, assessment at the state and national levels was marked by substantial increases in the number of tests given, stronger demand in performance standards, and higher stakes for both students and schools (DePascale, 2004; Dietel, 2001; Mathews, 2006).

The following background information establishes the context for high stakes testing and lays the foundation for the study on the relationship of key factors and achievement gap(s). The 1994 reauthorization of the *Elementary and Secondary Education Act of 1965* was part of the effort to set standards for student achievement. The NCLB law, discussed below, amplified testing expectations, requiring annual assessments in reading and math in grades 3 through 8 (Thompson & Barnes, 2007).

On January 8, 2002, President Bush signed NCLB into law. NCLB redefined the federal government’s responsibility in K-12 education. The reform was designed in part to assist in closing the achievement gap among Minority and disadvantaged students and their peers. The NCLB act encourages parents, educators, and communities to work together to improve teaching and learning, and focuses on meeting the needs of every child (Thompson & Barnes, 2007). Teachers and administrators were to have the information from annual assessments to judge the performance of every student to help in developing a successful academic program. Parents were to be given reports about their child’s progress on standardized assessments, including their strengths and weaknesses, the quality of the school, and their teachers’ qualifications. NCLB reportedly gave leaders at the local and state levels important information about which schools were
flourishing and why, so that success could be expanded and schools that were failing could be addressed (Barton & Coley, 2008; Thompson & Barnes, 2007; U.S. Dept. of Education, n. d.).

Under the NCLB act, all schools’ students are required to achieve 100% proficiency by the year 2013-2014 in the subjects of reading and math. In order to reach this goal, every state was directed to develop standardized tests to measure students’ academic abilities in reading and math (Miklavic, 2008). Ohio, under the NCLB mandate, developed the Ohio Achievement Test (OAT), the achievement measure discussed in this study. The OAT was first given in 2003 to meet the guidelines of Ohio Senate Bill 1, Ohio House Bill 3, under the Federal NCLB Act. All public school students are given the OAT starting in third grade (Ohio Department of Education, 2004).

The OAT is given to all students in grades 3-8 in reading and mathematics and grades 5 and 8 in science. Students receive a score that corresponds to one of five performance levels: Limited, Basic, Proficient, Accelerated, and Advanced (Ohio Department of Education, 2010). These ratings are formal performance levels developed and used by the Ohio Department of Education (ODE). ODE uses a fairness and sensitivity committee to analyze test questions before administration. ODE uses this process to eliminate questions possibly affecting various cultures of students. Achievement tests are used only after the committee reviews, field tests, and approve questions (American Institutes for Research, 2010).

The OAT is one part of the state’s accountability system that uses numerous methods to assess the performance of schools and districts. Ratings are calculated based on State Indicators, Performance Index, Adequate Yearly Progress (AYP), and Value-
Added data. State Indicators include OAT tests, Ohio graduation tests, graduation rate and attendance rate. Performance Index measures the achievement of every student, not just those proficient or higher. AYP is a federal measure that determines if schools and districts are making adequate gains in proficiency rates and participation rates. Value-Added data recognizes that schools and districts maybe making significant improvements in academic performance despite not achieving the proficiency indicator. These four measures calculate the achievement and growth of students within a school or school district (Ohio Department of Education, 2010).

**White Poverty-White Achievement Gap.** Even though Whites make up the majority of urban poverty, White people often are assumed to be middle class based on their race (Sears, 2003). Often schools discuss strategies to assist lower performing Minority groups, with the assumption that white students are performing adequately, as was the case in Morris’ study of White students (Morris, 2005; 2006). The lack of additional research on low-income White students’ achievement is an important reason for this study; despite lower performing scores in comparison to other White students across the state and nation, the achievement gap for Minority students receives considerably more attention than does the achievement gap related to SES among non-Minority students (Morris, 2005; 2006).

The extant research on achievement gaps is extensive with regard to impoverished Minority students (e.g., Diamond, 2006; Hanushek & Rivkin, 2006; Herman, 2009; Jencks & Phillips, 1998; Johnson, 2005; Moss, 2003). Research is lacking on the income-based achievement gaps specific to non-Hispanic White families. Conditions and characteristics purported to explain the extensive achievement gaps between African-
American students and White students have emphasized child-rearing practices and environmental circumstances (Thompson & Barnes, 2007; Jencks & Phillips, 1998). Thus, the unique influence of key factors or social stressors on the academic achievement of impoverished urban Whites is a topic that merits inquiry.

Despite the large numbers of White people living below poverty level in the United States, research investigating the achievement gap related to SES among non-Minority students is lacking. According to the U.S. Census Bureau (2003), there are:

- 3,548,532 White families living below poverty level in the United States
- 18,847,674 White individuals living below poverty level in the United States
- 149,075 White families living below poverty level in the state of Ohio
- 766,827 White individuals living below poverty level in the state of Ohio.

Therefore, this dissertation centers on the achievement gap of low-income non-Hispanic White families and sets out to analyze the relationship between achievement and variables from student and school level.

**Social Stressors-Key Factors.** One of the first serious empirical studies done on equal educational opportunities for children of different backgrounds, including: race, color, religion, and different national origin, was the Coleman Report (Coleman, et al., 1966). Coleman and colleagues found social class to be the most effective predictor of achievement in school. Social problems impact children daily in schools. Crime, poverty, racism, substance abuse, access to health care, mental health issues, mortality rates, education of parents, and child abuse are just a few of the social problems that impact educational achievement (Zastrow, 1992). —A social problem exists when an
influential group asserts that a certain social condition affecting a large number of people is a problem that may be remedied by collective action” (Zastrow, 1992, p. 5). The literature reports that health/well-being and SES play an integral part in child development and achievement (Mistry, et al., 2007; Sing & Kogan, 2007). The focal group in the extant literature is minorities, however, and when White children are mentioned in the literature it is typically only in reference to Appalachian children (Lareau, 2000; Obermiller & Maloney, 2002; Woodrum, 2004). As noted above, what is not evident in the literature is what impact key factors have on the achievement of impoverished White urban children. The purpose of this present study is to understand challenges to academic achievement for urban impoverished White students and to investigate whether the challenges are the same as for urban impoverished Minority students.

Morris (2006), in his work on White students in urban schools, focuses on a different way to study the race and class inequality in education. His study explores how the meaning of race and whiteness changes when intersecting with social class, place, and style (Morris, 2006). The literature in Morris’ study discusses cultural assumptions tying whiteness to benefits. The setting of Matthews Middle School aided White students academically. At Matthews, Whiteness, though changed by class and gender, “still often represented harmlessness, normative masculinity and femininity, knowledge of manners and etiquette, and in many cases, academic ability” (Morris, 2006, p. 134). The perceptions of White students held by teachers at Matthews were not congruent with the experiences of those White students. Lareau and Horvat (1999) suggested that whiteness itself is a type of cultural capital in schools. This study focuses on structural variables,
though culture, parental educational attainment, parental occupational status, familial attitudes, and teacher perceptions all have an impact on a students’ achievement (Jeynes, 2005; Mandara, Greene & Varner, 2006). The aforementioned variables are discussed in the section on limitations and delimitations of the study presented later in this chapter.

White teachers at Matthews were inclined to view the White students as impoverished and their families as unable to find better housing elsewhere. These teachers did not react encouragingly to White students and typically looked past them academically. In comparison, African-American teachers at Matthews typically viewed the White students as middle class and responded favorably to them. Alternately, they viewed the White students as among the highest at Matthews in terms of academic performance, income level, and self-discipline (Morris, 2006). In comparison of discipline by Matthew’s teachers, White teachers directed additional disciplinary action on White students compared with African-American teachers. However, White male students typically did not receive the same strict disciplinary action directed at Black and Latino male students, even when they committed comparable offenses either in dress or behavior. Perceptions of race tended to show privilege toward White male students at Matthews. Black and Latino male students were seen as aggressive and White male students appropriate for comparable inappropriate wrongdoing (Morris, 2006). Rist (1970) wrote about teacher expectations and the fulfillment of first impressions that determine the success or failure of students in school. Everything that educators say or do is magnified because of the position that teachers hold: children rise and fall based on teacher expectations (Morris, 2005; 2006; Rist, 1970).
Statement of the Problem

Research on the academic achievement of impoverished urban White students is limited. This study explores the ways in which key factors influence student achievement for urban impoverished White students and investigates whether the influences differ from those identified for urban impoverished Minority students.

The present study investigates achievement gaps that are probably a function of student demographic characteristics, and achievement equity (i.e., the influence of school-level demographic and structural characteristics on student achievement and on distributions of student achievement among schools). This study analyzes the academic performance of White students in urban settings, relative to Minority peers, and investigates structural variables that might exacerbate or attenuate differences.

The use of a multilevel regression model is appropriate for this type of study. The OAT data used in this study are hierarchical in nature because students are nested within schools. The use of a multi-level model (MLM) addresses the challenge of students nested within schools. Ordinary Least Squares (OLS) model produces less reliable statistical relationships for estimating school effects than can be obtained through the use of a MLM analysis. Multilevel modeling and the inclusion of interaction variables provide a manner in which to explore the ways in which the influence of key student and school characteristics on achievement varies between White and Minority students.

Research Question

The ensuing research question is the primary focus of the study:

- *To what extent do student-(particularly race/ethnicity and SES) and school-level factors influence student achievement?*
A sub-confirmatory question is part of the study:

- *Do impoverished urban White students perform at comparable levels to impoverished urban Minority students?*

The results derived from this research question could provide an opportunity for the development of a description of the extent to which poverty influences student achievement and if the influences vary according to the student-level characteristics (e.g., race) and school-level characteristics (e.g., enrollment size).

**Significance of the Study**

The goal of this research is to understand how key factors impact impoverished urban White students. The particular focus is on one district, the largest district in the state of Ohio and the researcher's home district, because of the desire to learn about gaps that might later inform the implementation of academic interventions. The findings have the potential to: (a) enhance understanding of achievement gaps and related issues, and (b) suggest policy recommendations that might lead to improved outcomes for a student population that has been largely ignored: impoverished urban White students. Very few research studies have been done in reference to economically disadvantaged urban White students. Including a thorough, quantitative study on the significance key factors have on the achievement of a student population that has received scant attention is socially significant.

**Delimitations and Limitations of the Study**

The following section looks into the delimitations impacting the generalizability of the study and the internal limitations of the research.
Delimitations. The first delimitation of this study is its sampling of a population that included only one public school district from the state of Ohio. Outcomes from an analysis from one school district may impact external validity and generalizability, as its results may not pertain to students in other parts of the state and country.

An additional delimitation of the study is from the use of a single test of achievement scores (OAT) from one grade level (third grade) in one school year (2008-2009). The number of school-to-school transfers that the students accrued during the school year is another delimitation of the study due to the influence on achievement that occurs with student mobility. The combination of factors influencing student achievement is delimited to those factors measured by demographic and structural variables available in extant data (SES-poverty level attendance, and discipline).

Limitations. Several study limitations must be acknowledged. First, it must be recognized that the researcher treated students in a largely homogenous manner in part due to limitations in the data and in part because of the research question.

The study used Ohio Achievement Test data collected by the Ohio Department of Education. The accuracy of these data cannot be authenticated, however, it must be assumed. Possible threats to this assumption include: schools reporting complete and valid information and the testing tool accurately measuring student achievement.

Another limitation of the research stems from the use of achievement scores from only the third grade. Structural influences on school level decisions on grade level configurations, school funding, and other variables impact the entire school, not just two grade levels as analyzed in this study. The use of free and reduced meal eligibility rates as a measure of socioeconomic status constitutes another limitation. Specifically,
the measure has been criticized for being affected by factors unrelated to SES such as willingness to complete the application (Cruse & Powers, 2006). Not having access to prior achievement results in the research model is another limitation that is a threat to internal validity. A student’s prior achievement is a factor to be considered in gaining authentic school outcomes.

The use of exploratory analysis in the study is another limitation. By nature and design this type of study is exploratory and is not intended to fully test hypotheses or theories. Even when using large samples and the best data available the procedure can prove error-prone. Conclusions based on the use of exploratory analyses should be tentative (Costello & Osborne, 2005).

The unavailability of data on parental educational attainment and parental occupational status yields another limitation, as these characteristics likely influence achievement. In addition, there is no data to yield insights on culture, familial attitudes, teacher perceptions, and teacher race. Even though these variables are discussed in the literature review (Chapter 2) and have influences on student performance, they are not part of the analysis for this research.

The district presented in the proposed study is the researcher’s district of employment. This raises the possibility that personal bias may influence the research. Even though this study is quantitative in nature the findings can potentially be skewed because of the researchers’ biases from prior experiences, although a committee member did independently verify results of analyses.

**Definition of Terms**

For the purpose of this research study:
Achievement Gap-The difference between the academic achievement of impoverished students and non-impoveryed students and between Minority students and their non-Minority colleagues (Northwest Evaluation Center, 2006).

Culture - Cultures, like organizations, are not better or worse; simply unique from one another, different mixes of virtues, strengths, and weaknesses, in different circumstances (Kim & Cohen, 2010).

High Achievement - A student’s proven ability to meet or exceed the proficiency of the state’s established goals on the academic standards established by the State Board of Education (ODE, 2010).

Non-economically disadvantaged - If family household income is more than 185% of the federal poverty guidelines a student is not eligible for a free or reduced price lunch (Harwell & LeBeau, 2010).

Economically disadvantaged (lower) - If family household income is less than 130% of the federal poverty guidelines a student is eligible for a free lunch (Harwell & LeBeau, 2010).

Economically disadvantaged (middle) - If family household income is less than 185% of the federal poverty guidelines” a student is eligible for a reduced price lunch (Harwell & LeBeau, 2010).

Summary

This exploration of achievement gaps focuses on the following research question: To what extent do student-(particularly race/ethnicity and SES) and school-level factors influence student achievement? A sub-confirmatory question is part of the study: Do impoverished urban White students perform at comparable levels to impoverished urban
Minority students? The question centers on how school structures can have the most impact on achievement. Research has been extensive on how minorities are impacted by school structures, teaching pedagogy, and ensuing achievement gaps (Diamond, 2006; Hanushek & Rivkin, 2006; Herman, 2009; Jencks & Phillips, 1998; Johnson, 2005). Although White poverty makes up the majority of poverty (Moss, 2003; Sears, 2003), two Minority groups, Blacks and Latinos are the focus of research on lower-income students (Moss, 2003; Jencks & Phillips, 1998).

The benefit to be gained in the study is a better understanding of school structures that afford the greatest impact on student achievement, such as how school funding, school size, school discipline, student socioeconomic status (SES) enrollment, and class size offer an opportunity for improvement in student achievement that is easier to attain than through teacher instruction.
Chapter Two

Review of Relevant Literature

Introduction. Chapter two presents a review of the relevant literature regarding the ways in which key demographic and school factors influence student achievement. The chapter also reviews challenges to academic achievement for urban poor White students and whether the challenges are the same as for urban poor Minority students.

Achievement Gaps

The term *Achievement Gap* is defined, for the purposes of this study, as the variations in the degree to which distinctive demographic groups of students show proficiency on the academic standards created by the State Board of Education, Ohio Department of Education. But before getting into specifics, it is important to understand some of the global implications of such gaps, particularly for low achieving students. To start, consider that large numbers of children enter school each year drastically behind. The factors for students entering school behind each year include:

- Poverty
- Language spoken other than English
- Lack of exposure to basic skills (Jencks & Phillips, 1998; Prentiss, 2009).

It is clear that many students, particularly low income and Minority children, are entering the classroom without the skills needed to succeed. It also seems that a self-perpetuating cycle may be at work. Haycock (2002) made the point that pairing expert teachers with those children of greatest need is sensible, yet the exact opposite occurs. Students most in need of strong teachers are assigned, typically, to teachers who have less experience, less
education, and less skill than those teaching other children. This is not a trivial observation. Not much can damage a child’s self-esteem than being confined to a bottom level path by the first or second grade (Kozol, 1991). Consider that 90% of the male population of the New York City prisons are dropouts of the city's public schools.\footnote{As an aside, the spending per pupil in the New York public schools ranged between $5600 and $12,000, while the price to incarcerate an inmate per year cost the city nearly $60,000.}

Looking at the same concern from another angle, less than 10 percent of the students in the bottom level track will graduate from school (Kozol, 1991). The Maryland court system has looked at the inequalities of the school funding system. The goal of the court was 75 percent equality, because 100 percent equality was too expensive (Kozol, 1991). The Maryland court system is striving for a goal that does not attempt to attain a level playing field. Kozol (1991) suggests:

> The New Jersey constitution, says the court in its decision, requires that all students be provided with an opportunity to compete fairly for a place in our society.....Pole vaulters using bamboo poles even with the greatest effort cannot compete with pole vaulters using aluminum poles. p.168

Despite New Jersey's constitution, a level playing field has not been achieved.

The extant literature supports the contention that all students deserve the same level playing field and the same educational equipment in order to compete fairly in our society. Of greatest concern is the lowered expectations placed on students of low socioeconomic status. The money spent on students is not a fraction of what is needed to provide all children with the basic education that by law is to be provided for every citizen. Kozol argues that the achievement gap will not be closed between Minority
groups and the middle class until spending levels for students rise above 75 percent
equality, despite the courts’ finding that 100 percent equality is too expensive (Kozol,

Children of poverty are faced with serious hurdles in their schooling experience.
Socioeconomic status accounts for part of the achievement gap of students. Parental
educational attainment and parental occupational status are other barriers that factor into
the differences in achievement scores (Israel, et al., 2001; Jencks & Phillips, 1998;
Mandara, Greene & Varner, 2006). A nation study of poverty reported that of children
living in poverty, African-American children made up the largest percentage at 33.4
percent and Hispanic children made up the second largest percentage at 26.9 percent.
White children living in poverty in 2006 included nearly 8 million children, more than 2
times African-American children and more than African-American children and Hispanic

There is little, if any, research that considers the achievement gap of
impoverished White students (Diamond, 2006; Hanushek & Rivkin, 2006; Herman,
2009; Jencks & Phillips, 1998; Johnson, 2005; Morris, 2005). This study is therefore
concerned with the impact key factors have on the achievement of impoverished urban
White students.

