STUDENT ACADEMIC ACHIEVEMENT IN RURAL VS. NON-RURAL HIGH SCHOOLS IN WISCONSIN

By Rebecca L. Droessler Mersch

A dissertation submitted in partial fulfillment

of the requirements for the degree of

DOCTOR OF EDUCATION

at

EDGWOOD COLLEGE

2012

ABSTRACT

This study analyzed how Wisconsin rural public high schools' academic achievement compared to their city, suburb and town peers while controlling for ten factors. The Wisconsin Knowledge and Concepts Examination (WKCE) measured academic achievement for tenth graders including reading, language arts, mathematics, science and social studies. The ten independent variables included geographic location, socioeconomic status, students of color, spending per pupil in the school district, high school enrollment, parent education level, truancy, disciplinary actions: suspensions and expulsions, students with disabilities and extra/co-curricular activity participation. Data were provided by state and federal public databases. Findings indicated that rural high schools in the state of Wisconsin performed as well as town and city high schools and in some subject areas as well as suburban high schools. Further, the data suggest that there are serious academic performance concerns for students and schools with certain demographics and that those problems need to be addressed immediately and effectively. Findings from this study suggest that the argument to consolidate rural high schools because of poor academic performance is not a valid one. All high schools in Wisconsin including rural high schools should be supported by policy makers and practitioners to ensure high academic achievement opportunities for all.

ACKNOWLEDGEMENTS

I would like to acknowledge several individuals that made this accomplishment possible. First, thank you to my husband, Kurt, for his love, encouragement and support to pursue my doctoral degree. Also, to my parents Gary and Julie and siblings Adam, Nathan and Sarah Droessler for their unconditional love and support always.

I would also like to extend a sincere appreciation to Richard and Linda Barrows, Kitty Flammang and the other members of Cohort IX for making this experience a wonderful journey. Your intellect and life experiences have truly inspired me to be a better educator each and every day.

DEDICATION

I would like to dedicate this study to all Wisconsin educators during this difficult political climate. May you continue to be inspired to do the invaluable work that you do each and every day.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION TO THE STUDY

Introduction

It is no secret, and Wisconsin is no exception, that public schools in the United States have struggled to maintain a lucrative funding source to enhance and maintain educational institutions. Due to declining enrollments in rural areas and increased costs to uphold current school systems, school consolidation has become the answer for many legislators, policymakers, and school districts in several states. In the state of Wisconsin, there are 417 public high schools. Of those, 229 are located in rural areas (54.9%); 82 are located in towns (19.7%); 61 are located in suburban areas (14.6%); and 45 are city schools (10.8%) (U.S. Department of Education, 2011). This research analyzed the impact rural high schools have on student achievement in the communities in which they serve.

Historical Background

According to Bard, Gardener, and Wieland (2006), small schools date back to the 1800s. One-room schoolhouses were very efficient in the times where there were not any paved roads and automated transportation. In the early 1900s, there were over 200,000 one-room schoolhouses in the United States (Purcell & Shackelford, 2005). Toch (2003) per Hylden stated that most students only attended until the eighth grade and that only 35% of Americans attended high school by the year 1910. Since high school was viewed as college preparatory, only about 4% attended college.

The invention of the automobile, new roads and the Industrial Revolution reformed the way education had been for many years. A major campaign against child labor also took place which made it more difficult for teenagers to find jobs, so students chose to stay in school. Businesses also had a great influence on education and felt that the same policies used to run a business could be transferred to the educational setting. The new methods were considered *economies of scale* or *more bang for your buck* initiatives. Based on this theory, politicians and school reformers decided that larger schools in the urban areas were the best model, and the rural schools were considered inadequate (Lyson, 2002).

According to Hylden (2004), reformers such as Ellwood Cubberly, John Dewey and James Conant influenced the future of education by supporting schools with enrollment in the hundreds and thousands. The comprehensive high school was created as a large scale operation. James Conant conducted several studies and wrote *The American High School Today* in 1959 in which he recommended eliminating small high schools as a top priority. Cubberly expressed school size in business or factory terms. As the Dean of Stanford's School of Education, he stated in 1916,

> Our schools are, in a sense, factories in which the raw products (children) are to be shaped and fashioned into products to meet the various demands of life. The

> specifications for manufacturing come from the demands of the twentieth century civilization, and it is the business of the school to build its pupils to the specifications laid down. This demands good tools, specialized machinery, continuous measurement of production to see if it is according to specification, the elimination of waste in manufacture, and a large variety of output (Hylden, 2004, p. 5).

However, Bailey (2000) counters that argument based on efficiency. Rural school dropout rates are much lower than urban areas and equal to more affluent suburb areas. He argues that small schools cannot be considered inadequate when they continue to produce high school graduates. In an era of accountability, with high school graduation being the benchmark, large schools have yet to match the small school graduation rates. "When did educational attainment, one of the historic, hallmark goals of public education, become *inefficient*?"(Bailey, 2000, p. 2).

The plummeting of the economy in rural areas also contributed to the consolidation effort. During 1933-1970, more than 30 million people left their family farms for some other occupation (Lyson, 2002). In addition, in 1954, the landmark case of *Brown vs. the Board of Education of Topeka, KS*, the United States Supreme Court found segregation of schools unconstitutional under the Equal Protections Clause under the 14th Amendment of the United States Constitution. After this ruling, there were several additional school consolidations throughout the United States (Bard et al., 2006).

In the 1930s, there were more than 130,000 school districts in the United States. By the year 2000, there were less than 15,000 (Lyson, 2002). While the number of school districts was decreasing by almost 90%, the United States population had doubled (Hylden, 2004). Currently, the population of rural areas has continued to decline while the cost of educating students continues to rise, with very little increase in government funding (Lyson, 2002).

A great debate has taken place for many years on the ideal enrollment number of a school district that has the most positive effect on student achievement, attendance, and graduation rates. Some experts argue that a district should have 4,000-5,000 students. Others recommend a district enrollment of 750 students. Still others believe that an enrollment between 260-2,925 students is ideal. Despite the difference of opinion on ideal school district size, one statistic is not in dispute: school spending is a U-curve with the smallest schools and the largest schools costing more to operate than those in between (Bard et al., 2006).

Measuring Rurality

What is *rural*? According to Merriam-Webster (2011), *rural* is defined as "of or relating to the country, country people or life…." Despite the simple dictionary definition, defining rural is not an easy task. Typically, rural is defined by population size, population density, or distance to a city of some size. According to the United States Department of Agriculture Economic Research Service (ERS) (2007), there are nine definitions of rural based on three sources including the United States Census Bureau, United States Office of Management and Budget (OMB) and the ERS. Three definitions are based on census locations; three are based on census urban area; one is based on the OMB Metropolitan Statistical Area; one is based on the ERS rural-urban commuting area codes; and one is based on socioeconomic indicators provided by the census bureau. In addition, the National Center for Education Statistics (NCES) has its own set urban-centric locale categories released in 2006 including three city, three suburb, three town, and three rural definitions.

As an official at the Wisconsin Department of Public Instruction (WDPI) has stated, “Landing on a definition of rural is, as you have found, not as easy as one would think” (S.M. Grady, personal communication, January 17, 2012). At WDPI, the *Small Rural School Achievement Program* defined rural as districts with an NCES urban-centric code of 6, 7, or 8 and having fewer than 600 students enrolled in the school district. However, the federal *Rural and Low Income Grants* require an NCES rural-centric code of 6, 7, or 8 with a poverty rate greater than 20% and not eligible for the *Small Rural School Achievement Program*. Another, at the state level is a sparsity aid program for school districts with less than 725 students, fewer than 10 students per square mile and have at least 20% of the student population eligible for free and reduced lunch. Lastly, WDPI also sometimes uses the NCES urban-centric locale codes. The concept of rural may be intuitively clear, but it is not a fixed category. Another complication arises when school districts fall into more than one category (S.M. Grady, personal communication, January 17, 2012). For purposes of this study, geography will be defined by the NCES urban-centric locale categories, specifically discussed in Chapter 3.

Contextual Orientation

In recent years, various states have created legislation to give incentives or mandates for small schools to consolidate. For example, Silverman (2005) stated that the state of West Virginia appointed a School Building Authority (SBA) to give stipends for school improvements to buildings or facilities, remodeling or new building projects. The criterion to be considered for these funds was that school districts needed to have a student enrollment that also met the state-mandated enrollment number. If not, these schools were not considered for funding. This prompted many districts to consolidate in order to get this funding. According to Silverman, West Virginia spends more on school transportation than any other state in the United States; however, their graduation rates and standardized test scores are just average.

Yet, Lyson (2002) found the statistical evidence to support the importance of a school in a community: a) the gap between the rich and the poor is more common in communities without schools than with schools; b) the number of households receiving public assistance is also higher in communities without schools than with schools; c) the number of families receiving welfare benefits is higher in communities without schools than with schools; and d) the child poverty rates are also higher in communities without schools than those with schools.

Many states' educational systems are in economic crisis due to the funding formulas and the inadequacy to cover current costs. Many talk about finding tax relief but also funding reform for schools – seemingly contradictory goals.

In Wisconsin, then newly elected, Governor Scott Walker, unveiled the 2011-2013 biennial budget this past March 2011. According to Stein, Marley & Berquist (2011), education cuts were specified, including $834 million less in state aid to school districts compared to the 2009-2011 biennial budget. This loss equates to a 7.9% decrease in overall aid funding from the previous biennium budget to K-12 public schools. Along with the decrease in state aid, the state has also lowered the revenue cap on the number of dollars that can be collected through local property taxes that provides a 5.5% decrease in the amount of local property tax and state aid that will be received for each student. For example, the average revenue per student in Wisconsin is approximately $10,100. The new budget decreased this funding by $555 for each student. Those districts that spend more than the average would see a greater decrease versus districts that spend less than the average. It can be argued that the current quality of education provided by Wisconsin school districts may not continue to exist with fewer resources.

Since 229 of the high schools in the state of Wisconsin are considered *rural*, what is the impact of these schools compared to their city, suburb and town peers? Are rural school districts competing academically at a level that shows their positive impact not only to students, but also to communities and governmental leaders?

Problem Statement

Within this study, rural high school student achievement was measured by performance on the tenth grade Wisconsin Knowledge and Concepts Examination (WKCE) scores for the 2009-2010 academic school year. While controlling for ten variables (geographic location, socioeconomic status, students of color, spending per pupil, high school enrollment, parent education level, truancy, disciplinary actions: suspensions and expulsions, students with disabilities and extra/co-curricular participation), rural student achievement was compared to the performance of public city, suburb and town students in the state of Wisconsin. Data were collected from multiple state and federal databases and analyzed by a multiple regression analysis that compared the different variables using the Statistical Package for the Social Sciences (SPSS) software.

Conceptual Model

The research interest in this study was the effect, if any, of rural location on student performance. A very large body of research indicates that student achievement is related to variables, such as family socioeconomic status, ethnic/racial group membership and other factors, including some that are specific to the school setting. Any model to examine the effect of rural location must control for these other factors that influence student achievement. The statistical procedure of multiple regression analysis is designed to isolate the effect of one variable while controlling for the effects of others. Thus, a multiple regression statistical model was used in this study. The conceptual model drew on previous research analyzing the determinants of student achievement, and the researcher's interest in examining the effect of rural location. The generalized conceptual model, shown in Table 1, depicts the dependent variable of high school academic achievement, along with the ten independent variables that were isolated during data analysis.

Table 1. Conceptual Model

Data Year: 2009-2010 (WINSS)

Dependent Variable:
HSA = High School Academic Achievement (percent of 10^{th} grade students proficient and advanced on the 10^{th} Grade WKCE tests in Reading, Language Arts, Mathematics, Science & Social Studies)

Independent Variables:
G = Geographic Location (City, Suburb, Town, Rural)
S = Socioeconomic Status (SES) (percent of students receiving free & reduced lunch in the high school)

M = Students of Color (percent of students of color in the high school [Total Number of Students of Color/High School Enrollment])
Sp = Spending per Pupil in the School District
P = High School Enrollment (based on September third Friday count by WDPI)
Pa = Parent Education Level (Average Income by School District [Total Income/Number of School District Residents])
T = Truancy (percent of high school students truant)
R = Disciplinary Actions: Suspensions & Expulsions (total number of suspensions and expulsions as a percent of high school enrollment [Number of Students Suspended + Number of Students Expelled/Fall Enrollment])
D = Students with Disabilities (percent of high school students diagnosed with disabilities)
X = Extra/Co-Curricular Activity Participation Rate Index (the sum of the percentage of students who participated in the three sanctioned areas of school sanctioned activities)

Equation:
HAS(Reading) = f (G, S, M, Sp, P, Pa, T, R, D, X)
$HAS(Reading) = a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

HAS(Language Arts) = f (G, S, M, Sp, P, Pa, T, R, D, X)
$HAS(Language\ Arts) = a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

HAS(Mathematics) = f (G, S, M, Sp, P, Pa, T, R, D, X)
$HAS(Mathematics) = a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

HAS(Science) = f (G, S, M, Sp, P, Pa, T, R, D, X)
$HAS(Science) = a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

HAS(Social Studies) = f (G, S, M, Sp, P, Pa, T, R, D, X)
$HAS(Social\ Studies) = a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

The precise form of the equation and specification of the variables will be discussed in Chapter 3, so the variables in the above equation should be taken as generalized measures rather than specific variables. For example, the general concept represented by the geographical location variable may be specified in the regression equation as a series of binary (dummy) variables representing three of the four categories. The research question was answered by examining the statistical significance of the regression coefficient on the variable representing rural location. The nature of the regression model, the precise form of the equation and the measurement of the variables is the subject of Chapter 3. The equation is given in functional form, and then in the form that was estimated using multiple regression analysis. Each of the equations depicts how high school achievement, represented through the WKCE test for 10th graders during the 2009-2010 academic school year, was affected by the independent variables. The rationale for the variables is developed in Chapter 2, and the precise definition and measurement of each of the variables are presented in Chapter 3.

Research Question

The purpose of this study was to distinguish how rural Wisconsin high students performed on the tenth grade WKCE in the areas of reading, language arts, mathematics, science and social studies compared to Wisconsin city, suburb and town public high students.

Significance of the Study

Berry (2004) wrote, “Small schools, once derided as relics of the education system and obstacles to national progress, now lie at the heart of one of America’s most popular reform strategies…yet there has not been enough rigorous research examining the effects of school size on student achievement” (p. 11). This study proposed to add to the research base.

Raywid (1999) cited several past studies that support the notion that small schools are more effective than large schools. She cited a study conducted by Lee & Smith in 1995 examining 12,000 students from 800 high schools that found students had higher achievement in smaller schools. She also cited supportive studies including a 1994 study in Philadelphia conducted by McMullan, Sipe & Wolf where 20,000 students participated, a 1993 study conducted by Huang & Howley of 13,000 Alaskan students and others that researched all academic scores within a specific state. In 1994, Howley stated school size "exerts a unique influence on students' academic achievement, with a strong negative relationship linking the two: the larger the school, the lower the student's achievement levels" (Hylden, 2004, p. 13).

Similar studies have taken place in Arkansas, Kentucky, Montana, North Dakota, Ohio, Texas and West Virginia comparing academic achievement and high school location (rural, town, suburb or city). Per Silverman (2005), according to the Rural School and Community Trust, students in rural states such as South Dakota, Nebraska, Montana and Wyoming were continuing to achieve despite obstacles and high percentages of low SES within their schools. The question remains as to how these states accomplished this task.

However, an analysis of academic achievement and geographic school type had never been conducted in the state of Wisconsin. By isolating ten variables (including geographic location, socioeconomic status, students of color, spending per pupil, high school enrollment, parent education level, truancy, disciplinary actions: suspensions and expulsions, students with disabilities and extra/co-curricular participation), this analysis brought depth in understanding the relative academic competitiveness of public rural, town, suburban and city high schools in the state of Wisconsin in the five core subject areas. This study was timely as funding for Wisconsin public schools had been cut significantly for the next state biennial budget. State lawmakers and educational leaders needed to know the value of rural schools as they debated future school funding decisions.

Limitations of the Study

Several limitations to this study are important to note. First, in the research, student achievement is said to be effected by many factors including socioeconomic status, ethnicity, spending per pupil, school size, parent education level, student motivation and the relationship to the teacher. In this current study, the first five of these factors were analyzed with respect to student achievement. However, student motivation and relationship to teacher will not be included in this study. Neither student motivation (Martin and Dowson, 2009; Meyer, Weir, McClure, Walkey & McKenzie, 2009) nor relationship to teacher (Gehlbach, Brinkworth & Harris, 2011) has statewide data available for Wisconsin. Therefore, analysis of these factors is outside of the scope of this quantitative study.

Also, class size is sometimes said to impact student achievement (Blatchford, Bassett & Brown, 2011). However, class size varies considerably within each high school regardless of the school size. For example, a required class such as English may have 30 or more students while an advanced level language class may have less than ten with both classes occurring within the same high school. Since considerable variation exists within high schools of varying locations and/or size, class size was not included as a factor in this study.

Another possible limitation to this study included the type of high schools in this study. For the purpose of comparing city, suburban, town and rural schools, certain high schools were excluded from this study. These excluded schools included parochial, alternative, charter, single purpose and juvenile detention centers. Only traditional ninth through twelfth grade public

Wisconsin high schools were included in this study, so not all Wisconsin high school students were accounted for in this study.

Further, another possible limitation may have resulted because some data included in this study were school specific while others were district specific. The data differences will be discussed further in Chapter 3. Also, this investigation was limited to the state of Wisconsin and, therefore, the generalizability to other states is limited.

Additionally, as the measure being used to quantify academic achievement, the WKCE scores, may or may not be the best reflection of a student's aptitude based on several factors. First, a student may experience test anxiety or a lack of motivation to do well as the 10th grade test is the seventh in a series of the WKCE exams students will participate in before they graduate high school. Also regarding the WKCE scores, the definition of what is *proficient* and *advanced* can be argued as arbitrary as the cut scores have changed over the years to ensure adequate yearly progress (AYP) is met. For example, a student in the 40th percentile in reading is determined as proficient. Researchers may question if this is the best representation of academic achievement.

While recognizing the limitations of this study, the researcher, nevertheless, believed that the appropriate available measures could be chosen to best represent the constructs for this study. Despite the limitations above, the researcher believed that the study had merit and could provide reliable information.

Summary

In summary, the researcher was interested in knowing if Wisconsin rural public high students were as academically competitive as their city, suburb and town peers. By gleaning this information from this research study, the researcher hoped to provide salient evidence to the significance of Wisconsin rural schools. Ultimately, the researcher intended to share the results with state legislators and the Department of Public Instruction officials to assist them as they develop public policy.

As Governor Walker continues to lead significant changes on how schools will be funded in the future and with a recall election for the governor's seat in the state of Wisconsin in June 2012, the political climate remains tense with several questions left unanswered. The researcher has hope that this research study will provide evidence germane to this important public debate.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

This study examined how rural students' academic achievement compared to their respective city, suburb and town peers. With 229 (54.9%) high schools in the state of Wisconsin considered rural, the question was "How did rural students perform academically compared to their peers?"

The literature review analyzed several factors that affect academic achievement, prior studies on the impact of rural schools from several states, the research on the benefits of rural schools and some opposing views about the benefits of rural schools with respect to school consolidation.

Factors Affecting Academic Achievement

Several factors that impact student achievement are well documented within the literature. They are geographic location, socioeconomic status, students of color, spending per pupil, high school enrollment, parent education level, truancy, and disciplinary actions: suspensions and expulsions, students with disabilities and extra-/co-participation and how they may or may not influence academic achievement. Each factor will be reviewed separately with geographic location, the central focus of this study reviewed last. That review will include several studies from various states including the following: Arkansas, Kentucky, Montana, North Dakota, Ohio, Tennessee, Texas, and West Virginia. Finally, the writings related to the advantages and disadvantages of rural schools will be presented.

Socioeconomic Status

Research suggests that socioeconomic status (SES) may be a factor affecting academic achievement. The U.S. Department of Education (2001) publishes statistics showing the percentage of students attending schools in rural areas across several states. Examples of states that have nearly one-half of rural student enrollments are the following: Vermont (56%), Maine (54%) and South Dakota (46.8%). States that have the majority of their schools located in rural areas include South Dakota (77.2%) and Nebraska (60.8%). Of those students who live in rural areas, approximately 13.8% also live in poverty.

In the state of Mississippi, Coffey & Obringer (2000) outlined the problem of educating the rural poor. Approximately 69% of all students live in low SES rural areas with 30% coming from single-parent homes and 32% below the poverty line. The free and reduced lunch rate in Mississippi is over 50% with 36% of those students coming from various ethnicities, including African American, Asian American, Hispanic American and Native Americans. Academically, students from Mississippi scored the lowest in the nation on the Iowa Test of Basic Skills (ITBS) and the American College Test (ACT). The National Assessment of Educational Progress

(NAEP) tests demonstrated that only 18% of Mississippi fourth graders and 10% of eighth graders were proficient in mathematics.

In the state of Tennessee, Hopkins (2005) analyzed student achievement with regard to school location and the percentage of low SES students within the school. Schools were defined by the percentage of students receiving free and reduced lunch. The schools were then placed into three economic categories: 1) low to moderately disadvantaged (< 50% of students receiving free and reduced lunch), 2) highly disadvantaged (50-74%) and 3) highest disadvantaged (75% or higher). Hopkins (2005) collected data from the Tennessee State Department of Education online public database including the 2002-2003 Tennessee Comprehensive Assessment Program (TCAP) in mathematics for grades sixth, seventh and eighth, the American College Test (ACT) for high school students and the SES of the school. The school location information was collected from the National Center for Educational Statistics (NCES) Public School Locator. Findings were consistent across all middle school grades and high school ACT scores. Among all grade levels, schools categorized as other non-rural ranked the highest in mathematics achievement followed by schools categorized as rural. Schools designated as large central city schools scored the lowest and, notably, significantly lower than the other non-rural and rural schools. Regarding the ACT, the variability among all three locales was significant. The average mathematics ACT sub-score for other non-rural was 19.7326; for rural, 19.0562 and for large central city, 16.7079. After factoring in each level of SES, the mathematics achievement measured by the ACT and location showed similar results. Students from large central city schools showed a greater range of scores (5.5) than their other non-rural (3.5) and rural schools (1.2) counterparts. For example, students from large central city schools within the highest disadvantaged category had lower mathematics sub-scores than students from large central city schools in the low to moderate disadvantaged category and their other non-rural and rural counterparts. The range in scores among the different socioeconomic categories were vast. Notably, the rural category had narrowest margin of scores regardless of SES. Also, among the highest disadvantaged category, the rural schools performed the best across all grade levels tested. The researcher then proposed that the rural schools have characteristics that enhance achievement of students from the highest disadvantaged backgrounds but admitted that defining these characteristics is still very unclear. Overall, this study suggests that the higher the disadvantage, the lower the academic achievement. However, if students are disadvantaged, it is better for them to be educated in a rural setting rather than in other non-rural or large central city setting.

De Haan & MacDermid (1998) found that 75% of all poor students living in urban areas in the United States have below average skills in reading and math, with 50% of those in the lowest quintile. Thus, academic achievement in small schools is as good as or better than that of larger schools, especially for students from low socioeconomic backgrounds. Therefore, SES is an important factor with regard to academic achievement and will be included in this study.

Students of Color

In the state of Wisconsin, if a student has an ethnic background other than white, there may be an influence on academic achievement. In 2003, Education Trust from Washington, D.C., reviewed Wisconsin's WKCE scores for fourth and eighth graders and compared them to their respective National Assessment of Educational Progress (NAEP) equivalent scores to determine if Wisconsin was narrowing the achievement gap between students of color and their white peers. In 1998, Wisconsin was considered by the state to have the third largest achievement gap for fourth grade students in reading.

The Education Trust (2003) also noted that students of color were also underrepresented in both AP courses and Gifted and Talented programs as documented by Table 2 and Table 3.

Table 2. Participation in Advanced Placement (AP) exams during the 2000-2001 school year

	Public K-12 Enrollment	Calculus AB	English Language & Composition	Biology
African American	10%	1%	1%	3%
Asian	3%	4%	3%	3%
Latino	5%	1%	1%	1%
White	82%	94%	95%	93%
Total	100%	100%	100%	100%
Number	867,134	2,646	1,485	1,429

(Education Trust, 2003)

Table 2 displays the percentage of the student body population by ethnicity that participated in the AP exams during the 2000-2001 school year. For example, of those taking the AP Calculus AB exam, 94% of the students were White while the African American (1%), Asian (4%) and the Latino (1%) student populations were much lower.

Table 3. Percentage of students scoring a 3, 4, or 5 on the AP exam

	Calculus AB	English Language & Composition	Biology
African American	*	*	32%
Asian	64%	69%	54%
Latino	43%	*	*
White	73%	66%	57%
Total	71%	66%	56%

* Data not reported for those states that had fewer than 25 students take the test. (Education Trust, 2003)

Of those students taking an AP exam, only 32% of African American students scored a passing mark on Biology while only 43% of the Latino population scored a 3, 4, or 5 on the Calculus AB exam. The Asian population had comparable results to the white population. Of the White student population, 73%, 66% and 57% scored a 3, 4 or 5 on the Calculus AB, English Language and Composition and Biology, respectively (Education Trust, 2003). Overall, the factor of ethnicity demonstrates a great disparity among those who graduated within the traditional four years of high school as illustrated in Table 4.

Table 4. 1995-1996 eighth graders who received a high school diploma in the year 2000

	8^{th} graders	High School Diplomas	Completion Rate
African American	5,424	2,573	47%
Asian	1,678	1,520	91%
Latino	2,096	1,446	69%
Native American	918	532	58%
White	55,672	52,474	94%
Total	65,788	58,545	89%

(Education Trust, 2003)

The white student population had a high school diploma completion rate of 94%; the highest of all the other ethnic groups followed by the Asian (91%), Latino (69%), Native American (58%) and African American (47%) student groups. Also, approximately 44% of Wisconsin high school graduates will enroll in college compared to the national average of 54%. African Americans are also known to have fewer college graduates than other ethnicities. In the end, school districts that have high poverty rates and high enrollments of students of minorities have found to also have less money to spend per student (Education Trust, 2003).

A *The New York Times* article entitled “Racial Gap in Testing Sees Shift by Region” (Dillon, 2009), discussed the racial gap in NAEP testing and how it has shifted from the south to the north and Midwest. Historically, the achievement gap between black and white students was most pronounced in the southern states. However, there has been shift over the past 20 years. A report from the Department of Education based on data from the NCES showed that southern states such as Alabama and Mississippi were no longer seeing the achievement gaps that Connecticut, Illinois, Nebraska and Wisconsin are witnessing. From the 1992 NAEP testing, an average white student's score on the fourth grade math test was 227/500 while an African American fourth grader's average score was 192, showing a 35-point gap. In 2007, the average math score for a white fourth grader was 248/500 while the average African American fourth grader rose to 222, narrowing the gap from 35 to 26 points. In 2007, Wisconsin had the largest black-white gap in the nation on the fourth grade math test (not counting the District of Columbia) by an average of 10 points. Wisconsin also had the largest achievement gap in reading and math in both fourth and eighth grades. The Milwaukee Public Schools (MPS) has missed NCLB requirements for the past five years (Dillon, 2009). "Black kids in Wisconsin do worse than in all these Southern states," and among the reasons for this gap is that Wisconsin educators "haven't been focusing on doing what's necessary to close these gaps," Kati Haycock, President of *Education Trust* (Dillon, 2009, p. 2).

Most recent WKCE results provided by WINSS (2012) for the fall of 2010 showed the following ethnic subgroups tested proficient and advanced in grade 4 reading: American Indian (77.7%), Asian (80.6%), Black (60.3%), Hispanic (69.6%) and White (88.5%). In grade 8 mathematics, proficient and advanced results were the following: American Indian (67.8%), Asian (79.3%), Black (44.7%), Hispanic (63.2%) and White (84.9%). Lastly, proficient and advanced results for science in grade 10 demonstrated the following: American Indian (60.8%), Asian (66.9%), Black (34.4%), Hispanic (50.3%) and White (82.1%). Overall, the white students significantly did better on the test than their peers of color. This evidence supports the theory of the achievement gap among students of color in the state of Wisconsin and, therefore, warrants attention and will be included within this study.