The achievement gap phrase is most frequently used to describe the alarming
achievement gaps between many Black and Hispanic students and their non-Hispanic
White peers. The overwhelming majority of research conducted has been done in regards
to the Black-White achievement gap (Diamond, 2006; Hanushek & Rivkin, 2006;
Herman, 2009; Jencks & Phillips, 1998; Johnson, 2005). Lacking in the literature is the
achievement gap among low-income non-Hispanic White families and wealthy non-Hispanic White families.

**The Black-White Gap.** Unacceptable achievement gaps between African-American students and White students exist in our schools. The National Assessment of Educational Progress (NAEP) reading assessment illustrates an alarming finding amongst students: African American 17 year-olds read at the same level as White 13 year-olds (Thompson & Barnes, 2007). The outcomes in mathematics are just as alarming: only 13 percent of African American 4\textsuperscript{th} graders scored at or above proficient level on NAEP mathematics assessments, as opposed to 47 percent of their White counterparts (Thompson & Barnes, 2007). These authors also report that, during the 1990s, African-American 12\textsuperscript{th} graders were reading at a level of White 8\textsuperscript{th} graders. Achievement gaps that divide White students from African-American students remain substantial despite a narrowing in the 1980s (Thompson & Barnes, 2007; Clotfelter, et al., 2006; Hanushek & Rivkin, 2006; Lee, 2006; Page, Murnane & Willett, 2008). During the 1970s, NAEP results showed Black test scores were rising. Although the gap was shrinking the gains were only slight and the gap between Blacks and Whites remained (Graham, 2005; Hanushek & Rivkin, 2006; Lee, 2006).

While trying to explain the achievement gap Meredith Phillips and her colleagues (1998) emphasized the importance of child-rearing practices. Their analyses suggest that different races’ practices in raising children are related to variations in IQ scores. Another key factor in explaining the Black-White achievement gap, according to Phillips and her colleagues, is neighborhood environments. Between 1980 and 1985 nearly half the children from non-poor Black families lived in areas which at least a fifth of their
neighbors were impoverished. By comparison, only 7% of non-poor White families lived in these areas (Jencks & Phillips, 1998).

**The Racial Achievement Gap in Ohio.** The same unacceptable achievement gaps that are prevalent throughout the United States are seen in Ohio. In 1999, 57% of White fourth graders passed the Ohio proficiency test in math versus 22% of their African-American counterparts. Results for other parts of the Ohio proficiency assessment were similar. In 2002, 43.1% of White fourth graders passed all five parts of the state proficiency test while 11.5% of African-Americans passed all parts (Prentiss, 2009).

The 2005 achievement assessment scores in Ohio revealed that 82% of White 4th graders, and 55% of African American 4th graders performed at the proficient level on the OAT reading assessment. The 2008 Ohio achievement assessment results show that 86% of White 4th graders and 59% of African American 4th graders achieved at the proficient level in reading. Between the years 2005 and 2008, the percentage of students deemed to be proficient advanced at an average rate of 1.6 percentage points yearly for White students and 1.4 percentage points yearly for African American students, representing an expanding achievement gap (Center on Education Policy, 2009).

The poverty-based achievement gap starts before children even start school (Prentiss, 2009). Across the state of Ohio, when testing children entering kindergarten, children of poverty have a 5,000-6,000 word recognition level, while middle and upper income children have 15,000-30,000 word recognition level (Prentiss, 2009). Students in the urban district this study is centered on enter kindergarten scoring 40 percent below the readiness levels of the Kindergarten Readiness Assessment-Literacy Test based on
results from 2005-2006 through the 2008-2009 school years (Columbus City Schools, 2010).

**The Poverty Gap among White Students.** The majority of literature presented on educational achievement gaps is centered on race and ethnicity, particularly the Black-White achievement gap (Diamond, 2006; Hanushek & Rivkin, 2006; Herman, 2009; Jencks & Phillips, 1998; Johnson, 2005). The achievement gap arguably has more to do with the obstacles of belonging to the lower SES quintile, than having to do with race or ethnicity. Despite the wide-spread research on the achievement gap between different races and ethnicities, similar academic gaps are found among low-income and wealthy families (Johnson, 2005). Lee (2006) found the socioeconomic gap in the NAEP reading and math achievement endures after the enactment of NCLB; however, if the existing trend perseveres, the proficiency gap between privileged White and underprivileged Minority students will close by the 2014 goal. Their findings forecast that less than 25% of impoverished and Black students will be proficient in reading, and less than 50% will be proficient in math (Lee, 2006). Despite poverty gaps there is no mention of closing the gaps for impoverished White students.

The belief that SES disparity is responsible for part of the achievement gap comes from the finding that factors of SES such as parental educational attainment, parental occupational status, and family wealth are strongly connected with student academic achievement (Jeynes, 2005; Mandara, Greene, & Varner, 2006). Low achievement is strongly associated with lack of resources, and many studies have found a correlation between low SES and low achievement (e.g., Barton & Coley, 2008; Considine & Zappala, 2002; Hodgkinson, 1995).
Key Factors

This section provides an overview of some key factors that impact academic achievement. Parental education, parental occupation, and familial attitudes are part of an individual’s culture and influence upbringing and achievement (Bourdieu & Passeron 1964; Jeynes, 2005; Morris, 2006; Ogbu, 1991). Teacher perceptions and interactions with students form their school experiences, significantly impacting their educational achievement. The cultural background of both the student and teacher also influence the student’s educational experiences (Morris, 2006). Morris (2006) found that being middle class implied being a good student, while being from the lower socioeconomic class by contrast was indicative of academic obstacles. This is congruent with the research on teacher perceptions and the overall impact on student achievement. The present study and Morris’ case study in Texas (2006) starts from the viewpoint that overall teachers and people in general conflate race and SES; teachers make assumptions based on race and SES with poor Minority and affluent White (Rhodes, In Press). Achievement and socioeconomic status are related in this study through their influence on a student’s schooling experience and a student’s achievement and any potential gaps in achievement.

Discipline problems play a significant role in the amount of academic time lost for students (Morris, 2005; 2006; Skiba, Michael, Nardo & Peterson, 2002; Skiba & Rausch, 2006). Skiba and Rausch (2006) found that African American students are 2.8 times more likely to have out-of-school suspensions than White students and 2.5 times more likely to be expelled. Even more alarming is these disproportionate rates are an increase from the 1970s. Ervin Matthew in his 2007 study: Effort Optimism in The Classroom: Attitudes of Black and White Students on Education, Social Structure and
*Causes of Life Opportunities* found that Black students understand they are faced with obstacles that hinder their ambitions, despite how well they might achieve in school. In turn, they determine success in school has little payoff. Nevertheless, Matthew (2007) suggests that Black students have a desire to prove they are as intelligent as White students and are motivated to perform well in school; despite the belief the reward for their success will not be equal to that of White students. African-American students often perceive themselves to be second-class citizens and that they must contend with corresponding obstacles such as teacher perceptions, parental attitudes, parental occupation status, and family SES. Anthropologist John Ogbu (1986; see also Fordham & Ogbu, 1986) argues that, in the Black community, youth are pressured not to act White; this includes not doing well in school. Oppositional Culture arguments persist in African American students’ ridicule of their peers for striving for excellence in academic achievement. Tyson (2005) argues, in order for the “acting white” approach to lead to serious implications for the Black/White achievement gap at least 3 scenarios must apply. First, behavioral patterns should demonstrate that a large number of black students oppose or reject expectations of high academic performance. Secondly, black students must be more opposed to schooling and academic performance expectations than their White peers. Lastly, Black students must relate high academic performance to acting white (Diamond, 2006; Tyson, Darity, & Castellino, 2005). This explains partly the Black-White achievement performance. Contrary to Ogbu, Phillip Cook and Jens Ludwig (1998) suggest that, instead of focusing on the problem of addressing oppositional culture, attention needs to be directed to other adverse facets of a Black students’ environment, such as deficient schools and insufficient support and guidance.
Certainly, cultural resistance is not unique to Black students. Woodrum (2004) researched cultural resistance and state mandated testing in Appalachian schools. The results of the study showed the role parents played in the students’ education was non-participatory. Teachers believed the parents of the Appalachian students did not partake in the spirit of the school, so they did not value education. These teachers thought the parents lacked education themselves and did not see education as a way of improving their lives. Furthermore, Woodrum suggests that poor Appalachian families did not find merit in state mandated testing (2004).

Appalachian working class families see the role of the school in the lives of their children as teaching the same values that are taught at home and at school. The concern these parents have is schools are giving students an education that resulted in their children leaving the area and their families (Woodrum, 2004). Woodrum (2004) poses the following about schools’ influence on family culture:

Local schools, they believe, are educating children to be citizens of a socially mobile culture, one that is disconnected from place and local values. Far from reinforcing local family and community-based values, these working class families interpret the education offered in most schools as a challenge to, and often rejection of, their local values. p.7

Morris’ (2006) study of Matthews Middle School in Texas found, in regards to how discipline was administered, White teachers were inclined to view the White students as impoverished and their families as undesirable. These teachers did not seem to fully support these students academically, and tended to focus on disciplinary actions. Interestingly, White teachers were found to be more likely to adopt this focus than
African-American teachers. But this was all a complex pattern in the school. White male students typically did not receive the same kind of strict disciplinary action that Black and Latino male students experienced, even when they committed similar offenses either in dress or behavior. Perceptions of race tended to show privilege toward White male students at Matthews. Black and Latino male students were seen as aggressive and White male students appropriate for comparable inappropriate wrongdoing (Morris, 2006).

It is noteworthy that some of these findings connect to the well-known Pygmalion effect that suggests teachers who perceive some students as lower achievers engage in subtle, perhaps even unconscious behavior, that discourages the efforts of such students, and vice versa (Rosenthall & Jacobson, 1968; 1992). Indeed, these subtle behaviors have garnered contemporary interest and are being studied via complex observation schemes to coach teachers in ways that help them better understand how their behavior can influence students’ achievement expectations (see Downer et al., 2012; Hamre et al., 2012; Pianta 1999).

As seen in the aforementioned studies (Diamond, 2006; Ogbu, 1986; Skiba, et al., 2002; Skiba & Rausch, 2006; Woodrum, 2004) students are negatively impacted by disciplinary action resulting in lower performance in academic achievement. Although Arlie Woodrum’s study dealt with impoverished White students, the students studied were from Appalachia. Lacking in the literature is the impact of disciplinary action on impoverished White urban students.

**Poverty and the Development of Academic Skills**

The first few years of child development are critical to future success (Barton & Coley, 2008; Duncan & Murnane, 2011). Learning and developing the abilities to learn
and think happen during the first few years of life. Barton and Coley (2008) report from their study that by the age of 4, the average child from a professional family has heard:

- approximately 20 million more words than an average child in a working class family, and
- approximately 35 million more words than an average child in a welfare family.

The quantity of the children’s vocabulary paralleled that of their parents. At this young age, even before any formal schooling, the vocabulary of the average child in a professional family exceeded the vocabulary of the average parent in a welfare family (Barton & Coley, 2008). High income or White children spend over 400 more hours involved in literacy activities before they enter school as opposed to their low-income or African-American peers (Duncan & Murnane, 2011). According to the study by Barton and Coley regarding kindergarten readiness, “there were also considerable differences by the SES of the children’s parents or guardians, ranging from 85 % in the highest quintile to 39 % in the lowest quintile. Lower scoring minority children were also likely to be in families with lower SES” (Barton & Coley, 2008, p. 11). This alarming achievement gap for lower SES minorities is explained in Hart and Risley’s (2008) study and extensively in other research (Duncan & Murnane, 2011), however, left out of the research regarding lower SES are urban White families.

In Parsing the Achievement Gap, Paul Barton researched the life and educational experiences associated with student development and achievement. Barton looked at the differences in experiences among sub-groups of the population, by race/ethnicity, and measure of income. If low birth weight unfavorably affects cognitive development, is there a greater occurrence of low birth weight among minorities? If moving schools
regularly impacts achievement, which population of sub-groups do children do this the most? Barton identified 14 correlates of school achievement. In all 14 correlates of achievement, there were gaps between the majority and Minority student populations. Including the 12 cases with data available, 11 displayed clear achievement gaps from low income families and higher income families. Minority students and impoverished students have excessively confronted challenges that are roadblocks to achieving levels attained by majority students (Barton, 2003). The extant literature references White children not in the lower SES quintile. Substantial research has been done regarding the obstacles leading to achievement gaps for minorities (Diamond, 2006; Hanushek & Rivkin, 2006; Herman, 2009; Jencks & Phillips, 1998; Johnson, 2005); again, little research is available for the impact on impoverished White children.

Children in the public schools deserve the same respect and dignity as children in private schools. A child’s respect and dignity is equally important, no matter the child’s race, gender, or socioeconomic status. All people need to receive a just and equal education, no matter the circumstances or personal characteristics. In *The Lives of Children: The Story of The First Street School* by George Dennison (1969), Dennison writes about the parents of the students in the school wanting to find out how their child was doing and what they had been learning: they simply asked the teacher. Assessment occurred, however it was not competitive in nature where students were compared against each other on one uniform scale. It was essential to be aware of what the children knew, but more essential to be aware of how each child knew what he or she knew (Dennison, 1969).
The information tested in a standardized test does not account for individual life experiences and individual exposure to different components of society. —The success of an educational institution and any individual teacher should not be measured by the treatment of the high-achieving students, but rather by the treatment of those not achieving. As is the case with a chain, ultimate value is based on the weakest member. So long as the lower-status students are treated differently in both quality and quantity of education, there will exist an imperative for change” (Rist, 1970, p. 448).

**Culture**

Culture refers to the set of rules that a group or society uses to govern its actions. The rules are formal and informal, spoken and unspoken, and cover thought, communication, and behavior that people use to help act in an orderly manner (Cohen, 1998). Cohen (1998) also points out that variation between most human groups comes down to cultural differences. The literature review in Morris’s (2006) study discusses cultural assumptions linking whiteness to advantages that endured in the setting of Matthews Middle School, aided White students academically. At Matthews, white skin, though changed by class and gender, —still often represented harmlessness, normative masculinity and femininity, knowledge of manners and etiquette, and in many cases, academic ability” (Morris, 2006, p. 134). Lareau and Horvat (1999) suggested that whiteness itself is a form of cultural capital in schools.

Family culture plays an integral role in a child’s upbringing (Eisenhart, 2001). Educators need to ask parents for assistance and use the strategies in the classroom. If educators want to truly embrace diversity, rather than giving lip-service, it is important to understand parents’ beliefs and background. Research studies suggest that parents’
level of education and professional standing are connected with children’s educational and professional ambitions (Chenoweth & Galliher 2004; Eberly, Jody, Arti & Konzal, 2007; Eccles, et al., 2001). The criticism of the status-attainment model is the only description is restricted to socioeconomic status produces socioeconomic status. Researchers are looking at another factor: family processes that influence the development of children’s identities and choices. The processes include family attitudes, behaviors, and role modeling. Eccles in her research study developed a comprehensive model of the influences of parents’ education on children’s development (Eccles, et al., 2001).

The role of culture in the growth of cognitive abilities is believed to play a key role in academic achievement (Barton & Coley, 2007; Tyler, et al., 2006). The theoretical framework centered on student attribution is rooted in attribution theory which is concerned with how an individual interprets an event and how it relates to his or her actions and thinking (Weiner, 1972; 1976). Students’ home-based cultural experiences dictate their preferences regarding school learning and behaviors; that is, children’s preferences for learning are probably related to their parents’ preferences. Cultural themes and the behaviors those themes help to form in a child have a tremendous impact on school learning and school behavior. Minority students’ cultural practices in schools that are aligned with his or her out of school experiences, often are not aligned with teacher in-school instructional practices (Delpit, 1995; Kanstoroom & Finn, 1999; Morris, 2006; Tyler, et al., 2006). The culture of White students is typically discussed in a rural or Appalachian setting (Obermiller & Maloney, 2006; Woodrum, 2004), however, left out of the discussion is the culture of urban White families.
Parental Status and Attitudes

Parental educational attainment and parental occupational status are key factors influencing the achievement of children of poverty and their schooling experience (Bernard, 1993; Mandara, Greene & Varner, 2006). Parents' education levels and expectations are also major factors in their children's decision-making about college, and their educational attainment can influence whether a child can handle the college application process, and indeed whether a child can benefit from a college education (Chenoweth & Galliher, 2004). To understand why, it can be helpful to consider social capital. The construct can be defined as: Social capital is made up of both structure and process. Structure consists of the interpersonal interactions, including frequency and duration, whereas process represents the quality of involvement the parent has with their children and includes nurturing activities and the effort made to limit inappropriate behaviors exhibited by their children (Israel, et al., 2001). Israel (2001) studied the influence of family social capital on educational achievement. Family social capital denotes the customs, social systems, and affiliations among adults and children that are meaningful for children while they are developing in age (Israel, et al., 2001). Family social capital likely impacts achievement but the unavailability of data excluded it from the present study.

Chenoweth and Galliher (2004) studied college aspirations among West Virginian high school seniors located in the most rural of counties. They learned that family factors have significant influence in the decision-making process for children on whether to enroll in higher education (Chenoweth & Galliher, 2004). This is not surprising because
the family unit is a resource and family members serve as role models (Eberly, et al., 2007; Eccles, et al., 2001).

Although parent’s occupational status and its association with child occupational aspirations is a constant finding reported in the sociological literature, a limitation of this research is that it fails to produce understanding beyond “SES begets SES;” that is, documenting simple reproduction of social and/or economic inequality. In light of this, researchers have changed their focus to exploring family processes, such as, parents’ as role models, behaviors, and attitudes potentially contributing to the growth of adolescent’s occupational identities and choices (Eccles, et al., 2001). Involuntary job separations and unemployment may lead to lower future earnings, significant hardship, health issues, family stress, and poor parent-child relationships (Kalil & Guest, 2008).

Students are believed to develop educational and occupational plans based on their backgrounds and experiences determined in part by the families to which they belong (Chenoweth & Galliher, 2004; Mandara, Greene & Varner, 2006; McCracken & Barcinas, 1991). These life experiences, coupled with the influence of parents on students’ aspirations, strongly determine educational and occupational expectations of young boys and girls (Chenoweth & Galliher, 2004; Eberly, et al., 2007; Eccles, et al., 2001). Students believe a parent more than any one person, influences their career choice, and the mother is more influential on a child than the father (McCracken & Barcinas, 1991).

Family involvement is essential for young children’s cognitive and social growth. For children to achieve success from birth through adolescence, active family participation is crucial and support given to children must come from a variety of
learning supports including families, after school programs, social services, etc. (Barton & Coley, 2007; Tyler, et al., 2006). The whole child needs to be developed starting at birth: physically, socially, emotionally, and psychologically. A wide variety of exposure is crucial to helping a child in an ever changing global world.

Family involvement is impacted by the number of parents in the home. Another form of inequality that a child faces growing up and receiving an education is dependent on whether the child grows up with one parent or two in the home. The inequality of one-parent homes knows no boundaries; it cuts across racial and ethnic subgroups, and socioeconomic status. There is higher concentration of single-parent homes among Minority and low-income families (Barton & Coley, 2007).

Early experiences affect language acquisition and are crucial to the success of every child. Children mimic their parents and early literacy skills are developed. In working class families approximately half of all comments were positive among family members when children were between 13 to 18 months old and 35 to 36 months (Barton & Coley, 2007). Barton and Coley (2007) stated:

Conversely, in families on welfare, verbal interactions with children were much more likely to be negative and, in turn, the same was true of the interactions of the child with the rest of the family. In the families on welfare, the researchers generally found a “poverty of experience being transmitted across generations”.

There is extensive research regarding family attitudes of impoverished Minority children in urban education (Diamond, 2006; Hanushek & Rivkin, 2006; Herman, 2009; Jencks & Phillips, 1998); however the research is limited concerning impoverished White
children and the affect with which family attitudes toward education impact student achievement (Morris, 2005; 2006). Many educators believe that economically disadvantaged families do not place a high importance on their child’s education. Educators often find it hard to believe other people might enjoy their way, as opposed to their way.

The literature in Morris’ study discusses cultural assumptions linking whiteness to advantages endured in the setting of Matthews Middle School, aided White students academically. At Matthews, White skin though changed by class and gender, -still often represented harmlessness, normative masculinity and femininity, knowledge of manners and etiquette, and in many cases, academic ability” (Morris, 2006, p. 134). Lareau and Horvat (1999) suggested that whiteness itself is a form of cultural capital in schools. Substantial research has been done on culture and the impact it has on impoverished minorities.

**Teacher Perceptions**

The critical pieces are the judgments that educators place on children that can shape their lives forever (Kozol, 1991; Rist, 1970). All that educators say or do is magnified with the position they hold causing the rise and fall of children based on teacher expectations (Kozol, 1991; Morris, 2005; 2006; Rist, 1970). Author Ray Rist wrote about teacher expectations and the fulfillment of first impressions to determine success or failure. Rist (1970) suggests:

Of particular concern will be the relation of the teacher’s expectations of potential academic performance to the social status of the student. Emphasis will be placed on the initial presuppositions of the teacher regarding the intellectual ability of
certain groups of children and their consequences for the children’s socialization into the school system. A major goal of this analysis is to ascertain the importance of the initial expectations of the teacher in relation to the child’s chances for success or failure within the public school system. p. 413

The theoretical framework centered on teacher expectations is rooted in expectancy theory (Vroom, 1964) which is centered on an individual making decisions based on his or her motivation for completing a requirement and the outcome of completing the requirement. The theory also implies a person makes a decision based on what will provide the most pleasure and avoid the most pain.

Many scholars have argued teacher perceptions and expectations play a significant role in student success (Kozol, 1991; Morris, 2005; 2006; Rist, 1970). Researchers argue that schools and teachers are apt to support White students over students of other racial/ethnic backgrounds. The question deserving deeper investigation is do impoverished White students in urban schools benefit from “White Privilege” as manifested in greater academic success or are they subject to the same advantages or disadvantages as impoverished Minority students (Morris, 2005)?

White teachers at Matthews Middle School tended to view the White students as poor and their families as undesirable. These teachers did not react encouragingly to these students and typically looked past the White students academically and focused more disciplinary action on them than African-American teachers did. White male students typically did not receive the same strict disciplinary action that was aimed at Black and Latino male students, even when they committed similar offenses either in dress or behavior. Perceptions of race tended to show privilege toward White male
students at Matthews. Black and Latino male students were seen as aggressive while White male students appropriate for a comparable unacceptable wrongdoing (Morris, 2006).

The “Whiteness” of these students did not give them privilege in the eyes of White teachers. In comparison, African-American teachers at Matthews typically viewed the White students as middle class and reacted favorably to them. The African-American teachers did not consider the social styles and geographic location of these students to indicate an impoverished background. Alternatively, they viewed the White students as among the highest at Matthews in terms of academic performance, income level, and self-discipline (Morris, 2006). Rist (1970) wrote about teacher expectations and the fulfillment of first impressions to determine success or failure. Children succeed or fail based on teacher expectations (recall the Pygmalion effect).

Family environment coupled with SES can be transformed into generational poverty. Even when White and Black parents have the same average salary, White parents have significantly more resources than Black parents. White parents have typically attended better schools and colleges than Black parents with an equal amount of schooling. Children’s achievement scores are affected not only by SES of their parents but by that of their grandparents. This translates into several generations before reductions in SES inequality produce their full impact (Jencks & Phillips, 1998). High rates of family poverty translate into very high rates of poverty for children. In Appalachia, 33 percent of all individuals below the poverty level in 1990 were under 18 years of age” (Obermiller & Maloney, 2002, p.233).
Scholars have studied racial segregation and poverty in schools, however, little research has been attempted to show if and how race-based decisions by parents clusters poverty amid Minority students. Saporito and Sohoni (2007) explored the impact of school selection. The study used school enrollment information comparing the percent of impoverished students attending public schools with the percent of impoverished students living in the attendance boundaries. The research also assessed economic segregation for diverse racial groups, particularly, how much greater the concentration of poverty is within a typical White, Black, or Hispanic child’s school compared with their neighborhood? In contrast to White students, children who are characterized as belonging to a racial minority group often attend schools that serve high poverty communities. Nearly half of segregation among impoverished and non-impoverished students is attributed specifically to the enrollment of children in non-neighborhood schools (Saporito & Sohoni, 2007). Saporito and Sohoni (2007) further suggested urban Minority children are subjected to higher poverty rates:

Our data illuminate further inequality by showing that minority children attending urban, public schools are exposed to elevated poverty rates because of at least three factors: the under representation of more affluent children in neighborhood-based public schools, the tendency for wealthier students to withdrawal from public schools serving economically balanced areas, and the differential withdrawal of poor and non-poor children from schools serving neighborhoods that are predominantly black or Hispanic. p. 1247

The consequences of these patterns of segregation have severe consequences for Minority children (Saporito, 2007).
Arguments are made that impoverished neighborhoods are deprived of organizational resources that the middle class takes for granted. High poverty neighborhoods tend to offer less business opportunities. The opposite effect occurs. As the poverty level rises the number of organizations increases (Duncan & Murnane, 2011; Small, 2006; Small & McDermott, 2006; Small & Stark, 2005). The same occurs when the number of foreign born residents increases in a neighborhood; so does the number of establishments. The opposite effect happens when the proportion of Black residents increases in the neighborhood; the number of organizations decreases (Small, 2006). The premise that poor neighborhoods are lacking in institutional resources derives from the social disorganization theory. The theory was developed to explain differences in crime rates in neighborhoods. Social disorganization theory states that higher crime rate neighborhoods have higher poverty rates, higher resident transience, and higher levels of ethnic diversity. These issues promote social disorganization, which in turn promotes increases in crime. Researchers and policymakers might therefore argue that impoverished single mothers will experience improved circumstances if residing in middle-class neighborhoods, as opposed to impoverished ones. Some such improvement could be the presence of more helping institutions that might be missing in poor neighborhoods. It is thought that fewer businesses and organizations that require the backing of the middle class will be present in high poverty neighborhoods (Small & Stark, 2005). In short, it appears that neighborhood poverty and the number of organizations depends on larger economic circumstances. Indeed, it has been noted in the South and West, poorer neighborhoods often have more helping organizations.
because of stronger economic conditions in their cities as compared to other regions in the country (Small, 2006).

Parent involvement is positively linked with school success (Barton & Coley, 2007; Emory, 2006; McDonald, Moberg, Brown, Rodriguez-Espiricueta, Flores, Burke, et al. 2006; Tyler, et al., 2006). NCLB mandates one percent of Title I dollars given to school districts serving low-income students must be used for parent involvement. Schools must improve communication with parents and close the achievement gap. NCLB mandates achievement for all students and finds families integral in achieving successful schools. Lynn McDonald and a team of researchers (2006) conducted a large study on parent involvement on low-income children from diverse cultural backgrounds. Teachers assessed the children’s socioemotional performance and academic accomplishment (McDonald, et al., 2006). McDonald (2006) suggests that drastically altering outcomes for low-income, culturally dismissed, the family, the school, and the community must be integrated into a coherent, supportive system. By incorporating parents in school decisions, such systems can promote the likelihood that more children will meet the NCLB requirements of improving academic performance for all students (McDonald, et al., 2006).

In testing the effects of preschool competition, Henry and Gordon (2006), used student level data collected over a 5-year period on a large sampling of children attending a publicly subsidized prekindergarten. The effects on students were estimated for four variables in the quantitative study: retention, language arts standardized test scores, math standardized test scores, and a child’s overall readiness for school evaluated by his or her teacher. Evidence supports the notion that competition is a motivation for private and
public schools to improve performance. Grades Pre K-3 may benefit greatly from competition, given that accountability reform from NCLB seldom covers below third grade (Henry & Gordon, 2006). When choosing a pre-kindergarten class, parents are participating in the first choice of school for their child. The increase in competition improves test scores in both private and public schools; the more competition amongst schools the less likely retention for working class poor children (Henry & Gordon, 2006).

Impoverished families are faced with many challenges. Racial minorities are subjected to elevated poverty rates in schools. Parent involvement can help in closing the achievement gap for all students. Schools that build relationships that pull the family and community together can significantly change the outlook for under privileged children. More resources need to be made available to impoverished, Minority families with young children. Parental stressors lead to health issues and cause problems with child development. Programs such as the PALS program, implemented in Chicago, were designed to engage families with social services in order to improve the academic and social functioning in impoverished urban Minority families. The cultural differences and individualism of low-income African Americans is underutilized in the classroom setting. Competition improves achievement in private and public schools. The research however is inconclusive on what effect the number of establishments has in neighborhoods of impoverished families, and whether the inequalities in social living conditions affect health and development of impoverished Minority children. Few studies have been done to ascertain how the interaction of middle-class citizens, the state, and non-profits impact the capability of institutional assets, such as supermarkets and daycare centers in poor neighborhoods (Small & McDermott, 2006). Impoverished single mothers are not
automatically better off living in middle class neighborhoods than in impoverished neighborhoods. Disadvantaged conditions are prevented in high poverty neighborhoods when the state and non-profit organizations respond to these conditions (Small & Stark, 2005).

Educators see poor families as not valuing education due to parents’ lack of support in regards to participation with homework, discipline support, and school activity participation. Research has shown that families’ educational and occupational status play a major role in the child’s ambitions. Impoverished families see schools as teaching their children to follow a path away from their cultural upbringing and values (Woodrum, 2004).

Educational outcomes are increased for a child when the parent has contact regarding education or educational goals are intended. Lareau (1987) discussed how parental intelligence is transferred to the child during educational functions; children then have use of additional resources to use in school that were previously unavailable. Educational expectations increase when high levels of education-centered activities occur between parent and child. Achievement increases as expectations increase (Emory, 2006).

Lareau sought to explain that social class created distinctive parenting styles. She challenged the argument that social class does not distinguish children’s daily lives. White poverty makes up the majority of urban poverty. White people often are assumed to be middle class based on their race (Sears, 2003). Morris (2006), in his work on White students in urban schools, focuses on a new angle to study the race, class, and gender inequality in education…a fascinating case for exploring how the meaning of
race and whiteness alters when intersecting with social class, place, gender, and style” (Morris, p. 2, 2006). Lacking in the research is a systematic way to quantify the relationship of culture and the effect on children’s daily lives, including academic achievement (Lareau, 2002). This study attempts to analyze student and school factors that influence the achievement of urban White students; a group that has not been given adequate attention in the literature.

**Summary**

From a global perspective, the students in our country are being outperformed by their international peers. In comparing mathematics scores of 15-year olds, Americans were outperformed by 20 of the other participating 28 industrialized countries. Adding to this epidemic concern is the dropout rate of American students-7,000 students every school day (Thompson & Barnes, 2007).

The focus of this study is on the achievement gap for impoverished urban White students. This chapter has reviewed the Black-White gap and the gap as it is evidenced in the state of Ohio. Our lowest performing students are put at further risk because teacher quality is unfairly distributed in schools. Students with the greatest needs are provided with teachers that are the least qualified and have the least experience and expertise. Children in high impoverished schools are more likely to have teachers who lack content knowledge and have lower academic skills as opposed to their more advantage peers (Thompson & Barnes, 2007; Haycock, 2006).

This dissertation focuses on the extent key factors influence student achievement and the variance according to student race and ethnicity. The existing literature on achievement gaps focus on race and ethnicity, particularly the Black-White

Lacking in the literature is an empirical study that can be generalized over a larger group of students in reference to poor urban White students. This study sets out to investigate ways in which key factors influence student achievement and further investigates the challenges to academic achievement for urban poor White students and whether the challenges are the same as for urban impoverished Minority students. Is the struggle with achievement for urban impoverished White students equal to or greater than urban impoverished Minority students? Do impoverished White students in urban schools benefit from “White Privilege” as manifested in greater academic success or are they subject to the same advantages or disadvantages as impoverished Minority students? These questions are the framework for the research study involving impoverished urban White students.
Chapter Three: Methodology

Introduction

Building on the research gap described in Chapter Two, the primary purpose of this study is to examine racial-group achievement differences while focusing on economically disadvantaged White elementary school students in a single district. The analyses determine whether student-level characteristics like racial group and SES influence achievement, and then determine if these factors are influenced by school-level contextual variables. The investigation was guided by the achievement gap literature focusing on White and Minority students, which not only suggests differences should be expected but also what factors influence the size and direction of gaps (calculating and modeling gaps may or may not be included in exploratory analyses). Analyses are exploratory because although there is voluminous literature dealing with the achievement gap for Minority students, little is known about economically disadvantaged White students. This study is motivated by and extends qualitative work investigating the experiences of middle school students in Texas (Morris, 2006). While Morris‘ (2006) ethnographic study focused on one school and the target area looked beyond individual and group identities into the everyday interactions associated with being White and economically disadvantaged in an urban setting, the project presented here offers an extension that allows for quantifying the relationships of interest.

This dissertation investigates the distribution of academic achievement outputs among students in a large urban school district in Ohio. The district of interest is the largest in the state of Ohio and has 118 schools with 52,851 students in grades Pre-Kindergarten to twelve. The urban district has 79 elementary schools and 4,215 students
in grade 3 included in the study. The student population is comprised of 60% African American, 27.2% Caucasian, 6.1% Hispanic, 4.5% Multi-racial, 1.9% Asian and 0.2% American Indian/Native Alaskan. Students in the district have a mobility rate of 19.7%, average daily attendance rate of 94.2%, a free or reduced meal rate of 77.3 %, speak 89 languages at home, and 17.2% of the student population receive special education services. The academic breakdown is discussed in Table 2 below. The state of Ohio academic designation for school districts is based on four measures of performance: state indicators, value added measure, performance index score, and Adequate Yearly Progress (AYP). The value added measure represents the progress a school has made with its students since the previous year. Performance index score measures the weighted average of all tested subjects and grades and AYP, a federally required measure has assessment goals set for reading and mathematics proficiency and participation, attendance rate, and graduation rate.