Spending per Pupil

Spending per pupil may be a factor affecting academic achievement. In 1993, a study in the state of Illinois discussed the relationship between spending per pupil and academic achievement. Sharp (1993) collected data from 655 schools for grade 11 and 2,347 schools for grade 3. At the time, state assessments in reading and mathematics were given to grades 3, 6, 8 and 11. The language arts assessment was given at grades 3, 6 and 8. This state assessment was used to measure academic achievement. A Pearson r correlation was used to analyze if there was a relationship between *operating expenditures per pupil* for the 1989-1990 academic school year and the state test results from April 1991. On average, spending per pupil for the state of Illinois at that time was $4,424. The school district with the lowest spent $2,253 per pupil. The highest spending per pupil was $14,316. All data were collected from the Illinois State Department of Education. Sharp’s 1993 study results showed a small but significant negative correlation between spending per pupil and academic achievement for all grade levels and all subjects except grade 11. It was found that there was no relationship between the variables at grade 11. Overall, this finding showed that spending more money per pupil did not necessarily guarantee higher academic achievement. The author suggested one reason for this may be that the majority of school costs are used for employee salary and benefits, not specific programming. Previous studies done in Arkansas (Klingele & Warrick, 1990), New York (Wendling & Cohen, 1981) and Virginia (Connors, 1982) found increased spending per pupil did enhance students' achievement. If money was spent on resources directly related to student instruction, there was an increase in student achievement. However, if the additional funding was spread equally across the budget and mostly on personnel, a relationship between the two variables was not found. This issue was more about how the money was spent versus how much money was spent. An additional factor to take into consideration was special education costs and how they may skew the overall spending per pupil since they increase the overall average spending (Sharp, 1993).

In 1989, Howley did a follow-up study to the 1987 Walberg and Fowler's study on school district efficiency based on spending per pupil and three SES variables (i.e. assessed property evaluation, personal income and free and reduced lunch percentages). Efficient school districts were defined as those whose spending per pupil was less than the state average, and inefficient school districts were those that spent more than the state average per pupil. Academic performances were measured through the Kentucky Essential Skills Test (KEST) in the areas of reading, writing, math, spelling, library and research skills and the Comprehensive Test of Basic Skills, Form U (CTBS/U) in the areas of reading comprehension, writing, math, spelling and library skills for all grade levels. Scores were then compared to the efficient and inefficient districts. The three main questions in this study included the following: 1) How does SES effect spending to predict *efficien*t school districts? 2) How does student achievement in those districts that are considered *efficient* compare to *inefficient* districts? 3) Are *efficient* districts considered small, rural or some other type of organization?

Howley's (1989) data came from three resources: the Kentucky Department of Education, the Northwest Regional Educational Laboratory and the Appalachia Educational Laboratory (AEL). The author, Howley, chose Kentucky because it not only had the largest number of rural districts at 178, but also had testing data for all grade levels from the 1985-1986 school years. He also defined *smallness* by the AEL definition of a county district less than 3,000 students and an independent district less than 1,500 students. Of Kentucky's districts, 40 independent districts and 61 county districts were classified as small. *Ruralness* was defined as the number of students per square mile. Within all districts, Kentucky had zero independent districts and 88 county districts that were classified as rural.

Howley's (1989) analysis was done in two parts. The first part explored the significance of seven different variables on spending per pupil. These variables included enrollment, nonurban population (%), personal income per student, poverty rates, free lunch rates, assessed property valuations and student density. Of the seven, three variables were found to have a moderate to significant effect on spending per pupil: assessed property valuation, personal income per student and the free lunch rate. The districts were than categorized as *efficient* and *inefficient* based on spending per pupil and SES. Analysis showed that 83 districts were considered *inefficient* due to spending up to $1,309 per pupil above the average, and 95 districts were considered *efficient* due to spending up to $1,308 less per pupil against the average. The second part of the analysis compared the *efficient* and *inefficient* districts against achievement on the KEST and CTBS/U tests. In all comparisons, districts considered *inefficient* (spending more per pupil than expected) showed greater academic achievement than *efficient* districts (spending less per pupil than expected). The overall finding was that the increased spending per student affected academic achievement positively. This contradicted Walberg and Fowler's (1987) study stating that spending per pupil did not have an effect on academic achievement (Howley, 1989).

Overall, spending per pupil has contradictory results on whether its influence on academic achievement is a positive or negative one. However, due to the sensitivity of the future of funding for Wisconsin schools, the researcher regards spending per pupil as an important factor and is included in this study.

School Size (High School Enrollment)

Recent research suggests that school size may be a factor affecting student achievement. Raywid (1999) asked, "How big is small?" (p. 3). She found that several studies had been performed on the optimal enrollment number at the high school level. The Cross City Campaign for Urban School Reform conducted by Fine & Somerville in 1998 set the limit at 500 students while another study conducted by Williams in 1990 recommended 800 students for high schools. In 1996, the National Association of Secondary School Principals (NASSP) recommended a high school size of 600 students; whereas, Lee & Smith (1997) suggested a range between 600-900 students in 1997.

On a national level, the U. S. Department of Education (1998) conducted a *Principal/School Disciplinarian Survey on School Violence* to a nationally representative population of 1,234 public schools, of which all responded. The survey requested the number of specific crimes that occurred during the 1996-1997 academic school year as well as principal's perceptions, disciplinary actions and follow-up measure taken, if any. When comparing small schools (less than 300 students), medium-sized (300 to 999 students) to larger schools (more than 1,000 students), the larger schools were found to have 875% more crime, 270% more vandalism, 378% more theft, 394% more physical assaults, 3,200% more robbery and 1,000% more weapons cases than small schools. In addition, of all schools reporting, only 38% of the small schools reported incidents while 60% of the medium-sized and 89% of the large schools reported criminal activity. As learning environment is a key to academic achievement, one can conclude that smaller schools are considered safer per this study.

Howley (2000) found poverty and school size have a strong influence on academic achievement, both positively and negatively. For example, if students of poverty attend a large school with a large percentage of low-income students, their academic achievement was lower than those students of poverty who attended a smaller school with a large percentage of low-income students. The relationship between academic achievement, school size and socioeconomic status (SES) of students and their families has been found to be indirect but applicable (Walberg & Fowler, 1987). This article review combined two of the factors within this study, school size and SES. N. Friedkin and J. Necochea (1988) established the calculus equation to measure the effect of varying SES levels. R. Bickel and C. Howley (2000) found strong evidence of a positive indirect relationship between students from low socioeconomic backgrounds attending smaller schools and academic achievement in the state of Ohio. However, in Texas, they found a direct relationship. They also found weak evidence in Montana, and no evidence in the state of Georgia (however, after conducting a multi-level analysis, an effect was found not evident at the single-level layer). Thus, the following standards were found to be true: 1) low SES communities achieve more with smaller schools, and 2) the studies in all five states demonstrated equity in student achievement in smaller schools and districts.

> Further studies are clearly needed, but it is time for superintendents and policymakers to begin considering the issue of scale: the complex relationship of class, school, and district size in creating an environment in which excellence and equity function together to reinforce one another for the benefit of impoverished communities (Howley, 2000, p. 10).

Only one researcher, Kennedy (1990) was found to contradict the previous studies and stated that school size had little to no effect on student achievement. Although, specific school size recommendations are conflicting, school size is an important factor to consider when assessing academic achievement and will be included in this study.

Parent Education Level

Parents' education level may also have an effect on academic achievement. Considerable research has consistently shown that parents' education level has a positive correlation to predicting their children's achievement (Smith, Brooks-Gunn & Klebanov, 1997; Haveman and Wolfe, 1995; Klebanov, Brooks-Gunn & Duncan, 1994).

Davis-Kean (2005) studied the indirect relationship between parent's education and income and their children's academic achievement. A national cross-sectional population of children was used for this study containing survey data from the 1997 *Child Development Supplement of the Panel Study of Income Dynamics (PSID-CDS).* These data were collected since 1968 and included approximately 8,000 families. Of those, there were 868 8-12 year olds (436 females, 433 males). This sample included 49% non-Hispanic European American and 47% African American children. The author used structural equation modeling techniques for her statistical analyses. She proposed two hypotheses: 1) "Parents' education and family income influence children’s achievement indirectly through their association with parents’ educational expectations and parenting behaviors that stimulate reading and constructive play and provide emotional support in the home” (Davis-Kean, 2005, p. 295) and 2) that her predictions would apply across different racial groups. The *Primary Caregiver Interview* was given to the parents with an 88% response rate while the children were given the *Woodcock-Johnson – Revised Tests of Achievement* in the areas of *Letter-Word*, *Passage Comprehension*, *Calculations* and *Applied Problems*. All participants received a small gift for participating in the study. The average education within the households was 13.34 years, just above a high school diploma. The average income of the families was $48,178. As a part of their interview, parents were given a scale of 1 to 8 to predict how much education they thought their child would complete (1=11th grade or less to 8=M.D., Law, Ph.D. or other doctoral degree). The mean for this sample was 5, meaning parents expected their children to graduate from a two-year college. Overall, the correlations showed “…that parent education and income are moderate to strong predictors of achievement outcomes” (Davis-Kean, 2005, p. 297). Of the author’s hypotheses, the first was supported through her findings; however, her second hypothesis was not supported, and she did find that race differences were significant when looking at the relationship of parent education and academic achievement.

“Achievement motivation is defined as a disposition to strive for success and/or the capacity to experience pleasure contingent upon success” (Acharya & Joshi, 2009, p. 72). These authors also believed that other socioeconomic variables, such as parents’ level of education, parents’ occupations and parents’ income also influenced academic achievement. Parents of 200 intermediate school students having four levels of education including high school, intermediate, graduation and post graduation were given the *Deo-Mohan* achievement motivation scale (1985). This assessment explored various areas of academics along with general interest, dramatics and sports. The study had two objectives: 1) to study the mother's influence on the four areas being assessed and 2) to study the father's influence on the four areas being assessed. Two hundred adolescents volunteered for the study and were divided into four groups of 50 based on parent education (i.e. high school, intermediate, graduation and post-graduation). The survey contained 50 questions, and the volunteers self-reported their parent's education levels. The data were then analyzed using SPSS, version 11.01 using the mean, standard deviation and a one-way ANOVA test. The results revealed that the mother's education level significantly and positively impacted a child's academic motivation. However, the significance took place in academics only, not in the other three categories of general interest, dramatics and sports. There was also a positive effect from the father's education level. Overall, adolescents whose father had more education had a higher achievement motivation than those fathers with less education. Also, the results indicated that the higher the parent education level, the higher the motivation for achievement in academic areas. Other elective areas were not found to have been influenced by parent's education level (Acharya & Joshi, 2009).

Acharya and Joshi (2009) also noted that the more parent involvement with the child and his/her school, the higher the level of importance on academic motivation for the child. The authors stated that through their meta-analyses, they found a positive correlation between parent education and academic achievement. Acharya and Joshi supported Corwyn and Bradley's study in 2002 stating that the mother's education had the most direct influence on the child's cognitive and behavioral development. Therefore, parent education level has significant influence on academic achievement and will be included in this study.

Truancy

Daily attendance or non-attendance in school may affect academic achievement. During the 19^{th} century, compulsory attendance laws were made in the United States and Europe. The intent was having more students attend school and not be a part of the workforce (Baskerville, Duncan, & Hutchinson, 2010). McCluskey, Bynum and Patchin (2004) stated that students who are truant become at-risk for drug and alcohol abuse, minimal participation in community affairs and have fewer job opportunities.

Blasik (2005) found in the Broward County School District in Florida, the sixth largest in the United States, the higher the number of unexcused absences, the lower the performance on state standardized tests. As the assistant superintendent for the Broward County Schools, the purpose of her research was to conduct a longitudinal study spanning five and one half years. Not only was she looking for trends in absenteeism, she was also interested in the impact absenteeism may have on academic achievement measured by the Florida Comprehensive Assessment Test (FCAT). Her method included the count of enrolled days, excused absences and unexcused absences for each student of each school in the district. The data were provided by the Total Educational Resource Management System database. Results showed that an inverse relationship was found between unexcused absences and FCAT scores. Specifically, the more unexcused absences a student had, the lower the FCAT score. No relationship between excused absences and FCAT scores was significant.

Puzzanchera, C., Stahl, A., Finnegan, T., Snydeer, H., Poole, R., & Tierney, N. (2003) noted that truancy is one of the early warning signs that a youth may participate in delinquent activity. They also referenced a 2002 San Bernardino, California, review that stated 78% of all California inmates admitted their first infraction with the law was during a time they were truant from school. The same report stated 57% of violent crimes also took place during the time a juvenile should have been in school.

Other researchers including Baker, Sigmon & Nugent (2001) separated the causes for poor attendance into four categories: 1) family factors, 2) school climate factors, 3) economic factors and 4) student factors and a fifth added later, 5) demographic factors (Cash & Duttweiler, 2006). The family factors were identified as living in poverty, domestic violence, drugs and/or alcohol abuse, lack of parental supervision, lack of awareness of attendance laws and the value placed on education. School climate factors were defined as safety, school size, relationships with staff, inconsistent truancy procedures and the lack of meeting students' needs for minority populations. Economic challenges included parental employment, parents having more than one job, student employment, single parent homes, high mobility rates, transportation and childcare expenses. Student factors encompassed alcohol and/or drug abuse, mental health or physical health problems, lack of social skills and poor academic achievement. Lastly, demographic factors involved SES levels, delinquent peers, gang involvement, interracial tensions, sense of community and recreational facilities for adolescents. Students with the highest truancy rates have been found to have the lowest academic achievement and are most likely to drop out of school (Dynarski & Gleason, 1999).

According to the Public Policy Forum, Schmidt and Lemke (2006) reported the negative effects of truancy in Wisconsin's southeastern school districts. Of 318,000 students enrolled in this area's public schools, 3.6 million days were missed during the 2005-2006 school year. This represented 6.5% of the school year ranging from a 2.8% absenteeism rate in Whitefish Bay to a 10.9% rate in Milwaukee Public Schools (MPS). Milwaukee County saw an absenteeism rate of 8.7%; the absenteeism was 6.8% in Kenosha County, and Racine County students missed 5.2% of school days. These three counties make up the three largest school districts in southeastern Wisconsin, ranking one, two and seven overall for absenteeism. In addition, over two thirds of the days missed due to suspensions took place in southeastern Wisconsin.

As a whole, students in southeast Wisconsin are performing below the state average. This applies to all grade levels in reading, math and science WKCE scores. For the third year in a row, 37 MPS schools were identified for improvement in 2005. In 2006, 34 MPS schools failed to meet the NCLB requirements that identified them as needing improvement even though six of ten categories did improve from the previous testing year. When Milwaukee, Kenosha and Racine counties are removed from the equation, the region's WKCE scores are higher than scores for the rest of the state. The academic disparity between the suburban and urban schools becomes very evident. Science, in particular, was much lower in this region than compared to the state at every grade level. Overall, five of the top ten school districts for WKCE results were located in Waukesha County; however, Milwaukee, Kenosha and Racine with the highest enrollments were located in the bottom five (Schmidt & Lemke, 2006).

The student attendance rate is much higher in smaller schools than in larger ones. The issues of truancy, discipline problems, violence, theft, substance abuse and gang involvement are less in small schools. Therefore, truancy is a substantiated factor and will be included in this study.

Disciplinary Actions: Suspensions & Expulsions

Exclusionary discipline, including school suspensions and expulsions, is one of the most common forms of discipline used in order to maintain a safe and conducive school climate for learning. However, the irony remains that students who are removed from such learning opportunities may also suffer academically over time. Thus, school disciplinary actions including suspensions and expulsions may affect academic achievement.

National data concludes that 7% of the school population missed a day of school due to being suspended or expelled, which has doubled since the 1970s. This leads to two competing hypotheses. The first suggests that by removing disruptive students from the learning environment, the protection and preservation of learning of all other students is ensured. However, the simultaneous consequence is that frequent student removal from school has a negative effect on the academic achievement of the removed student (Rausch & Skiba, 2006).

Rausch & Skiba (2006) performed a study on the rates of school discipline and student achievement for grades one through twelve in a Midwestern state for the 2002-2003 school year. The results were disaggregated by race and controlled for poverty. All disciplinary, achievement and socioeconomic data were downloaded from the state Department of Education database. The study contained the following variables:

- Out-of-school suspensions (OSS) or expulsion (EXP) rates for the entire school grades one through twelve.

- Achievement rates represented by the percent of students not receiving special education services who scored proficient or higher in both the English/language arts and mathematics subtests on the state accountability test, organized by racial subgroup.
- School type defined as elementary (grades one through five) or secondary (grades six through twelve).
- Minority percentage calculated by the sum of each minority group divided by the school's total enrollment.
- Poverty rate based on the percentage of students receiving free or reduced lunch.

Two regression models containing 635 schools including 69 elementary schools (10.87%), and 566 secondary schools (89.13%) were used in this analysis. The results indicated that after accounting for poverty levels, 1) secondary schools had a higher OSS incident rate compared to elementary schools; 2) OSS incident rates for African American students was greater than those for White, Hispanic and Multiracial students, and 3) the differences by race and school type did interact with one another. For the elementary schools, the African American incident rate was significantly higher than the other three racial groups. However, at the secondary level, the African American incident rates were higher than the White and Multiracial rates but not statistically different from the Hispanic rate. For expulsions, secondary schools had a higher incident rate than elementary schools; however, there was no significant effect based on race or an interaction effect (Rausch & Skiba, 2006).

Regarding academic achievement, Rausch & Skiba (2006) noted that after controlling for poverty, school type and race had a significant interaction effect with each other. At the elementary level, White passing rates were significantly higher than the three other racial groups. At the secondary level, the average White passing rates were the highest among the other racial groups while the African American average passing rates were significantly lower than all the other racial groups. Also, each racial group had different mean passing rates that were significantly different from one another ranking the following from best to worst: White, Multiracial, Hispanic and African American.

Lastly, the relationship between school discipline and academic achievement found that 1) OSS incident rates significantly predicted school achievement passing rates accounting for 17.1% of the total variation; 2) the socio-demographic factors accounted for an additional 36.1% of the total variation, and 3) OSS and expulsion incident rates predicted some variation in achievement passing rates. Overall, the higher the rates of expulsion and OSS predicted lower percentages of students passing the state accountability test, after factoring for socio-demographic influences. The authors' research also concluded that the results from this study do not indicate that suspensions and expulsions have a positive effect on school achievement but rather are consistent with previous research that indicates a negative relationship between exclusionary discipline and academic achievement. In summary, although the use of OSS and expulsions are related negatively to achievement, socio-demographic variables only accounted for 36-38% of the variation and did not fully explain the relationship. Based on these findings and after accounting for poverty, an inverse relationship existed where OSS rates were the next strongest predictor of achievement and expulsion rates being the second strongest predictor of achievement (Rausch & Skiba, 2006).

In 2004, Rausch & Skiba evaluated the state of Indiana's suspensions and expulsions data and academic achievement. They reviewed the relationship between a school's out-of-school suspension and expulsion rates and the passing rate on both the math and English/language arts subtests on the Indiana State Test of Educational Progress (ISTEP). Findings included schools with higher rates of suspension and expulsion also experienced lower average passing rates on the ISTEP. Schools with lower rates of suspension and expulsion experienced higher average passing rates on the ISTEP. The authors delved further to see if this could be related to other factors such as demographic variables. Upon further research controlling for poverty rate, percentage of African American students, total enrollment, school type (elementary or secondary) and geographic location (urban, suburban, town and rural), researchers found that out-of-school suspension is negatively related to academic achievement. Thus, schools with higher out-of-school suspension rates found lower achievement results on the ISTEP (Rausch & Skiba, 2004). Therefore, school disciplinary actions including suspensions and expulsions are established as an important factor regarding academic achievement and will be included in this study.

Students with Disabilities

Academic achievement may also be affected by students with disabilities. The United States public school system educates more than six million students with disabilities, approximately nine percent of the school-age population. Of those, one third is of traditional high school age. Through federal legislative efforts, such as the Individuals with Disabilities Education Act (IDEA), No Child Left Behind (NCLB) and Response to Intervention (RTI), students with disabilities continue to be included in the general education setting. A wide belief has been that students with disabilities cannot achieve at the same level as those students without a disability. This may be true in some cases, but it is also important to note that some students do achieve at and above the average nondisabled student. Overall, academic achievement varies widely across special education populations (Swanson, 2008).

Swanson (2008) also noted that according to the United States Department of Education's National Assessment of Educational Progress (NAEP), often known as the *Nation's Report Card*, students are assessed and categorized into four achievement levels: 1) below basic, 2) basic, 3) proficient and 4) advanced. NAEP allows for the comparison of students with disabilities versus general education students. In 2005, only 5% of twelfth grade students with disabilities scored at or above the proficient level compared to their non-disabled peers on the reading test. Approximately three quarters scored below the basic level. However, one should not make generalizations about special education populations as each disability can vary dramatically.

Swanson (2008) also referenced another analysis performed by the 2006 National Longitudinal Transition Study-2 that investigated the academic and functional performance of a nationally representative group of students with disabilities. Since the series of tests were based on national norms, the researchers were able to make comparisons to the general education population. Results showed that 16-18 year old students with disabilities did not perform as well as their non-disabled peers on the academic assessments. In reading comprehension, only 12% of students with disabilities reached the level that the average non-disabled student achieved on this test. However, the disability diagnosis seemed to have a strong correlation to student performance. For example, one quarter of students diagnosed with a visual impairment performed at or above the national norms. But on the other end of the spectrum, less than one percent of students with mental retardation reached the national norms. These same results held true for the other academic-skill domains as well. Since all of the schools in this study are public schools and serve special education needs, students with disabilities will be included as a variable in this study.

Extra/Co-curricular Participation

A question often asked is if participation in extra/co-curricular activities has a relationship to academic achievement. Research suggests that extra/co-curricular participation may affect academic achievement.

Dick (2010) studied a mid-sized high school in western Nebraska consisting of 850 students where 44% of the students participated in the free and reduced lunch program. Dick (2010) offered ten research hypotheses. Relationships were found for five of the hypotheses, and students who participated in extra-curricular activities were found to have the following: 1) higher grade point averages (G.P.A.), 2) higher rate of school attendance, 3) students who participated in sports only had a higher rate of discipline referrals, 4) students who were from families of a higher socioeconomic status were more likely to participate in extra-curricular activities and 5) white students were more likely to participate in extra-curricular activities than students of color. The five hypotheses that were rejected because there was no relationship between the variables were the following: 1) G.P.A. between students who participated in athletics and students who participated in non-sport activities, 2) attendance between athletes and non-athletes, 3) participation in extra-curricular activities and disciplinary referrals, 4) G.P.A.'s of students who participated in sports only activities, non-sport activities or both and 5) attendance of students who participated in sports only activities, non-sport activities or both. One of the main conclusions from this study was that a positive relationship exists between participation in extra-curricular activities and academic achievement.

In the state of Wisconsin, Wiederholt (2009) performed a study reviewing alumni perceptions in the small rural community of Cuba City. The class of 1993 (74 students) was asked to participate in a survey that assessed the following two questions: 1) Does participation in high school athletics affect academic achievement? and/or 2) Does participation in high school athletics affect leadership development? The survey included three questions regarding the impact of high school athletics on academic achievement by assessing the number of athletic seasons each participated in, if the participants were on the honor roll and if they were inducted into the National Honor Society. A total of 65 surveys were mailed to members of the class of 1993 with 36 of them being completed for a return rate of 55%. Findings indicated that a positive relationship existed between participation in high school athletics and academic achievement. On a four-point scale, there was a strong positive response to the statement, *Participation in high school athletics helped me develop skills that contributed to earning better grades with an average response of 3.03.*

Lastly, a 2001 study of North Carolina high school athletes revealed significant differences between athletes and non-athletes including the following: 1) the average G.P.A. for athletes was 2.98 while non-athletes was 2.17; 2) the average number of days absent for athletes was 6.3 compared to 11.9 for non-athletes for a 180-day school year; 3) discipline referrals were 33.3% for athletes while non-athletes was 41.8%; 4) the dropout rate was lower for athletes at .6% versus 10.32% for non-athletes and 5) the graduation rate for athletes was 99.4% versus

93.5% for non-athletes. This study among others can be accessed at National Federation of State High School Associations (NFHS), 2011.

Based on the previously stated studies, participation in extra/co-curricular activities is established as a likely factor affecting student achievement and will be included in this study.

Geographic Location

Geographic location may be a factor affecting academic achievement. Studies related to geographic location and student achievement have been performed in a number of states. In some studies, geographic location and one or more factors affecting achievement were also analyzed. In the following section, several of those studies will be reviewed.

Arkansas

Johnson, Howley, and Howley (2002) conducted a study examining academic achievement, school size and poverty and the relationship among the variables in 2002. Data were collected from grades 4, 5, 6, 7, 8 and 9 from all Arkansas schools through state test scores provided by the Arkansas Department of Education. Poverty was measured by the percentage of students who received free and reduced lunch. Previous research by the same authors in Alaska, California, Georgia, Montana, Ohio, Texas and West Virginia found that students coming from poverty had better academic success in smaller schools, thus, narrowing the achievement gap between students of poverty and their peers. The following study specifically details students in the state of Arkansas.

The researchers specifically studied two effects. The *excellence effect* of school size, "Does the size of a school or a school district affect its students' academic performance, and does the nature and extent of that effect depend on the level of poverty in the community?"

(Johnson et al., 2002, p.6). The *equity effect* – "Is poverty's power over student achievement greater in smaller or in larger schools?" (Johnson et al., 2002, p.6). The Arkansas researchers found similar results as past studies. First, students from poverty performed better academically in smaller schools than in larger ones. They also found that students from wealthier communities achieved academically despite school size; however, the poorer the community, the larger the gap. Second, the achievement gap between students from wealthier communities compared to poorer communities was far less in smaller schools than in larger ones. Third, students from poor families achieved better in smaller schools located within smaller school districts versus smaller schools within larger school districts. Lower academic achievement among poor students was greatest amongst larger schools within larger school districts. Lastly, African American students who comprised the majority of the school population had three times the negative relationship amongst academic achievement, poverty and school size (Johnson et al., 2002).

Overall, Johnson et al., (2002) concluded the following:

- The *excellence effect* of small schools by increasing the size of schools from Arkansas's poorest 50% of students would lower student performance on the state mandated testing.
- The *excellence effect* of consolidating small school districts with free and reduced lunch rates of 48% or more would also lower student performance on the state mandated tests.
- The *equity effect* of small schools weakens the strength of poverty over academic achievement and also diminishes the achievement gap between wealthy students and poor students.

- The *equity effect* of small school districts decreases poverty's strength influence between 50-85%.

Montana

The *Matthew Project* study was conducted by Howley (1999), and supported by the Rural Challenge Policy Program, comparing academic achievement to school size, SES and the product of school size and SES in Montana, Georgia, Ohio and Texas. The author chose these states to provide a variety in the geography, school organization, ethnic and racial diversity, and rural and urban diversity. The findings for the state of Montana are discussed below.

Howley (1999) found five key findings throughout this study: 1) as of 1999, Montana led the country in the National Assessment of Educational Progress (NAEP) test scores; 2) teachers in Montana are not paid very well compared to the average teaching salary; 3) Montana does not spend more per pupil than the national average for public funding; 4) people from Montana support their schools financially more than other states, and lastly 5) income distribution among Montana residents is fairly equal. The question becomes, how can Montana continue to have high academic achievement from smaller schools with only spending an average amount per student?

According to Howley (1999), "Poverty figures is the chief and most prevalent threat to normal academic accomplishment among individuals" (p. 7). Based on previous studies in West Virginia (Howley, 1996), Alaska (Huang & Howley, 1993) and California (Friedkin & Necochea, 1988), the author noted that the poorer the community, the smaller the school or district needed in order for high academic achievement. His *interaction hypothesis* stated that an optimal size for a school or school district depends on the percentage of students from lower SES backgrounds. Howley (1999) found it important to mention that previous studies have not found there to be a significant difference in achievement and the size of the school, but the achievement and size of the school is based on the population of low SES students.