Table 2

2009-2010 Academic Status Ohio Department of Education

<table>
<thead>
<tr>
<th>Designation</th>
<th>Continuous Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduation Rate (2009)</td>
<td>72.7%</td>
</tr>
<tr>
<td>Value Added Score</td>
<td>Below Expected Growth</td>
</tr>
<tr>
<td>Performance Index Score</td>
<td>80.3</td>
</tr>
<tr>
<td>Adequate Yearly Progress</td>
<td>Not Met</td>
</tr>
</tbody>
</table>
The following overarching research question guides the study: *To what extent do student-(particularly race/ethnicity and SES) and school-level factors influence student achievement?* A sub-confirmatory question is part of the study: *Do impoverished urban White students perform at comparable levels to impoverished urban Minority students?*

The question was initially addressed through the use of multi-level modeling (MLM) because observational units (in this case, students) are nested within schools (Vogt, 2007). Multilevel-modeling is appropriate for this inquiry because the analysis offers simultaneous results of student level and school level regression models while also providing more accurate estimates of relationships between predictors and outcomes of both levels (Bol, Wilson, & Warkentin, 1993; Lee & Coladarci, 2001). The present study allows for determining whether, for example, the influence of poverty on student achievement varies according to the students’ race within schools. The interpretation of the results includes an explicit focus on impoverished White students. The interpretation standards are explained in detail later in the chapter.

Chapter Three is organized into the following sections: a) population, b) data set, c) research design, d) variables, and e) data analysis. The research focuses on students that reside in Ohio and attend an urban school district. While the study is primary focused on economically disadvantaged White students, the nature of the inquiry also discloses whether influences vary according to other student-level characteristics such as gender and socioeconomic status.

Margolin, 2007; Mistry, et al., 2007; Saporito, 2007; Sing & Kogan, 2007; Small & McDermott, 2006; Small & Stark, 2005; Small, 2006). The explicit focus on economically disadvantaged urban White students reflects a decision to explore achievement among a student population that has received scant attention in the extant literature. The relationship between measured achievement and student and school characteristics are analyzed using data from the 2009 Ohio Achievement Test (OAT). For purposes of this inquiry factors exerting influence in a school setting include: socioeconomic status, mobility, attendance, and discipline. Socioeconomic status and mobility are social stressors that have an influence on the daily social roles of attendance and discipline.

Identification of Population

The population selected for this study was drawn from a large urban district in Ohio. The population was delimited to include all third grade students from that district. The third grade students in the state of Ohio are administered reading and math achievement tests as part of the Ohio Achievement Test. Fourth and fifth grade students are also given achievement tests at the elementary school level in the areas of reading, math, and science. Grade three was chosen because this is the first year that high-stakes, standardized tests are given to students. While findings from an investigation of one grade level are not generalizable to the district as a whole, patterns observed among the third graders may be interpreted to tentatively suggest the possibility of similar patterns throughout the district. The delimitation to a single district suggests that results are not immediately generalizable to other districts or the state as a whole. Therefore, the findings are directly applicable only to the district studied. However, findings may be
useful for analyzing achievement distributions in similarly situated large urban districts, in the sense of research to be conducted there than as a way of drawing conclusions about distributions there.

Dataset

The dataset was prepared using results secured from the Ohio Department of Education (ODE). The researcher’s school district prepared the data into spreadsheets containing student-level achievement data, and student-level demographic data. The student-level achievement data included Ohio Achievement Test (OAT) scores in Reading and Ohio Achievement Test (OAT) scores in Math. The student-level demographic data included: student grade level (third), free or reduced-price meal eligibility status (free, reduced, or full-price lunch status), mobility (total schools student attended during 2008-2009 school year), attendance (days absent, days present, total days enrolled), discipline (discipline offenses and discipline days), sex (male or female), ethnicity (American Indian, White, Black, Hispanic, Asian, and Other), and birth-date (student birthday). The dataset for the study comes entirely from extant sources.

The data sets were converted into SPSS 20.0 files, and then merged to assign variables. Student-level variables were aggregated to create school-level variables. The resulting merged dataset was comprised of third grade students reading and math OAT results from the 2009 test administration. Not all cases contain all data required for use in analysis.

Research Design

This section of the chapter describes the regression model, variables, and analyses that comprise the research model employed in this study. The dataset was prepared using
information collected by the Ohio Department of Education. That is, the study uses extant data for correlational analysis taking place after the data has been collected.

**Regression Model**

To study *the extent to which student- and school-level factors influence student achievement*, the researcher explores models with up to up to six independent variables. The research model hypothesizes that variables representing student level socially-ascribed characteristics and school-level aggregations of socially-ascribed characteristics represent a robust set of predictors for student achievement as measured by the Ohio Achievement Test. Each of the independent variables can be viewed differently as predictor variables. The use of MLM regression analysis allows three key components that are essential in the importance of this study: (1) the combined influence of every independent variable; (2) the contribution each variable has in explaining variance; and (3) the function of a particular independent variable isolated from the effects of the other independent variables (Vogt, 2007).

**Variables.** This study sets out to analyze the relationship of achievement and the following student-level variables presented in Table 3.

Table 3

*Student Independent Variables*

<table>
<thead>
<tr>
<th>Ethnicity (ETH1)</th>
<th>Socioeconomic status (POV1)</th>
<th>Sex (variable SEX1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance (ATT1)</td>
<td>Discipline (DIS1)</td>
<td>Mobility (MOB1)</td>
</tr>
</tbody>
</table>
For use in the analyses, SEX 1 is coded into male = 1 and female = 0, and ethnicity is
coded as a dummy variable (i.e., White = 0; nonwhite = 1). School-level aggregations of
the student-level variables represent additional independent variables displayed in Table
4. Student SES is measured by the guidelines of the United States Department of
Agriculture; for a student to qualify for free lunch, his or her family earnings must be
equal to or below 130% of the federal poverty level. The qualification for reduced-price
lunch requires that a student's family earnings are equal to or below 185% of the federal
poverty level (ODE, 2011).

Table 4

*School Independent Variables*

<table>
<thead>
<tr>
<th>ETH2 (percentage of minority students)</th>
<th>POV2 (percentage of poverty)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEX2 (percentage of female students)</td>
<td>ATT2 (percentage of attendance)</td>
</tr>
<tr>
<td>DIS2 (total number of incidents)</td>
<td>MOB2 (total number of schools)</td>
</tr>
</tbody>
</table>

The independent variables in the study represent student-level socially ascribed
characteristics, student-level social stressors, and school-level contextual characteristics.
Student level independent variables are separated into socially ascribed characteristics
and social stressors. The student-level socially ascribed characteristics include student's
self-reported ethnicity and sex, while social stressors include total number of absences,
total number of discipline interventions, and mobility. The distribution of the
achievement variables were reviewed using descriptive statistics (i.e., skewness and kurtosis), histograms, and Q-Q plots. The study investigates the presence of achievement gaps by quantifying and describing achievement distributions thought to be associated with student and school characteristics identified as exerting influence over schooling outcomes. The inquiry has an explicit focus on economically disadvantaged White students.

**Dependent Variables.** The dependent variable in the proposed study is student achievement (in reading and in math), and is operationalized as assessment scores on the reading and math sections of the Ohio Achievement Test (OAT). All public school students in Ohio are tested annually, starting in the 3rd grade. The OAT is designed to measure performance in Reading and Math and is administered annually in grade three. The OAT has been utilized since 2003 when it was first administered to third graders during the week of October 6-10. To meet the conditions of Ohio Senate Bill 1, Ohio House Bill 3, and the Federal NCLB Act the new sequence of achievement tests (OAT) were established by the state of Ohio (Ohio Department of Education, 2004).

The objective of the OAT reading and math assessments is to help ensure all students have acquired the level of reading and math required by Ohio students at the end of their relevant grade level (Ohio Department of Education, 2010). Of the achievement measures offered, scale scores are the closest to the actual raw scores, and are the simplest to understand (Ohio Department of Education, 2010). Accordingly, scale scores are the measure used in the analyses. A score of 400 or higher (Proficient, Accelerated, or Advanced) is considered meeting the performance standard while a score of 399 or below (Basic or Limited) is considered not meeting the performance standard displayed
in Table 5. Scores below the proficient level require student intervention by the school (Ohio Department of Education, 2010).

Table 5

*Range of Performance Levels for OAT Reading Achievement Results*

<table>
<thead>
<tr>
<th>Level</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced</td>
<td>467-533</td>
</tr>
<tr>
<td>Accelerated</td>
<td>435-466</td>
</tr>
<tr>
<td>Proficient</td>
<td>400-434</td>
</tr>
<tr>
<td>Basic</td>
<td>384-399</td>
</tr>
<tr>
<td>Limited</td>
<td>265-383</td>
</tr>
</tbody>
</table>

*Range of Performance Levels for OAT Math Achievement Results*

<table>
<thead>
<tr>
<th>Level</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced</td>
<td>452-568</td>
</tr>
<tr>
<td>Accelerated</td>
<td>432-451</td>
</tr>
<tr>
<td>Proficient</td>
<td>400-431</td>
</tr>
<tr>
<td>Basic</td>
<td>377-399</td>
</tr>
<tr>
<td>Limited</td>
<td>233-376</td>
</tr>
</tbody>
</table>

The scores available for use in the analysis of this study include 3rd grade OAT Reading and Math scores from the 2008-2009 test administration.

**Reliability and Validity**

Reliability deals with the ability for scores to be reproduced or consistent. Reliability estimates change with different populations (Thompson, & Snyder, 1998). Validity simply is the meaning of the assessment (Messick, 1995).
Tables 6-8 display psychometric properties from the 3rd Grade Reading and Math OAT (Ohio Department of Education, 2009).

Table 6

*Grade 3 Reading Operational Subscale Reliabilities and Passing Bands*

<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Below Score</th>
<th>Near Score</th>
<th>Above Score</th>
<th>Possible Score</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocabulary</td>
<td>0 – 7</td>
<td>8 – 10</td>
<td>11</td>
<td>0 – 11</td>
<td>0.64</td>
</tr>
<tr>
<td>Reading process</td>
<td>0 – 9</td>
<td>10 – 13</td>
<td>14 – 17</td>
<td>0 – 17</td>
<td>0.72</td>
</tr>
<tr>
<td>Informational text</td>
<td>0 – 5</td>
<td>6 – 8</td>
<td>9 – 10</td>
<td>0 – 10</td>
<td>0.56</td>
</tr>
<tr>
<td>Literary text</td>
<td>0 – 6</td>
<td>7 – 9</td>
<td>10 – 11</td>
<td>0 – 11</td>
<td>0.55</td>
</tr>
</tbody>
</table>
Table 7

*Grade 3 Math Operational Subscale Reliabilities and Passing Bands*

Raw Score Bands

<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Below</th>
<th>Near</th>
<th>Above</th>
<th>Possible Score</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number, Number Sense, and Operations</td>
<td>0 – 7</td>
<td>8 – 10</td>
<td>11 – 16</td>
<td>0 – 16</td>
<td>0.70</td>
</tr>
<tr>
<td>Measurement</td>
<td>0 – 5</td>
<td>6 – 8</td>
<td>9</td>
<td>0 – 9</td>
<td>0.47</td>
</tr>
<tr>
<td>Geometry and Spatial Sense</td>
<td>0 – 5</td>
<td>6 – 8</td>
<td>9</td>
<td>0 – 9</td>
<td>0.47</td>
</tr>
<tr>
<td>Patterns, Function, and Algebra</td>
<td>0 – 5</td>
<td>6 – 8</td>
<td>9</td>
<td>0 – 9</td>
<td>0.61</td>
</tr>
<tr>
<td>Data Analysis and Probability</td>
<td>0 – 5</td>
<td>6 – 8</td>
<td>9</td>
<td>0 – 9</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Table 8

*Grade 3 Reading and Math Parameters*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Reading</th>
<th>Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-count</td>
<td>125,177</td>
<td>130,715</td>
</tr>
<tr>
<td>Max Raw Score</td>
<td>49</td>
<td>52</td>
</tr>
<tr>
<td>Max Scaled Score</td>
<td>503</td>
<td>521</td>
</tr>
<tr>
<td>Min Scaled Score</td>
<td>257</td>
<td>241</td>
</tr>
<tr>
<td>Raw Score Mean</td>
<td>35.97</td>
<td>38.78</td>
</tr>
<tr>
<td>Raw Score</td>
<td>8.09</td>
<td>8.33</td>
</tr>
</tbody>
</table>
Table # 8 continued

<table>
<thead>
<tr>
<th></th>
<th>Raw Score SEM</th>
<th>Scaled Score Mean</th>
<th>Scaled Score SD</th>
<th>Scaled Score SEM</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.99</td>
<td>415.35</td>
<td>25.97</td>
<td>9.59</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>3.08</td>
<td>422.40</td>
<td>28.60</td>
<td>10.57</td>
<td>0.86</td>
</tr>
</tbody>
</table>

Fifteen forms of the reading and math OAT were reviewed. Overall the reading assessments display a picture of good alignment to the content and consistency in depth of knowledge (DOK) classifications of content and assessment items. Despite the mathematics forms not reaching above 90% in meeting the criteria, the test forms as a whole seem to display alignment (ODE, 2006).

**Data Analysis**

The research model theorizes that the independent variables exert influence over the dependent variables representing student achievement. Specifically, Model 1 hypothesizes that the student level predictors student ethnicity (variable ETH1), student socioeconomic status (variable POV1), student sex (variable SEX1), student attendance (variable ATT1), student mobility (variable MOB1), and student discipline (variable DIS1) for student i within school j have effects on the dependent variables of student achievement. Level 2 hypothesizes that the school aggregate values of student-level predictors school ethnicity (variable ETH2), school socioeconomic status (variable POV2), school attendance (variable ATT2) and school discipline incidents (variable
DIS2) have effects on the dependent variables of student achievement making up a strong set of predictors for reading and math achievement.

The theoretical model is given by the following exploratory equations:

The MLM is conceptualized as third grade students (n=4,215) nested in schools (n=79).

Analyses were exploratory in nature but a general level 1 model took the following form:

\[
\hat{y}_{ij} = \beta_{0j} + \beta_{1j}(ETH_{ij}) + \beta_{2j}(POV_{ij}) + \beta_{3j}(GENDER_{ij}) + \beta_{4j}(NSCHATT_{ij}) + \beta_{5j}(NABS_{ij}) + \beta_{6j}(REDISDAY_{ij}) + r_{ij}.
\]

\[
\hat{y}_{ij} = \beta_{0j} + \beta_{1j}(ETH_{ij}) + \beta_{2j}(POV_{ij}) + \beta_{3j}(EXPLORE_{ij}) + r_{ij}.
\]

Level 2 is:

\[
B_{qj} = Y_{q0} + u_{qj} \text{ for } q = 0,1,2,3…
\]

Where

\[
\hat{y}_{ij} = \text{achievement for student } i \text{ in school } j;
\]

ETH = Minority Status and is a dichotomous variable;

POV = is a dichotomous variable based on whether a student is eligible for Free/Reduced Price Lunch;

EXPLORE = is shorthand for indicating additional student-level variables as listed above were modeled in an exploratory fashion;

\[
\beta_{0j} = \text{mean achievement for school } j;
\]

\[
\beta_{1j} = \text{Minority slope in school } j;
\]

\[
\beta_{3j} = \text{Additional slopes for exploratory models in school } j;
\]

\[
B_{qj} = \text{level 2 random coefficient model for } q \text{ terms, examples of which are described above};
\]

Level 1 predictors were grand mean centered.
The general analytic framework follows the 2-level model building approaches articulated by Raudenbush & Bryk (2002). As noted above, these were exploratory analyses to identify useful predictor variables while examining whether student Ethnicity and SES status predict achievement while accounting for school-level contextual variables. The motivating question for the model building is to examine if economically disadvantaged White students show comparable levels of achievement to peers and if this level of achievement is contingent upon varying school characteristics. Using achievement gaps (i.e., achievement of impoverished White students-referent group as a dependent variable) may be attempted.

Summary

This study addresses the research question: To what extent do student- (particularly race/ethnicity and SES) and school-level factors influence student achievement? A sub-confirmatory question is part of the study: Do impoverished urban White students perform at comparable levels to impoverished urban Minority students? In order to address the question the researcher models Ohio Department of Education (ODE) data. The data secured from ODE was prepared by the researcher's school district into spreadsheets that contained student-level achievement data (OAT Reading and Math scores) and student-level demographic data. The student-level demographic data included: free or reduced-price meal eligibility status (POV), mobility (NSCHATT), attendance (NABS), discipline days (REDISDAY), gender (GENDER) and ethnicity (ETH). These predictor variables were used in the models to measure the dependent variable of achievement. The following regression model was used with these predictor
variables: \( \tilde{y}_{ij} = \beta_0 + \beta_{1j}(\text{ETH}_{ij}) + \beta_{2j}(\text{POV}_{ij}) + \beta_{3j}(\text{GENDER}_{ij}) + \beta_{4j}(\text{NSCHATT}_{ij}) + \beta_{5j}(\text{NABS}_{ij}) + \beta_{6j}(\text{REDISDAY}_{ij}) + r_{ij} \).

As detailed throughout Chapter Three, the data is delimited to one school district and it cannot be generalized to other districts in the state of Ohio or other districts in the United States and it has been discussed in the delimitations and limitations section in chapter one.
Chapter Four: Introduction

Analysis of Data

The guiding research question in the investigation is: To what extent do student-(particularly race/ethnicity and SES) and school-level factors predict student achievement in the target district? A sub-confirmatory question is part of the study: Do impoverished urban White students perform at comparable levels to impoverished urban Minority students? The purpose of this study was to examine achievement differences between groups based on socially ascribed characteristics, with a focus on economically disadvantaged White elementary school students in one large urban district. The analyses examined how both student-level characteristics and the interaction of student-level characteristics like race and SES influence achievement. The analyses also considered whether student-level factors are influenced by school-level contextual variables (e.g., school-level SES, school size, etc.).

Findings from these analyses are presented in this chapter in the following order: (1) descriptive analyses, (2) results from ancillary analyses and (3) hierarchical linear regression analyses. A chapter summary reviews major findings, focusing first on exploratory analyses from the student and school level factors and then other significant results.

Descriptive Analyses

The data used are compiled from one school district during the 2008-2009 school year, and were obtained from the Ohio Department of Education. The sample contained all third graders (4,215 students) from the district studied. Reading Ohio Achievement Test (OAT) scores were missing for 203 students and math OAT scores were missing in
136 cases. Information describing Ethnicity is missing for three students and mobility is missing for 102 students. No data is missing for the following variables: student poverty, gender, attendance and discipline days. Overall, missing data does not exceed 5% for any single variable. This is a key point since 5% is a commonly used threshold for determining whether to use listwise or multiple imputation methods for handling missing data (Enders & Bandalos, 2001; Royston, 2004). In short, the default listwise procedures used here should not yield biased estimates.

The researcher converted the Excel file provided by ODE into SPSS (Statistical Package for the Social Sciences) files. Descriptive statistics were calculated for all the dependent and independent variables used in the study. The researcher used SPSS version 20.0 to perform these analyses.

**Dependent Variables**

This study used two dependent variables to operationalize grade 3 achievement levels among students in the district: OAT reading scores and OAT math scores. The range of possible scores on the OAT reading is 265 to 533; the range of scores on the OAT math is 233 to 568. Both dependent variables were examined for the presence of skewness and kurtosis. The skewness for OAT reading is -.038 and the kurtosis is -.107. The skewness for OAT math is .124 and the kurtosis is -.014. Examination of histograms (available in Appendix A) for each dependent variable suggests the data are normally distributed as well. In sum, the data for each dependent variable appear to be reasonably normally distributed. Descriptive statistics for the dependent variables are presented in Table 9.
Table 9

*Descriptive Statistics for Dependent Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3 OAT Reading Scale Score</td>
<td>400.72</td>
<td>27.992</td>
</tr>
<tr>
<td>Grade 3 OAT Math Scale Score</td>
<td>408.14</td>
<td>31.322</td>
</tr>
</tbody>
</table>

The observed mean and standard deviations for each dependent variable are in expected ranges. At the district level, students score, on average, right in the middle of the distributions, and a score in the 400 range of either measure is fairly typical.

**Independent Variables**

Student ethnicity was coded by the state of Ohio as a dichotomous variable, where 0 = White and 1 = Minority. The frequency distributions for the student-level race variable indicated that 1,177 (27.9%) of the students self-reported their race as White.

Table 10 presents the frequency of students in each category.

Table 10

*Summary of Frequency Statistics for Computed Ethnicity Variable*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;white&quot;</td>
<td>1177</td>
<td>27.9</td>
<td>27.9</td>
</tr>
<tr>
<td>&quot;minority&quot;</td>
<td>3035</td>
<td>72.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4212</td>
<td>99.9</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>System 3</td>
<td>.1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4215</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The student-level variable "poverty" was also dichotomously coded by the state (0 = Nonpoverty; 1 = Poverty). This variable was measured using the guidelines of the United
States Department of Agriculture for Free-Reduced Price Lunch (FRPL). The data show students in the district were predominantly impoverished (83.7% of valid cases). The frequency distribution for poverty is displayed in Table 11. A total of 3,529 students were identified in the poverty category while 686 students (16.3% of valid cases) were identified in the non-poverty category.

Table 11

Summary of Frequency Statistics for Poverty

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>nonpoverty</td>
<td>686</td>
<td>16.3</td>
<td>16.3</td>
</tr>
<tr>
<td>Poverty</td>
<td>3,529</td>
<td>83.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4,215</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 12 presents additional school-level descriptive statistics. The average percent of poverty for each school (school level variable) in the district is 60.9%, while 83.7% of all students in the district are impoverished (student level variable). The average number of missed school days for students was 12.46 (8.01 for absences and 4.45 for discipline days).
Table 12

Summary of Descriptive Statistics for Independent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean/Std. Deviation</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Ethnicity Students</td>
<td>4,215</td>
<td>.17</td>
<td>1.00</td>
<td>.7200 / .25157</td>
<td>-.696</td>
</tr>
<tr>
<td>School Percent Poverty</td>
<td>4,215</td>
<td>.36</td>
<td>1.00</td>
<td>.8372 / .16307</td>
<td>-1.248</td>
</tr>
<tr>
<td>Average number of absences</td>
<td>4,215</td>
<td>4.86</td>
<td>13.29</td>
<td>8.0114 / 1.91889</td>
<td>.290</td>
</tr>
<tr>
<td>Average number of discipline days</td>
<td>4,103</td>
<td>1.00</td>
<td>10.55</td>
<td>4.4489 / 2.48160</td>
<td>.887</td>
</tr>
</tbody>
</table>

Descriptive Analyses of Student-Level Achievement Gaps

Achievement gaps between high and non-poverty students, and Minority and White students, were apparent when related descriptive statistics were calculated (Table 5). The mean score for Minority students in math was 15.54 points lower than for White students (419.34 for White students versus 403.80 for Minority students). See Table 13.

Table 13

Summary of Descriptive Statistics for Dependent Variables by Ethnicity

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading (Minority Students)</td>
<td>3,035</td>
<td>397.99</td>
<td>27.626</td>
</tr>
<tr>
<td>Reading (White Students)</td>
<td>1,177</td>
<td>407.83</td>
<td>27.706</td>
</tr>
<tr>
<td>Math (Minority Students)</td>
<td>3,035</td>
<td>403.80</td>
<td>30.109</td>
</tr>
<tr>
<td>Math (White Students)</td>
<td>1,177</td>
<td>419.34</td>
<td>31.639</td>
</tr>
</tbody>
</table>
In terms of reading scores, the gap is smaller: White students scored on average, 9.84 points higher (407.83 White students versus 397.99 for Minority students). This difference is noteworthy in that the average for White students exceeds the state’s cutoff score for proficiency whereas the average for Minority students falls in the basic score ranges (non-proficient). Furthermore, the magnitude of the differences relative to the observed variance suggests that Ethnicity is a strong predictor of achievement in the district.

By contrast, differences were much smaller when comparing males and females. Descriptive statistics calculated for the population disaggregated by gender showed female students had a slightly higher mean in both reading and math: .53 points higher in reading and .78 points higher in math (Table 14).

Table 14

Summary of Descriptive Statistics for Dependent Variables by Gender

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading (Female Students)</td>
<td>2,127</td>
<td>401.23</td>
<td>10.35</td>
</tr>
<tr>
<td>Reading (Male Students)</td>
<td>2,088</td>
<td>400.70</td>
<td>10.07</td>
</tr>
<tr>
<td>Math (Female Students)</td>
<td>2,127</td>
<td>408.60</td>
<td>14.35</td>
</tr>
<tr>
<td>Math (Male Students)</td>
<td>2,088</td>
<td>407.82</td>
<td>14.12</td>
</tr>
</tbody>
</table>

Achievement gaps were apparent when descriptive statistics were calculated by student poverty status (Table 15). The reading OAT analytic results show a gap for
economically disadvantaged students versus non-economically disadvantaged students.

The mean score for non-poverty students was 9.24 points higher than poverty students (408.70 non-poverty students versus 399.46 for poverty students).

Table 15

*Summary of Descriptive Statistics for Dependent Variables by Poverty*

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading (Non Poverty Students)</td>
<td>686</td>
<td>408.70</td>
<td>9.39</td>
</tr>
<tr>
<td>Reading (Poverty Students)</td>
<td>3,529</td>
<td>399.46</td>
<td>9.67</td>
</tr>
<tr>
<td>Math (Non Poverty Students)</td>
<td>686</td>
<td>419.47</td>
<td>13.98</td>
</tr>
<tr>
<td>Math (Poverty Students)</td>
<td>3,529</td>
<td>406.02</td>
<td>13.22</td>
</tr>
</tbody>
</table>

On the math assessment, the mean score for poverty students is 13.45 points lower than for non-poverty students. As with Ethnicity, Poverty appears to be a strong predictor of both types of achievement.

Besides investigating how student-level and school-level characteristics influence achievement, the study also considered whether achievement, attendance, and discipline differences appear to be related to multiple variables (e.g., Minority status and poverty). Table 16 presents additional school-level independent variables disaggregated by student ethnicity (Table 16).
Table 16

Summary of Descriptive Statistics for Independent Variables by Ethnicity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Discipline (n = 1,103)-(White)</td>
<td>3.77</td>
<td>2.2335</td>
</tr>
<tr>
<td>Average Discipline (n = 3,035)-(Minority)</td>
<td>5.70</td>
<td>8.034</td>
</tr>
<tr>
<td>Percent Poverty (n = 1,177)-(White)</td>
<td>.78</td>
<td>.19744</td>
</tr>
<tr>
<td>Percent Poverty (n = 3,035)-(Minority)</td>
<td>.86</td>
<td>.14145</td>
</tr>
<tr>
<td>Average Absences (n = 1,177)-(White)</td>
<td>9.05</td>
<td>1.9943</td>
</tr>
<tr>
<td>Average Absences (n = 3,035)-(Minority)</td>
<td>7.61</td>
<td>7.031</td>
</tr>
</tbody>
</table>

In sum, the descriptive statistics disaggregated by ethnicity show that, on average, White students achieved higher OAT reading and math scores, averaged fewer discipline days, and attended schools with less poverty in the student population. White students did however average more absences.

As a follow-up descriptive step, 2 X 2 Analyses of Variance procedures were conducted to examine whether there is an interaction between the Ethnicity and Poverty variables when examining mathematics and reading achievement. The following figures depict the relationship between Ethnicity, Poverty and achievement. See Figures 1 and 2.
Figure 1. Poverty and Ethnicity Interactions for the Whole Dataset: Reading
Both graphs show slopes that are not perfectly parallel, suggesting a small but arguably trivial interaction effect. The associated interaction test for each graph was statistically significant, but as the graphs suggest the effect size for each is quite small (Reading eta-squared values for the interaction effect was 0.002; for Math the eta-squared value is 0.009).
The statistically significant interaction effect is probably due to the large sample size, and possibly because of an achievement floor effect (i.e., scores tend to drop by small amounts at the lower end of the performance range). This makes it hard to assess the presence of an interaction, a point which is revisited later on in this chapter. In terms of main effects, Poverty has a powerful impact on achievement within each Ethnicity category (which is consistent with the above descriptive statistics). The poverty difference in OAT Reading within Minority students is 15.07 (411.37 versus 396.30); the difference within White students is 22.41 points (424.21 versus 401.80). By contrast, the difference between economically disadvantaged White and impoverished Minority students is 5.5 points (401.80 to 396.30), favoring the former. The reading achievement difference between the differences for impoverished White students is larger than for economically disadvantaged Minority students (7.34 points). Within Minority students, the OAT math achievement gap is 18.33 (420.00 to 401.67); the poverty difference in OAT Math within White students is 24.92 points (437.25 to 412.33); and the difference for economically disadvantaged White to economically disadvantaged Minority is 10.66 points (412.33 to 401.67). The difference between the differences for impoverished White students is larger than for impoverished Minority students (6.59 points). These descriptive statistics suggest a higher poverty influence for White students, compared to Minority students, keeping in mind that a causal attribution cannot be drawn from these data.

ANOVA was used for primarily descriptive as opposed to inferential reasons because students are nested by school which violates the independent error assumption. These same data are therefore examined using HLM. This latter technique allows one to
determine if these relationships are stronger in some types of schools than in others. Relationships between characteristics like poverty and ethnicity status are slopes, and the slopes may differ from one school to the next.

**Distributional Assumptions of School-Level Variables**

Before conducting statistical analyses, it is prudent to check on assumptions pertaining to the characteristics of analytic variables. Details are in Appendix B. The majority of variables are not problematic but POV_MEDI is not normally distributed. POV_MEDI, a school-level (i.e., Level 2 variable) is the percentage of students in a school who are on FRPL (i.e., 1.0 means 100% of students are on FRPL and 0 means no students receive this service). A p-p plot (probability-probability” plot) of POV_MEDI shows the cumulative probability of observing values against an expected normal distribution. In short, the plot compares a z-value for each observation against an expected value if the data were normally distributed (the diagonal line). If data are normally distributed, the data follow the diagonal line (Field, 2009). Appendix B displays a p-p plot and associated histogram of POV_MEDI; the variable is skewed and is characterized by large numbers of high poverty schools (seven schools serve only students who receive FRPL). A box plot in the appendix shows that the median POV_MEDI rate is 0.86 (rounded). Any low poverty schools are fairly extreme outliers. The relationship between POV_MEDI and Reading Mean displays a large, negative correlation (-0.764). The scatterplot in the appendix shows that as school-level poverty increases, OAT reading drops. Squaring the correlation means that 58.3% of the variance

---

4 This variable has unusual distributional properties which are revisited below and in Appendix B. Note that this information is not directly related to the research questions, but details are provided because these inform later modeling decisions.
in school-level reading achievement is explained by school poverty levels. A similar result is the case with the relationship between POV_MEDI and Math. The scatterplot in the appendix shows that as school-level poverty increases, OAT math drops. Squaring the correlation means that 39.4% of the variance in school-level math achievement is explained by school poverty levels. The net result of these factors is that HLM models that use school-level poverty as a predictor variable yield coefficients that are difficult to interpret. To promote model parsimony, the researcher decided to dichotomize the variable by splitting it at the median value. ―Low poverty schools‖ have a percentage of students of FRPL that is below the median for the 79 schools, ―High poverty schools‖ are those above the median.

**Hierarchical Linear Modeling**

HLM is appropriate for this study because of the nested nature of the sample and because it is worthwhile examining if the relationship between student-level predictors varies by schools. Two-level HLM models, where students were conceptualized as informing level 1 equations and schools are at level 2, were used to test whether reading and math achievement were influenced by student-level ethnicity and poverty status. School-level socioeconomic status, gender, school-level attendance, school-level discipline, and school-level mobility were also modeled. The overall approach uses the ―slopes and intercepts as outcomes‖ technique described by Raudenbush and Bryk (2002, p. 80). This approach allows for investigation of whether intercepts (i.e., average achievement) vary across schools for math and reading achievement (a separate model is run for each dependent variable). The approach also allows for an examination of whether slopes within schools vary. That is, if a relationship exists between, for example,
student reading achievement and poverty, the modeling approach determined if this relationship is constant across all 79 schools, or if it was stronger in some schools than others. If the latter is the case, one can attempt to determine what types of schools have students where poverty status more strongly predicts achievement, and the types of schools where poverty status is less important. This can directly address the guiding research question, which focuses on identifying student and school-level factors that predict student achievement in the target district.

An initial step when using this approach is to empirically determine if the data are indeed nested. To do so, Raudenbush and Bryk (2002) use a random effects analysis of variance model, which partitions variance at each level of the data (i.e., school and student level variance). The basic model for this analysis is:

$$\gamma_{ij} = \gamma_{00} + \mu_{oj} + r_{ij}$$

where

$\gamma_{ij}$ is the math (or reading) OAT score of student $i$ in school $j$,

$\gamma_{00}$ is the grand mean of the dependent variable (i.e., the district average on math or reading),

$\mu_{oj}$ is a random effect estimate associate with school-level variance around the mean, and

$r_{ij}$ is student level variance.

This model yields the variance components needed to calculate the intraclass correlation (ICC). The ICC measures the proportion of variance in the outcome between schools (Raudenbush & Bryk, 2002). Put another way, an ICC of zero would mean that each observation is completely independent. This is not only a critical statistical
assumption if one is to interpret a $p$-value in classic $t$-tests, ANOVA, etc., it would mean that school membership has no bearing on student achievement. By contrast, an ICC value of one would indicate all variance is a function of school membership (i.e., all students score the same within each school). This of course not typically expected, but there is merit in explaining the ranges of a statistic so as to ascertain its meaning. The formula for the ICC is:

$$\rho = \frac{\tau_{00}}{(\tau_{00} + \sigma^2)}$$

where $\rho$ is the ICC, $\tau_{00}$ is the estimate of the variance in the data attributed to schools and $\sigma^2$ is an estimate of student level variance (Raudenbush & Bryk, 2002). In the current dataset, the following ICCs were observed: 0.116 ($\tau_{00} = 90.51$ and $\sigma^2 = 689.81$) $90.51/90.51 + 689.81$ for the Reading OAT and an ICC of 0.181 ($\tau_{00} = 174.66$ and $\sigma^2 = 789.39$) $174.66/174.66 + 789.39$ for the Math OAT. ICCs of this magnitude call for the application of hierarchical and not more standard ordinary least square modeling procedures (Raudenbush & Bryk, 2002).

A next step is to consider school-level variation around mean performance on each achievement variable (Raudenbush & Bryk, 2002). Table 17 displays the mean estimated reading and math achievement among schools in the study and the variance around this mean.
Table 17

Results from Random Effects ANOVA for READING

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>se</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, β0</td>
<td>INTRCPT2, γ00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>400.508860</td>
<td>1.149453</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Variance Component</th>
<th>d.f.</th>
<th>χ²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRCPT1, u₀</td>
<td>89.30004</td>
<td>78</td>
<td>587.79927</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>level-1, r</td>
<td>695.32498</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The variance around the mean is statistically significant; the expectation is that 95% of the 79 school means (recall these analyses consider the average performance of each individual school) fall within the plausible values range of 381.99 to 419.03.

Table 18 displays the mean Math achievement among schools in the study and associated variance.