All Montana students in grades 4, 8 and 11 were tested using the Comprehensive Test of Basic Skills (CTBS), Iowa Test of Basic Skills (ITBS), and the Stanford Achievement Test (SAT) respectively and were used as the dependent variables for this study. The independent variables included the size of the school and its SES levels based on free and reduced meals participation. The data were completed for a total of 176 K-6 elementary schools, 172 7-8 grade schools and 167 9-12 high schools. The results showed a *regression* relationship as well as *correlations* between SES levels and the achievement by the size of the school. First, the regression results found the proper size conditions in order for students to achieve academically. Second, the academic achievement of students varied based on the size of the school and its low SES population ratio. Similar results were found, "…equity in achievement means breaking—or at least substantially mitigating—the prevailing bond between SES and achievement" (Howley, 1999, p. 31). More importantly, researchers found that achievement in the poorer schools and districts is equal to, if not better, than its more affluent counterparts. Most significantly were the 210 districts with eighth grades scores being studied which found there to be an effect size of 1/3 to ½ standard deviation units in support of the smaller, low SES districts. Also, across all grade levels, the relationship between SES and achievement showed a 40% variance among the larger districts and no significant results for the smaller districts.

Limitations of this study did include the three different assessments (i.e. CTBA, ITBS and SAT) at the three grade levels and that no analysis was made that the assessments were comparable. In addition, SES was difficult to measure as not all low SES families participate in the free and reduced lunch program. Also, how schools recruit or solicit families to participate in this program was different for each school and district.

North Dakota

North Dakota's school system consisted of 118,600 students in 1995. By 2004, it had declined to 99,421 students. In 2000, North Dakota's Department of Public Instruction (NDDPI) proposed consolidation of 214 school districts into 62 mega-districts to the state legislature. The legislature denied such a proposal, but Tom Decker, a NDDPI employee and main developer to the 62-school consolidation plan, persisted with another plan. Based on new regulations, the NDDPI now required all schools to provide specific programs and courses, inevitably forcing some schools to close who could not meet the requirements. Decker concluded that such smaller schools did not have the resources in order for students to achieve academically as well as their peers in the larger schools. Hylden (2004) conducted research on North Dakota's academic testing for all high schools in order to analyze reading and math proficiencies compared to the size of their respective schools. The researcher was most interested in how students from small schools compared to their larger peers and if Decker's logic to consolidate school districts was supported by quantitative evidence (Hylden, 2004).

Findings of his research concluded that the largest high schools had the worst test scores. Small schools were found to perform at or better than their larger peers. Even those with a population of less than 50 students outperformed all schools in all areas of reading proficiency. In North Dakota, schools in the small and poorer communities performed better on the academic testing than the wealthier cities of Fargo and Bismarck. "In fact, the very poorest and very smallest schools outperform all other schools in the state in terms of reading proficiency" (Hylden, 2004, p. 39). Enrollment and proficient data provided by the NDDPI is illustrated in Table 5 and Table 6.

Table 5. Reading Proficiency based on school size

Reading Proficiency						
School Size	<50	50-100	100-150	150-250	250-500	>500
Proficiency	61.74%	59.64%	56.71%	59.94%	60.07%	55.44%

(Hylden, 2004)

For example, Table 5 illustrates that reading proficiency for schools greater than 500 students (55.44%) were the lowest when compared to all other schools based on size. The school size with the highest reading proficiency had an enrollment of less than 50 students (61.74%).

Table 6. Math Proficiency based on school size

Math Proficiency						
School Size	<50	50-100	100-150	150-250	250-500	>500
Proficiency	39.25%	38.3%	37.88%	41.04%	39.2%	37.25%

(Hylden, 2004)

Table 6 also illustrates that schools with the lowest math proficiency were schools that had enrollments greater than 500 students (37.25%). The schools with the highest math proficiency had enrollments of 150-250 students (41.04%).

Hylden's (2004) study indicated that the lowest proficiency rating in reading and math were in high school populations exceeding 500 students.

> All of this data, of course, is quite problematic for the NDDPI's assertion that North Dakota students in small schools are being underserved academically. Quite the contrary, the data should lead one to argue precisely the opposite: it is North Dakota's large

schools that are poorly serving their students, and North Dakota small schools that are providing a better education (Hylden, 2004, p. 38-39).

The data shows no quantitative evidence to suggest that consolidating or closing North Dakota's small schools will increase student achievement.

Ohio

McCracken and Barcinas (1991) performed a study in Ohio with four major objectives: 1) is location of a school (rural or urban) related to school factors (i.e. class size, enrollment, staff size, extra/co-curricular offerings and expenditure per pupil), 2) is location of school related to demographic factors (i.e. gender, ethnic background, SES, parent education level, parental expectations, grade point average), 3) is location of school related to occupational factors (i.e. job expectations, job aspirations, expected income, likelihood of finding a job, and when the occupational choice was made), and 4) is location of school related to post-secondary aspirations (i.e. plans for post-secondary education, type of education, start date). Only two of these four objectives (#1 and #2) are related to this study and will be discussed here.

Ten rural schools and five urban schools agreed to participate through a cluster sampling and were selected at random. A survey for both the school administrator and students was used for this study. A total of 529 students out of 767 rural seniors from the class of 1989 provided parental permission and completed the survey (69% response rate). A total of 718 out of 834 urban students provided parental permission and completed the survey (86% response rate). All 15 administrators participated in the survey. Data analysis was performed using basic statistics including frequency distribution, percentages, means, and standard deviations. These characteristics of rural and urban secondary schools in Ohio are listed in Table 7.

Table 7. State of Ohio survey results

	Rural	Urban
Average Class Size	74	333
High School Enrollment	309	1368
Teachers (avg.)	24	79
Teacher Aides	0	2
Certified Support Staff	3	13
Administrator	1	5
Extra/co-curricular Offerings	107	262
Extra/co-curricular Participation	3.5	3.5
Spending per Pupil	$2,657	$3,527
Ethic Population: White	94%	72%
General Curriculum	23%	9%
Vocational Curriculum	19%	27%
Academic Curriculum	58%	64%
Average G.P.A.	2.64	2.54

(McCracken and Barcinas, 1991)

Overall, several differences are apparent between the rural and urban school related to school factors and demographics. Most notably, an increase in spending per pupil did not equate to higher academic achievement based on grade point averages.

Tennessee

Under NCLB, rural and urban schools are treated the same although they are vastly different. With requirements to meet Adequate Yearly Progress (AYP) and hire highly qualified teachers, Crow (2010) felt that NCLB did not allow for the differences between urban and rural schools. He believed it was more important to specify both rural and urban school’s specific strengths and deficits to help understand their respective needs. His dissertation compared the achievement scores of low SES public urban and low SES rural schools in the state of Tennessee to see if there were statistically significant differences in the variables of ethnicity, economically disadvantaged status, students with disabilities, and limited English language proficiency. Crow (2010, p.1) stated, "Research has shown a significant factor of achievement gap is location, or geography." He proposes that there are institutional challenges for both rural and urban schools, such as location, funding, student population and economic health of the area that suburb communities do not face. Crow (2010) stated that rural America is currently changing from one of ethnically uniform, traditional farming communities to one of multiethnic communities of agricultural and manufacturing workers. Since 25.4% of all schools are located in rural areas and 37.2% in urban areas in the United States, rural schools are not to be discounted (Sutton & Pearson, 2002).

Crow (2010) analyzed the Tennessee Comprehensive Assessment Program (TCAP) scores in mathematics and language for grades three to eight in 207 low SES public schools. A low SES school was defined as one who had at least 75% of its students qualifying for free and reduced lunch and breakfast programs. This would include any family with a gross income of $31,765. A random sampling of 10 low SES urban and 10 low SES rural schools was selected for the study in which twelve participated. The TCAP results included the three performance levels of below proficient, proficient and advanced. The TCAP scores used were a three-year average (2003-2006) of students who were proficient and advanced. Statistical analyses using the Statistical Package of the Social Sciences included *t* tests to determine if there was significance in test scores of students from rural and urban areas when considering the variables of ethnicity, low SES, students with disabilities and English language learners. The results indicated that 1) low SES percentage of students proficient in mathematics was significantly higher in rural students versus urban students, 2) the low SES percentage of students proficient in reading and language arts was also significantly higher in rural students versus urban students, and 3) low SES students with disabilities from urban schools scored significantly lower than low SES students with disabilities from rural areas. Overall, despite the fact that urban and rural areas may share some of the same challenges such as recruiting high quality teachers and obtaining proper educational funding, urban schools have significant academic achievement consequences based on this study (Crow, 2010).

Another study conducted in the state of Tennessee examined eighth and twelfth grade students' math achievement based on school location, county location, class looping status, SES, grade and class size and access to upper-level math courses. Winters (2003) specified questions related to high school students that included 1) What, if any, relationship existed between twelfth grade students' ACT math achievement and its school location, county location, SES, and twelfth grade class size? 2) Could ACT math achievement be predicted by school location, county location, SES and the twelfth grade class size? and 3) What relationship, if any, existed between school averages on the ACT math test and school location, county location, SES, twelfth grade class size, average math class size, faculty size and access to higher-level math courses? Of all the high schools in Tennessee, 98% of public schools that contained twelfth grade students reported ACT math test mean scores. The author also distributed surveys to all of the Tennessee math chairpersons and students from three rural Appalachian Tennessee counties in upper math courses (above Geometry and Algebra II) with a return rate of 60%. Results indicated that there was a significant interaction between the county location and the results of the ACT math test. Students from rural Appalachian schools, rural non-Appalachian schools and non-rural Appalachian schools had higher means on the ACT math test than non-rural non-Appalachian schools. In summary, students from the poorest, rural sections of Tennessee outscored students from non-rural Tennessee on the ACT math subtest.

Texas

Stewart (2009) performed a study to determine if there was a relationship between academic achievement, size of the high school and SES. At the time of the study, there was nearly an even split, with 55.6% low SES and 44.4% non-disadvantaged students. This study compared traditional Texas high schools based on the University Interscholastic League (UIL) athletic conference organization. The five athletic conferences based on high school size within the state of Texas were as follows: 5A (1,985 students or more), 4A (950-1,984), 3A (415-949), 2A (195-414) and 1A (less than 195). To compare the size of the schools and SES, the high schools were divided into quartiles based on low SES percentages and the location of the high school. Low SES students were identified through the free and reduced lunch and/or families on public assistance within each high school. Academic achievement was measured by the eleventh grade Texas Assessment of Knowledge and Skills (TAKS) administered during the 2005-2006 school year. These data were provided through the Texas Education Agency (TEA) online program named the Academic Excellence Indicator System. The following parameters were used while collecting the data. Only traditional high schools were used within this study that excluded the following programs: Alternative Education Programs (AED), Disciplinary

Alternative Education Programs (DAED), Juvenile Justice Alternative Education Programs (JJAED) and charter schools. Those remaining were organized by their athletic conference divisions. High schools were then divided into quartiles based on SES percentages and location (urban, suburb or rural). Lastly, the percentage of eleventh grade students passing the TAKS test within the five different school sizes were compared to the quartile rankings using a one-way ANOVA test and the Scheffe analysis. The level of significance was set at .05.

Based on Stewart's (2009) research question, "Is there a relationship between student achievement in Texas as measured by the Texas Assessment of Knowledge and Skills (TAKS) test, and the size of the high school at different socioeconomic levels?" (p. 23), the findings showed a positive relationship. The author stated that the purpose of this study was to compare urban, suburban and rural schools to one another. He stated that the 1A and 2A schools are located in rural areas; the 3A schools are located in both the suburb and urban areas while 4A and 5A schools are mostly located in the urban and suburb areas of Texas: the findings are summarized in Table 8.

Table 8. Texas's five athletic conference divisions, percentages of disadvantaged students and proficiency percentages on the TAKS test.

Athletic Divisions	<25% SES	25%-49% SES	50%-74% SES	75%-100% SES
1A (<195)	72.50	69.83	64.01	53.80
2A (195-414)	78.7	69.82	62.72	56.00
3A (415-949)	78.81	67.01	57.70	49.04
4A (950-1,984)	77.22	66.01	51.31	45.86
5A (>=1,985)	81.72	67.44	57.84	50.56

(Stewart, 2009)

The data illustrated that in all but the first quartile, smaller schools were more proficient on all four areas of the TAKS test than the larger schools. However, according to Stewart (2009), this study also generates two interesting questions: 1) Why do students in the larger urban schools score better on all four parts of the TAKS test when the SES level is less than 25%? and 2) Why do the small rural schools seem to better prepare students with low SES backgrounds?

West Virginia

In 1999, Fan and Chen studied the achievement of rural students from the *National Education Longitudinal Study of 1988* (U.S. Department of Education, 2012). This study compared students from representative samples from across the nation for eighth, tenth and twelfth grade students in reading, math, science and social studies. Several variables were taken into consideration including SES, ethnicity and if the school was public or private. The classification of location was defined by the United States Census of 1980.

Fan and Chen (1999) found that rural students achieved at, if not better, than their peers in urban schools. This study was different than those in the past as its quantitative data were comprised from a national sample and conceivably more credible. This particular study was also unique because it encompassed the following four objectives: 1) it isolated findings between four different ethnic groups: Asian/Pacific Islanders, Hispanic, Caucasian and African-American; 2) it delineated between students from public and private schools; 3) its multi-year analyses by tracking students' progress from 8th grade to 10th grade to 12th grade and 4) its separation of performance across the United States (Northeast, Midwest, South and West).

This study in 1988 also mitigated five weaknesses from prior studies: 1) including a national representative sample from a reputable data source, 2) using a standard definition of *rural*, *suburb* and *urban* from the United States Census Bureau (1980), 3) isolating SES by using a composite score of five factors including father's and mother's education levels, father's and mother's occupation and family income, 4) isolating achievement levels for different ethnic backgrounds and 5) separating the difference between students attending public or private schools (Fan & Chen, 1999). "We find that students from rural schools perform as well as their peers in metropolitan areas in the four areas of school learning: reading, math, science, and social studies" (Fan & Chen, 1999, p. 42). The researcher does acknowledge that the study is dated; however, due to its nationally represented data sample and comprehensiveness, it is noteworthy. From these studies, one can conclude that geography is an established factor affecting academic achievement and will be included in this study.

Several studies in other states have been described as well as the factors impacting student achievement. The literature review would not be complete without a look at the advantages and disadvantages of small rural schools. It is important to note that there is strong opinion on both sides of this argument. Some argue that academic achievement comes as a cost while others say that cost efficiency is the top priority.

Benefits of Small Rural Schools on Communities

Researchers have identified a variety of benefits of small rural schools to students, families and communities. Primarily, rural schools have an impact on communities both financially and socially. According to Hylden (2004),

> Students in small schools perform better academically, graduate at higher levels, are more likely to attend college, and earn higher salaries later on in life…they participate more in

> extracurricular activities, have better rates of attendance, report greater positive attitudes towards learning, and are less likely to face school-related crime and violence…teachers report greater job satisfaction, and are more likely to feel as if they are succeeding in their work…parents and relatives are more likely to become involved in the school…small schools are often characterized by personalized attention, curriculum integration and specialization, relational trust and respect, a student sense of belonging, a strong positive ethos, greater accountability, and a sense of communal mission (p. 3).

Hylden (2004) also suggests that communities benefit from small schools by having a central meeting place for entertainment and activities, common advisory and decision-making practices and a sense of pride.

Columbia University (Nachtigal, 1982) research showed that small schools had "strengths of smallness" that were not apparent in large schools. Included in these strengths were the number of students involved in extra-curricular activities, a higher number of students in academic courses, a positive relationship between teachers and students due to teacher to student ratio, and showing an appreciation and connection to their communities (Bard et al., 2006).

Cotton (1996) studied the advantages of small schools through a quantitative study of the literature and listed eighteen core factors that students experienced attending a small school. Among those eighteen core factors were academic achievement, attitude toward school, social behavior problems, extracurricular participation, feeling of belongingness, interpersonal relationships, attendance, dropout rates, self-concept, and success in college, etc. She further stated from her analysis that the states with the larger schools and school districts had the lowest achievement and social outcomes. Cotton (2001) stated, "…small size alone is certainly not enough…to improve the quality of schooling. What small size does is to provide an optimal setting for high-quality schooling to take place" (p. 4).

Peshkin (1978, 1982) showed that schools serve as symbols of community autonomy, vitality, tradition, and personal and community identity. Schools are generally a large employer to a small community. They also create civic and social opportunities for citizens (Lyson, 2002). From these studies, one can conclude small schools may provide more than just a positive climate for education but also a core value and an identity to a community.

In 2002, O'Neal & Cox reviewed literature over a twenty year span and found small school strengths within rural education that still seemed relevant today, including the following examples:

- Close relationships between faculty and administration
- Less bureaucratic red tape
- Decisions are more student-centered
- A sense of community
- More personal relationships between teachers and students
- More favorable teacher to student ratios
- Greater potential for individualized instruction
- Allows for more student participation in extra/co-curricular activities
- Fostering close relationships among teachers providing for a more unified staff in vision and school mission
- A greater opportunity for community partnerships

- Increased parent involvement

Opposing Views: Pro-Consolidation

Supporters of eliminating or consolidating small rural schools into larger ones do exist. Per Hylden (2004), Ellwood Cubberley expressed a strong conviction that a manufacturer's perspective to meeting the demands of society and mass production were applicable to education practices. He felt that larger schools were better than smaller schools due to the following: 1) reduced staffing, specifically teachers and administrators which offered an opportunity for cost savings, 2) more availability and opportunity for specialized instruction, and 3) the use of larger buildings to reduce costs. Along with Cubberley, James Conant firmly believed in equity and opportunities for all citizens. By doing so, he did not want the same educational system as Europe, whereby students are tracked by the age of ten. He specifically stated that he wanted "a variety of vocational programs" and "programs for those who have high academic ability" (Hylden, 2004, p. 6). It is worthy to note that Conant defined small schools as *less than* 100 students and did not specifically advocate those with an enrollment in the thousands; he was primarily an advocate for the *comprehensive high school* (i.e. core subject areas and career and technical education areas), not for large schools. Conant and Cubberley both advocated for efficient larger schools that operated at a lower cost (Hylden, 2004).

Debertin and Goetz (1994) noted that public school enrollments are continuing to decline. This provides communities with fewer jobs and teachers that may have several years of experience. With experienced teachers and less enrollment, districts are finding themselves having a higher rate of spending per pupil. In addition to staff, buildings and transportation must be maintained. It may also have an impact on the type of curriculum that is able to be offered within the small school. Often times, small schools will provide the state-mandated curriculum of the core classes and then offer one or two vocational areas as electives. This, too, may serve as a disadvantage for small schools compared to larger schools.

Others thought that districts could run more efficiently if they would combine resources. For example, school districts sharing resources might only have a need for one principal instead of two or three. By sharing, costs should theoretically decrease. If so, schools could run more efficient buildings and facilities. It should open up more opportunities for extra-curricular activities for students and a more expansive curriculum in all areas (Nitta, K. A., Holley, M. J., & Wrobel, S. L., 2010).

As O'Neal & Cox (2002) identified the strengths of small schools stated in the previous section, they also discussed the weaknesses, a few of which are the following:

- Higher per student expenditures
- Fewer curricular offerings
- Less diverse study body
- Limited pupil services such as nursing, psychological and counseling services
- Limited special education services
- Lack of cultural opportunities
- Difficulty in recruiting highly qualified teachers

It is also noteworthy to mention that a consolidation study (Schwinden, 1993) sponsored by the Montana School Boards Association and led by their former governor Ted Schwinden, advised the state against any comprehensive policies on school consolidation. The study was performed to see if school consolidation would save the state of Montana money; the results concluded the savings to be minimal.

Conclusion

Pertinent literature regarding factors that affect academic achievement identified the following ten independent variables to be included in this study: geographic location, socioeconomic status, students of color, spending per pupil, high school enrollment, parent education level, truancy discipline actions: suspensions and expulsions, students with disabilities and extra/co-curricular participation. Similar studies in other states have concluded that geographic location may affect academic achievement, and this study focused on the state of Wisconsin. Finally, the literature discussing the advantages and disadvantages of small rural schools was included in this chapter. In Chapter 3, the methodology for conducting this study is presented in detail.

CHAPTER 3

METHODOLOGY

The purpose of this study was to analyze the performance of Wisconsin rural public high students on the tenth grade WKCE in Reading, Language Arts, Mathematics, Science and Social Studies compared to the performance of Wisconsin city, suburb and town public high students. This chapter outlines the research methodology, design of the study, regression and aggregation bias, data sources, data definitions, data analysis, limitations to the study and the Human Participants Review Board (HPRB) approval process.

Research Design

The research methodology chosen for this study was a quantitative, non-experimental, ex post facto design. Multiple regression analysis was used to test for a statistically significant effect of rural location on academic achievement (test scores) while controlling for the effect of other relevant variables. A multiple regression analysis was conducted for each of the five areas of academic achievement – reading, language arts, mathematics, science and social studies – as measured by WKCE test scores. All Wisconsin public high schools, with the exception of alternative, charter, single purpose and juvenile detention centers were the population and the sample for analysis. The data sources were state and federal education online resources that provide information for the 2009-2010 academic school year. A brief overview of the conceptual model is contained in Table 9, and the rationale for the model and detailed discussion of the dependent and independent variables will follow.

Table 9. Conceptual Model

Data Year: 2009-2010 (WINSS)

<u>Dependent Variable</u>:
HSA = High School Academic Achievement (percent of 10th grade students proficient and advanced on the 10th Grade WKCE tests in Reading, Language Arts, Mathematics, Science & Social Studies)

<u>Independent Variables</u>:
G = Geographic Location (City, Suburb, Town, Rural)
S = Socioeconomic Status (SES) (percent of students receiving free & reduced lunch in the high school)
M = Students of Color (percent of students of color in the high school [Total Number of Students of Color/High School Enrollment])
Sp = Spending per Pupil in the School District
P = High School Enrollment (based on September third Friday count by WDPI)
Pa = Parent Education Level (Average Income by School District [Total Income/Number of School District Residents])
T = Truancy (percent of high school students truant)
R = Disciplinary Actions: Suspensions & Expulsions (total number of suspensions and expulsions as a percent of high school enrollment [Number of Students Suspended + Number of Students Expelled/Fall Enrollment])
D = Students with Disabilities (percent of high school students diagnosed with disabilities)
X = Extra/Co-Curricular Activity Participation Rate Index (the sum of the percentage of students who participated in the three sanctioned areas of school sanctioned activities)

<u>Equation</u>:
HAS(Reading) = f (G, S, M, Sp, P, Pa, T, R, D, X)
HAS(Reading) = $a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

HAS(Language Arts) = f (G, S, M, Sp, P, Pa, T, R, D, X)
HAS(Language Arts) = $a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

HAS(Mathematics) = f (G, S, M, Sp, P, Pa, T, R, D, X)
HAS(Mathematics) = $a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

HAS(Science) = f (G, S, M, Sp, P, Pa, T, R, D, X)
HAS(Science) = $a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

HAS(Social Studies) = f (G, S, M, Sp, P, Pa, T, R, D, X)
HAS(Social Studies) = $a + b_1G + b_2S + b_3M + b_4SP + b_5P + b_6Pa + b_7T + b_8R + b_9D + b_{10}X$

Regression and Aggregation Bias: The Ecological Fallacy

It is imperative for the researcher to acknowledge the limitation of regression and aggregation bias within this study. The dependent variable was academic achievement as measured by WKCE test scores, but individual students take tests, not schools. However, to analyze data from the fall 2009 WKCE in five subjects that 67,679 individual students took was not feasible. First, although the test scores were available by individual student, it would have been extremely difficult or impossible to gain access to them. Also, it would be nearly impossible to gather the other data by student, that are necessary to control for other factors influencing test scores, such as family income. Second, even if this method were theoretically possible, the time and resources required to collect the data were clearly beyond the scope of what was possible in the effort of a single individual in a dissertation. Therefore, aggregate data were used for this study.

Regression is defined as “a category of problems where the objective is to estimate the value of a continuous output variable from some input variables” (StatSoft, Inc., 2011). In this case, the output variable was student achievement, at the school level, as measured by the WKCE tests. Statistical tests based on mathematical distributions provide a basis for assessing whether an independent variable is a statistically significant predictor of the value of the dependent variable, within some range of possible error specified by the researcher. In this research, the variable of interest was geographic location indicating rural location. The null hypothesis was that the value of the regression coefficient for the rural location variable was zero; i.e., rural location was not an important predictor of academic achievement. The regression procedure allowed a test for the significance of the coefficient on the rural location variable. Other variables were included in the regression model in order to control for other factors that influenced test scores.

Conceptually, the appropriate dependent variable was individual student test scores, but the data allowed only for a model that used aggregate test scores by school. Although this was identical to the procedure used in other research on the effect of rural schools on achievement, the model was based on a fundamental assumption that cannot be tested for accuracy. The assumption was that the relationship between the dependent and independent variables at the individual level was the same as that when the variables were aggregated by school. This is the classic problem in regression that is termed "aggregation bias" or the "ecological fallacy." A typical textbook example of the problem is the regression relationship between cholesterol and life expectancy using the individual data versus using national averages. Higher cholesterol in the diet is associated with lower life expectancy for individuals, i.e. the regression coefficient is negative – the line graphing the relationship has a negative slope. However, using national averages, higher average cholesterol in the diet is associated with higher life expectancy, i.e. the regression coefficient is positive; the line graphing the relationship has a positive slope. The reason is that higher average cholesterol is also associated with much higher national income which causes higher life expectancy due to basic public health and sanitation, better access to health care and other factors.

It was impossible to rule out the presence of the ecological fallacy in the model used in this research. For example, it was possible that some very important variable that influenced individual achievement was omitted from the model, and that variable was highly correlated with rural location. For example, it is possible (but not likely) that rural students are more motivated to study and learn than non-rural students. If this was true, and if a rural school actually decreases achievement (for example because of fewer resources), then it is possible that the regression coefficient for rural location would not be statistically different from zero (the positive effect of motivation cancels the negative effect of lack of resources). This is one possible example of how the ecological fallacy could have negated the accuracy of the model.

Although this example is highly unlikely, it was still theoretically possible that some other factor was omitted from the model that was highly correlated with rural location that would produce the same result. Although it was impossible to dismiss totally this possibility, it was highly unlikely that the ecological fallacy would operate in this model. Decades of research support the conceptual model both at the individual and at the aggregate level.

A large body of research (Chapter 2 Review of the Literature) has demonstrated the importance of the model and the variables in explaining variation in academic achievement. Although not all important variables were included in the model; for example, individual motivation, it is not likely that any important omitted variable was also highly correlated with rural location. For these reasons, it was extremely unlikely that the individual data would show a different relationship than the aggregate data and should be considered reliable. However, it is impossible to be totally certain that all the important factors affecting academic achievement have been considered.

In conclusion, it was reasonable to use aggregate data within this study. It was possible, however, not likely, that the coefficient signs and levels of significance were affected by the bias introduced by aggregation. It was also unreasonable and impossible to use individual data due to the unavailability and the time and cost of acquisition that is beyond the scope of this dissertation. But state level representatives may want to consider this when performing longitudinal household surveys that might include academic achievement among the characteristics routinely surveyed.

DATA SOURCES

All data were collected from secondary sources. Databases such as the National Center for Education Statistics (NCES), Wisconsin Information Network for Successful Schools (WINSS) and specific Wisconsin Department of Revenue (WDOR) and Wisconsin Department of Public Instruction (WDPI) sources were used for this study. The dependent variable for this study was high school academic achievement in five areas (Reading, Language Arts, Mathematics, Science and Social Studies) based on the Wisconsin Knowledge and Concepts Examination (WKCE) at grade 10 from the State of Wisconsin Assessment System (WSAS) for the 2009-2010 academic year.

National Center for Educational Statistics

The NCES (U.S. Department of Education, 2012) is the primary federal organization for collecting and analyzing data in the United States. NCES is located in the United States Department of Education and the Institute for Education Sciences. The primary purpose of NCES is to collect, collate, analyze and report statistical information on the status of American education. This agency publishes reports and disseminates education-related information internationally. NCES data users include Congress, federal agencies, state education agencies, state and local officials, educational organizations, the media, business organizations and the general public. Its website contains publications, products, surveys, programs, data tools, etc. The researcher used the *Search for Public Schools* data tool to search for all high schools in the state of Wisconsin. NCES provided a plethora of results but for the purpose of this study, the following high school data were used from the NCES database: 1) name of high school, 2) name of school district, 3) county in which the high school resides, 4) geographical designation (identifying if the high schools are city, suburb, town or rural) and 5) the number of students receiving free and reduced lunch.

Wisconsin Information Network for Successful Schools

The WINSS (WDPI, 2012) database was developed as an information resource for educators, parents and the general public. It is comprised of four sections including 1) standards and assessment, 2) data analysis, 3) continuous school improvement and 4) best practices. *Standards and Assessment* outlines students' expectations and the measurements used to demonstrate students are meeting those expectations, including the knowledge and skills students develop as a result of classroom instruction. *Data analysis* encompasses data on student achievement, behavior, demographics and resources. Several data categories are available for comparison on a school, district, state and national level. *Continuous school improvement* outlines the seven characteristics for successful schools including surveys and tools for improvement of learning. Lastly, *best practices* provides exemplary practices for each of the seven characteristics of successful schools including vision, evidence of success, high academic standards, standards of the heart, professional development, leadership and family, school and community partnerships. WINSS includes school district data on student achievement including the WKCE tests, ACT, Advanced Placement test results, student retention, attendance, dropouts, truancy, high school completion, post-graduation plans, extra/co-curricular involvement, school staffing, school finance including revenue per member and cost per member, and suspensions and expulsions. The data are housed in the Wisconsin Information Network for Successful Schools (WINSS) database (WDPI, 2012).

WINSS (WDPI, 2012) provided the following data for this study: 1) WKCE test results in Reading, Language Arts, Mathematics, Science and Social Studies in grade 10, 2) the total number of students who were truant in grades 9-12, 3) extra/co-curricular activity participation rates for grades 6-12, 4) spending per pupil per school district, 5) the number of students who had been suspended and expelled and 6) the number of students with disabilities within each high school. The data will be discussed in detail below.

Wisconsin Department of Public Instruction

WDPI defines school size by high school enrollment. The high school enrollment is measured by the annual headcount of students enrolled in school on the third Friday in September. WDPI also provided the ethnicity/race enrollment data measured as the annual headcount of students enrolled in school on the third Friday in September (WDPI, 2012).

WDPI (2012) provided the following data for this study: 1) high school enrollment and 2) students of color including subsets of Native American, Asian, Black, Hispanic and White. A crosscheck was also applied to ensure that the total number of ethnicity/race numbers also equaled total enrollment for grades 9-12.

Wisconsin Department of Revenue

The WDOR (2011) Division of Research and Policy provides school district statistics regarding income tax information. This data set used is the annual median household income per school district. Individuals that filed taxes and indicated on their 2010 tax returns that they reside in a specific school district provided this data.

DATA DEFINITIONS

Academic Achievement

The WDPI has administered standardized assessments to measure academic achievement for many years. The WKCE was developed after the Wisconsin Legislature repealed Act 269, which eliminated the previous state testing requirements. The new requirement included knowledge and concepts exams in the eighth and tenth grades in 1993-1994 and also incorporated the fourth grade in 1996-1997. This exam contained the following subtests: reading, language arts, mathematics, science, social studies and writing. The early tests contained test items from ACT's EXPLORE and PLAN assessments. In 1997-1998, the state chose CTB/McGraw-Hill of Monterey, California, as the primary vendor for the Wisconsin Student Assessment System (WSAS). Results were reported in four categories: 1) minimal performance, 2) basic, 3) proficient and 4) advanced. These categories were set by a TerraNova scale, which was defined using a standard-setting process including feedback from over 200 Wisconsin educators, business professionals, and citizens knowledgeable in the five subject areas. Since 2001, the WKCE for grade 10 has used only Wisconsin customized items in all five subject tests drawn from the high school graduation test (HSGT) (a test that never came into existence) bank. In February 2003, threshold scores (often referred to as "cut scores") defining the boundaries of each subject area for all four categories were redefined as a result of the federal reauthorization of the No Child Left Behind (NCLB) act. This standard-setting process was called the Bookmark Standard Setting Procedure (BSSP) that involved more than 250 educators, business professionals and citizens of Wisconsin. BSSP was developed by CTB/McGraw-Hill and allowed for both the selected- and constructed-response items. Lastly, in 2005-2006, NCLB led to several changes in the WSAS. All students in grades 3, 4, 5, 6, 7, 8 and 10 were required to participate in the criterion-referenced exam. Criterion-reference tests outlined students' performance based upon their grade level expectations. This allowed students to see how they performed based on all the students in their grade level in Wisconsin. The testing window has been in the fall since 2002. In the fall of 2009, there were 67,769 students who participated in the tenth grade WKCE examination.

The dependent variable of academic achievement was precisely defined as the percentage of students who scored proficient and advanced on the WKCE test in Reading, Language Arts, Mathematics, Science and Social Studies in grade 10 for each public high school in Wisconsin. Since NCLB has mandated that all students will test in the proficient and advanced categories in all subjects by 2014, the researcher felt it was a proper measure of academic achievement.

However, standard test scores are not a perfect measure of academic achievement. The WKCE scores may or may not best reflect a student's achievement based on several factors. First, a student may experience test anxiety or a lack of motivation to do well as the tenth grade test is the seventh and last in a series of WKCE exams students will participate in before they graduate high school. In addition, the definition of what is *proficient* and *advanced* can be argued to be arbitrary as the cut scores have been modified over the years.

The WKCE proficiency score ranges for the 2009-2010 school year are listed in Table 10.

Table 10. WKCE Proficiency Score Ranges – Grade 10 (effective beginning 2005-2006)

	Minimal Performance	Basic Performance	Proficient	Advanced
Reading	350-455	456-502	503-554	555-820
Language Arts	290-392	393-427	428-483	484-630
Mathematics	410-515	516-540	541-594	595-750
Science	240-410	411-428	429-465	466-610
Social Studies	240-407	408-419	420-454	455-620

(WDPI, 2009)

At first glance, the WKCE Proficiency Score Ranges may not depict anything unusual. However, since the researcher was using academic achievement as the percentage of students who scored proficient and advanced, it is noteworthy to point out the variances in the ranges. Notice that the Basic Performance range for science is 17 points. Also, the Basic Performance range for social studies is 11 points. On the other hand, the Advanced range for reading is 265 points. Table 11 illustrates the point differences for all areas of the WKCE.

Table 11. WKCE Point Differentials (Minimal + Basic) (Proficient + Advanced)

	Minimal + Basic	Point Difference	Proficient + Advanced	Point Difference
Reading	350-502	152	503-820	317
Language Arts	290-427	137	428-630	202
Mathematics	410-540	130	541-750	209
Science	240-428	188	429-610	181
Social Studies	240-419	179	420-620	200

(WDPI, 2009)

When adding the two lower and two higher ranges together, inherently, one would suggest that more students should score in the proficient and advanced categories due to the broadness of the ranges. For example, a student who scored in the 40th percentile in reading is currently determined proficient. The researcher questions if this is the best representation of academic achievement but realizes that this measure is the most reliable available. For more information on the construct validity or test integrity, one can refer to the WKCE Fall 2009 Technical Manual (WDPI, 2010) located at http://dpi.wi.gov/oea/publications.html.

The ten independent variables to be included in this study include geographic location, socioeconomic status, students of color, spending per pupil, high school enrollment, parent education level, truancy, disciplinary actions: suspensions and expulsions, students' with disabilities and extra/co-curricular participation and were discussed separately.

Geographic Location

The NCES classifies all school districts into one of these 12 categories based on the schools' mailing address, location address and the latitude and longitudinal coordinates of the school. The NCES Locale Codes follow the Census Bureau geography definitions, and the locale codes are assigned by the Census Bereau – Geography Division. The size of the school is not a factor in the locale code assignment. For purposes of this research, *City* was defined as the the NCES large, midsize and small city definitions; *Suburb* was defined as the NCES large, midsize and small suburb definitions; *Town* was defined as the NCES fringe, distant and remote town definitions, and *Rural* was also defined as the NCES fringe, distant and remote rural definitions. NCES argues this method to be more precise and accurate than previous methods (U. S. Department of Education, 2011). The NCES locale categories are listed in Table 12.

Table 12. National Center for Education Statistics (NCES) locale categories (2008)

Locale	Definitions
City	
Large	Territory inside an urbanized area and territory inside a principal city of 250,000 or more.
Midsize	Territory inside an urbanized area and inside a principal city with a population of less than 250,000 and greater than or equal to 100,000.
Small	Territory inside an urbanized area and inside a principal city with a population of less than 100,000.
Suburb	
Large	Territory outside a principal city and inside an urbanized area with a population of 250,000 or more.
Midsize	Territory outside a principal city and inside an urbanized area with a population of less than 250,000 and greater than or equal to 100,000.
Small	Territory outside a principal city and inside an urbanized area with a population of less than 100,000.
Town	
Fringe	Territory inside an urban cluster that is less than or equal to 10 miles from an urbanized area.
Distant	Territory inside an urban cluster that is more than 10 miles and less than 35 miles from an urbanized area.
Remote	Territory inside an urban cluster that is more than 35 miles from an urbanized area.
Rural	
Fringe	Census-defined territory that is less than or equal to five miles from an urbanized area, as well as, rural territory that is less than or equal to 2.5 miles from an urban cluster.
Distant	Census-defined rural territory that is more than five miles but less than or equal to 25 miles from an urbanized area, as well as, rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster.
Remote	Census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.
Principal City	City that contains the primary population or the economic center of a metropolitan statistical area.
Urbanized Area	Core areas with a population of 50,000 or more.
Urban Clusters	Core areas with a population of 25,000 to 50,000.
Rural Areas	Census-defined as those areas that are not inside an urbanized area or urban cluster.

(Office of Management and Budget, 2000)

NCES categorizes schools using the geographic coordinates of the location, supplemented by aerial photographs. This procedure sometimes results in classifications that are clearly inaccurate. For example, Racine Case High School is classified as “rural.” NCES staff explained that the aerial photography shows that the school is bordered on one side by city, but on the other side by undeveloped land (F. Johnson, NCES staff member, personal communication, January 18, 2012). This led to the classification of the school as “rural,” but clearly, it is a part of the Racine Unified School District, and the students are from Racine. This same problem led to a rural classification for twelve other high schools that are clearly not rural. These high schools enroll more than 1,000 students and are located within or close to larger cities. The source of the error is that NCES geographically defines these high schools as rural based on their physical address, which is on the edge of towns or cities and connected to an underdeveloped area. Therefore, the researcher reclassified the following 13 high schools from the NCES “rural” category into a more appropriate geographical category listed in Table 13.

Table 13. Geographical reclassification of 13 rural high schools

Name of High School	Population of Students 2009-2010	City Location	Census Population 2010	Name of Nearest City & Population 2010	Miles to Nearest City	New Geographical Classification
Ashwaubenon	1,048	Ashwaubenon	16,693	Green Bay: 104,057	4.15	Suburb
Racine Case	1,984	Racine	78,860	Racine: 78,860	5.27	City
Westosha Central	1,201	Salem	12,067	Kenosha: 99,218	15.59	Town
Wausau East	1,195	Wausau	39,106	Wausau: 39,106	2.74	City
Hamilton	1,348	Sussex	10,518	Milwaukee: 594,833	20.54	Town
Hortonville	1,118	Hortonville	2,711	Appleton: 76,623	13.90	Town
Kaukauna	1,184	Kaukauna	15,462	Appleton: 72,623	7.97	Suburb
Merrill	1,109	Merrill	9,661	Wausau: 39,106	23.75	Town
Muskego	1,761	Muskego	24,135	Milwaukee: 594,833	18.5	Suburb
Neenah	2,124	Neenah	25,501	Appleton: 72,623	9.34	Suburb
New Berlin	1,164	New Berlin	39,584	Milwaukee: 594,833	14.07	Suburb
Oregon	1,154	Oregon	9,231	Madison: 233,209	11.20	Suburb
Wilmot Union	1,158	Salem	12,067	Kenosha: 99,218	16.94	Town

As the NCES (U.S. Department of Education, 2008) geographical definitions stated on pages 69-70, a city locale is defined by as territory inside an urbanized area and inside a principal city with a population of less than 100,000 to greater than 250,000. As Table 13 illustrates, Racine Case High School is located within the city limits of Racine with a population of 78,860 according to the U.S. Census Bureau (2011) and was reclassified under the *city* category. Wausau East is located in the city of Wausau with a population of 39,106 (U.S. Census Bureau, 2011). Its counterpart Wausau West, located on the other side of town, was defined as *city* according to NCES. For these two reasons, Wausau East was also reclassified as a *city* school.

NCES (U.S. Department of Education, 2008) also defined a suburb as a territory outside a principal city and inside an urbanized area with a population of less than 100,000 to greater than 250,000. These high schools, formerly defined as *rural* were reclassified as *suburb*: Ashwaubenon, Kaukauna, Muskego, Neenah, New Berlin and Oregon.

Lastly, NCES (U.S. Department of Education, 2008) defined a town as territory inside an urban cluster that is less than or equal to 10 miles to 35 miles from an urbanized area. Five high schools were reclassified as *town* schools: Westosha, Hamilton, Hortonville, Merrill and Wilmot Union. The researcher felt the reclassifications were a better representation of the actual geographical location in which the schools reside.

Socioeconomic Status (SES)

The SES percentage was defined as the total number of high school students who participated in the Free and Reduced-Price Lunch (FRPL) program provided by NCES Common Core Data for Public Schools divided by the total enrollment provided WDPI for the 2009-2010 school year. FRPL provides a proxy measure for the number of low-income students within the school and is widely used in educational research as such (Hopkins, 2005; Howley, 1989). NCES defines FRPL as the number of students who are eligible for free and reduced lunch under the National School Lunch Act, which provides monetary subsidies based on a families' size and income level. The federal guidelines for FRPL in 2009-2010 are presented in Table 14.

Table 14. Income Eligibility Guidelines

Household Size	Federal Poverty Guidelines
1	$10,830
2	$14,570
3	$18,310
4	$22,050
5	$25,790
6	$29,530
7	$33,270
8	$37,010
For each additional family member, add	$3,740

(U.S. Department of Agriculture, 2011)

Through WDPI and NCES, some rural high schools in Wisconsin were classified specifically as 9-12, 7-12, 6-12 and Kindergarten through 12. By doing so, free and reduced lunch participation data for each of these schools was inaccurate. After further research, it was found that NCES only posts the data that is provided to it by WDPI. After contacting a staff member at WDPI about acquiring data specifically for grades 9-12, it was stated that the online resources did not include free and reduced lunch participation data specifically by grade level. After further research, it was not intuitive as to which high schools included other grade level data. Therefore, each high school was individually researched to see if other grade level data were included. After researching all 417 high schools, it was concluded that 104 schools' free and reduced lunch participation data could not be delineated by grade level to include only grades 9-12. Information on this variable was left blank for 104 high schools listed in Appendix A.

Although the FPRL is an established indicator of students living in poverty, it does have its limitations. First, not all students who qualify for FPRL enroll in the program. Second, each school district has a different way of promoting the FPRL through announcements, mailings, websites, student registration, and other activities. Nevertheless, some families may not have been aware of the FPRL program. Consequently, the percent FPRL is not a perfect proxy for the percent of school families living in poverty. However, it is reasonably accurate in measuring large variations and is by far the best data available. Thus, it was the most reliable construct for this study.

Students of Color

Previous studies cited in the literature review have shown achievement gaps, specifically in southeast Wisconsin, concerning the Black student population. Students of color have been established as a factor when discussing academic achievement. The WINSS data collection system was used to identify the following five categories of race/ethnicity: 1) American Indian, 2) Asian, 3) Black, 4) Hispanic and 5) White for the 2009-2010 school year. Because the data were from 2009-2010, WDPI only collected data within these five categories based on the previous federal reporting guidelines, and each student was identified by one category only. The five categories are defined as follows by the U.S. Department of Education (2008):

- American Indian - a person with origins in any of the original peoples in North, Central and South America, who maintains tribal affiliations or community attachment.
- Asian – a person having origins in any of the original peoples of the far East, Southeast Asia, or the Indian subcontinent including Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand and Vietnam.
- Black – a person having origins in any of the black racial groups of Africa.
- Hispanic – a person of Cuban, Mexican, Puerto Rican, South or Central America or other Spanish culture or origin.

- White – A person having origins in any of the original peoples of Europe, the Middle East or North Africa.

The Public Enrollment Master (PEM10.xls) provided the grade level data by gender and ethnicity/race within each individual high school. Enrollment is based on the third Friday count in September (WDPI, 2012). The students of color percentage was calculated by the sum of the total number of students in the American Indian, Asian, Black and Hispanic categories divided by the total high school enrollment.

Limitations to this data included the new classification system that designated two additional categories implemented in the 2010-2011 school year. WDPI has now included a two-part question format that will now allow for the collection of individuals of two or more races (WDPI, 2011). To stay consistent with the timeline of this study, data from the WINSS database provided for the 2009-2010 school year was used.

Spending per Pupil

The WDPI has a School Data Warehouse that contains reports such as the comparative cost and revenue per member, equalized aid and value per member, mill rates, etc. For the purposes of this study, spending per pupil was defined by total district cost per member. The total district cost per member is the sum of the total educational cost per member (i.e. instructional, pupil/staff support and operations/administration), transportation cost per member, facility cost per member and the food and community services cost per member. The WDPI and the Wisconsin Association of School Business Officials (WASBO) jointly developed this cost methodology. In 2009-2010, the state average for spending per pupil was $12,624, comprised of educational costs ($10,836 or 86%), transportation costs ($475 or 4%), facility costs ($775 or

6%) and food and community services costs ($537 or 4%). These data were also reported on WINSS and extracted from the database for this study.

High School Enrollment

The WDPI collects enrollment data as a part of the Individual Student Enrollment System (ISES) based on the Wisconsin Student Number Locator System (WSLS) and reported on the third Friday of September each academic school year. The Public Enrollment by District by School by Grade (PESGr10.xls) was used for the total enrollment for grades 9-12 in all public high schools in Wisconsin. These data reflected enrollment by grade, by school and school district reported on the third Friday in September of each academic school year (WDPI, 2012).

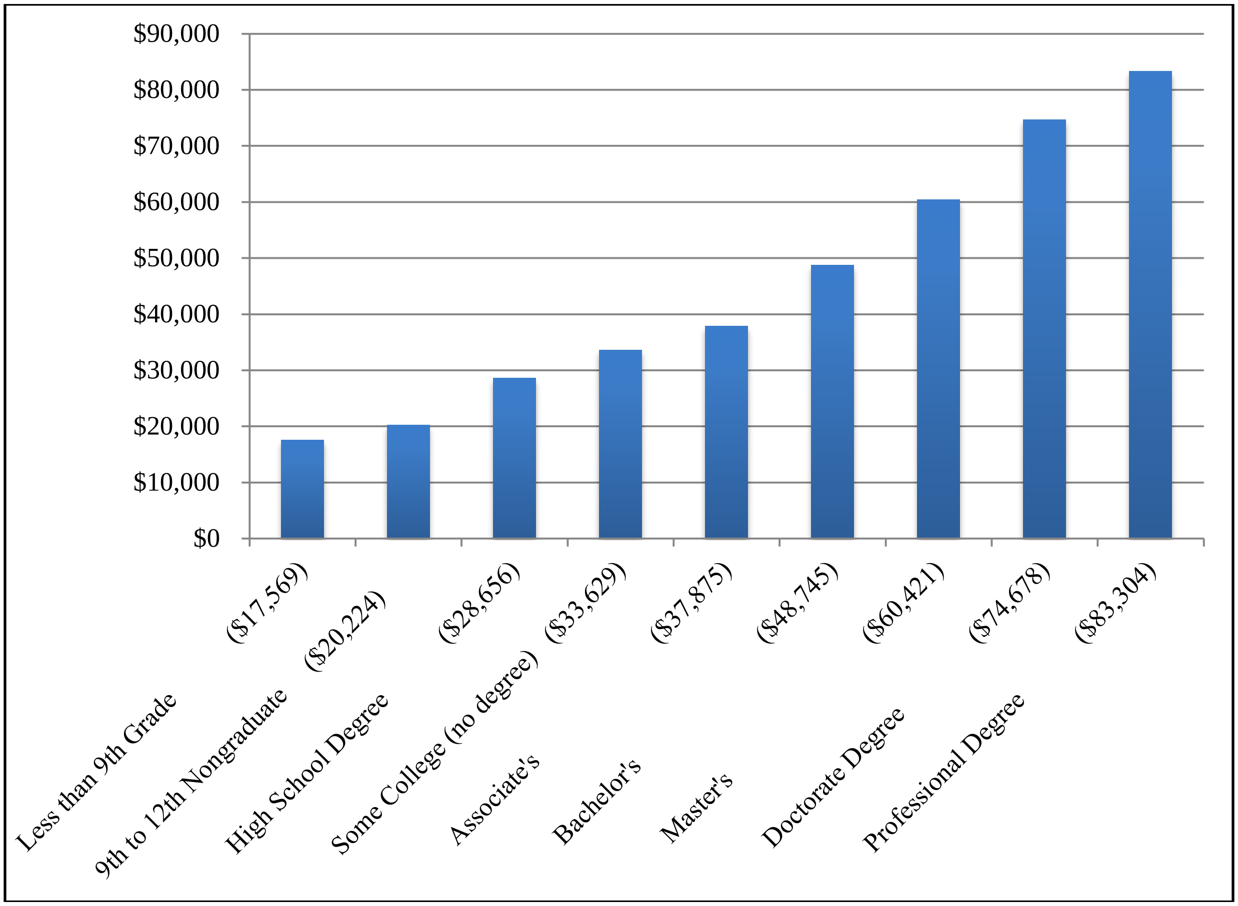
Parent Education Level

As the literature review indicated, parent education level can have a positive impact on a child's academic achievement. However, the average parent education level by school or by school district is not a measure that is collected in the state of Wisconsin. Therefore, average income per school district has been chosen as a surrogate variable to represent parent education level. According to the U. S. Census Bureau (2011), the *Current Population Survey* demonstrates the higher the educational attainment, the more earnings an individual would have over a lifetime, thus providing a numerical measure for parent education level.

This survey has been in existence for more than 50 years and is given monthly to 50,000 households done by the Bureau of Census for the Bureau of Labor Statistics. The survey collects data regarding employment, unemployment, earnings, hours of work, etc.

The median annual earnings by educational attainment are illustrated in Figure 1.

Figure 1. Median Annual Earnings by Educational Attainment (in 2008 dollars)



United States Department of Labor (2011)

For example, an individual who does not graduate high school has an annual median income of $17,569 versus an individual with a professional degree with an annual median income of $83,304. Research indicated that a parent's educational level is highly correlated with a child's educational attainment, and educational attainment is highly correlated with household. Thus, average household income in the school district is a reasonable proxy for family education level.

However, there are limitations in using this variable. Individual income and education level are not perfectly correlated – some individuals with little education have high income, and some individuals who are highly educated have low income. In addition, according to the Wisconsin Department of Revenue (2011), only individuals who have designated the school district they live in on their tax returns are included in this data. Also, this measure does not include individuals who do not file tax returns because their income falls below the minimum-filing requirement that would lead to an overestimate of average household income. This potentially serious omission is partially corrected by including in the model the percentage of students receiving free and reduced lunch. The variable excludes other sources of income that are fully or partially exempt from taxes such as social security, public assistance or unemployment compensation which would lead to an underestimate of average household income. Lastly, this measure does also not include income from nonresident property owners or corporations located within the school districts, but these omissions are not tied to school district residents.

Truancy

WDPI (2011) defines truancy as a student who is absent from school without an acceptable excuse for part or all of five or more days each semester. Truancy is calculated by dividing the total number of truants in grades 9-12 by the total high school enrollment and is expressed as a percentage. However, certain high school data were reported as grades 6-12, 7-12 and KG-12. High schools' (Appendix B) data were modified to only include 9-12 truancy data based on grade level delineation provided by WINSS (WDPI, 2012).

A limitation to this construct was that it is often at the school administrator's discretion when a student is referred for truancy although there was no data to represent this variance. A total of 10 days per school year is stated within the statute; however, it may be several more days before a student is referred for truancy based on the individual circumstances. Another limitation to this variable was that the data is self-reported by each high school and subject to individual interpretation of definitions for reporting purposes.

Disciplinary Actions: Suspensions and Expulsions

According to WDPI (2011), out-of-school suspensions and expulsions are used as measures of disciplinary actions. Wisconsin State Statute 120.13(1) defines out-of-school suspension (b) as “absences from school imposed by the school administration for noncompliance with school district policies or rules, for threatening to destroy school property, or for endangering the property, health, or safety of those at school.” Expulsions are defined as “absences from school for purposes of discipline as imposed by the school board for violation of school district rules; threats against school property; or conduct which endangers the property, health, or safety of those at school.” Expulsion is a school board action defined by Wisconsin State Statute 120.13(1) (c) and 119.25 (WDPI, 2011).

The total percentage of students with disciplinary action was the sum of the total number of pupils suspended out-of-school in grades 9-12 and the total number of pupils expelled in grades 9-12 as reported by WINSS for the 2009-2010 academic school year divided by the high school enrollment. However, certain high school data were reported as grades 6-12, 7-12 and KG-12. High schools’ (Appendix B) data were modified to include only 9-12 suspension and expulsion data based on grade level delineation provided by WINSS (WDPI, 2012).

Limitations to this variable were that the data is self-reported by each high school and subject to individual interpretation of definitions for reporting purposes and can be skewed based on one event. The out-of-school and expulsion data were extracted from the WINSS database for the 2009-2010 academic school year.

Students with Disabilities

WDPI (2011) follows the Wisconsin Administrative Cody, Section PI 11.36 for special education eligibility for the following disabilities: autism, cognitive disabilities, emotional behavioral disabilities, hearing impairments, orthopedic impairment, other health impairment, significant development delay, speech/language impairments, specific learning disabilities, traumatic brain injury, and visual impairments. Program consultants have developed eligibility criteria worksheets to aid in determining if a student qualifies for special education services. Students who are identified and have an individual education plan (IEP) will be counted as a part of the students with disabilities construct.

The students with disabilities percentage was the total number of students diagnosed with a disability within grades 9-12 divided by high school enrollment. Through WDPI and NCES, some rural high schools in Wisconsin were classified specifically as 9-12, 7-12, 6-12 and Kindergarten through 12. By doing so, students with disabilities percentages for each of these schools were inaccurate. After further research, it found that NCES only posted the data that was provided to it by WDPI. After contacting a staff member at WDPI about acquiring data specifically for grades 9-12, it was stated that the online resources did not include students with disabilities data specifically by grade level. After further research, it was not intuitive as to which high schools included other grade level data. Therefore, each high school was individually researched to see if other grade level data were included. After researching all 417 high schools, it was concluded that 104 high schools' students with disabilities data could not be delineated by grade level to only include grades 9-12 and, therefore, data on this variable for the high schools listed in Appendix A was left blank.

Extra/Co-curricular Participation

Extra/Co-curricular activity participation is defined as “school-sanctioned activities intended to broaden, develop, and enhance a student’s school experience in the areas of academics, athletics, and music. Participation is not required and the group or event is not offered for credit or grade” (WDPI, 2005, p. 18). A limitation to this variable was that the data were self-reported by each high school and subject to individual interpretation of definitions for reporting purposes. The extra/co-curricular participation index was the sum of the percentage of pupils participating in grades 6-12 academic, athletic and music extra/co-curricular activities as reported by WINSS for the 2009-2010 academic school year. In all cases, the data were reported at the 6-12 level; separate 9-12 data were not available. Some students may participate in academic, athletic and music extra/co-curricular activities, so percentages may be represented in numbers greater than 100%.