Table 18

Results from Random Effects ANOVA for MATH

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>se</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, β₀</td>
<td>INTRCPT2, γ₀₀</td>
<td></td>
</tr>
<tr>
<td></td>
<td>406.672357</td>
<td>1.527610</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Variance Component</th>
<th>d.f.</th>
<th>χ²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRCPT1, u₀</td>
<td>162.06716</td>
<td>76</td>
<td>804.21286</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>level-1, r</td>
<td>787.50108</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The variance around the mean is statistically significant and the expectation is that 95% of the 79 school means fall within the plausible values range of 381.72 to 431.62.

A take away point from Tables 9-10 is that one should not assume that the grand mean (based on the total sample) adequately describes the sample on each achievement variable; rather, it is clear that schools vary considerably in terms of their average reading and math performance.

**Preliminary Models**

The intercepts and slopes as outcomes model approach is used in this study. These models conceptualize each school as having its own regression equation between student-level poverty and achievement. The models were run to examine the relationship between the dependent variables Reading and Math and the predictor variables Ethnicity and Poverty across the 79 schools. That is, the strategy is to look at each school as having its own regression equation with an intercept and slope. To promote model parsimony, the researcher eliminated variables that were not statistically significant predictors. Details are in Appendix C.

Three questions are addressed using these models:

1. What is the average of the coefficients of the 79 regression equations?
2. How much variation is there from one school to another?
3. What is the correlation between the intercepts and the slopes? (Raudenbush & Bryk, 2002).

The models centered student-level (i.e., Level 1) variables on the group mean (group centered; Raudenbush & Bryk, 2002). Briefly, one can engage in grand or group mean centering. Grand mean centering simply forces the overall intercept (i.e., average
performance on a dependent variable) to equal zero. This is done to aid in the interpretation of coefficients. Group mean centering, by contrast, is needed if one wishes to compare performance across higher order units in the analyses (Raudenbush & Bryk, 2002). In this case, schools represent the higher order unit and the analyses “centers” coefficients within schools. This sort of centering allows for making comparisons across schools. Two primary types of models are presented below, one for each dependent variable (student-level reading and math). These models include student-level poverty and math variables and school-level variables.

Table 19 provides variable abbreviations used in the models. Table 20 defines the school level abbreviations used in the models.

Table 19

*Abbreviations for Student-Level Independent Variables*

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETH</td>
<td>A student’s ethnicity where 0 = White and 1 = Minority</td>
</tr>
<tr>
<td>POV</td>
<td>Student’s socioeconomic status using FRPL Data, where 0 = Non-Poverty and 1 = Poverty</td>
</tr>
<tr>
<td>GENDER</td>
<td>0 = Female, 1 = Male</td>
</tr>
<tr>
<td>NABS</td>
<td>Student’s number of absences during the academic school year</td>
</tr>
<tr>
<td>REDISDAY</td>
<td>Student’s number of discipline days during the academic school year</td>
</tr>
<tr>
<td>NSCHATT</td>
<td>Student’s number of schools attended during the academic school year</td>
</tr>
</tbody>
</table>

* * All variables were compiled from the Ohio Department of Education Website (2010)
Table 20

*Abbreviations for School-Level Independent Variables*

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OATRDG_M</td>
<td>(OAT Reading Mean)</td>
</tr>
<tr>
<td>OATMAT_M</td>
<td>(OAT Math Mean)</td>
</tr>
<tr>
<td>NABS_MEA</td>
<td>(Number of Absences Mean)</td>
</tr>
<tr>
<td>ETH_MEDI</td>
<td>(Percentage of Students in the “Ethnicity” (i.e., non-White) category in a School)</td>
</tr>
<tr>
<td>POV_MEDI</td>
<td>(Percentage of Students in “Poverty,” meaning they are in the FRPL program)</td>
</tr>
<tr>
<td>REDISDAY_mean</td>
<td>(Discipline Days Mean)</td>
</tr>
</tbody>
</table>

* All variables were compiled from the Ohio Department of Education Website (2010)

The following preliminary models display parameter estimates using students‘ reading and math OAT scores as the dependent variable (across separate models for each dependent variable). The rationale for running these models is to determine which student and school-level variables are statistically significant predictors of achievement and slopes. These initial models are all preliminary and were run to identify statistically significant predictor variables. Since several variables available from ODE were not found to be useful predictors of achievement, these exploratory models were placed in appendices. Final models are presented later in the chapter.

Appendix C displays variance parameter estimates for the reading achievement model with all available level one predictor variables and with only predictor variables of Ethnicity and Poverty. Appendix D displays variance parameter estimates for the two relevant regression equations with math achievement as the dependent variable. The
estimates in the regressions were first made with all the student level components (ethnicity, poverty, gender, attendance, discipline, and mobility) included in the regression equation. Then the student level components of Ethnicity and Poverty were only reported for the estimates. After running the preliminary models only Poverty and Ethnicity at the student level were found to be statistically significant predictors of achievement. The rest of the predictors were dropped in order to unencumber the composition of the models. An attempt was made to run Eth*Pov interaction at student level but the models would not converge. This is likely due to the variable adding no information over and above Eth + Pov, as well the failure to converge is possibly due to multicollinearity (i.e., the new interaction variable provides the same information as the base variables). Based on the ANOVA results, it was suspected there was no interaction between the two variables so this was not investigated further.

**Reading Results**

The following section provides estimates for the average regression equation within schools. To promote model parsimony, the researcher eliminated variables that were not statistically significant predictors of reading achievement. Details are in Appendix E. The level 1 model takes the following form:

\[ OATRDG_{ij} = \beta_{0j} + \beta_{1j} (ETH_{ij}) + \beta_{2j} (POV_{ij}) + r_{ij} \]

Level 2 is:

\[ \beta_{0j} = \gamma_{00} + \gamma_{01} (POV\_MEDI_{j}) + \gamma_{02} (ETH\_MEDI_{j}) + u_{0j} \]

\[ \beta_{1j} = \gamma_{10} + \gamma_{11} (POV\_MEDI_{j}) + \gamma_{12} (ETH\_MEDI_{j}) + u_{1j} \]

\[ \beta_{2j} = \gamma_{20} + \gamma_{21} (POV\_MEDI_{j}) + \gamma_{22} (ETH\_MEDI_{j}) + u_{2j} \]
Table 21 displays results for reading as the dependent variable for the regression model for Ethnicity and Poverty with all level two predictors.

Table 21

Results from Intercepts and Slopes Outcomes Model for Ethnicity and Poverty only model with ALL level two predictor variables and Reading as the dependent variable

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, $\beta_0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{00}$</td>
<td>400.514572</td>
<td>0.882152</td>
<td>454.020</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>POV_MEDI, $\gamma_{01}$</td>
<td>-11.134988</td>
<td>1.867717</td>
<td>-5.962</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>ETH_MEDI, $\gamma_{02}$</td>
<td>-4.784443</td>
<td>1.867707</td>
<td>-2.562</td>
<td>0.012</td>
</tr>
<tr>
<td>For ETH slope, $\beta_1$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{10}$</td>
<td>-5.332128</td>
<td>1.516793</td>
<td>-3.515</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>POV_MEDI, $\gamma_{11}$</td>
<td>4.109014</td>
<td>2.730620</td>
<td>1.505</td>
<td>0.137</td>
</tr>
<tr>
<td>ETH_MEDI, $\gamma_{12}$</td>
<td>-2.821454</td>
<td>3.087077</td>
<td>-0.914</td>
<td>0.364</td>
</tr>
<tr>
<td>For POV slope, $\beta_2$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{20}$</td>
<td>-9.416802</td>
<td>1.867519</td>
<td>-5.042</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>POV_MEDI, $\gamma_{21}$</td>
<td>3.870597</td>
<td>4.007355</td>
<td>0.966</td>
<td>0.337</td>
</tr>
<tr>
<td>ETH_MEDI, $\gamma_{22}$</td>
<td>6.929791</td>
<td>3.293900</td>
<td>2.104</td>
<td>0.039</td>
</tr>
<tr>
<td>Random Effect</td>
<td>Standard Deviation</td>
<td>d.f.</td>
<td>$\chi^2$</td>
<td>p-value</td>
</tr>
<tr>
<td>INTRCPT1, $u_0$</td>
<td>6.81112</td>
<td>64</td>
<td>298.08982</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>ETH slope, $u_1$</td>
<td>5.05811</td>
<td>64</td>
<td>82.68169</td>
<td>0.058</td>
</tr>
<tr>
<td>POV slope, $u_2$</td>
<td>5.49872</td>
<td>64</td>
<td>86.50349</td>
<td>0.032</td>
</tr>
<tr>
<td>level-1, $r$</td>
<td>25.83883</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 21 displays Ethnicity and Poverty group centered model with all available level two predictors. The results show an intercept coefficient of 400.51 with POV slope intercept of -9.42 and ETH_MEDI slope of 6.93. The statistically significant coefficient for ETH_MEDI yields a weaker POV slope. The "penalty" for FRPL appears to be minimized in high Ethnicity schools.

Math Results

The following section provides estimates for the average math intercept (i.e., math achievement) and slope (i.e., regression equation) within schools. Math results are provided with two separate regressions each performed for Ethnicity and Poverty. Math results follow the same regression models as Reading. To promote model parsimony, the researcher eliminated variables that were not statistically significant predictors of math achievement. Details are in Appendix F. The level 1 model takes the following form:

\[
OATMAT_{ij} = \beta_{0j} + \beta_{1j}*(ETH_{ij}) + \beta_{2j}*(POV_{ij}) + r_{ij}
\]

Level 2 is:

\[
\beta_{0j} = \gamma_{00} + \gamma_{01}*(POV_{MEDI_j}) + \gamma_{02}*(ETH_{MEDI_j}) + u_{0j}
\]

\[
\beta_{1j} = \gamma_{10} + \gamma_{11}*(POV_{MEDI_j}) + \gamma_{12}*(ETH_{MEDI_j}) + u_{1j}
\]

\[
\beta_{2j} = \gamma_{20} + \gamma_{21}*(POV_{MEDI_j}) + \gamma_{22}*(ETH_{MEDI_j}) + u_{2j}
\]

Table 22 displays results for math as the dependent variable for the regression model for Ethnicity and Poverty with all level two predictors.
Table 22

Results from Intercepts and Slopes Outcomes Model for Ethnicity and Poverty only model with ALL level two predictor variables and Math as the dependent variable

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, $\beta_0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{00}$</td>
<td>406.972583</td>
<td>1.186808</td>
<td>342.914</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>POV_MEDI, $\gamma_{01}$</td>
<td>-13.386259</td>
<td>2.514348</td>
<td>-5.324</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>ETH_MEDI, $\gamma_{02}$</td>
<td>-8.562173</td>
<td>2.514334</td>
<td>-3.405</td>
<td>0.001</td>
</tr>
<tr>
<td>For ETH slope, $\beta_1$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{10}$</td>
<td>-7.910480</td>
<td>1.726427</td>
<td>-4.582</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>POV_MEDI, $\gamma_{11}$</td>
<td>2.463298</td>
<td>3.194487</td>
<td>0.771</td>
<td>0.443</td>
</tr>
<tr>
<td>ETH_MEDI, $\gamma_{12}$</td>
<td>0.475562</td>
<td>3.521855</td>
<td>0.135</td>
<td>0.893</td>
</tr>
<tr>
<td>For POV slope, $\beta_2$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{20}$</td>
<td>-7.630802</td>
<td>2.101909</td>
<td>-3.630</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>POV_MEDI, $\gamma_{21}$</td>
<td>7.923166</td>
<td>4.520686</td>
<td>1.753</td>
<td>0.084</td>
</tr>
<tr>
<td>ETH_MEDI, $\gamma_{22}$</td>
<td>5.885256</td>
<td>3.834571</td>
<td>1.535</td>
<td>0.129</td>
</tr>
<tr>
<td>Random Effect</td>
<td>Standard Deviation</td>
<td>d.f.</td>
<td>$\chi^2$</td>
<td>p-value</td>
</tr>
<tr>
<td>INTRCPT1, $u_0$</td>
<td>9.66913</td>
<td>64</td>
<td>444.04822</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>ETH slope, $u_1$</td>
<td>7.23242</td>
<td>64</td>
<td>100.03089</td>
<td>0.003</td>
</tr>
<tr>
<td>POV slope, $u_2$</td>
<td>7.80802</td>
<td>64</td>
<td>91.69299</td>
<td>0.013</td>
</tr>
<tr>
<td>level-1, $r$</td>
<td>27.48319</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 22 displays Ethnicity and Poverty group centered model with all available level two predictors. The results shows the average school mean for math is 406.97 with the average ETH_MEDI intercept of -8.56 suggesting a student at a school with a high percentage of Minority students can expect to score 8.56 points lower than a student at a school with a low percentage of Minority students. The POV_MEDI intercept of -13.39 suggests a student at a school with a high percentage of impoverished students can expect to score 13.39 points lower than a student at a school with a low percentage of impoverished students. The POV slope intercept of -7.63 and POV_MEDI slope of 7.92 yields a weaker POV slope. The "penalty" for FRPL is minimized in high Poverty schools, although this is not a statistically significant coefficient.

Table 23 displays t-test results comparing the means of high Ethnicity schools versus the means of low Ethnicity schools.

Table 23

<table>
<thead>
<tr>
<th>ETH_median</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>oat math mean &gt;= .84</td>
<td>40</td>
<td>401.1020</td>
<td>11.02151</td>
<td>1.74265</td>
</tr>
<tr>
<td>oat math mean &lt; .84</td>
<td>39</td>
<td>414.2274</td>
<td>15.18891</td>
<td>2.43217</td>
</tr>
<tr>
<td>oat reading mean &gt;= .84</td>
<td>40</td>
<td>396.3730</td>
<td>8.97772</td>
<td>1.41950</td>
</tr>
<tr>
<td>oat reading mean &lt; .84</td>
<td>39</td>
<td>404.7949</td>
<td>9.93040</td>
<td>1.59014</td>
</tr>
</tbody>
</table>
Table # 23 continued

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality t-test for Equality of Means of Variances</th>
<th></th>
<th></th>
<th></th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>( F )</td>
<td>( \text{Sig.} )</td>
<td>( T )</td>
<td>( df )</td>
</tr>
<tr>
<td>( t )-test for Equality of Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances assumed oat math mean</td>
<td></td>
<td>4.256</td>
<td>.042</td>
<td>-4.404</td>
<td>77</td>
</tr>
<tr>
<td>Equal variances not assumed oat math mean</td>
<td></td>
<td>-4.387</td>
<td>69.249</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Equal variances assumed oat reading mean</td>
<td></td>
<td>.052</td>
<td>.819</td>
<td>-3.956</td>
<td>77</td>
</tr>
<tr>
<td>Equal variances not assumed oat reading mean</td>
<td></td>
<td>-3.951</td>
<td>75.796</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

The t-test results show that achievement drops for both math and reading in schools with high levels of Ethnicity (84% and higher). The average math mean score for schools with 84% or higher Ethnicity is 401.10 versus 414.22 for schools with Ethnicity below 84%.

The results for reading are similar: the average reading mean score for schools with 84% or higher Ethnicity is 396.37 versus 404.80 for schools with Ethnicity below 84%.

The difference in schools with higher Ethnicity versus lower Ethnicity may account for the HLM coefficient. There may simply be a smaller within school slope coefficient in high Ethnicity schools because these schools do not achieve well in the first place, relative to other schools.
Summary

The purpose of this study was to investigate how key predictors impact academic achievement. A large urban Ohio school district was the focus of the study. Student and school level predictors were used to consider relationships in academic outcomes. Multilevel regression analyses were deployed, using data obtained from the Ohio Department of Education to examine achievement differences among students based on socially ascribed characteristics, with the focus on impoverished urban White students’ academic achievement.

Descriptive analyses suggested that Ethnicity and Poverty were strong predictors of achievement in the district. Minority students scored lower in both reading and math as compared with White students. The mean score for Poverty students is substantially lower than for non-poverty students (13.45 points). As with Ethnicity, Poverty appears to be a strong predictor of both types of achievement.

Regression analyses were conducted using HLM software. Two-level HLM models (students were level 1, schools were level 2) were run to test whether reading and math achievement were influenced by the predictor variables: student-level ethnicity, school-level socioeconomic status, gender, school-level attendance, school-level discipline, and school-level mobility. Several preliminary models were run to determine which student and school-level variables were statistically significant predictors of achievement. These details are appended. Overall, the values of these estimates differ across the 79 schools in the district. The variation in slope means that each school has its own student-level regression equation that explains the relationship between achievement, poverty and ethnicity.
Two separate multilevel regressions were performed for each dependent variable, using Ethnicity and Poverty as group centered predictors. It was found that the students who receive Free and Reduced Price Lunch did not appear to perform appreciably worse than their peers who do not receive this support, if attending schools that serve a high percentage of Minority students. In an attempt to explain this pattern, an independent t-test was performed using the school-level Ethnicity variable as a grouping variable, and reading achievement scores at the school level was the dependent variable. The results indicate achievement drops for reading in schools with high levels of Ethnicity. The average reading mean score for schools with 84% or higher Ethnicity is 13.12 points lower than for schools with Ethnicity below 84% (401.10 versus 414.22). No statistically significant outcomes were found when modeling math achievement. The final models leave a significant amount of unexplained variance for slopes and intercepts. Chapter five discusses the significance of these findings and how they relate to the original context of the study of how student and school level factors impact achievement.
Chapter Five: Summary of Findings, Discussions, and Recommendations

Introduction

This chapter summarizes the results of the study and provides interpretations of those results. The investigation was motivated by qualitative work that investigated the experiences of middle school students in Texas (Morris, 2006). The study presented here is a quantitative extension of the idea in a large urban district. This study investigated key predictors of achievement among impoverished urban students with a particular focus on ethnicity (which was a dichotomous variable in the ODE dataset). The 2 x 2 ANOVA plainly answers the sub-confirmatory question: Do impoverished urban White students perform at comparable levels to impoverished urban Minority students? The study distinctly shows that Ethnicity and Poverty are strong predictors of both math and reading achievement. The findings of the present study parallel the findings of the middle school in Texas. These findings are not surprising but also like Morris' study show that impoverished urban White students need attention.