Data Analysis

In the state of Wisconsin, there are 417 traditional public high schools. Of those, 229 are located in rural areas (54.9%); 82 are located in towns (19.7%); 61 are located in suburban areas (14.6%) and 45 are city schools (10.8%) (U.S. Department of Education, 2011). Only data from traditional public high schools were included in this study. Certain nontraditional high schools have been excluded including parochial, alternative, charter, magnet, single purpose schools and juvenile detention centers.

For each data source, the data were downloaded to an Excel® spreadsheet. The data were then uploaded into the SPSS software which was used in the statistical analysis. The key result of most interest was the size and significance of the coefficient on the Geography variable.

In closing, although no variable is perfect, it was reasonable to assume that each of the ten variables or their surrogate were statistically sound.

Human Participants Review Board (HPRB) Approval

The HPRB process does not apply to this study due to the use of public data sources of an aggregate nature such as data by community, school district, county, etc. There were no human subjects within this study; therefore, there was no risk to anyone individually.

Summary

In Chapter 3, the research methodology was presented including the research design and the conceptual model. The limitation of regression and aggregation bias was explained and acknowledged. Descriptions of the data sources were provided along with specific data definitions for all ten independent variables and five dependent variables. The method of analysis was also defined. In Chapter 4, the results of implementing this methodology will be fully presented.

CHAPTER 4

RESULTS

The purpose of this study was to distinguish how rural Wisconsin high students performed on the tenth grade WKCE in the areas of reading, language arts, mathematics, science and social studies compared to Wisconsin city, suburb and town public high students.

The most fundamental problem with the use of multiple regressions to analyze the determinants of academic achievement by high school was the possibility of aggregation bias and the ecological fallacy. Students take exams, not schools; therefore, it was possible that using aggregate data would produce results different from the results using individual data. Although other research demonstrated that the probability of these problems was low, it was not zero. As the data discussion that follows will show, the results in the aggregate data paralleled very closely the research based on data from individual student performance, so the ecological fallacy was not a problem in this study.

DATA DESCRIPTIONS

Prior to analyzing the relationships among the variables, each variable was described in statistical terms including the mean and standard deviation. WKCE test scores in the areas of Reading, Language Arts, Mathematics, Science and Social Studies represented the dependent variable of high school academic achievement. The independent variables were described in detail in Chapter 3 and included the following: geographic location, the percentage of students receiving free and reduced lunch (SES), the percentage of students of color in the high school enrollment, spending per pupil in the school district, high school enrollment, average income in the school district (parent education level), truancy cases as a percent of enrollment, total suspensions and expulsions as a percent of the enrollment, the percentage of students with disabilities and the sum of participation rates in three categories of extra/co-curricular activities.

Academic Achievement

Academic achievement was represented by students who scored proficient or advanced on the tenth grade WKCE tests in the areas of Reading (Read), Language Arts (LA), Mathematics (Math), Science (Science) and Social Studies (SS) during the 2009-2010 academic year. For the purpose of this study, 417 public high schools in Wisconsin data were analyzed, five including one suburb, and four rural of which did not provide any WKCE test data. Thus the test data represented 412 schools in each subject area. Table 15 summarizes the WKCE data for Wisconsin tenth grade students for the 412 high schools for which data was available.

Table 15. WKCE Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Read_ProfAdv	412	18.48	100.00	80.2704	10.78030
LA_ProfAdv	412	13.76	100.00	72.3927	11.86981
Math_ProfAdv	412	10.20	100.00	74.3819	12.56704
Science_ProfAdv	412	9.39	100.00	77.0097	12.31278
SS_ProfAdv	412	12.52	100.00	78.9809	11.36912
Valid N (list wise)	412				

In reading, the percentage of students who scored proficient or advanced included a minimum of 18.48% students from one city high school to a maximum score of 100.00% represented by three rural high schools. The average percentage of students who scored proficient or advanced was 80.27% with a standard deviation of 10.78 percentage points.

In language arts, only 13.76% of students from one city high school scored proficient or advanced while two rural high schools had 100.00% of students scoring in those categories. The average percentage of students scoring proficient or advanced was 72.39% with a standard deviation of 11.87 percentage points.

In mathematics, only 10.20% of students from one city high school scored proficient and advanced while 100.00% of students from one rural high school scored within the same range. The mean percentage of students scoring proficient or advanced was 74.38% with a standard deviation of 12.57 percentage points.

In science, scoring proficient or advanced included a minimum of 9.39% of students from one city high school to 100.00% of students from three rural high schools. The average percentage of students scoring proficient or advanced in science was 77.01% with a standard deviation of 12.31 percentage points.

Lastly, in social studies a minimum of 12.52% of students from one city high school and a maximum of 100.00% of students from four rural high schools scored in the proficient or advanced range. The average percentage of students who scored proficient or advanced was 78.98% with a standard deviation of 11.37 percentage points.

Geographic Location

Each school district was classified by NCES as rural, town, suburb or city. This study included 417 public high schools in the state of Wisconsin. Geographical location data are summarized in Table 16.

Table 16. Geographical Location Descriptive Statistics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	City	45	10.8	10.8	10.8
	Rural	229	54.9	54.9	65.7
	Suburb	61	14.6	14.6	80.3
	Town	82	19.7	19.7	100.0
	Total	417	100.0	100.0	

Of those, 45 high schools are designated as city; 229 are located in rural areas; 61 are in suburbs, and 82 are in towns. Thus, a high school in a city represents 10.8% of the total number of schools while rural, suburb and town high schools represent 54.9%, 14.6% and 19.7% respectively, the same proportions as discussed in Chapter 1.

Free and Reduced Lunch (SES)

Socioeconomic status was represented by the percentage of free and reduced lunch participants within the high school. Although there are 417 high schools, data were available for only 313 high schools for this variable. Data for the other 104 high schools contained other grade level data (i.e. 6-12, 7-12, middle/high, etc.) that could not be separated out. Attempts to obtain high school free and reduced lunch participation data from NCES, WDPI WINSS and the National School Lunch program were unsuccessful and, therefore, data for this variable for those 104 high schools were not included in this study. These 104 high schools listed in Appendix A included 89 rural, eight town, five suburb and two city high schools. The data for free and reduced lunch are summarized in Table 17.

Table 17. *Free and Reduced Lunch Descriptive Statistics*

	N	Minimum	Maximum	Mean	Std. Deviation
FRRL_Per	313	.56	86.03	30.0190	15.57029
Valid N (list wise)	313				

One suburban high school had the lowest percentage of students who participated in free and reduced lunch at .56% while one city high school had the highest rate of participation at 86.03%. The average percentage of students participating in free and reduced lunch in Wisconsin high schools was 30.02% with a standard deviation of 15.57 percentage points. An analysis of the scatter plot (see Appendix C) revealed a cluster of six schools, all city schools, that had more than 77% of its students participating in the free or reduced lunch program and lay substantially outside the distribution of the other observations. These outliers were analyzed later to determine whether they influenced the findings of the study. The results of this analysis will be reported under the regression analysis.

Students of Color

Students of color in a high school was measured by the percentage of students within four ethnicity categories including Asian, Black, Hispanic and American Indian as defined by WDPI. These data are summarized in Table 18.

Table 18. Students of Color Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Students_Color_Per	417	.0000	99.3266	12.770983	18.1375102
Valid N (list wise)	417				

Of the 417 high schools, there were five rural high schools that had no students of color. Conversely, the maximum percentage of students of color was 99.33% at one rural high school. The average percentage of students of color in a high school was 12.77% with a standard deviation of 18.14 percentage points. A scatter plot (see Appendix C) analysis revealed a cluster of ten schools, nine city and one rural high school, that had more than 85% students of color and that lay substantially outside the distribution for the other observations. These outliers were analyzed later to determine whether they influenced the findings of the study. The results of this analysis will be reported under the regression analysis.

Spending per Pupil

Spending per pupil per school district was provided by WDPI and represented the total district cost per member which is the sum of the total educational cost per member (i.e. instructional, pupil/staff support and operations/administration), transportation costs per member, facility costs per member and the food and community services cost per member. The variable is expressed in thousands of dollars of income. Per pupil spending data are summarized in Table 19.

Table 19. Spending per Pupil ($'000) Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Spend_Pupil	417	4.107	24.377	12.90544	1.752995
Valid N (list wise)	417				

The minimum spending per pupil per school district was $4,107 in one rural school district while the maximum was $24,377 in one rural school district. The average spending per pupil per school district was $12,905 with a standard deviation of $1,753. A scatter plot (see Appendix C) analysis revealed that all schools were loosely clustered together, and none lay substantially outside the distribution of the other observations. Therefore, outliers in spending per pupil were not a concern in the regression analysis.

High School Enrollment (School Size)

High school enrollment was based on the third Friday count in September provided by the WDPI and is summarized in Table 20.

Table 20. *High School Enrollment Descriptive Statistics*

	N	Minimum	Maximum	Mean	Std. Deviation
Enrollment	417	24	2408	625.49	545.448
Valid N (list wise)	417				

Of the 417 public high schools, the lowest enrollment during the 2009-2010 academic school year was at one rural high school with 24 students. One suburban high school had the highest enrollment with 2,408 students. The average number of students attending a high school in Wisconsin was 625 with a standard deviation of 545 students. A scatter plot (see Appendix C) analysis revealed that all schools were loosely clustered together, and none were substantially outside the distribution for the other observations. Therefore, outliers in the high school size variable were not a concern in the regression analysis.

Average Income by School District (Parent Education Level)

Parent education level was measured by the surrogate variable of average income per school district as provided by the WDOR. The unit of measure for the variable was thousands of dollars of income. These data are summarized in Table 21.

Table 21. Average Income per School District ($'000) Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Avg_Inc_SD	417	5.344	65.748	31.58667	7.072919
Valid N (list wise)	417				

Of the 417 high schools, one rural school district had the lowest average income per school district at $5,344; however, one suburban school district had the highest with $65,748. The average income per school district in the state of Wisconsin was $31,587 with a standard deviation of $7,073. A scatter plot (see Appendix C) analysis revealed that all schools were loosely clustered together, and none lay substantially outside the distribution of the other observations. Therefore, outliers in the average income by school district variable were not a concern in the regression analysis.

Truancy

The truancy rate was defined as the number of students who were absent without an acceptable excuse for part or all of five or more days each semester as defined by the WDPI divided by the school enrollment as defined by the WDPI. The truancy rate can be greater than 100% as a single student can be identified as truant multiple times throughout a school year.

Truancy data are summarized in Table 22.

Table 22. Truancy Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Truancy_Per	417	.00	111.08	8.5809	15.34163
Valid N (list wise)	417				

Of the 417 high schools in Wisconsin, twenty-nine high schools reported as having zero students truant during the 2009-2010 school year including twenty-eight rural high schools and one town high school. The high school with the highest truancy rate was a city high school at 111.08%. The average truancy rate within a Wisconsin public high school was 8.58% with a standard deviation of 15.34 percentage points. A scatter plot (see Appendix C) analysis revealed a cluster of nine schools, eight city and one rural high school, that had a truancy rate of more than 70% and lay substantially outside the distribution for the other observations. These outliers were analyzed later to determine whether they influenced the regression findings, and the results will be reported in the regression analysis section.

Disciplinary Actions: Suspensions and Expulsions

Disciplinary actions were defined as the number of suspensions plus the number of expulsions divided by the school enrollment, all as defined by WDPI. The data were obtained through the WINSS database, and again a single student may have multiple cases of suspension or expulsion during the school year. Disciplinary action data are summarized in Table 23.

Table 23. Disciplinary Actions: Suspensions & Expulsions Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Sum_Sus_Exp	417	.00	94.21	6.6150	9.74703
Valid N (list wise)	417				

Out of the 417 high schools, eight reported having zero out-of-school suspensions or expulsions for the 2009-2010 school year. All eight were rural high schools. The high school reporting the most out-of-school suspensions and expulsions was one city high school at 94.21%. The mean out-of-school suspension and expulsions rate was 6.62% with a standard deviation of 9.75 percentage points. A scatter plot (see Appendix C) analysis revealed a cluster of eight schools, all city schools that had a combined suspension and expulsion rate of more than 40% and lay substantially outside the distribution of the other observations. These outliers were analyzed later to determine whether they influenced the findings of the study. The results of this analysis will be reported under the regression analysis section.

Students with Disabilities

Students with disabilities were represented by the percentage of students diagnosed with a disability within the high school. Although there are 417 high schools, data were available for only 313 high schools because data for the other 104 high schools listed in Appendix A including 89 rural, eight town, five suburb and two city contained other grade level data (i.e. 6-12, 7-12, middle/high, etc.) that could not be separated or disaggregated to only include grades 9-12. Attempts to obtain students with disabilities high school data from NCES, WDPI WINSS and the WDPI special education department were unsuccessful and, therefore, data for this variable for those 104 high schools were not included in this study. Data for the 313 high schools are summarized in Table 24.

Table 24. Students with Disabilities Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Stud_Dis_Per	313	5.44	64.23	13.6945	4.71350
Valid N (list wise)	313				

From the 313 high schools in Wisconsin, a town high school had the lowest percentage of students with disabilities at 5.44% while a city high school had the highest rate at 64.23%. The average percentage of students with disabilities in a Wisconsin high school was 13.69% with a standard deviation of 4.71 percentage points. An analysis of the scatter plot (see Appendix C) revealed that one city school had more than 60% of its students identified as having a disability. This observation lay substantially outside the distribution of all of the other observations and was analyzed later to determine whether it influenced the findings of the study. The results of this analysis will be reported under the regression analysis.

Extra/Co-curricular Participation

Extra/co-curricular activities were represented by the sum of the percentages of students who participated in academic, athletic and music school sanctioned activities as defined by the WDPI. The extra/co-curricular activities index can be greater than 100% as a single student may participate in multiple activities throughout the school year. These data are summarized in Table 25.

Table 25. Extra/Co-curricular Participation Index Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Extra_Total	417	.00	277.62	119.0947	43.49348
Valid N (list wise)	417				

Out of the 417 high schools in Wisconsin, twelve schools reported offering no extra/co-curricular activities within the high school including eleven city high schools and one rural high school. A rural high school had the highest participation rate at 277.62%. The average participation rate was 119.09% with a standard deviation of 43.49 percentage points. An analysis of the scatter plot (see Appendix C) revealed that all schools were loosely clustered together, and none lay substantially outside the distribution of the other observations. Therefore, outliers in the extra/co-curricular activities participation variable were not a concern in the regression analysis.

DATA CORRELATIONS

The data correlation matrix included all variables including dependent and independent and represents the relationship between the pairs of variables. The Pearson correlation coefficient (*r*) ranges from -1.00 to +1.00 and the strength of the relationship is indicated by the absolute value of the coefficient. In this section, the discussion of correlation was based on the bivariate correlation coefficient, the simple correlation between two variables. In the regression analysis, partial correlation coefficients were used to analyze potential problems with multicollinearity. The partial correlation coefficient was the correlation between two variables, controlling for the effects of other variables, and in particular those variables included in the regression analysis. The total or bivariate correlation coefficient was analogous to the total derivative, and the partial correlation coefficient is analogous to the partial derivative. In general, the partial correlation coefficient will differ from the bivariate correlation coefficient.

Only data correlations greater than .500 (positive and negative) were included in this discussion. Many other correlations are statistically significant (i.e. different from zero at the .05 level of probability), but the strength of the association is relatively weak. Again, a low bivariate correlation coefficient does not necessarily imply a low partial correlation coefficient when controlling for the influence of the other variable. The correlations involving the dependent variables of Reading, Language Arts, Mathematics, Science and Social Studies will be discussed in detail in the data regression section. In the bivariate correlations, the number of observations was 417 (every public high school in the state) except for correlations that involve the two variables of free and reduced lunch and students with disabilities for which data were available for only 313 high schools.

Geographic Location

The geographic location data correlations compared to all the other independent variables are summarized in Table 26.

Table 26. Geographic Location Data Correlations

		Enrollment	Average Income by School District	Rural	Town	Suburb	City	Students of Color (%)	Free & Reduced Lunch (%)	Truancy (%)	Extra/Co-Part. Index	Spending per Pupil	Suspensions & Expulsions (%)	Students w/ Disabilities (%)
Rural	Pearson Correlation	-.722**	-.273**	1	-.546**	-.457**	-.384**	-.349**	.050	-.246**	.474**	.159**	-.236**	-.016
Town	Pearson Correlation	.144**	.045	-.546**	1	-.205**	-.172**	-.136**	-.155**	-.096*	-.109*	-.172**	-.092	-.072
Suburb	Pearson Correlation	.411**	.468**	-.457**	-.205**	1	-.144**	.069	-.312**	-.004	-.137**	-.076	-.002	-.223**
City	Pearson Correlation	.505**	-.153**	-.384**	-.172**	-.144**	1	.655**	.467**	.523**	-.466**	.051	.500**	.361**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

The interpretation of a correlation coefficient for a binary variable is more complex than correlations involving one or more continuous variables. The variables representing geographic location are mutually exclusive, by definition, so correlation coefficients among these variables are not meaningful. Only enrollment was correlated with rural at an absolute value of .5 or higher

(r = -.722, r^2 = .52). No variables were highly correlated with Town or Suburb. City was highly correlated with four variables: 1) enrollment (r = .505, r^2 = .26), 2) students of color (r = .655, r^2 = .43), 3) truancy (r = .523, r^2 = .27) and 4) suspensions and expulsions (r = .500, r^2 = .25). Therefore, 26% of the variation of city is explained by enrollment, 43% by students of color, 27% by truancy and 25% by suspensions and expulsions respectively. Overall:

- The higher the enrollment, the more likely the school will be located in a city.
- The higher the percentage of students of color, the more likely the school is located in a city.
- The higher the truancy rate, the more likely the school is in a city.
- The higher the suspension and expulsion rates, the more likely the school is in a city.

These results are consistent with previous studies in the literature regarding geographic location.

Free and Reduced Lunch

The free and reduced lunch data correlations compared to all the other independent variables are summarized in Table 27.

Table 27. Free and Reduced Lunch Data Correlations

		Enrollment	Average Income by School District	Rural	Town	Suburb	City	Students of Color (%)	Truancy (%)	Extra/Co-curricular Index	Spending per Pupil	Suspensions & Expulsions (%)	Students w/ Disabilities (%)
Free & Reduced Lunch (%)	Pearson Correlation	-.030	-.740**	.050	-.155**	-.312**	.467**	.636**	.626**	-.306**	.372**	.613**	.592**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

The free and reduced lunch (FRRL_Per) participation percentage is highly correlated with five variables including average income by school district, students of color, truancy, suspensions and expulsions and students with disabilities. As will be discussed in the next section, these numerous high correlations created multicollinearity problems in the regression analysis. These data are summarized in Table 28.

Table 28. Free and Reduced Lunch Pearson (r) Correlations

Variable	Pearson Correlation (*r*)	r^2
Average Income by School District	-.740	.55
Students of Color	.636	.40
Truancy	.626	.39
Suspensions & Expulsions	.613	.38
Students with Disabilities	.592	.35

The amount of variation in the free and reduced lunch participation percentage variable that is associated with variation in the other variables are the following: average income by school district (55%), students of color (40%), truancy (39%), suspensions and expulsions (38%) and students with disabilities (35%). Several observations follow from the correlations:

- The higher the average income by school district, the lower the participation rate in free and reduced lunch, and vice versa.
- The higher the percentage of students of color, the higher the participation percentage in free and reduced lunch.
- The higher the truancy rate, the higher the free and reduced lunch participation rate.
- The higher the suspensions and expulsions percentage, the higher the participation percentage in free and reduced lunch.

- The greater the students with disabilities percentage, the higher the participation percentage in free and reduced lunch.

These findings are consistent with previous research within the literature.

Students of Color

The students of color data correlations compared to all the other independent variables are summarized in Table 29.

Table 29. Students of Color Data Correlations

		Enrollment	Average Income by School District	Rural	Town	Suburb	City	Free & Reduced Lunch (%)	Truancy (%)	Extra/Co-curricular Index	Spending per Pupil	Suspensions & Expulsions (%)	Students w/ Disabilities (%)
Students of Color (%)	Pearson Correlation	.389**	-.214**	-.349**	-.136**	.069	.655**	.636**	.762**	-.549**	.210**	.734**	.475**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

The student of color (Students_Color_Per) variable was highly correlated with five other independent variables as shown in Table 30:

Table 30. Students of Color Pearson (r) Correlations

Variable	Pearson Correlation (*r*)	r^2
City	.655	.43
Free & Reduced Lunch	.636	.40
Truancy	.762	.58
Extra/Co-curricular	-.549	.30
Suspensions & Expulsions	.734	.54

The proportion of variation in the students of color variable that can be explained by variation in the other variables are the following: city (43%), free and reduced lunch (40%), truancy (58%), extra/co-curricular participation (30%) and suspensions and expulsions (54%) and vice versa. Results included the following observations:

- The greater the percentage of students of color, the more likely the school is located in the city.
- The greater the percentage of students of color, the higher the percentage of students who participated in the free and reduced lunch program.
- The greater the percentage of students of color, the higher the truancy rate for that school.
- The greater the percentage of students of color, the lower the extra/co-curricular participation index.
- The greater the percentage of students of color, the higher the sum of the combined suspension and expulsion rates within that school.

These correlations are consistent with similar results within the literature. This series of high correlations proved to be troublesome in the regression analysis and will be discussed in the regression section.

Spending per Pupil

The spending per pupil data correlations compared to all the other independent variables are summarized in Table 31.

Table 31. Spending per Pupil Data Correlations

		Enrollment	Average Income by School District	Rural	Town	Suburb	City	Students of Color (%)	Free & Reduced Lunch (%)	Truancy (%)	Extra/Co-curricular Index	Suspensions & Expulsions (%)	Students w/ Disabilities (%)
Spending per Pupil	Pearson Correlation	-.200**	-.412**	.159**	-.172**	-.076	.051	.210**	.372**	.143**	.073	.139**	.235**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

No variables were highly correlated with spending per pupil (Spending_1000).

High School Enrollment

High school enrollment data correlations compared to all the other independent variables are summarized in Table 32.

Table 32. High School Enrollment Data Correlations

		Average Income by School District	Rural	Town	Suburb	City	Students of Color (%)	Free & Reduced Lunch (%)	Truancy (%)	Extra/Co-curricular Index	Spending per Pupil	Suspensions & Expulsions (%)	Students w/ Disabilities (%)
Enrollment	Pearson Correlation	.293**	-.722**	.144**	.411**	.505**	.389**	-.030	.269**	-.496**	-.200**	.262**	-.068

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Another way to interpret the correlation coefficient is to square the simple correlation coefficient (r^2) which then represents the percentage of variance of one variable that is explained by variation in the other variable and vice versa. For example, enrollment and rural have a correlation (r) of -.722. If r is squared, $r^2 = .52$ meaning that 52% of the variation in enrollment was explained by variation in rural and vice versa. The simple regression coefficient (r) is negative, meaning that the higher the enrollment, the less likely the school will be rural. Enrollment is also highly correlated with City (r = .505, r^2 = .26) which means 26% of the variation in enrollment is explained by city and vice versa. Therefore, the higher the enrollment, the more likely the school will be located in a city. These results are consistent with previous studies regarding enrollment.

Average Income by School District

Average income by school district data correlations compared to all the other independent variables are summarized in Table 33.

Table 33. Average Income by School District Data Correlations

		Enrollment	Rural	Town	Suburb	City	Students of Color (%)	Free & Reduced Lunch (%)	Truancy (%)	Extra/Co-curricular Index	Spending per Pupil	Suspensions & Expulsions (%)	Students w/ Disabilities (%)
Avg_Inc_SD	Pearson Correlation	.293**	-.273**	.045	.468**	-.153**	-.214**	-.740**	-.266**	.012	-.412**	-.214**	-.420**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Average income by school district (Income_1000) was highly correlated with free and reduced lunch participation percentage (r = -.740, r^2 = .55). Thus, 55% of the variation in average income by school district could be explained by the variation in free and reduced lunch participation percentage and vice versa. Since the relationship between the two variables was negative, the higher the school district average income the lower the free and reduced lunch participation percentage in the high school. These correlations are consistent with previous research regarding average income by school district.

Truancy

Truancy data correlations compared to all the other independent variables are summarized in Table 34.

Table 34. Truancy Data Correlations

		Enrollment	Average Income by School District	Rural	Town	Suburb	City	Students of Color (%)	Free & Reduced Lunch (%)	Extra/Co-curricular Index	Spending per Pupil	Suspensions & Expulsions (%)	Students w/ Disabilities (%)
Truancy (%)	Pearson Correlation	.269**	-.266**	-.246**	-.096*	-.004	.523**	.762**	.626**	-.463**	.143**	.760**	.542**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Truancy (Truancy_Per) also had five variables that are highly correlated including city, students of color, free and reduced lunch, suspensions and expulsions and students with disabilities in Table 35:

Table 35. Truancy Pearson (r) Correlations

Variable	Pearson Correlation (*r*)	r^2
City	.523	.27
Students of Color	.762	.58
Free and Reduced Lunch	.626	.39
Suspensions and Expulsions	.760	.58
Students with Disabilities	.541	.29

The percentage of the variation in the truancy rate that was explained by variation in the variables was the following: city (27%), students of color (58%), free and reduced lunch (39%), suspensions and expulsions (58%) and students with disabilities (29%). Therefore, the following interpretations can be made as follows:

- The higher the truancy rate, the more likely the school is within a city.
- The higher the truancy rate, the higher the percentage of students of color.
- The higher the truancy rate, the higher the participation percentage in free and reduced lunch.
- The higher the truancy rate, the higher the suspensions and expulsions percentage.
- The higher the truancy rate, the higher the students with disabilities rate.

These correlations are consistent with other previous research within the literature.

Disciplinary Actions: Suspensions & Expulsions

Disciplinary actions: suspensions and expulsions data correlations compared to all the other independent variables are summarized in Table 36.

Table 36. Disciplinary Actions: Suspensions & Expulsions Data Correlations

		Enrollment	Average Income by School District	Rural	Town	Suburb	City	Students of Color (%)	Free & Reduced Lunch (%)	Truancy (%)	Extra/Co-curricular Index	Spending per Pupil	Students w/ Disabilities (%)
Sus & Exp. (%)	Pearson Correlation	.262**	-.214**	-.236**	-.092	-.002	.500**	.734**	.613**	.760**	-.454**	.139**	.385**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

The variable representing the sum of the suspensions and expulsions (Sum_Sus_Exp) rates was highly correlated with the four variables, city, students of color, free and reduced lunch and truancy as shown in Table 37.

Table 37. Disciplinary Actions: Suspensions & Expulsions Pearson (r) Correlations

Variable	Pearson Correlation (*r*)	r^2
City	.500	.25
Students of Color	.734	.54
Free & Reduced Lunch	.613	.38
Truancy	.760	.58

The proportion of variation in the suspension and expulsion variable that is explained by the other variables was as follows: city (25%), students of color (54%), free and reduced lunch (38%) and truancy (58%). Thus:

- The higher the suspensions and expulsions percentage, the more likely the school is located in a city.
- The higher the suspensions and expulsions percentage, the higher the students of color percentage.
- The higher the suspensions and expulsions percentage, the higher the free and reduced lunch participation percentage.
- The higher the suspensions and expulsions percentage, the higher the truancy rate.

These findings are consistent with previous research within the literature.

Students with Disabilities

Students with disabilities data correlations compared to all the other independent variables are summarized by Table 38.

Table 38. Students with Disabilities Data Correlations

		Enrollment	Average Income by School District	Rural	Town	Suburb	City	Students of Color (%)	Free & Reduced Lunch (%)	Truancy (%)	Extra/Co-curricular Index	Spending per Pupil	Suspensions & Expulsions (%)
Students w/ Disabilities (%)	Pearson Correlation	-.068	-.420**	-.016	-.072	-.223**	.361**	.475**	.592**	.542**	-.254**	.235**	.385**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

The students with disabilities (Stud_Dis_Per) variable had only two variables that were highly correlated, free and reduced lunch and truancy. Free and reduced lunch (r = .592 and r^2 = .35) explains 35% of the variation in the students with disabilities variable and the higher the free and reduced lunch participation percentage, the higher the students with disabilities percentage.

Truancy (r = .542 and r^2 = .29) explained 29% of the variation in the students with disabilities variable and had a positive relationship, thus, the higher the truancy percentage, the higher the students with disabilities percentage as well. These findings are consistent with previous research within the literature.

Extra/Co-curricular Participation

Extra/co-curricular participation data correlations compared to all the other independent variables are summarized in Table 39.

Table 39. Extra/Co-curricular Participation Data Correlations

		Enrollment	Average Income by School District	Rural	Town	Suburb	City	Students of Color (%)	Free & Reduced Lunch (%)	Truancy (%)	Spending per Pupil	Suspensions & Expulsions (%)	Students w/ Disabilities (%)
Extra-Co-curricular Index	Pearson Correlation	-.496**	.012	.474**	-.109*	-.137**	-.466**	-.549**	-.306**	-.463**	.073	-.454**	.254**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Extra/co-curricular (Extra_Total) participation is only highly correlated with one other variable, students of color, r = -.549 and r^2 = .30. Therefore, 30% of the variation for extra/co-curricular participation can be explained by variation in the percentage of students of color in the high school, overall, the higher the students of color percentage, the lower the extra/co-curricular participation index. This is consistent with the observation that some of the city schools had no extra/co-curricular activities and also had high percentages of students of color in enrollment.

REGRESSION ANALYSIS

Geographical Location

The geographic variable is categorical and was represented by four binary dummy variables, one each for rural, town, suburb and city. To avoid singularity in the regression matrix, the binary dummy variable for rural was excluded, so in effect the regression coefficient on rural was set to zero by its omission from the regression estimates. Thus, the hypothesis that each of the coefficients on the other location variables was equal to zero was a test of the hypothesis that the coefficients did not differ from the coefficient on rural (zero). Thus, formally, the null hypotheses were the following: H_0: Town = 0, H_0: Suburb = 0, H_0: City = 0.

READING

All Variables Model

The first regression model included Reading_ProfAdv (reading proficient and advanced percentage) as the dependent variable and included all ten of the independent variables. This regression, named the *All Variables* model, included 310 high schools because the 104 high schools (Appendix A) with missing data on free and reduced lunch and students with disabilities could not be included. In the regression the r^2 was .708, meaning that 71% of the variation in the percentage of students reading proficient or advanced was explained by the ten independent variables, and the model was highly significant (.000). The r^2 is very high for research in the social sciences.

The *All Variables Model – Regression 1* is summarized in Table 40.

Table 40. *All Variables* Model – Regression 1

All Variables Model – Regression 1								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	85.099	5.499		15.476	.000		
	Enrollment	.001	.001	.043	.808	.420	.341	2.935
	Income_1000	.069	.085	.045	.807	.420	.320	3.128
	Town	.836	.993	.034	.842	.400	.618	1.619
	Suburb	3.197	1.360	.115	2.352	.019	.410	2.437
	City	1.145	1.818	.037	.630	.529	.280	3.566
	Students_Color_Per	-.151	.043	-.265	-3.528	.000	.175	5.728
	FRRL_Per	-.102	.049	-.149	-2.062	.040	.188	5.330
	Truancy_Per	-.096	.039	-.149	-2.449	.015	.265	3.772
	Extra_Total	-.008	.010	-.032	-.744	.457	.532	1.879
	Spending_1000	.296	.264	.041	1.120	.264	.720	1.390
	Sum_Sus_Exp	-.371	.062	-.344	-5.983	.000	.296	3.374
	Stud_Dis_Per	-.191	.096	-.085	-1.984	.048	.539	1.855
a. Dependent Variable: Read_ProfAdv								

The coefficients on several of the variables were statistically significant ($p \leq .05$) including suburb (.019), students of color (.000), free and reduced lunch (.040), truancy (.015), suspensions and expulsions (.000) and students with disabilities (.048). The coefficients can be interpreted as follows: 1) location in a suburb increased the percentage of reading proficient and advanced by 3.197 percentage points, compared to location in a rural area; 2) for every percentage point increase in the percentage of students of color, the percentage reading proficient or advanced decreased by .151 percentage points; 3) for every percentage point increase in the percentage of free and reduced lunch participation, the percentage reading proficient or advanced decreased .102 percentage points; 4) for every percentage point increase in the percentage of students who were truant, the percentage reading proficient or advanced decreased .096 percentage points; 5) for every percentage point increase in the percentage of suspensions and expulsions, the percentage reading proficient or advanced decreased .371 percentage points and 6) for every percentage point increase in the students with disabilities percentage, the percentage of reading proficient or advanced decreased .191 percentage points. The signs on each of these variables were the same as those reported in the research literature that used individual data to analyze influences on reading achievement.

Although the results were clear and consistent with findings in other research, two types of problems may have influenced the results, problems that could affect the interpretation and policy implications.

First, the model demonstrated high variance inflation factors (VIF) and low tolerance (one is the reciprocal of the other). A high VIF suggests that there are high correlations among the variables that can create multicollinearity problems in the regression. The threshold for a "high" VIF cannot be determined statistically but is a matter of judgment of the researcher. Ideally, all VIF are less than 2, but some researchers choose thresholds of 3, 4 or even 6 in judging the likelihood of multicollinearity in the model. In this study, a VIF of 3 was used in identifying likely multicollinearity problems although, as will be discussed below, it was not always possible to modify the model to produce VIF of 3 or less for all variables.

In Regression 1, the *All Variables* model, six variables had high VIF values that signaled likely multicollinearity problems: average income by school district (3.128), city (3.566), students of color (5.728), free and reduced lunch (5.330), truancy (3.772) and suspension and expulsions (3.374). In the presence of multicollinearity, coefficient estimates are not biased, but the standard errors will be inflated, thus leading to lower t-values, higher significance numbers and less likely rejection of the null hypothesis that the coefficient is equal to zero. In addition, the coefficient estimates may not be stable across different samples. Thus, these six variables with high VIF may have created problems in interpretation of the results, so further analysis was required to isolate this problem. The results of the analysis of multicollinearity will be discussed in a separate section after the presentation section on the *All Schools* model, Regression 2.

Second, it is possible that outliers, high schools with extreme values for one or more of the independent variables, exerted an extraordinary influence on the coefficient estimate. This is a potential problem in any regression analysis, so an analysis of the possible effect of outliers was carried out using the *All Variables* model. The analysis is presented below.

The first step in the outlier analysis was to create scatter plots to examine the distribution of each variable and identify possible outliers. Appendix C includes a scatter plot for all independent variables except geographic location variables that were straightforward by definition. The distributions for five variables had outliers, a very small group of observations well outside the distributional pattern of all the other observations. The variables with clearly identifiable outlier clusters were the following: free and reduced lunch, students of color, truancy, suspensions and expulsions and students with disabilities. Free and reduced lunch had six city high schools with percentages greater than 77%; students of color had 10 high schools (nine city and one rural) with percentages greater than 85%; nine high schools (eight city and one rural) had percentages greater than 70% for truancy; suspensions and expulsions percentages which were greater than 40% were in eight city high schools; and one city high school had a students with disabilities percentage greater than 60%. Of those five variables with clear outlier clusters, the same six city high schools were included in the outlier group for four of the five variables, including free and reduced lunch, students of color, truancy and suspensions and expulsions. Another city high school was an outlier for the variables students of color, truancy and students with disabilities while yet another city high school was an outlier for the variables students of color, truancy and suspensions and expulsions. Four high schools were in the outlier group for one variable only: 1) one city high school for suspensions and expulsions, 2) one city high school for students of color, 3) one rural high school for students of color and 4) one rural high school for truancy. A new regression was calculated excluding the high schools that had an outlier value for one or more of the variables; that is, they had free and reduced lunch <77%, or students of color <85%, or truancy <70%, or suspensions and expulsions <40% or students with disabilities <60%. The regression results showed coefficients that were very close to the values estimated with the full sample of high schools in the *All Variables* model (see Table 40). Removing the outlier cases produced results consistent with the *All Variables* regression. Therefore, the outliers did not substantially influence the coefficient estimates.

All Schools Model

A second regression model was estimated, termed the *All Schools* model, with reading as the dependent variable. Two of the ten independent variables could not be used in this model, free and reduced lunch percentage and the students with disabilities percentage, because data for these variables were not available for 104 high schools for grades 9-12 and WKCE scores were not available for five schools (of which two were overlapping with the lack of information for free and reduced lunch percentages and students with disabilities percentages). By removing the variables free and reduced lunch and students with disabilities, a total of 412 schools were included in the second regression model.

The second regression produced an r^2 = .600, meaning that 60% of the variation in reading proficient or advanced was explained by the eight remaining independent variables. The model was also highly significant (.000).

The *All Schools Model – Reading* regression is summarized in Table 41.

Table 41. *All Schools* Model – Reading

All Schools Model - Reading[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	72.637	4.501		16.139	.000		
	Enrollment	.002	.001	.086	1.599	.111	.343	2.920
	Income_1000	.250	.064	.163	3.912	.000	.575	1.740
	Town	.824	1.054	.031	.782	.434	.654	1.528
	Suburb	3.352	1.477	.110	2.270	.024	.427	2.344
	City	-.577	1.975	-.017	-.292	.770	.305	3.277
	Students_Color_Per	-.145	.040	-.243	-3.657	.000	.226	4.431
	Truancy_Per	-.135	.039	-.193	-3.467	.001	.322	3.108
	Extra_Total	-.005	.011	-.020	-.474	.636	.561	1.781
	Spending_1000	.327	.255	.048	1.282	.201	.704	1.421
	Sum_Sus_Exp	-.385	.058	-.350	-6.579	.000	.354	2.827

a. Dependent Variable: Read_ProfAdv

Again, the coefficients on several of the variables were statistically significant ($p \leq .05$), including average income by school district (.000), suburb (.024), students of color (.000), truancy (.001) and suspensions and expulsions (.000). The coefficients can be interpreted as follows: 1) for every $1,000 dollar increase in average income by school district, the percentage reading proficient or advanced increased .250 percentage points; 2) location in a suburb increased the percentage reading proficient or advanced by 3.353 percentage points, compared to location in a rural area; 3) for every percentage point increase in the percentage of students of color, the percentage reading proficient or advanced decreased .145 percentage points; 4) for every percentage point increase in the percentage of students who were truant, the percentage reading proficient or advanced decreased .135 percentage points; 5) for every percentage point increase in the percentage of students suspended or expelled, the percentage reading proficient or advanced decreased .385 percentage points. The signs on each of these variables are the same as those reported in the research literature that used individual data to analyze influences on reading achievement.

Although the *All Schools* model demonstrated a substantial reduction in multicollinearity compared to the *All Variables* model, high VIF were associated with three variables: city (3.277), students of color (4.431) and truancy (3.108).

As in the *All Variables* model, a separate regression was calculated with the removal of high schools included in any of the outlier clusters. Thus, a school was removed from the analysis if it had the following: free and reduced lunch <77%, or students of color <85%, or truancy <70%, or suspensions and expulsions <40% or students with disabilities <60%. The regression results were consistent with the *All Schools* regression (see Table 41). Thus, schools with extreme values on the independent variables were not a problem and did not influence the results of the regression for the *All Schools* model.

In conclusion, the results from the *All Variables Model - Regression 1* and *All Schools Model - Regression 2* were fundamentally identical. Both had essentially the same statistically significant coefficients. The *All Variables Model* statistically significant coefficients included suburb, students of color, free and reduced lunch, truancy, suspensions and expulsions and students with disabilities while the *All Schools Model* statistically significant coefficients included average income, suburb, students of color, truancy and suspensions and expulsions. Both regressions included the statistically significant coefficients of suburb, students of color, truancy and suspensions and expulsions. Suburb had a positive relationship with reading proficient or advanced percentage in both regressions while students of color, truancy and suspensions and expulsions had a negative relationship with the percentage reading at proficient or advanced in both regression equations. Both regressions also produced the same conclusions about geographic location. Location in a town or a city did not produce reading results different from location in a rural area – the coefficients on town and city were not statistically significantly different from zero, the value of the excluded rural location variable. However, the coefficient on the variable suburb was positive and statistically significant, meaning that location in a suburb was associated with a higher percentage of students reading at the proficient or advanced levels. Also, all of the coefficients on the variables were exactly as predicted by the theory and consistent with empirical results using individuals rather than schools as the unit of analysis. Thus, it was very unlikely that the ecological fallacy was present in these regression results. Overall, the regression analysis was reassuring because the results for the geographic location variable were the same no matter which model was used or whether outliers were included or excluded.

Analysis of Multicollinearity

The VIF data for both the *All Variables* and the *All Schools* models showed likely problems with multicollinearity in the regressions. The analysis of multicollinearity proceeded in two different ways: 1) omitting highly correlated variables and 2) factor analysis to reduce a cluster of highly correlated variables into a single measure. The *All Variables* model was used for the multicollinearity analysis because it showed the highest levels of multicollinearity and because all of the variables with high VIF values in the *All Schools* model also had high VIF values in the *All Variables* model. Thus, eliminating the multicollinearity problem in the *All Variables* model would very likely eliminate it in the *All Schools* model as well.

The *All Variables* model showed high multicollinearity in the following six variables listed from highest to lowest VIF values: 1) students of color (5.728), 2) free and reduced lunch (5.330), 3) truancy (3.772), 4) city (3.566), 5) suspensions and expulsions (3.374) and 6) average income by school district (3.128). The variable for students of color was retained in the regression since a large amount of research and discussion is focused on the academic achievement of students of color. In addition, the geographic variable City was retained in the regression because the effect of geographic location on achievement was the core question in this study, and City could not be eliminated without affecting the coefficients on the other geographic location variables. Therefore, the regression equation was estimated three additional times removing the following variables: 1) free and reduced lunch, 2) free and reduced lunch and truancy and 3) free and reduced lunch, truancy and suspensions and expulsions. The purpose was to examine the change in the VIF multicollinearity diagnostic and, in particular, to determine whether VIF might be reduced to ≤ 3.00 for all variables. After the removal of free and reduced lunch, overall multicollinearity decreased, but four variables still had high VIF values, including city (3.561), students of color (5.339), truancy (3.768) and suspensions and expulsions (3.168).

After the removal of free and reduced lunch and truancy, the VIF values decreased again, but two variables had high VIF including city (3.560) and students of color (4.843). Lastly, after the removal of free and reduced lunch, truancy and suspensions and expulsions, two variables had collinearity including city (3.517) and students of color (3.033). Although the multicollinearity improved after removing one, two and then three variables, the procedure was not fully effective in eliminating all of the multicollinearity (VIF ≤ 3.00) for all variables, and removing three variables for the analysis was not consistent with the underlying theoretical model in the study. Since the removal of variables was not fully effective, factor analysis was used to collapse several highly correlated variables into a single index.

Factor Analysis

Factor analysis was used to create one or more variables that were based on, and derived from, the common variation of the highly correlated cluster of variables in the model. Factor analysis is often used to extract a common "factor" or unmeasured but important concept (or concepts) from a set of variables. For example, factor analysis might be used to construct a variable measuring a "factor" called "health status" of a population based on indicators, such as infant mortality, life expectancy, incidence of preventable communicable diseases and other indicators that have high levels of correlation among them. Two methods were used in this study to construct variables to capture the common variation of the variables with high VIF values in the regression analysis. First, a simple conceptual model was used to sort the highly correlated variables into two groups, and a single factor was extracted for each group. Second, the five highly correlated variables were included in a single factor analysis, in effect allowing the factor analysis algorithm to empirically define the groups.

First, a POVERTY factor was created using average income by school district, students of color and free and reduced lunch participation, all indicators associated with family socio-economic status. The variables truancy and suspensions and expulsions were used in a second factor analysis, and the factor capturing the common variation was termed OUT_OF_SCHOOL. Using the results of the factor analysis, factor scores were created for each high school for each of the factor analysis factors. These factor scores were then used as independent variables in the regression analysis in place of the highly correlated variables used to create the factors. In the regression including the factor analysis variables POVERTY and OUT_OF_SCHOOL, the results are presented in Table 42.

Table 42. Factor Analysis 1 – *POVERTY & OUT_OF_SCHOOL*

Factor Analysis 1 – POVERTY & OUT_OF_SCHOOL								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	80.269	3.944		20.353	.000		
	Enrollment	.001	.001	.034	.624	.533	.343	2.912
	Town	.862	1.006	.035	.857	.392	.622	1.607
	Suburb	2.315	1.324	.083	1.749	.081	.447	2.238
	City	-.394	1.734	-.013	-.227	.820	.318	3.144
	Extra_Total	-.003	.010	-.012	-.282	.778	.554	1.805
	Spending_1000	.139	.261	.019	.532	.595	.759	1.317
	Stud_Dis_Per	-.147	.093	-.065	-1.580	.115	.591	1.691
	OUT_OF_ SCHOOL	-5.719	.516	-.565	-11.076	.000	.389	2.571
	POVERTY	-2.947	.618	-.278	-4.768	.000	.298	3.352
a. Dependent Variable: Read_ProfAdv								

The statistically significant coefficients ($p \leq .05$) were the two new factors, OUT_OF_SCHOOL (.000) and POVERTY (.000). However, the coefficient on suburb was not statistically significantly different from zero (.081) in this model. Unfortunately, evidence of multicollinearity still existed in the form of high VIF values for two variables including city (3.144) and poverty (3.352).

The second factor analysis approach was to allow the software algorithms to determine empirical associations and extract factors from the variables using students of color, average income by school district, free and reduced lunch, truancy and suspensions and expulsions. The results showed that the variables students of color, free and reduced lunch, truancy and suspensions and expulsions loaded heavily and positively on the first extracted factor (FACTOR_1) while average income by school district loaded heavily and positively, and free and reduced lunch loaded somewhat heavily and negatively on the second factor (FACTOR_2) (See Appendix D). These two factor loadings were then used to calculate factor scores for each high school, and the resulting variables were used within a regression. The results are below in Table 43.

Table 43. Factor Analysis 2 – *FACTOR_1 & FACTOR_2*

Factor Analysis 2 – FACTOR_1 & FACTOR_2[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	78.848	3.852		20.468	.000		
	Enrollment	.001	.001	.045	.843	.400	.342	2.928
	Town	.956	.995	.038	.961	.337	.622	1.608
	Suburb	3.241	1.347	.117	2.406	.017	.422	2.368
	City	1.039	1.732	.034	.600	.549	.312	3.206
	Extra_Total	-.008	.010	-.032	-.749	.454	.549	1.822
	Spending_1000	.260	.253	.036	1.027	.305	.790	1.266
	Stud_Dis_Per	-.146	.092	-.065	-1.582	.115	.592	1.688
	FACTOR_1	-7.426	.521	-.733	-14.246	.000	.375	2.670
	FACTOR_2	1.769	.506	.166	3.495	.001	.438	2.283
a. Dependent Variable: Read_ProfAdv								

The statistically significant coefficients ($p \leq .05$) were suburb (.017), FACTOR_1 (.000) and FACTOR_2 (.001). Evidence of multicollinearity existed in the form of high VIF values for one variable, City (3.206). The coefficient on the suburb variable was again statistically significant and was at approximately the same magnitude as the regressions including all five of the variables rather than the factors. Unfortunately, the VIF values still indicate potential problems with multicollinearity. In the end, the use of factor analysis reduced but did not eliminate the problems with multicollinearity in the model

Base Model Selection

The regression results with the percent proficient or advanced in reading as the dependent variable were used to analyze the differences between the *All Variables* and the *All Schools* models, the effect of removing high schools with extreme values on some of the independent variables, and the differences that might result from omitting variables or using factor analysis to overcome multicollinearity problems. The coefficient estimates and significance levels for the variables were remarkably stable across all of these analyses. This suggested that a single base model can be used in the analysis without loss of explanatory power and with some assurance that the conclusions would be stable across many types of variations in the observations and variables included in the model.

Since the essential research question was to study how rural high schools' academic achievement compares to that in other town, suburb and city high schools, it was logical to include as many schools in the data set as possible. Although the *All Schools Model* was not perfect, the *All Variables Model* removed 104 schools from the data set due to lack numbers for free and reduced lunch and students with disabilities, leaving only 310 high schools for data analysis. Using the *All Schools Model* would allow for 412 schools data to be analyzed.

The major drawback of the *All Schools Model* was that the variables, free and reduced lunch and students with disabilities, could not be used in the analysis. But average income by school district was highly correlated with free and reduced lunch, accounting for 55% of the variation using the bivariate correlation coefficient and about the same percentage using the partial correlation coefficient in the regressions. Therefore, average income by school district was a reasonable proxy for the poverty concept that underlies both the income and free and reduced lunch variables. In addition, although the students with disabilities variable could not be replaced or accounted for with a proxy, the effect of students with disabilities on academic achievement is a well known, especially the effects of cognitive disability on test scores. Second, this variable was not highly correlated with the geographic location variables so excluding it would not likely result in a substantial bias to the coefficient estimates or significance levels. Therefore, although it would have been desirable to include this variable in the model, it was not necessary, and excluding it in order to include more schools in the analysis was a reasonable concession.

The base model could potentially have included the variables created from the factor scores in the factor analysis. However, including these variables did not solve the multicollinearity issues and would have omitted variables with more clear interpretations. For example, factor analysis was used to create a variable to capture the common variation among students of color, truancy and suspensions and expulsions. Including this factor variable in the regression produced similar coefficient and VIF results as using the variables themselves. Yet in the regression with the three variables included, the coefficients on all three variables were all highly significant despite inflation in the coefficient of standard error caused by multicollinearity. Thus, the only remaining variable with high VIF values was City, and this variable could not be excluded or submerged in a factor because geographic location was central to the research question in the study. Therefore, using factor analysis would not improve the base model beyond the use of the underlying variables themselves, and thus the factor variables were not included in the base model.

In summary, the *All Schools Model* was used as the base model. The *All Schools Model* has shown stable results across several specifications of the model. It was very clear that this is a highly stable model.

READING

The *All Schools Model – Reading* regression was discussed in detail above (see Table

41), and the coefficients and significance levels will not be repeated here. The regression included 412 high schools in the data set with r^2 = .600, meaning that 60% of the variation in reading proficient or advanced was explained by the eight remaining independent variables, and the model was highly significant (.000).

LANGUAGE ARTS

The *All Schools Model – Language Arts* regression summarized in Table 44 included 412 high schools in the data set with r^2 = .537, meaning that 53.7% of the variation among high schools in the percentage of students at the proficient or advanced in language arts was explained by variation in the eight independent variables. The model was also highly significant (.000).

Table 44. All Schools Model – Language Arts

All Schools Model – Language Arts[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	54.758	5.328		10.277	.000		
	Enrollment	.001	.001	.030	.524	.601	.343	2.920
	Income_1000	.450	.076	.267	5.951	.000	.575	1.740
	Town	1.905	1.247	.064	1.528	.127	.654	1.528
	Suburb	5.019	1.748	.149	2.871	.004	.427	2.344
	City	1.083	2.338	.028	.463	.644	.305	3.277
	Students_Color_Per	-.122	.047	-.185	-2.585	.010	.226	4.431
	Truancy_Per	-.113	.046	-.147	-2.448	.015	.322	3.108
	Extra_Total	-.010	.012	-.035	-.765	.445	.561	1.781
	Spending_1000	.639	.302	.086	2.116	.035	.704	1.421
	Sum_Sus_Exp	-.427	.069	-.352	-6.169	.000	.354	2.827
a. Dependent Variable: LA_ProfAdv								

Results showed that the coefficients on several of the variables were statistically significant ($p \leq .05$) including the positive correlations on average income by school district (.000), spending per pupil (.035) and suburb (.004), and the negative coefficients on students of color (.010), truancy (.015) and suspensions and expulsions (.000). The coefficients on the variables enrollment, town, city and extra/co-curricular participation index were not statistically significant at the .05 level.

The statistically significant factors can be interpreted as follows: 1) for every $1,000 dollar increase in average income per school district, the percentage of proficient or advanced in language arts increased .450 percentage points; 2) a high school located in the suburb scored 5.019 percentage points higher than a high school located in a rural area; 3) for every percentage point increase in the percentage of students of color, the percentage of students proficient or advanced in language arts decreased by .122 percentage points; 4) for every percentage point increase in truancy percentage, the percentage of students proficient or advanced in language arts decreased by .113 percentage point; 5) for each additional $1,000/pupil in school district spending, the percentage of students proficient or advanced in language arts increased .639 percentage points and 6) for every percentage point increase in the percentage of suspensions and expulsions, the percentage of students proficient or advanced in language arts decreased .427 percentage points.

MATHEMATICS

The *All Schools Model – Mathematics* regression summarized in Table 45 included 412 high schools in the data set with $r^2 = .575$, meaning that 57.5% of the variation among high schools in the percentage of students at the proficient or advanced in mathematics was explained by the variation in eight independent variables. The model was also highly significant (.000).

Table 45. All Schools Model – Mathematics

All Schools Model - Mathematics[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	59.646	5.404		11.037	.000		
	Enrollment	.002	.001	.102	1.826	.069	.343	2.920
	Income_1000	.419	.077	.234	5.457	.000	.575	1.740
	Town	-.711	1.265	-.023	-.562	.574	.654	1.528
	Suburb	2.170	1.773	.061	1.224	.222	.427	2.344
	City	1.108	2.371	.028	.467	.641	.305	3.277
	Students_Color_Per	-.192	.048	-.277	-4.036	.000	.226	4.431
	Truancy_Per	-.107	.047	-.131	-2.277	.023	.322	3.108
	Extra_Total	.003	.013	.009	.204	.839	.561	1.781
	Spending_1000	.449	.306	.057	1.466	.143	.704	1.421
	Sum_Sus_Exp	-.453	.070	-.354	-6.459	.000	.354	2.827
a. Dependent Variable: Math_ProfAdv								

Results showed that the coefficients on four variables were statistically significant at $p \leq .05$ including the positive coefficients on average income by school district (.000) and the negative coefficients on students of color (.000), truancy (.023) and suspensions and expulsions (.000). The coefficients on the variables enrollment, town, suburb, city, extra/co-curricular participation index and spending per pupil were not statistically significant at the .05 level.

The statistically significant coefficients can be interpreted as follows: 1) for each additional $1,000/pupil in school district spending, the percentage of students proficient or advanced in mathematics increased .419 percentage points; 2) for every percentage point increase in the percentage of students of color, the percentage of proficient or advanced in mathematics decreased .192 percentage points; 3) for every percentage point increase in the percentage of truancy, the percentage of proficient or advanced decreased .107 percentage points and 4) for every percentage point increase in suspensions and expulsions percentage, the percentage of proficient or advanced in mathematics decreased .453 percentage points.

SCIENCE

The *All Schools Model – Science* regression summarized in Table 46 included 412 high schools in the data set with r^2 = .606, meaning that 60.6% of the variation among high schools in the percentage of students at the proficient or advanced in science was explained by the variation in the eight independent variables. The model was highly significant (.000).

Table 46. All Schools Model – Science

All Schools Model - Science[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	61.485	5.098		12.060	.000		
	Enrollment	.001	.001	.053	.982	.327	.343	2.920
	Income_1000	.392	.072	.224	5.422	.000	.575	1.740
	Town	.556	1.193	.018	.466	.642	.654	1.528
	Suburb	2.028	1.673	.058	1.212	.226	.427	2.344
	City	.025	2.237	.001	.011	.991	.305	3.277
	Students_Color_Per	-.249	.045	-.366	-5.545	.000	.226	4.431
	Truancy_Per	-.061	.044	-.077	-1.392	.165	.322	3.108
	Extra_Total	-.001	.012	-.005	-.109	.913	.561	1.781
	Spending_1000	.668	.289	.086	2.313	.021	.704	1.421
	Sum_Sus_Exp	-.422	.066	-.336	-6.377	.000	.354	2.827
a. Dependent Variable: Science_ProfAdv								

Results showed that the coefficients on four variables were statistically significant at $p \leq .05$ including the positive coefficients on average income by school district (.000) and spending per pupil (.021) and the negative coefficients on students of color (.000) and suspensions and expulsions (.000). The coefficients on the variables enrollment, town, suburb, city, truancy and extra/co-curricular participation index were not statistically significant at the .05 level.