These findings are discussed in further detail throughout the chapter. The first section of chapter five provides an overview of the major findings. The next section presents interpretations of these results and how they relate to the extant literature. The third section discusses implications for practice. The fourth section makes recommendations for future research.

Major Findings

The study set out to answer one major research question: To what extent do student-(particularly race/ethnicity and SES) and school-level factors influence student
achievement? A sub-confirmatory question is part of the study: Do impoverished urban White students perform at comparable levels to impoverished urban Minority students?

Analyses showed that Ethnicity and Poverty were significant predictors of achievement not only for impoverished urban Minority students as the extant literature suggests (e.g., Thompson & Barnes, 2007; CEP, 2007; Clotfelter, et al., 2006; Ferguson, 2000; Hanushek & Rivkin, 2006; Herman, 2009; Gardner, 2007; Jencks & Phillips, 1998; Johnson, 2005; Morris, 2006; Oakes, 1985) but also for impoverished urban White students.

The study used data compiled from one school district during the 2008-2009 school year, and were obtained from the Ohio Department of Education. The sample contained all third graders (4,215 students) from the district studied. Included in the data set were: 3,035 Minority students and 1,177 White students; a total of 3,529 students were identified in the poverty category while 686 students were identified in the non-poverty category.

The sample performed at about expected levels on the OAT: 400.72 mean for reading and 408.14 mean for math (the range around the mean school performance was sensible as per random effects ANOVA). There were a high number of Minority students (72%), and high number of students on FRPL (83.7%). The fact that some schools have 100% students on FRPL is not surprising based on the characteristics of the district studied.

There were two key multilevel models used to examine variance in the data, one for understanding math achievement and one for reading. Both models group centered student Ethnicity and Poverty at level one so as to allow for an examination of whether
these variables predict achievement in school, and to see if any school-level variables predicted the size of the 79 slopes. Key level-two variables included school level Ethnicity (a dichotomized variable based on the median split of .8387) and school level Poverty (median split of .8966).

The findings in this study are consistent with the study that informed this project. The present study found the same pattern as Morris' study using a very different method, in a different district, and with a much larger sample. The study of Matthews Middle School in Texas found White students were influenced by poverty. Both the present quantitative study of an entire district and the qualitative study of one school in Texas found urban White students are influenced by socioeconomic status. Ethnicity and Poverty are key influences on achievement which supports the motivation of the present study that the performances of impoverished White students in urban settings face constraints that are parallel to those of impoverished Minority urban students.

**Ethnicity.** The 2X2 ANOVA and simple descriptive analyses from HLM results show the mean score for Minority students in math was 15.54 points lower than for White students (419.34 White students versus 403.80 Minority students). The reading gap is smaller: White students scored on average 9.84 points higher (407.83 White students versus 397.99 for Minority students).

Additional results suggest the following information:

(1) White students achieved higher OAT reading and math mean averages (407.83/397.99 in reading and 419.34/403.80 in math),

(2) White students averaged 9.04 days absent per student while Minority students averaged 7.61 days absent per students,
(3) Minority students averaged nearly two more discipline days per student (5.70 days for Minority to 3.77 for White students), and

(4) Minority students attended schools where 88% of the students received FRPL (the poverty variable) whiles White students attended schools with 58% school-level poverty.

The coefficient for Minority students of -5.33 represents the average decrease in reading achievement score for a Minority student as opposed to a non-Minority student (-7.91 for math achievement). This shows a strong relationship between achievement and Ethnicity for the dependent variables of reading and math for the whole sample. In summary, Ethnicity status makes a difference depending on the school.

In regards to Ethnicity and achievement gaps the majority of research conducted has been done in regards to the Black-White achievement gap (Thompson & Barnes, 2007; Clotfelter, et al., 2006; Diamond, 2006; Hanushek & Rivkin, 2006; Herman, 2009; Jencks & Phillips, 1998; Johnson, 2005; Lee, 2006; Page, et al., 2008). The findings in this study are consistent with the extant research that gaps exist in regards to the Black-White achievement gap but also show gaps for impoverished disadvantaged White students which is lacking in the extant literature.

**Poverty.** The reading OAT results show a gap for poverty students versus non-poverty students. The mean score for non-poverty students was 9.24 points higher than poverty students (408.70 non-poverty students versus 399.46 for poverty students).

In addition:

(1) The difference in OAT Reading for Minority non-impoverished to impoverished is 15.07;
(2) The difference for White OAT Reading is 22.41 points;

(3) The difference for impoverished White to impoverished Minority is 5.5 points;

(4) The gap for impoverished White is larger than for impoverished Minority (7.34 points - 22.41 points to 15.07 points);

(5) The difference in OAT Math for Minority non- economically disadvantaged to economically disadvantaged is 18.33;

(6) The difference in OAT Math for White students is 24.92 points;

(7) The difference for economically disadvantaged White to economically disadvantaged Minority is 10.66 points;

(8) The gap for impoverished White is considerably larger than for impoverished Minority (6.59 points).

The coefficient (see analysis from Table 14) for impoverished students of -9.42 represents the average decrease in reading achievement score for an impoverished student as opposed to a non-impoverished student (-7.63 for math achievement). Despite the negative reading Poverty slope intercept (-9.42) the "penalty" for FRPL appears to be minimized in high Ethnicity schools due to the statistically significant coefficient for the Ethnicity median slope (6.93) yielding a weaker POV slope. This shows a strong relationship between achievement and Poverty for the dependent variables of reading and math for the whole sample.

The findings in this study are consistent with other studies centered on poverty and educational outcomes (Barton & Coley, 2007; Israel, et al., 2001; Jencks & Phillips, 1998; Kozol, 1991; Morris, 2005; 2006; Woodrum, 2004). Morris’ (2005, 2006) study is the only study in the aforementioned that deals directly with impoverished urban White
students. The present study is consistent with Morris’ work in finding that economically
disadvantaged urban White students are a group that deserves attention.

**Interpretation and Discussion**

**Achievement Gaps.** The current study strongly suggests that the reading
achievement gap for economically disadvantaged White 3rd graders in the district to
impoverished Minority 3rd graders in the district is relatively small (difference of 5.5
points). The math achievement showed the gap for impoverished White to impoverished
Minority is slightly more substantial than for reading (difference of 10.66 points). Both
findings support the idea that impoverished urban White students are in need of
intervention. This is however a group that receives scant coverage in the extant literature
(Diamond, 2006; Hanushek & Rivkin, 2006; Herman, 2009; Jencks & Phillips, 1998;
Johnson, 2005) and there is minimal policy designed to meet their needs (Thompson &
Barnes, 2007).

Existing studies (Hodgkinson, 1995; Jeynes, 2005; Mandara, Greene & Varner)
found that SES is responsible for part of the achievement gap comes from the consistent
finding that SES factors, such as parental educational attainment, parental occupational
status, and family wealth are strongly connected with student academic achievement.
Low achievement is strongly associated with lack of resources. The current study
displayed achievement data in both reading and math domains that affirms the extant
literature (non-impoverished students averaged 13.45 points higher in math and 9.24
points higher on average in reading).
Conditions used to explain the extensive achievement gaps between African-American students and White students have emphasized child rearing practices and environmental circumstances (Thompson & Barnes, 2007; Jencks & Phillips, 1998). Variables within the family, culture, and physical environment, as well as limitations within the genetic makeup of students will have a far stronger influence on achievement than improving educational programming (Evans, 2005; Gallagher, 1998). These aforementioned explanations can be used to explain the gap for impoverished Urban White students in the current district studied. A family’s values and attitudes toward education play a significant role in student, school, and district success. Home background and environmental measures play a major role in individual outcomes while schooling has marginal effect on individual achievement. Individual factors such as gender, race, human capital, psychological traits, parental occupation, and the social networks families are associated with far outweigh schooling influence with regards to impact on the achievement gap (Coleman, et al., 1966; Jenks & Phillips, 1998; U.S. Commission on Civil Rights, 2004).

Home background and environmental measures play a major role in individual outcomes while schooling has marginal effect on individual achievement. Individual factors such as, gender, race, human capital, psychological traits, parental occupation, and social networks families are associated with far outweigh schooling influence with regards to impact on the achievement gap (Coleman, et al., 1966; Jenks & Phillips, 1998; U.S. Commission on Civil Rights, 2004). Minority children comprise the highest percentage of impoverished children. However, White children living in poverty make up a higher total number comprising of nearly 8 million children, more than 2 times African-

The current study found that Ethnicity and student SES (Poverty level) were significant predictors of student achievement for the full sample. Student Ethnicity coefficient for reading was -5.33 and for math -7.91 representing the average decrease in score for Minority students from the average mean score. Student Poverty was -9.42 for reading and -7.63 for math representing the average decrease in score for impoverished students from the average mean score. Both school level predictors of achievement were significant: school percentage of Poverty (for reading and math) and school percentage of Ethnicity (for reading).

**Study Limitations**

Although study limitations were discussed in chapter one as part of the delimitations and limitations of the study, a few key points are reviewed in this section. The work in this study is exploratory in nature. That is, theory was not confirmed; rather, the findings here can only inform theory-based discussion around race and achievement in a single school district while working with a single grade. An additional limitation that arose from the analyses is the models leave unexplained variance around the dependent variables.

**Implications for Practice**

Again, this study was exploratory in nature leaving unexplained variance around the dependent variables of reading and math achievement. Yet the findings can inform policy implications for the district and broader educational practice. The 2X2 ANOVA shows the gap for economically disadvantaged White students is large, suggesting
impoverished White students should not be overlooked and policies should not be created based on race. Schools should have policies that meet the needs of all students.

Implications for practice are discussed in three areas: Early intervention, teacher efficacy, and student relationships. These areas all center on the idea that impoverished urban White students should not be overlooked.

The district studied can implement strategies with impoverished White students that have been successful in closing the gaps of impoverished Minority students.

**Early Intervention.** Though this study did not produce any direct implications for practice to decrease the achievement gap for urban impoverished White students, the findings should support the use of strategies for this group that are believed to narrow the gaps for Minority students. It is important for policymakers to recognize that gaps for impoverished students need to be narrowed before students enter school. Early experiences affect language acquisition and are crucial to the success of every child. Non-economically disadvantaged family's interactions with children during the first few years of life tends to support development while impoverished families interactions with the same age children is often problematic (Barton & Coley, 2008). This suggests universal Pre-Kindergarten is needed for all children. In order to cut or eliminate gaps before school starts or before children fall to far behind policy makers need to invest in schooling at an early age.

**Teacher Efficacy.** Administrators of Title I schools should have greater control over the teachers who work in their building. Teachers have a tremendous influence on the schooling outcomes of children (Kozol, 1991; Morris, 2005; 2006; Rist, 1970). Giving principals more control over who is teaching in their building should enable them
to build a more effective, qualified, and coherent staff. Higher poverty schools are often equipped with the least effective teachers (Haycock, 2002; Rice, 2010). These are the students who are lacking the most educationally. This suggests the most effective teachers need to teach in higher poverty schools to help students close and even eliminate gaps. Thompson and Barnes (2007) went as far as to recommend to The Commission on No Child Left Behind that administrators in Title I schools, the lowest performing schools, should be able to refuse the transfer or hiring of a teacher who is not a Highly Qualified Teacher (HQT). This suggests the best teachers need to be with the students that are most vulnerable to school failure.

**Student Relationships.** The average percentage of students receiving FRPL in the district is 83.7%. The key to achievement for students from impoverished backgrounds is in creating relationships with them (Baker, 1999; Bernard, 1993; Bryk, Lee & Holland 1993; Wang, Haertel & Walberg, 1993/1994; Weinstein, Tomlinson-Clarke & Curran, 2004). Benard (2012) reports that 70% of students from life’s most difficult circumstances go beyond survival and grow into thriving adults when schools put their focus on supporting children. Studies suggest that African American parents strongly push for their children to do their best in school (Harrison & Huntington, 2001). Teachers need to mentor students as well as teach them academics. Cultivating relationships is essential to achievement particularly with impoverished students. Bryk, Lee and Holland (1993) suggest that relationships are more essential to school success than is typically accepted, especially in regards to the most disadvantaged youth.
**Recommendations for Further Research**

This study set out to investigate ways that key predictors influence student achievement while investigating the challenges to academic achievement for urban impoverished White students (while analyzing whether the challenges are the same for Minority students). The study’s findings prompt a number of questions for further research. The analyses showed that Ethnicity and Poverty are strong predictors of both reading and math achievement. In schools with high Ethnicity the "penalty" for FRPL is minimized. Conclusions cannot be drawn for why this finding occurred (additional analysis completed in SPSS did not provide clarification; possible reason: most students did not perform well in high poverty schools). However, the finding that Race/Ethnicity is a significant predictor of achievement opens up the door for further research to answer why Ethnicity is such a strong predictor.

The findings of this research are based solely on one school district in one geographic location. It is likely all predictor variables are not included in the models leaving unexplained variance around the dependent variables. That is, per ODE data a full explanation of why schools perform differently on average (and why slopes within schools vary). Furthermore, as mentioned earlier the single state limits the generalizability of the results to other districts and other states. Additional research should be done to see if the general pattern of results appears in other school systems.

**Recommendation 1.** The results of the study showed Ethnicity to be a strong predictor of achievement. Future researchers might conduct a quantitative study to be generalized over a larger group of students. Additional grade levels could be studied and other predictor variables analyzed such as school-level teacher characteristics. ODE has
relevant school-level teacher characteristics (percentage with Masters Degrees, average years of experience, percentage of teachers Highly Qualified). This study would offer interesting possibilities (e.g., does percentage of teachers with masters’ degrees impact differently on White students versus Minority students?).

**Recommendation 2.** Future research might extend this study to other urban districts in the state, and/or compare with school districts in other locales (e.g., rural, suburban). This could be another quantitative study that uses extant data. Comparing with other types of schooling systems could identify differences that might suggest or inform policy and practice. How an impoverished White student achieves in an urban setting as opposed to an impoverished White student in a rural or suburban setting is worth investigating.

**Recommendation 3.** Future research around the impact social factors has on the impact of student achievement could use further investigating. A more comprehensive completely specified model might contain process variables (e.g., teacher qualifications, pedagogies, curriculum) in order to analyze their potential effect on achievement levels and achievement distributions. Possible research questions include:

- How does family culture and teacher perception affect the achievement gap for economically disadvantaged Minority children?
- How is the achievement gap in Minority children and impoverished White children affected by family health and socioeconomic status?
- How does poor health and development affect retention, social promotion, and school dropout of economically disadvantaged Minority students?
What is the effect of inadequate health and social resources on impoverished White children?

**Recommendation 4.** Parental education, parental occupation, family culture, and familial attitudes are part of an individual’s culture and influence upbringing and achievement (Jeynes, 2005; Morris, 2006). A research study that extends Morris’ qualitative work that was the motivation for the present study would be worth exploring. Morris (2006) looked at one school and how Ethnicity was a key factor in how student success or failure was measured. Despite students in his study having a similar SES as their Minority classmates White students were seen as intellectually superior to Minority students (Morris, 2006). The Texas study and the present study start from the viewpoint that teachers conflate race and SES; teachers make assumptions based on race and SES with poor Minority and affluent White (Rhodes, M. (In Press)). Going beyond what Morris (2006) and the current study have done, going beyond the conflating of race and SES and looking at more than the two groups of study; Minority and White is research worth exploring.

Researching more than one school through the use of ethnography would lead to an interesting comparison that can help teachers and administrators raise achievement.

**Recommendation 5.** Understanding how Ethnicity and SES impacts student achievement is a key finding of this study. A research study that investigates policy infrastructure centered on organizational structures that addresses the needs of impoverished urban White students is worth investigating. Research studies on impoverished Minority students is extensive (e.g., Thompson & Barnes, 2007; CEP, 2007; Clotfelter, et al., 2006; Ferguson, 2000; Gardner, 2007; Hanushek & Rivkin, 2006;

Lacking in the research are studies of how organizational school policies and administrative school policies impact impoverished urban White students.

**Recommendation 6.** The Texas study (Morris, 2006) and the present study start from the viewpoint that teachers conflate race and SES; teachers make assumptions based on race and SES with poor Minority and affluent White (Rhodes, M. (In Press)). Researching beyond what Morris (2006) and the current study have done, going beyond the conflating of race and SES and looking at more than the two groups of study (Minority and White) is research worth exploring.

**Summary**

The purpose of this study was to examine racial-group achievement differences while concentrating on economically disadvantaged White elementary school students in a single district. The 2X2 ANOVA results clearly indicate that impoverished White students do not exhibit the same achievement as White students who do not contend with poverty, and this drop is not trivial. This same pattern was found among Minority students as well. Multi-level regression analyses were used to explore the pattern of relationships between poverty and ethnicity status among third graders in the district, within each of the 79 schools. These analyses found that students who receive FRPL in "high Ethnicity schools" (these are schools where the majority of not all of the students who attend are classified by the state as Minority students) do not perform appreciably lower in reading than students who do not receive this support. An independent \( t \)-test was performed to examine if such schools perform differently than "low Ethnicity schools" and it was found that achievement drops for both math and reading in schools with high
levels of Ethnicity (84% and higher). This difference may simply be due to a smaller within-school slope coefficient in high Ethnicity schools because these schools do not achieve well in the first place, relative to other schools. Data from the Ohio Department of Education was used in the analysis. Chapter five summarizes the findings of the study and provides interpretations of those results.