The statistically significant coefficients can be interpreted as follows: 1) for every $1,000 dollar increase in average income by school district, the percentage of students proficient or advanced in science increased .392 percentage points; 2) for every percentage point increase in the percentage of students of color, the percentage of proficient or advanced in science decreased

.249 percentage points; 3) for each additional $1,000/pupil in school district spending, the percentage of proficient and advanced in science increased .668 percentage points and 4) for every percentage point increase in the percentage of suspensions and expulsions, the percentage of proficient or advanced in science decreased .422 percentage points.

SOCIAL STUDIES

The *All Schools Model – Social Studies* regression summarized in Table 47 included 412 high schools in the data set with r^2 = .590, meaning that 59% of the variation among high schools in the percentage of students at the proficient or advanced in social studies was explained by variation in the eight independent variables. The model was also highly significant (.000).

Table 47. All Schools Model – Social Studies

All Schools Model – Social Studies[a]								
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	71.835	4.801		14.964	.000		
	Enrollment	.001	.001	.063	1.148	.252	.343	2.920
	Income_1000	.289	.068	.179	4.242	.000	.575	1.740
	Town	.997	1.124	.035	.887	.375	.654	1.528
	Suburb	3.780	1.575	.117	2.399	.017	.427	2.344
	City	1.636	2.106	.045	.777	.438	.305	3.277
	Students_Color_Per	-.145	.042	-.230	-3.416	.001	.226	4.431
	Truancy_Per	-.158	.042	-.214	-3.802	.000	.322	3.108
	Extra_Total	-.012	.011	-.047	-1.098	.273	.561	1.781
	Spending_1000	.290	.272	.041	1.067	.286	.704	1.421
	Sum_Sus_Exp	-.427	.062	-.368	-6.844	.000	.354	2.827
a. Dependent Variable: SS_ProfAdv								

Results showed that the coefficients on five variables were statistically significant at $p \leq .05$ including the positive coefficients on average income by school district (.000) and suburb (.017) and the negative coefficients on students of color (.001), truancy (.000) and suspensions and expulsions (.000). The coefficients on the variables enrollment, town, city and extra/co-curricular participation index were not statistically significant at the .05 level.

The statistically significant coefficients can be interpreted as follows: 1) for every $1,000 dollar increase in average income by school district, the percentage of students proficient or advanced in social studies increased .289 percentage points; 2) a high school located in the suburb scored 3.780 percentage points higher than a high school located in a rural area; 3) for every percentage point increase in the percentage of students of color, the percentage of proficient or advanced in social studies decreased .145 percentage points; 4) for every percentage point increase in the percentage of truancy, the percentage of proficient or advanced in social studies decreased .158 percentage points and 5) for every percentage point increase in the percentage of suspensions and expulsions, the percentage of proficient or advanced in science decreased .427 percentage points.

RURAL LOCATION AND ACADEMIC ACHIEVEMENT

Table 48 provides a summary of the results for all the regressions. The number in each cell is the standardized coefficient (beta); the number of standard deviation changes in the advanced or proficient dependent variable from a one standard deviation change in the independent variable. The relative magnitude of the effects of the independent variables can be assessed by comparing the absolute value of the standardized coefficients. Coefficients significant at the .05 level are noted with a single asterisk next to the value in the cell, and the significance at the .01 level or better is noted with two asterisks.

Table 48. Base Model Regression Summary

	Reading	Language Arts	Mathematics	Science	Social Studies
Enrollment	.086	.030	.102	.053	.063
Income_1000	.163**	.267**	.234**	.224**	.179**
Town	.031	.064	-.023	.018	.035
Suburb	.110*	.149**	.061	.058	.117*
City	-.017	.028	.028	.001	.045
Students_Color_Per	-.243**	-.185**	-.277**	-.366**	-.230**
Truancy_Per	-.193**	-.147*	-.131*	-.077	-.214**
Extra_Total	-.020	-.035	.009	-.005	-.047
Spending_1000	.048	.086*	.057	.086*	.041
Sum_Sus_Exp	-.350**	-.352**	-.354**	-.336**	-.368**
r^2	.600	.537	.575	.606	.590
Model Significance	.000**	.000**	.000**	.000**	.000**

** Correlation is significant at the 0.01 level.

*Correlation is significant at the 0.05 level.

Enrollment was not significant in any of the five subject areas regressions. Although previous research has concluded that the size of a school is important, when controlling for other variables as within this study, the coefficients on enrollment were not significant.

Average income by school district had a significant coefficient at the $p \leq .01$ levels for all five subject areas. The null hypothesis is that the coefficient on average income by school district is zero, H_0: Income_1000 = 0. Based on the significance levels, the null hypothesis that the coefficient is equal to zero was rejected in every case. The alternative hypothesis H_1 =

Income_1000 ≠ 0 was accepted because the results were highly significant and consistent. Thus, as income increased, the percentage of students proficient or advanced also increased. The effect of average income was positive and statistically significant for reading, language arts, mathematics, science and social studies. Overall, average income by school district has a positive relationship to academic achievement. Furthermore, comparing the magnitude of the standardized coefficients, the impact of average family income on the percent at proficient or advanced levels was always greater than the impact of the geographic variable and spending per pupil. It was also always smaller than the impact of the suspension/expulsion variable and usually smaller than the impact of increases in the percentage of students of color. Average family income was usually greater than the impact of increases in the percentage of truancy.

The effect of geographical locations of rural, town, suburb and city on academic achievement was the central interest in this study. In the reading regression, the coefficients on town and city were not statistically significantly different from zero; however, the coefficient on suburb was positive and statistically significant at $p \leq .05$ levels but with low impact compared to other independent variables with significant coefficients. In language arts, town and city were not statistically significant. But suburb was positive and statistically significant at the $p \leq .01$ levels but again with low impact compared to other independent variables with significant coefficients. In the regressions with mathematics and science as the dependent variables, neither town, suburb nor city had statistically significant coefficients. In social studies, town and city were not statistically significant at $p \leq .05$ levels; whereas, suburb was statistically significant but with low impact compared to other independent variables with significant coefficients.

Compared to rural, location in a suburb was associated with higher test scores in reading, language arts and social studies but not in mathematics or science. Compared to rural, location in a town or city had no effect on test scores in any subject area. Overall, geographic location was not a strong predictor of academic achievement. It is clear that location in a rural school is not associated with lower test scores, relative to location in town or city. Location in a suburb is associated with higher test scores, compared to rural, in reading, language arts and social studies, but not in math or science. But even when the coefficient on the suburb variable was significant, the magnitude of the effect was low compared to the variables representing average family income, the percentage students of color, and the percentage suspensions/expulsions.

Students of color had negative and significant coefficients at the $p \leq .01$ levels for all five-subject areas. The null hypothesis was that the coefficient for students of color was equal to zero, i.e. H_0: Students_Color_Per = 0. Based on the significance levels, the null hypothesis was rejected for every subject area. The alternative hypothesis H_1 = Students_Color_Per ≠ 0 was accepted because the significant levels were strong; the coefficient was negative in every case, and the magnitude of the effect was large compared to other coefficients. Thus, increases in the percentage of students of color was associated with decrease in the percentage at the proficient or advanced levels in reading, language arts, mathematics, science and social studies. In summary, the students of color variable had a negative relationship to academic achievement, and its impact was fairly large compared to the impact of other variables.

Truancy had a negative and significant coefficient at the $p \leq .01$ levels in reading and social studies and at the $p \leq .05$ levels in language arts and mathematics. The coefficient on truancy was not statistically significant in the regressions with science as the dependent variable.

The null hypothesis was that the coefficient for truancy was equal to zero, i.e. H_0: Truancy_Per = 0. Based on the significance levels in reading, language arts, mathematics and social studies, the null hypothesis was rejected in four subject areas. The alternative hypothesis H_1 = Truancy_Per ≠ 0 was accepted because the significance level was strong, and the coefficient was negative in every case. But the magnitude of the effect was relatively small compared to other coefficients. However, in science the null hypothesis H_0: Truancy_Per = 0 was not rejected, and judgment was withheld. Thus, increases in truancy were associated with decreases in the percentage of proficient or advanced levels in reading, language arts, mathematics and social studies. Therefore, the truancy variable had a negative relationship to academic achievement but only affects four of the five subject areas. Furthermore, comparing the magnitude of the standardized coefficients, the impact of truancy on the percent at proficient or advanced levels was always greater than spending per pupil and always smaller than the impact of the students of color and suspensions and expulsions variables.

The coefficient on the extra/co-curricular participation index was not statistically significant in any regression within this study. Although the coefficients were never significant, there is literature that exists stating participation in extra/co-curricular activities is positively associated with student achievement. However, when controlling for the effects of several other variables as within this study, the coefficient on the extra/co-curricular participation index was not statistically significant in any of the five subject area regressions.

Spending per pupil had a positive and significant coefficient at the $p \leq .05$ levels in language arts and science. Spending per pupil was not statistically significant in reading, mathematics or social studies. The null hypothesis was that the coefficient for spending per pupil was equal to zero, i.e. H_0: Spending_1000 = 0. Based on the significance levels in language arts and science, the null hypothesis was rejected in these two subject areas. The alternative hypothesis H_1 = Spending_1000 ≠ 0 was accepted because the significance levels were strong and the coefficient was positive in both cases. However, the magnitude of the effect was low compared to the other variables representing average income by school district, the percentage of students of color, truancy and suspensions and expulsions. In the regressions for reading, mathematics and social studies, the null hypothesis H_0: Spending_1000 = 0 was accepted. Thus, for each additional $1,000/pupil in school district spending, the percentage at the proficient or advanced levels increased in language arts and science. In summary, spending per pupil has a positive relationship with academic achievement but is specific to language arts and science. Furthermore, comparing the magnitude of the standardized coefficients, the impact of spending per pupil on the percent at proficient or advanced levels was always smaller than the impact of the average income by school district, suburb, students of color, truancy, spending per pupil and suspensions and expulsions variables.

Lastly, suspensions and expulsions had a negative and significant coefficient at the $p \leq .01$ levels for all five-subject areas. The null hypothesis was that the coefficient for suspensions and expulsions was equal to zero, i.e. H_0: Sum_Sus_Exp = 0. Based on the significance levels, the null hypothesis was rejected for every subject area. The alternative hypothesis H_1 = Sum_Sus_Exp ≠ 0 was accepted because the significance levels were strong; the coefficient was negative in every case, and the magnitude of the effect was the largest compared to all other coefficients. Thus, increases in suspensions and expulsions were associated with decreases in the percentage at the proficient or advanced levels in reading, language arts, mathematics, science and social studies. Therefore, suspensions and expulsions had a negative and statistically significant relationship with academic achievement in all five subject areas. Furthermore, comparing the magnitude of the standardized coefficients, the impact of suspensions and expulsions on the percent at proficient or advanced levels was always greater than the impact of the average income by school district, suburb, students of color, truancy and spending per pupil variables.

In summary, the variables of students of color and suspensions and expulsions had large and very statistically significant impact on the percentage of students at the proficient or advanced levels in reading, language arts, mathematics, science and social studies. Truancy also had an impact on four subject areas. High and positive correlations of the variables percentage of students of color, percentages of suspensions and expulsions and percentages of truancy existed with the geographic location variable City. Average income by school district and spending per pupil also illustrated a positive relationship to academic achievement. Lastly, the effect of location in a suburb was positive and significant in three subject areas, but the impact was small compared to other variables. Overall, geographic location itself was not a strong predictor of academic achievement; however, the negative strength of the variables students of color, disciplinary actions: suspensions and expulsions and truancy influenced city schools substantially.

CHAPTER 5

CONCLUSIONS, RECOMMENDATIONS & SUMMARY

Introduction

A study analyzing the relationship between academic achievement and geographic location had never been conducted in the state of Wisconsin. Since rural high schools (229) make-up 54.9% of the high schools in Wisconsin, it is essential to understand their value and importance. In addition, since school funding will be drastically cut in the next state biennial budget, this study is timely and provides valuable information to educate policy makers and educational leaders about the worth of rural schools.

This study analyzed the academic achievement of rural high schools compared to city, suburb and town high schools. The research methodology for this study was a quantitative, non-experimental, ex post facto design using mined data from several state and federal public databases. The sample size included 412 public high schools in the state of Wisconsin but did not include Wisconsin high schools that were parochial, alternative, charter, single purpose or juvenile detention centers.

The purpose of this study was to distinguish how rural Wisconsin high students performed on the tenth grade WKCE in the areas of Reading, Language Arts, Mathematics, Science and Social Studies compared to Wisconsin city, suburb and town public high students. This study included ten independent variables (i.e. geographic location, SES, students of color, spending per pupil, high school enrollment, parent education level, truancy, disciplinary action: suspensions and expulsions, students with disabilities and extra/co-curricular participation) and five dependent variables (i.e. performance on WKCE tests in Reading, Language Arts, Mathematics, Science and Social Studies). Regression analyses were used to analyze all five areas of academic achievement while controlling for all ten dependent variables.

This study was important because it comes at a time of substantial budget cuts for Wisconsin school districts. These cuts may force rural school districts to consider other organizational arrangements or educational options in order to survive. These alternative arrangements and options include referenda for operational expenses, cooperative agreements with other school districts and school consolidation. Due to the decrease in state funding and restrictive revenue controls, school districts in Wisconsin have difficult choices to make on future staffing, curricula offerings and opportunities for its students.

In addition, a reduced state financial commitment to public schools may cause legislators and other educational policy makers to discuss consolidation or other organizational arrangements that threaten the existence of rural school districts. Since 229 high schools in the state of Wisconsin are in rural locations, it was especially important at this time to discover how rural high schools compared to its city, suburb and town peers. Similar studies had been conducted in Arkansas, Kentucky, Montana, North Dakota, Ohio, Texas and West Virginia comparing academic achievement and high school location, but never before in Wisconsin.

RESEARCH CONCLUSIONS

Regarding Geographical Location and Achievement

The purpose of this study was to distinguish how Wisconsin rural high students performed on the tenth grade WKCE in the areas of Reading, Language Arts, Mathematics, Science and Social Studies compared to Wisconsin city, suburb and town public high students.

The conclusions with respect to the effect of the geographical location of rural, town, suburb and city on academic achievement were the central interest in this study. The conclusions from the data analyses regarding academic performance and geographic location follow:

- In the reading regression, the coefficients on town and city were not statistically significantly different from zero; however, the coefficient on suburb was positive and statistically significant at $p \leq .05$ levels.
- In language arts, the coefficients on town and city were not statistically significant. But suburb was positive and statistically significant at the $p \leq .01$ levels.
- In the regressions with mathematics and science as the dependent variables, neither town, suburb nor city had statistically significant coefficients.
- In social studies, town and city were not statistically significant; whereas, suburb was statistically significant at the $p \leq .05$ levels.

From the data analysis, one can, therefore, conclude that compared to rural, location in a suburb was associated with higher test scores in reading, language arts and social studies but not in mathematics or science. Compared to rural, location in a town or city had no effect on test scores in any subject area. Overall, geographic location was not a strong predictor of academic achievement. It was clear that location in a rural school was not associated with lower test scores, relative to location in town or city. Location in a suburb was associated with higher test scores, compared to rural, in reading, language arts and social studies, but not in math or science. But even when the coefficient on the suburb variable was significant, the magnitude of the effect was low compared to the variables representing average family income, the percentage students of color, and the percentage suspensions/expulsions.

Regarding the Dependent Variables and the Other Independent Variables

With respect to the five dependent variables, the following additional conclusions can be made from the data analysis:

- The coefficients on several of the independent variables with respect to reading were statistically significant including average income by school district, suburb, students of color, truancy and suspensions and expulsions. The relationships of each of these variables were the same as those reported in the research literature that used individual data to analyze influences on reading.
- The coefficients on several of the independent variables with respect to language arts were statistically significant including average income by school district, suburb, students of color, truancy, spending per pupil and suspensions and expulsions. The relationships among these signs on each of these variables were the same as those reported in the research literature that used individual data to analyze influences on language arts achievement.
- The coefficients on several of the independent variables with respect to mathematics were

statistically significant including average income by school district, students of color, truancy and suspensions and expulsions. The relationships among these variables mirrored those reported in the research literature that used individual data to analyze influences on mathematics achievement.

- The coefficients on several of the independent variables with respect to science were statistically significant including average income by school district, students of color, spending per pupil and suspensions and expulsions. The relationships among these variables were the same as those reported in the research literature that used individual data to analyze influences on science achievement.
- The coefficients on several of the independent variables with respect to social studies were statistically significant including average income by school district, suburb, students of color, truancy and suspensions and expulsions. The relationships of these variables were the same as those reported in the research literature that used individual data to analyze influences on social studies achievement.

Regarding the Independent Variables

Originally, ten independent variables were identified by the literature as having an impact on student achievement. However, two of these variables, free and reduced lunch (the surrogate for SES) and students with disabilities, were not included in the analysis because data were not available on these two measures for 104 high schools in Wisconsin. Average income by school district was available, however, and a reasonable proxy for the poverty concept that underlies both the income and free and reduced lunch variables. In addition, although the students with disabilities variable could not be replaced or accounted for with a proxy, the effect of students with disabilities on academic achievement is well known, especially the effects of cognitive disability on test scores. Thus, the researcher chose to use the *All Schools* model with the population size of 412 schools and did not use the two previously identified independent variables.

With respect to the eight remaining independent variables, the following conclusions (not including those about rural location which were discussed previously) emerged from the data analyses.

- Students of color had negative and significant coefficients at the $p \leq .01$ levels for all five subject areas. Thus, increase in the percentage of students of color was associated with decrease in the percentage at the proficient or advanced levels in reading, language arts, mathematics, science and social studies. In summary, the students of color variable had a negative relationship to academic achievement, and its impact was fairly large compared to the impact of other variables.
- Spending per pupil had a positive and significant coefficient at the $p \leq .05$ levels in language arts and science. Spending per pupil was not statistically significant in reading, mathematics or social studies. Furthermore, comparing the magnitude of the standardized coefficients, the impact of spending per pupil on the percent at proficient or advanced levels was always smaller than the impact of the average income by school district, suburb, students of color, truancy, spending per pupil and suspensions and expulsions variables.

- Enrollment was not significant in any of the five subject areas regressions. Although previous research has concluded that the size of a school is important, when controlling for other variables as within this study, the coefficients on enrollment were not significant.
- Average income by school district had a significant coefficient at the $p \leq .01$ levels for all five subject areas. The effect of average income was positive and statistically significant for reading, language arts, mathematics, science and social studies. Overall, average income by school district had a positive relationship to academic achievement. Furthermore, comparing the magnitude of the standardized coefficients, the impact of average family income on the percent at proficient or advanced levels was always greater than the impact of the geographic variable and spending per pupil, always smaller than the impact of the suspension/expulsion variable, usually smaller than the impact of increases in the percentage of students of color and usually greater than the impact of increases in the percentage of truancy.
- Truancy had a negative and significant coefficient at the $p \leq .01$ levels in reading and social studies and at the $p \leq .05$ levels in language arts and mathematics. The coefficient on truancy was not statistically significant in the regressions with science as the dependent variable. Therefore, the truancy variable had a negative relationship to academic achievement but only affected four of the five subject areas. Furthermore, comparing the magnitude of the standardized coefficients, the impact of truancy on the percent at proficient or advanced levels was always greater than spending per pupil and

always smaller than the impact of the students of color and suspensions and expulsions variables.

- Lastly, disciplinary actions: suspensions and expulsions had a negative and significant coefficient at the $p \leq .01$ levels for all five-subject areas. Thus, increases in suspensions and expulsions were associated with decreases in the percentage at the proficient or advanced levels in reading, language arts, mathematics, science and social studies. Therefore, suspensions and expulsions had a negative and statistically significant relationship with academic achievement in all five subject areas. Furthermore, comparing the magnitude of the standardized coefficients, the impact of suspensions and expulsions on the percent at proficient or advanced levels was always greater than the impact of the average income by school district, suburb, students of color, truancy and spending per pupil variables.
- The coefficient on the extra/co-curricular participation index was not statistically significant in any regression within this study. Although the coefficients were never significant, there is literature that exists stating participation in extra/co-curricular activities is positively associated with student achievement. However, when controlling for the effects of several other variables as within this study, the coefficient on the extra/co-curricular participation index was not statistically significant in any of the five subject area regressions.

In summary, the variables of students of color and disciplinary actions: suspensions and expulsions had large and very statistically significant impact on the percentage of students at the proficient or advanced levels in reading, language arts, mathematics, science and social studies.

Truancy also had an impact on four subject areas. High and positive correlations of the variables percentage of students of color, percentages of suspensions and expulsions and percentages of truancy existed with the geographic location variable City. Average income by school district also illustrated a positive relationship to academic achievement in all five areas and spending per pupil in two subject areas. Lastly, the effect of location in a suburb was positive and significant in three subject areas, but the impact was small compared to other variables. Overall, geographic location itself was not a strong predictor of academic achievement; however, the negative strength of the variables students of color, disciplinary actions: suspensions and expulsions and truancy influenced city schools substantially.

IMPLICATIONS

This study was intended to increase knowledge about the value of rural schools and to provide useful information for policy makers and educational practitioners alike. Implications for each of these groups follow.

Considering the findings of this study and the strength of the conclusions, one could never argue that rural schools perform worse academically than town or city schools and should, therefore, be consolidated. Indeed, neither city high schools nor town high schools outperformed the rural schools. While the data suggest that suburban schools did better in some subject areas than the other three locations, suburban schools did not outperform the other geographic location types in all subject areas. Further, in the subject areas in which suburban performance was statistically different, performance was only minimally better.

Previous researchers have identified a variety of benefits of rural schools to students, families and communities. According to Hylden (2004),

> Students in small schools perform better academically, graduate at higher levels, are more likely to attend college, and earn higher salaries later on in life…they participate more in extra-curricular activities, have better rates of attendance, report greater positive attitudes towards learning, and are less likely to face school-related crime and violence…teachers report greater job satisfaction, and are more likely to feel as if they are succeeding in their work…parents and relatives are more likely to become involved in the school…small schools are often characterized by personalized attention, curriculum integration and specialization, relational trust and respect, a student sense of belonging, a strong positive ethos, greater accountability, and a sense of communal mission (p. 3).

Hylden (2004) also suggested that communities benefit from small schools by having a central meeting place for entertainment and activities, common advisory and decision-making practices and a sense of pride.

Columbia University (Nachtigal, 1982) research showed that small schools had "strengths of smallness" that were not apparent in large schools. Included in these strengths were the number of students involved in extra-curricular activities, a higher number of students in academic courses, a positive relationship between teachers and students due to teacher to student ratio, and showing an appreciation and connection to their communities (Bard et al., 2006).

Cotton (1996) listed eighteen core factors that students experienced attending a small school. Among those eighteen core factors were academic achievement, attitude toward school, social behavior problems, extracurricular participation, feeling of belongingness, interpersonal relationships, attendance, dropout rates, self-concept, and success in college, etc. She further stated from her analysis that the states with the larger schools and school districts had the lowest achievement and social outcomes. Cotton (2001) states, "…small size alone is certainly not enough…to improve the quality of schooling. What small size does is to provide an optimal setting for high-quality schooling to take place" (p. 4).

Peshkin (1978, 1982) showed that schools serve as symbols of community autonomy, vitality, tradition, and personal and community identity. Schools are generally a large employer to a small community. They also create civic and social opportunities for citizens (Lyson, 2002). From these studies, one can conclude small schools may provide more than just a positive climate for education but also a core value and an identity to a community.

In 2002, O'Neal & Cox reviewed literature over a twenty year span and found small school strengths within rural education that still seemed relevant today, including the following examples:

- Close relationships between faculty and administration
- Less bureaucratic red tape
- Decisions are more student-centered
- A sense of community
- More personal relationships between teachers and students
- More favorable teacher to student ratios
- Greater potential for individualized instruction
- Allows for more student participation in extra/co-curricular activities
- Fostering close relationships among teachers providing for a more unified staff in vision and school mission

- A greater opportunity for community partnerships
- Increased parent involvement

Due to the fact that most of the high schools (54.9%) in Wisconsin are rural, that this study demonstrated that Wisconsin rural schools performed as well as their city and town counterparts in all subject areas of the tenth grade WKCE and as well as suburban districts in two subject areas, and that the advantages to the community of having a local school are well-documented, policy makers should make a commitment to make possible the long-term survival of rural schools.

Educational practitioners should take special note of the findings of this study with respect to the academic performance of students of color and of high schools with high percentages of truancy and disciplinary actions: suspensions and expulsions. The data from this study are clear and consistent with existing research: performance problems are prevalent for students in certain demographic categories. The achievement gap widely written about and highly discussed is real. A plethora of research exists on the importance of implementing effective practices and doing so early in the life of risk students. Practitioners should implement effective strategies in early elementary school so that achievement problems, which are more difficult to remedy in later school years, never have a chance to develop.

LIMITATIONS OF THE STUDY

Several limitations existed within this study. First, two factors that the literature supports as contributing to student achievement, student motivation and the relationship of the teacher to students were excluded from this study because a quantifiable measure for each factor in Wisconsin high schools did not exist. In addition, class size, according to some researchers, is also a factor in student achievement, and it was not included in this study either. Class size was not used as a variable due to the considerable disparity within a high school. For example, a required class such as English may have 30 or more students while an advanced level language class may have less than ten with both classes occurring within the same high school. Since perhaps as much variation exists within a high school as between high schools in varying locations and/or size, class size was not included as a factor in this study.

The base model used for data analysis (as defined in chapter 4) was highly explanatory and did account for a large amount of variation among the variables, specifically reading (60%), language arts (53.7%), mathematics (57.5%), science (60.6%) and social studies (59%). Exclusion of the three previously mentioned variables did not appear to negatively impact the findings.

Several other potential limitations of the study were identified. These limitations and comments on their impact in the research follow:

1) Limitation: The use of school data rather than individual student test scores.

Comment: The results in the aggregate data paralleled very closely the research based on data from individual student performance, so the ecological fallacy was not a problem in this study.

2) Limitation: The use of school district data rather than high school data for average income (parent education level) and spending per pupil.

Comment: Although school district data were only available for average income (parent education level) and spending per pupil, it can be argued that both are general indicators of the school district condition and are adequate descriptors of the high school (e.g. one could argue that spending by school district per students would be similar across grades; it is not likely that one district would spend ten times the amount on high school than elementary and vice versa).

3) Limitation: The use of extra/co-curricular activity participation rates that included grades 6-12.

Comment: Since the data were reported for grades 6-12 in all the schools in the study, they are comparable data and appropriate for use in the research.

4) Limitation: The use of data on truancy, disciplinary actions: suspensions and expulsions and extra/co-curricular participation were self-reported by the school districts.

Comment: While it is possible to argue those school districts may define these variables differently and, in some cases, more aggressively enforce these standards (i.e. truancy), these data are the only data available. Other researchers who have studied truancy and disciplinary actions have relied on self-reported data as well.

RECOMMENDATIONS

Based on the findings of this study, recommendations for future research and for data collectors emerged.

One recommendation for additional research is to conduct a qualitative study examining the role of student motivation and teacher relationship to student with respect to student achievement. Such a case study, especially if it involved high schools in different geographic location types, could add to the research base and shed additional light on the value of rural schools on student achievement.

Another research recommendation is to conduct a quantitative study analyzing student individual data versus school data by using standard scores or cut scores paired with individual student background data. Since WDPI has a student location number for each student, one could investigate what other individual data is tied to that number such as ethnicity, disability, truancy, and the like.

A future possible research topic is a study including the new state test based on the common core standards since WDPI appears to have plans to change the mandated state testing program. Such a study would conceivably be more generalizable to other states and comparable on a national level.

Recommendations for data collectors also emerged from this study. Data collectors should compile individual student data (rather than district data) for performance on the WKCE (and any other mandated state test in the future) and make it available through the WDPI. Further, data that are currently collected and published should be cleaned so that they are precisely what they are labeled to be. For example, if the WINSS system provides data for a school labeled as a high school, then only data for grades 9-12 should be included and not other grade level(s) (such as 6-12, 7-12, etc.). As noted previously, current data on WINSS, such as the number of students participating in free and reduced lunch or the number of students with disabilities, is listed as high school data but, in fact, includes data from other grade levels as well. Further, NCES should be made aware that data provided by the WDPI might not be precisely as it is labeled, and NCES should make appropriate notes for potential users of their data sources.