As the chapter details, the predictor variables of Ethnicity and Poverty exhibit a strong relationship with achievement linked to both of the dependent variables of math and reading. The analysis showed a significant relationship as evidenced by student Poverty was -9.42 for reading and -7.63 for math representing the average decrease in score for impoverished students from the average mean score. Ethnicity predictor variable showed the mean score for Minority students in math was 15.54 points lower than for White students and the reading for Minority students was 9.84 points lower than for White students. Directly related to the research question the study centered on, *to what extent do student-(particularly race/ethnicity and SES) and school-level factors influence student achievement?*, the gap for impoverished White is larger than for economically disadvantaged Minority (7.34 points more than for economically disadvantaged Minority students- 22.41 points to 15.07 points) in the dependent variable of reading. This finding is consistent for the dependent variable of math also: the gap for economically disadvantaged White is larger than for impoverished Minority (6.59 points larger than for impoverished Minority students). These findings should at the least support the use of strategies that are believed to cut the gaps for Minority students with the intention of decreasing the achievement gap for urban impoverished White students, a group that the literature and policymakers have not given attention. As was
hypothesized in chapter one; the challenges appear to be parallel with the level of influence that is exerted on economically disadvantaged urban White students as has historically been given attention from educators, researchers and policymakers to impoverished urban Minority students.

Based upon the study findings the researcher suggested several implications for practice and opportunities for future research. Early intervention is essential to avoiding achievement gaps for all children regardless of Ethnicity or SES status. Teacher efficacy is another practice policymakers can enhance to influence student achievement. Administrators in struggling schools should have more power in hiring practices and the best teachers need to be with the most struggling students in order to close and even eliminate achievement gaps. Finally, student relationships are crucial if students of poverty are to have an opportunity of academic success. Teachers must cultivate relationships with students, to maximize their chances of getting out of poverty.

Additional research on how student and school-level factors influence student achievement is needed. Recommendations for further research studies are: conducting a qualitative study to be generalized over a larger group of students; extending this study to other urban districts in the state, possibly comparing with other types of school systems (rural, suburban); developing a more comprehensive fully specified study including process variables (e.g., teacher qualifications, pedagogies, curriculum) in order to analyze their possible influence on achievement levels and achievement distributions; and extending Morris' (2006) study researching more than one school through the use of ethnography would lead to an interesting comparison that can assist teachers and
administrators in raising achievement of students of all ethnicities and socioeconomic backgrounds.
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Appendix A: Histogram of the Dependent Variable OAT Reading

Figure 3. Histogram of the Dependent Variables OAT Reading

Histogram Dependent Variable: OAT Reading

Mean = 400.72
Std. Dev. = 27.992
N = 4,012
Figure 4. Histogram of the Dependent Variables OAT Math
Appendix B: Examining the Normality Assumption of POV_MEDI Level 2 OAT

Reading

Normal Q-Q Plot of POV_mean

Figure 5. Q-Q Plot of POV_mean
Histogram of POV_MEDI Level 2 OAT Reading

Figure 6. Histogram of Poverty Mean OAT Reading

Mean = 84
Std. Dev. = .163
N = 79
Box Plot of POV_MEDI Level 2 OAT Reading

Figure 7. Box Plot of Poverty mean OAT Reading
Figure 8. Scatter Plot of Poverty mean OAT Reading
Figure 9. Scatter Plot Poverty mean OAT Math
Appendix C: Variance Parameters OAT Reading with All Level 1 Predictors

Table 24

Estimates of Variance Parameters for Reading Achievement with ALL Level 1 Predictors included

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>se</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>400.750243</td>
<td>1.156574</td>
<td>346.498</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ETH</td>
<td>-4.412467</td>
<td>1.301340</td>
<td>-3.391</td>
<td>0.001</td>
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<tr>
<td>POV</td>
<td>-9.360875</td>
<td>1.523877</td>
<td>-6.143</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>GENDER</td>
<td>-5.443042</td>
<td>0.881315</td>
<td>-6.176</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>NSCATT</td>
<td>-9.117100</td>
<td>1.974353</td>
<td>-4.618</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>NABS</td>
<td>-0.233841</td>
<td>0.063519</td>
<td>-3.681</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>REDISDAY</td>
<td>-0.812096</td>
<td>0.134269</td>
<td>-6.048</td>
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<table>
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<tr>
<th>Random Effect</th>
<th>Variance Component</th>
<th>d.f.</th>
<th>$\chi^2$</th>
<th>p-value</th>
</tr>
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<tbody>
<tr>
<td>INTRCPT1, $u_0$</td>
<td>91.74185</td>
<td>49</td>
<td>333.78662</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ETH slope, $u_1$</td>
<td>25.91101</td>
<td>49</td>
<td>62.77901</td>
<td>0.089</td>
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<tr>
<td>POV slope, $u_2$</td>
<td>40.35842</td>
<td>49</td>
<td>59.97016</td>
<td>0.136</td>
</tr>
<tr>
<td>GENDER slope, $u_3$</td>
<td>7.15020</td>
<td>49</td>
<td>40.36802</td>
<td>&gt;0.500</td>
</tr>
<tr>
<td>NSCHATT slope, $u_4$</td>
<td>31.61010</td>
<td>49</td>
<td>56.06828</td>
<td>0.227</td>
</tr>
<tr>
<td>NABS slope, $u_5$</td>
<td>0.04366</td>
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<td>54.74841</td>
<td>0.265</td>
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<tr>
<td>REDISDAY slope, $u_6$</td>
<td>0.13851</td>
<td>49</td>
<td>60.16931</td>
<td>0.132</td>
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<tr>
<td>level-1, $r$</td>
<td>631.47111</td>
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</tr>
</tbody>
</table>
Table 25

Estimates of Variance Parameters for Reading Achievement with ONLY Predictors of Ethnicity and Poverty only included

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>se</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
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<tr>
<td>For INTRCPT1, $\beta_0$</td>
<td>400.75</td>
<td>1.16</td>
<td>346.45</td>
<td>&lt;0.001</td>
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<td>ETH1</td>
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<td>1.56</td>
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<td>pov1</td>
<td>-10.56</td>
<td>1.56</td>
<td>6.78</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Variance Component</th>
<th>d.f.</th>
<th>$\chi^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRCPT1, $u_0$</td>
<td>91.18</td>
<td>65</td>
<td>513.63</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ETH slope, $u_1$</td>
<td>29.64</td>
<td>65</td>
<td>84.78</td>
<td>0.05</td>
</tr>
<tr>
<td>pov slope, $u_2$</td>
<td>42.61</td>
<td>65</td>
<td>85.14</td>
<td>0.05</td>
</tr>
<tr>
<td>level-1, $r$</td>
<td>658</td>
<td>65</td>
<td>85.14</td>
<td>0.05</td>
</tr>
</tbody>
</table>

From these preliminary models, an intercept of 400.75 (Appendix C), which represents the average student’s reading score for the whole sample, was calculated when all level 1 components are placed into the model:

$$OATRDG_{ij} = \beta_0 + \beta_1 ETH_{ij} + \beta_2 POV_{ij} + \beta_3 GENDER_{ij} + \beta_4 NSCHATT_{ij} + \beta_5 NABS_{ij} + \beta_6 REDISDAY_{ij} + r_{ij}.$$  

By contrast, only a slight change was seen in the intercept when only Ethnicity and Poverty at the student level (level 1) were part of the regression equation: $OATRDG_{ij} = \beta_0 + \beta_1 ETH_{ij} + \beta_2 POV_{ij} + r_{ij}.$ The Ethnicity coefficient of $-3.95$ represents the average decrease in score for Minority students and the variance in Poverty of $-10.56$ represents the average decrease in score for impoverished students.

---

5 These models use maximum likelihood estimation techniques that entail running several iterations (sometime hundreds) until results converge on an estimate. For this reason, it is normal to see mean estimates alter in small ways from one model to the next (Raudenbush & Bryk, 2002, p. 40).
The variances around intercepts (i.e., average achievement for each school) and slopes are statistically significant in both equations ($p < .05$) when using the predictor variables Ethnicity and Poverty. The key implication here is that we can expect the values of these estimates to alter across the 79 schools in the district. The variation in slope means that it is best to think of each school as having its own student-level regression equation that explains the relationship between reading achievement, Poverty and Ethnicity. That is, some schools have steeper slopes than others, subsequently in some schools Poverty and Ethnicity status matter more than in others. Additionally, the differences between the two tables of parameter estimates indicate that inclusion of secondary variables contributes to the understanding of the variances in predictor terms.
Appendix D: Variance Parameters OAT Math with All Level 1 Predictors

Table 26

Estimates of Variance Parameters for Math Achievement with Fixed Components of All Level One Predictors

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>se</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, $\beta_0$</td>
<td>406.707868</td>
<td>1.530402</td>
<td>265.752</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{00}$</td>
<td>-8.162540</td>
<td>1.429272</td>
<td>-5.711</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>For ETH slope, $\beta_1$</td>
<td>-7.838004</td>
<td>1.839370</td>
<td>-4.261</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{10}$</td>
<td>-1.947454</td>
<td>0.917997</td>
<td>-2.121</td>
<td>0.037</td>
</tr>
<tr>
<td>For POV slope, $\beta_2$</td>
<td>-7.862412</td>
<td>2.196166</td>
<td>-3.580</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{20}$</td>
<td>-0.380146</td>
<td>0.065690</td>
<td>-5.787</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>For GENDER slope, $\beta_3$</td>
<td>-0.961177</td>
<td>0.159469</td>
<td>-6.027</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{30}$</td>
<td>-164.18604</td>
<td>49</td>
<td>468.22667</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ETH slope, $u_1$</td>
<td>30.61904</td>
<td>49</td>
<td>69.72301</td>
<td>0.027</td>
</tr>
<tr>
<td>POV slope, $u_2$</td>
<td>77.56095</td>
<td>49</td>
<td>67.70177</td>
<td>0.039</td>
</tr>
<tr>
<td>GENDER slope, $u_3$</td>
<td>3.02375</td>
<td>49</td>
<td>31.36380</td>
<td>&gt;0.500</td>
</tr>
<tr>
<td>NSCHATT slope, $u_4$</td>
<td>57.27894</td>
<td>49</td>
<td>67.01436</td>
<td>0.044</td>
</tr>
<tr>
<td>NABS slope, $u_5$</td>
<td>0.02464</td>
<td>49</td>
<td>62.85949</td>
<td>0.088</td>
</tr>
<tr>
<td>REDISDAY slope, $u_6$</td>
<td>0.31156</td>
<td>49</td>
<td>85.77864</td>
<td>0.001</td>
</tr>
<tr>
<td>level-1, r</td>
<td>725.11923</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 27

*Estimates of Variance Parameters for Math Achievement with Fixed Components of Ethnicity and Poverty only included*

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>se</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, β₀</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, γ₀₀</td>
<td>407.856300</td>
<td>1.647036</td>
<td>247.630</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>For ETH slope, β₁</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, γ₁₀</td>
<td>-7.612143</td>
<td>1.475742</td>
<td>-5.158</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>For POV slope, β₂</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, γ₂₀</td>
<td>-9.478814</td>
<td>1.862367</td>
<td>-5.090</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>INTRCPT1, u₀</td>
<td>198.05282</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETH slope, u₁</td>
<td>43.08463</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POV slope, u₂</td>
<td>91.49651</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>level-1, r</td>
<td>747.06213</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appendix D displays variance parameter estimates for the same two regression equations with the dependent variable of math achievement. The models are the same as in Appendix C except for the change in dependent variable. The models used in Appendix D are:

\[
\text{OATMAT}_{ij} = \beta_0j + \beta_1j*(\text{ETH}_{ij}) + \beta_2j*(\text{POV}_{ij}) + \beta_3j*(\text{GENDER}_{ij}) + \beta_4j*(\text{NSCHATT}_{ij}) + \beta_5j*(\text{NABS}_{ij}) + \beta_6j*(\text{REDISDAY}_{ij}) + r_{ij} \text{ and } \text{OATMAT}_{ij} = \beta_0j + \beta_1j*(\text{ETH}_{ij}) + r_{ij}.
\]

The intercept of 406.71 in Appendix D represent the average student’s math score when all level 1 components are placed into the model. The Ethnicity coefficient of – 8.16 represents the average decrease in score for Minority students and the Poverty coefficient of -7.84 represents the average decrease in score for
impoverished students. By contrast, only a slight change in the intercept and
Ethnicity and Poverty variance when only Ethnicity and Poverty are part of the
regression equation. As with the equations with reading achievement, the
variances and slopes are statistically significant in both equations (p < .05). The
differences between the parameter estimates show that when all fixed components
are included (i.e. not only Ethnicity and Poverty) having all predictor variables
included made a considerable contribution to accounting for variability in the
random components.

Random coefficient modeling was used instead of intercepts and slopes as outcomes
model with the preliminary models in this section. Each of the regression models used on
the predictor variables was run with three different variations: 1). No level two predictors
2). All level two predictors and 3). Only level two predictors that are significant. Reading
results are provided with separate regressions each performed for Ethnicity and Poverty.
Appendix E: Results from the Random-Coefficient Model for Ethnicity only model with no level two predictor variables and Reading as the dependent variable

Table 28

Results from Ethnicity model with NO level two predictor variables and Reading as the dependent variable

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>Se</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, $\beta_0$</td>
<td>400.152912</td>
<td>1.100297</td>
<td>363.677</td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{00}$</td>
<td>-5.246944</td>
<td>1.480547</td>
<td>-3.544</td>
</tr>
</tbody>
</table>

Random Effect

<table>
<thead>
<tr>
<th>Variance</th>
<th>Component</th>
<th>d.f.</th>
<th>$\chi^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRCPT1, $u_0$</td>
<td>79.39624</td>
<td>71</td>
<td>492.93669</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ETH slope, $u_i$</td>
<td>50.02535</td>
<td>71</td>
<td>113.18187</td>
<td>0.001</td>
</tr>
<tr>
<td>level-1, $r$</td>
<td>680.80453</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appendix E displays results for reading as the dependent variable for the regression model for Ethnicity with no level two predictor variables. The results from Appendix E shows the average school mean for reading as 400.15 with the average Ethnicity slope as -5.25 suggesting a school’s Ethnicity is a significant predictor of reading achievement.
Table 29

*Results from Poverty model with NO level two predictor variables and Reading as the dependent variable*

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, $\beta_0$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{00}$</td>
<td>400.165379</td>
<td>1.107258</td>
<td>361.402</td>
</tr>
<tr>
<td>For POV slope, $\beta_1$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{10}$</td>
<td>-10.986335</td>
<td>1.725921</td>
<td>-6.365</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Variance Component</th>
<th>d.f.</th>
<th>$\chi^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRCPT1, $u_0$</td>
<td>79.64751</td>
<td>67</td>
<td>460.58040</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>POV slope, $u_i$</td>
<td>64.75031</td>
<td>67</td>
<td>100.00772</td>
<td>0.006</td>
</tr>
<tr>
<td>level-1, $r$</td>
<td>667.55734</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In addition, Appendix E displays results for reading as the dependent variable for the regression model for Poverty with no level two predictor variables. The table in Appendix E displays a variance in poverty of -10.99 represents the average decrease in score for impoverished students. This shows a strong relationship between achievement and Poverty for the dependent variable of reading for the whole sample.
Appendix F: Results from the Random-Coefficient Model for Ethnicity only model with no level two predictor variables and Math as the dependent variable

Table 30

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, β₀</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, γ₀₀</td>
<td>406.671418</td>
<td>1.527923</td>
<td>266.160</td>
</tr>
<tr>
<td>For ETH slope, β₁</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT2, γ₁₀</td>
<td>-8.592973</td>
<td>1.729695</td>
<td>-4.968</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Variance Component</th>
<th>d.f.</th>
<th>χ²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRCPT1, u₀</td>
<td>162.66936</td>
<td>71</td>
<td>777.31517</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ETH slope, uᵢ</td>
<td>85.40127</td>
<td>71</td>
<td>130.10336</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>level-1, r</td>
<td>766.08612</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appendix F displays a variance in Ethnicity of -8.60 represents the average decrease in score for Minority students. This shows a strong relationship between achievement and Ethnicity for the dependent variable of math.
Table 31

Results from the Random-Coefficient Model for Poverty only model with no level two predictor variables and Math as the dependent variable

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, $\beta_0$</td>
<td>$406.697678$</td>
<td>$265.981$</td>
<td>$1.529048$</td>
</tr>
<tr>
<td>INTRCPT2, $\gamma_{00}$</td>
<td>$-9.870676$</td>
<td>$-4.957$</td>
<td>$1.991254$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Variance Component</th>
<th>d.f.</th>
<th>$\chi^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRCPT1, $u_o$</td>
<td>$163.05329$</td>
<td>$67$</td>
<td>$708.92700$</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td>POV slope, $u_i$</td>
<td>$108.05645$</td>
<td>$67$</td>
<td>$119.11252$</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td>level-1, $r$</td>
<td>$761.07933$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In addition, Appendix F displays a variance of $-9.88$ for impoverished students who attend a school with high percentage of impoverished students score 9.88 points less than a student at a school with low percentage of impoverished students. This shows a strong relationship between achievement and a school’s Poverty for the dependent variable of Math.