SUMMARY

In summary, rural high schools in the state of Wisconsin perform as well as town and city high schools and in some subject areas as well as suburban high schools. The data analyses from this study indicate that the argument that rural high schools should be consolidated because of poor academic performance is not valid. Further, the data suggest that there are serious academic performance concerns for students and schools with certain demographics and that those problems need to be addressed immediately and effectively. All high schools in Wisconsin including rural high schools should be supported by policy makers and practitioners to ensure high academic achievement opportunities for all.

REFERENCES

Acharya, N., & Joshi, S. (2009). Influence of Parents' Education on Achievement Motivation of Adolescents. *Indian Journal Social Science Researches*, 72-79.

Bailey, J. (2000). *The Case for Small Schools.* Walthill: Center for Rural Affairs.

Baker, M. L., Sigman, J. N., & Nugent, M. E. (2001). *Truancy reduction: Keeping students in school.* Washington, D.C.: U.S. Department of Justice, Office of Juvenile Justice and Delinquency Prevention.

Bard, J., Gardener, C., & Wieland, R. (2006). Rural School Consolidation: History, Research Summary, Conclusions, and Recommendations. *The Rural Educator*, 40-48.

Baskerville, S. R., Duncan, J. M., & Hutchinson, F. E. (2010). *How Do We Increase Attendance and Student Success?* Henniker: New England College.

Berry, C. (2004). School Inflation. *Education Next*, 56-58.

Bickel, R., & Howley, C. B. (2000). *When It Comes to Schooling...Small Works: School Size, Poverty, and Student Achievement.* Randolph: Rural School and Community Trust.

Blasik, K. (2005). *Student absences in Broward County public schools 1998-99 to first semester 2003-04.* Fort Lauderdale: School Board of Broward County.

Blatchford, P., Bassett, P., & Brown, P. (2011). Examining the effect of class size on classroom engagement and teacher-pupil interaction: Differences in relation to pupil prior attainment and primary vs. secondary schools. *Learning and Instruction*, 715-730.

Cash, T., & Duttweiler, P. C. (2006). *Planning, collaboration, and implementation: Strategies for truancy programs.* National Dropout Prevention Center.

Coffey, K. M., & Obringer, S. J. (2000). Culturally diverse rural students at special risk for LD classification. *Rural Special Education Quarterly*, 1-20.

Connors, E. T. (1982). *Educational funding and pupil achievement: The relationship between the two variables.* Richmond: Virginia State Department of Education.

Corwyn, R. F., & Bradley, R. F. (2002). *Family Process Mediators of the Relation between SES and Child Outcomes.* Little Rock: University of Arkansas.

Cotton, K. (1996, December). *Affective and Social Benefits of Small-Scale Schooling.* Charleston: ERIC Digest.

Cotton, K. (2001). *New Small Learning Communities: Findings from Recent Literature*. Portland: Northwest Regional Educational Laboratory.

Crow, J. (2010). *An Analysis of the Academic Achievement of Urban and Rural Low-Socioeconomic Status Tennessee Public Schools.* Ann Arbor: ProQuest LLC.

Davis-Kean, P. E. (2005). The Influence of Parent Education and Family Income on Child Achievement: The Indirect Role of Parental Expectations and the Home Environment. *Journal of Family Psychology*, 294-304.

De Haan, L. G., & MacDermid, S. (1998, Spring). The Relationship of Individual and Family Factors to the Psychological Well-Being of Junior High Students Living in Urban Poverty. *Adolescence*, pp. 73-89.

Debertin, D. L., & Goetz, S. J. (1994). *Differences in Rural and Urban Schools: Issues for Policymakers.* Lexington: University of Kentucky, Department of Agricultural Economics.

Dick, A. D. (2010). *The Relationship of Participation in Extracurricular Activities to Student Achievement, Student Attendance, and Student Behavior in a Nebraska School District.* Ann Arbor: UMI Dissertation Publishing.

Dillon, S. (2009, July 15). Racial Gap in Testing Sees Shift by Region. *The New York Times*.

Dynarksi, M., & Gleason, P. (1999). *How Can We Help? Lessons From Federal Dropout Prevention Programs.* Princeton: Mathematica Policy Research, Inc.

Education Trust. (2003). *Education Watch: Wisconsin. Key Facts and Figures. Achievement, Attainment and Opportunity. From Elementary School through College.* Washington, D.C.: Education Trust.

Fan, X., & Chen, M. J. (1999). Academic Achievement of Rural School Students: A Multi-Year Comparison with Their Peers in Suburban and Urban Schools. *Journal of Research in Rural Education*, 31-46.

Fine, M., & Somerville, J. I. (1998). *Small schools, big imaginations: A creative look at urban public schools.* Chicago: Cross city Campaign for Urban School Reform.

Friedkin, N., & Necochea, J. (1988). School system size and performance: A contingency perspective. *Educational Evaluation and Policy Analysis*, 237-249.

Gehlbach, H., Brinkworth, M. E., & Harris, A. D. (2011). *Social motivation in the secondary classroom: Assessing teacher-student relationships from both perspectives.* New Orleans: Paper presented at the American Educational Research Association.

Haveman, R., & Wolfe, B. (1995). The determinants of children's attainments: A review of methods and findings. *Journal of Economic Literature*, 1829-1878.

Hopkins, T. M. (2005). If You Are Poor, It is Better to be Rural: A Study of Mathematics Achievement in Tennessee. *The Rural Educator*, 21-28.

Howley, C. B. (1989). Efficiency and the Characteristics of School Districts: A Study of 178 School Districts in Kentucky. *Research in Rural Education*, 33-43.

Howley, C. B. (1996). *Sizing Up Schooling: A West Virginia Analysis and Critique.* Morgantown: West Virginia University.

Howley, C. B. (1999). *The Matthew Project: State Report for Montana.* Albany: Ohio University and Appalachia Educational Laboratory.

Howley, C. B. (2000). *School District Size and School Performance.* Charleston: Rural Education Issue Digest.

Huang, G., & Howley, C. (1993). Mitigating disadvantage: Effects of small-scale schooling on students' achievement in Alaska. *Journal of Research in Rural Education*, 137-149.

Hylden, J. (2004). *What's So Big About Small Schools? The Case for Small Schools: Nationwide and in North Dakota.* Cambridge: Harvard University.

Johnson, J. D., Howley, C. B., & Howley, A. A. (2002). *Small Works in Arkansas: How Poverty and the Size of Schools and School Districts Affect School Performance in Arkansas.* Washington D.C.: The Rural School and Community Trust.

Kennedy, R. (1990). *Educational Indicators and Eighth Grade MPT Passing Rates.* Hot Springs: ERIC.

Klebanov, P. K., Brooks-Gunn, J., & Duncan, G. J. (1994). Does neighborhood and family poverty affect mothers' parenting, mental health and social support? *Journal of Marriage and the Family*, 441-455.

Klingele, W. E., & Warrick, B. K. (1990). Influence of cost and demographic factos on reading achievement. *Journal of Educational Research*, 279-282.

Lee, V. E., & Smith, J. B. (1995). Effects of High School Restructuring and Size on Early Gains in Achievement and Engagement. *Sociology of Education*, 241-270.

Lee, V. E., & Smith, J. B. (1997). High school size: Which works best, and for whom? *Eduational Evaluation and Policy Analysis*, 205-227.

Lyson, T. A. (2002). *What Does a School Mean to a Community? Assessing the Social and Economic Benefits of Schools to Rural Villages in New York.* Ithaca: Cornell University.

Martin, A. J., & Dowson, M. (2009). Interpersonal relationships, motivation, engagement, and achievement: Yields for theory, current issues, and educational practice. *Review of Educational Research*, 327-365.

McCluskey, C. P., Bynum, T., & Patchin, J. W. (2004). Reducing chronic absenteeism: An assessment of an early truancy initiative. *Crime & Delinquency*, 214-234.

McCracken, J. D., & Barcinas, J. D. (1991). Differences Between Rural and Urban Schools, Student Characteristics, and Student Aspirations in Ohio. *Journal of Research in Rural Education*, 29-40.

McMullan, B. J., Sipe, C. L., & Wolf, W. C. (1994). *Charters and Student Achievement: Early Evidence from School Restructuring in Philadelphia.* Cynwyd: Center for Assessment and Policy Development.

Merriam-Webster. (2011). *Merriam-Webster Dictionary*. Retrieved June 15, 2011, from Merriam-Webster Dictionary: http://www.merriam-webster.com/

Meyer, L. H., Weir, K. F., McClure, J., Walkey, F., & McKenzie, L. (2009, July). *Motivation and achievement at secondary school: The relationship between NCEA design and student motivation and achievement: A three-year follow-up.* Retrieved April 2, 2012, from Education Counts: www.educationcounts.govt.nz/publications/schooling/50665

Nachtigal, P. (1982). *In search of a better way.* Boulder: Westview Press.

National Association of Secondary School Principals. (1996). *Breaking ranks: Changing an American institution.* . Reston: National Association of Secondary School Principals and Carnegie Foundation for the Advancement of Teaching.

National Federation of State High School Associations (NFHS). (2011). *The Case for High School Activities.* Indianapolis: National Federation of State High School Associations (NFHS).

Nitta, K. A., Holley, M. J., & Wrobel, S. L. (2010). A Phenomenological Study of Rural School Consolidation. *Journal of Research in Rural Education*, 1-19.

Office of Management and Budget. (2000). *Standards for Defining Metropolitan and Micropolitan Statistical Areas.* Washington D.C.: Federal Register.

O'Neal, L., & Cox, D. (2002). *Then and Now: Small Rural Schools Revisited.* Boone: Appalachian State University.

Peshkin, A. (1978). *Growing up american.* Chicago: The University of Chicago Press.

Peshkin, A. (1982). *The imperfect union: School consolidation and community conflict.* Chicago: The University of Chicago Press.

Purcell, D., & Shackelford, R. (2005). *An evaluation of the impact of rural school consolidation: What challenges may a new round of rural consolidation have on the 'safety, educational performance and social environment' of rural communities?* National Rural Education Association.

Puzzanchera, C., Stahl, A., Finnegan, T., Snydeer, H., Poole, R., & Tierney, N. (2003). *Forthcoming: Juvenile court statistics report.* Washington D.C.: U.S. Department of Justice, Office of Juvenile Justice and Delinquency Prevention.

Rausch, M. K., & Skiba, R. (2004). *Unplanned Outcomes: Suspensions and Expulsions in Indiana.* Bloomington: Center for Evaluation & Education Policy.

Rausch, M. K., & Skiba, R. J. (2006). *The Academic Cost of Discipline: The Relationship Between Suspension/Expulsion and School Achievement.* Bloomington: Indiana University Center for Evaluation and Education Policy.

Raywid, M. A. (1999, January). Current Literature on Small Schools. *ERIC Clearinghouse on Rural Education and Small Schools*, 1-8.

Schmidt, J. K., & Lemke, M. (2006). *How productive are southeastern Wisconsin schools?* Milwaukee: Public Policy Forum.

Schwinden, T. (1993). *School Reorganization in Montana: A Time for Decision?* Helena: Montana School Boards Association.

Sharp, W. L. (1993). *School Spending: Is There a Relationship between Spending and Student Achievement? A Correlation Study of Illinois Schools.* Carbondale: Southern Illinois University.

Silverman, F. (2005, October). *All Alone*. Retrieved 05 19, 2011, from District Administration: www.districtadministration.com

Smith, J. R., Brooks-Gunn, J., & Klebanov, P. K. (1997). *Consequences of living in poverty for young children's cognitive and verbal ability and early school achievement.* New York: Russell Sage Foundation.

StatSoft, Inc. (2011). *Statistics Glossary*. Retrieved January 21, 2012, from StatSoft Electronic Statistics Textbook: http://www.statsoft.com/textbook/statistics-glossary/

Stein, J., Marley, P., & Berquist, L. (2011, March 1). Walker's budget cuts would touch most Wisconsinites. Milwaukee, WI, USA.

Stewart, L. (2009). Achievement Differences between Large and Small Schools in Texas. *The Rural Educator*, 20-28.

Sutton, J. M., & Pearson, R. (2002). The practice of school counseling in rural and small town schools. *Professional School Counseling*, 266-276.

Swanson, P. C. (2008). *Special Education in America: The state of students with disabilities in the nation's high schools.* Bethesda: Education Research Center.

Toch, T. (2003). *High Schools on a Human Scale.* Boston: Beacon Press.

United States Census Bureau. (2011, December 23). *State & Country Quickfacts*. Retrieved January 21, 2012, from United States Census Bureau: http://quickfacts.census.gov/qfd/states/55000.html

United States Department of Agriculture. (2011, November 30). *Income Eligibility Guidelines*. Retrieved January 18, 2012, from Food and Nutrition Service: http://www.fns.usda.gov/cnd/Governance/notices/iegs/IEGs.htm

United States Department of Agriculture Economic Research Service. (2007, September 4). *Data Sets*. Retrieved January 17, 2012, from United States Department of Agriculture Economic Research Service: http://www.ers.usda.gov/data/ruraldefinitions/documentation.htm

United States Department of Education. (1998). *Violence and Discipline Problems in U.S. Public Schools: 1996-1997*. Washington, D.C.: NCES.

United States Department of Education. (2001). Why Rural Matters: Common Core of Data, Public School Universe. *National Center for Education Statistics*, 79-89.

United States Department of Education. (2008, October 19). *Statistical Standards*. Retrieved January 18, 2012, from National Center for Education Statistics: http://nces.ed.gov/statprog/2002/std1_5.asp

United States Department of Education. (2011). *Search for Public Schools*. Retrieved July 04, 2011, from National Center for Education Statistics: http://nces.ed.gov/ccd/schoolsearch/

United States Department of Education. (2012). *National Center for Education Statistics*. Retrieved January 18, 2012, from School and District Glossary: http://nces.ed.gov/ccd/commonfiles/glossary.asp

United States Department of Education. (2012, July 18). *National Center for Education Statistics*. Retrieved from National Education Longitudinal Study of 1988 (NELS:88): http://nces.ed.gov/surveys/nels88/

United States Department of Labor. (2011, November 17). *Bureau of Labor Statistics*. Retrieved January 17, 2012, from Labor Force Statistics from the Current Population Survey: www.bls.gov/cps/earnings.htm#education

Walberg, H., & Fowler, W. (1987). Expenditure and size efficiencies of public school districts. *Educational Researcher*, 5-13.

Wendling, W., & Cohen, J. (1981). Education resources and student achievement: Good news for schools. *Journal of Education Finance*, 44-63.

Wiederholt, M. (2009). *Long-term effects of participation in high school athletics.* Madison: Edgewood College.

Williams, D. T. (1990). *The Dimensions of Education: Recent Research on School Size.* Clemson: Strom Thurmond Institute of Government and Public Affairs.

Winters, J. J. (2003). *An Examination of Eighth and Twelfth Grade Students' Mathematics Achievement in Relation to School Locale, County Location, Looping Status, SES, Grade and Class Size, and Access to Upper-Level Mathematics Courses in Tennessee.* Ann Arbor: ProQuest Information and Learning Company.

Wisconsin Department of Pubic Instruction. (2011, September 8). *Department of Pubic Instruction*. Retrieved January 18, 2012, from Special Education Eligibility: http://dpi.wi.gov/sped/eligibility.html

Wisconsin Department of Public Instruction. (2005). *School Performance Report Data Definitions and Directions.* Madison: Wisconsin Department of Public Instruction.

Wisconsin Department of Public Instruction. (2009, July 1). *WKCE Proficiency Score Ranges*. Retrieved January 18, 2012, from Office of Educational Accountability: http://dpi.wi.gov/oea/wkce-crtcuts.html

Wisconsin Department of Public Instruction. (2010). WKCE Fall 2009 Technical Manual. Madison, WI, USA.

Wisconsin Department of Public Instruction. (2011, December 15). *Wisconsin Department of Public Instruction*. Retrieved January 18, 2012, from Understanding Habitual Truancy Data: http://dpi.wi.gov/spr/tru_q&a.html#definitions

Wisconsin Department of Public Instruction. (2011, December 21). *Wisconsin Department of Public Instruction*. Retrieved January 18, 2012, from Race and Ethnicity Data Collection FAQ: http://dpi.wi.gov/lbstat/dataracfaq.html

Wisconsin Department of Public Instruction. (2012, February 13). *Public School Enrollment Data*. Retrieved March 31, 2012, from Wisconsin Department of Public Instruction: http://dpi.wi.gov/lbstat/pubdata2.html

Wisconsin Department of Public Instruction. (2012). *Wisconsin Information Network for Successful Schools (WINSS)*. Retrieved March 1, 2012, from Wisconsin Information Network for Successful Schools (WINSS): http://dpi.wi.gov/sig/index.html

Wisconsin Department of Public Instruction. (n.d.). *School Finance Data Warehouse Home*. Retrieved January 18, 2012, from School Finance Data Warehouse: http://www2.dpi.state.wi.us/sfsdw/Std_Rpts.asp

Wisconsin Department of Revenue. (2011, November 25). *Reports - I*. Retrieved January 18, 2012, from Wisconsin Department of Revenue: http://www.revenue.wi.gov/report/i.html

APPENDIX A

104 HIGH SCHOOLS

(not included in free and reduced lunch participation and students with disabilities variables)

Abbotsford	Algoma	Almond
Argyle	Auburndale	Augusta
Bangor	Barneveld	Pembine
Belleville	Belmont	Benton
Blair-Taylor	Bowler	Boyceville
Bruce	Butternut	Cambria-Friesland
Cameron	Cashton	Cassville
Cedar Grove	Cochrane-Fountain City	Colby
Coleman	Colfax	Cornell
Dodgeland	Durand	Eleva-Strum
Elmbrook East	Fall River	Fennimore
Frederic	Gilman	Gilmanton
Goodman	Green Lake	Greenwood
Gresham	Highland	Hilbert
Hillsboro	Hurley	Hustisford
Independence	Iola-Scandinavia	Jefferson
Johnson Creek	Kickapoo	Kohler
La Farge	Laona	Luck
Little Wolf	Marion	Menominee
Mercer	Milwaukee School of the Languages	Northwest Secondary School
Mishicot	Monroe	Montello
Necedah	Neillsville	New Auburn
New Berlin Eisenhower	New Berlin High	New Glarus
New Lisbon	Niagara	Norris
North Crawford	Northwood	Norwalk-Ontario-Wilton Brookwood
Oakfield	Pecatonica	Pepin
Peshtigo	Plum City	Potosi
Prescott	Princeton	Rio
Royall	Sheboygan Falls	Shell Lake
Siren	Slinger	Solon Springs
Somerset	South Shore	Spencer
Stratford	Three Lakes	Tigerton
Tri-County	Turtle Lake	Wabeno
Waterloo	Wautoma	Wauzeka
White Lake	Wild Rose	

APPENDIX B

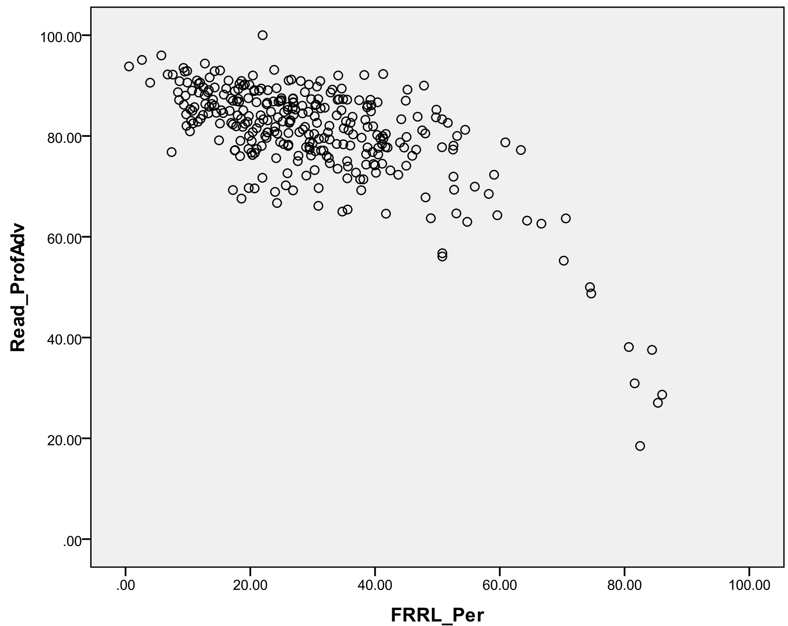
HIGH SCHOOLS INCLUDING OTHER GRADE LEVEL DATA

Abbotsford	Algoma	Almond
Argyle	Auburndale	Augusta
Bangor	Barneveld	Pembine
Belleville	Belmont	Benton
Blair-Taylor	Bowler	Boyceville
Bruce	Butternut	Cambria-Friesland
Cameron	Cashton	Cassville
Cedar Grove	Cochrane-Fountain City	Colby
Coleman	Colfax	Cornell
Dodgeland	Durand	Eleva-Strum
Elmbrook East	Fall River	Fennimore
Frederic	Gilman	Gilmanton
Goodman	Green Lake	Greenwood
Gresham	Highland	Hilbert
Hillsboro	Hurley	Hustisford
Independence	Iola-Scandinavia	Jefferson
Johnson Creek	Kickapoo	Kohler
La Farge	Laona	Luck
Little Wolf	Marion	Menominee
Mercer	Milwaukee School of the Languages	Northwest Secondary School
Mishicot	Monroe	Montello
Necedah	Neillsville	New Auburn
New Berlin Eisenhower	New Berlin High	New Glarus
New Lisbon	Niagara	Norris
North Crawford	Northwood	Norwalk-Ontario-Wilton Brookwood
Oakfield	Pecatonica	Pepin
Peshtigo	Plum City	Potosi
Prescott	Princeton	Rio
Royall	Sheboygan Falls	Shell Lake
Siren	Slinger	Solon Springs
Somerset	South Shore	Spencer
Stratford	Three Lakes	Tigerton
Tri-County	Turtle Lake	Wabeno
Waterloo	Wautoma	Wauzeka
White Lake	Wild Rose	

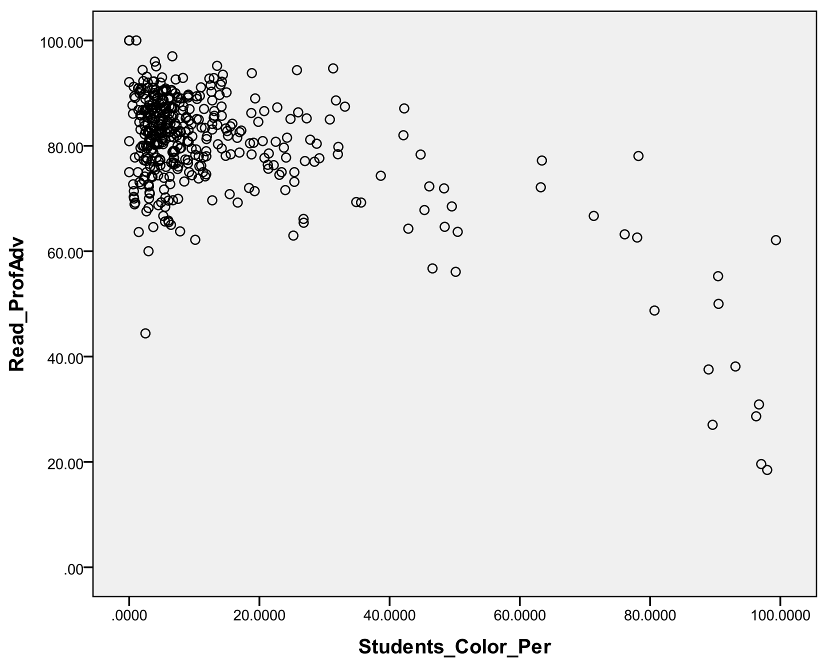
APPENDIX C

OUTLIER SCATTER PLOTS

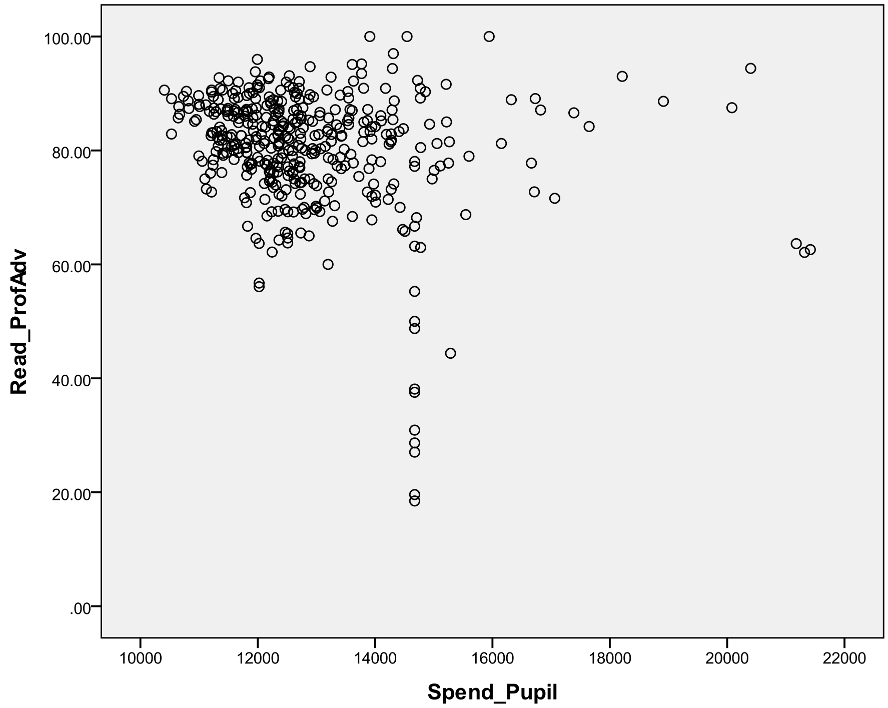
1. Socioeconomic Status (free and reduced lunch):



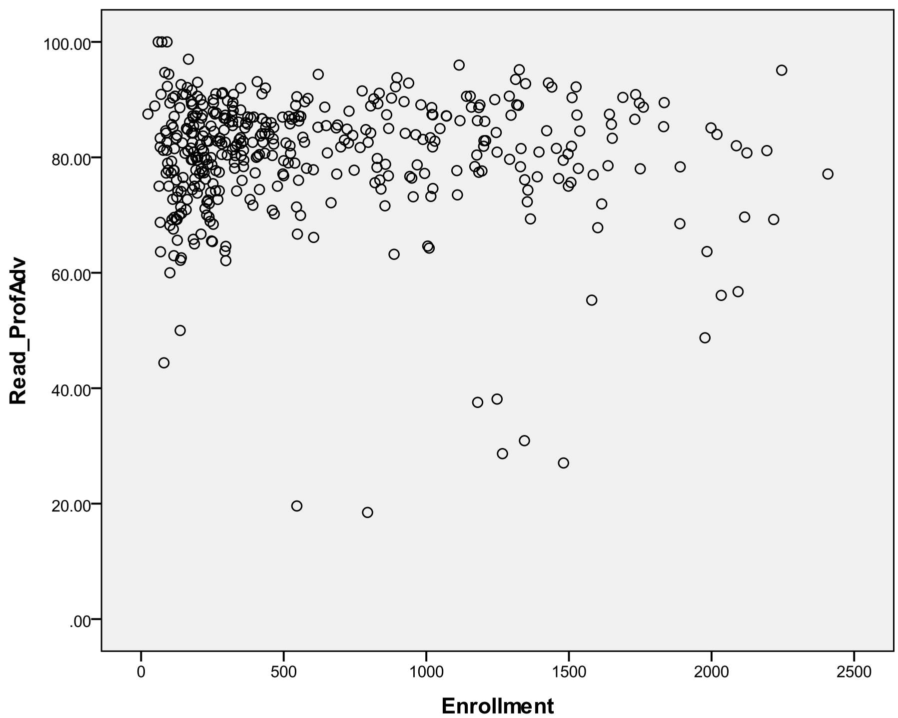
2. Students of Color:



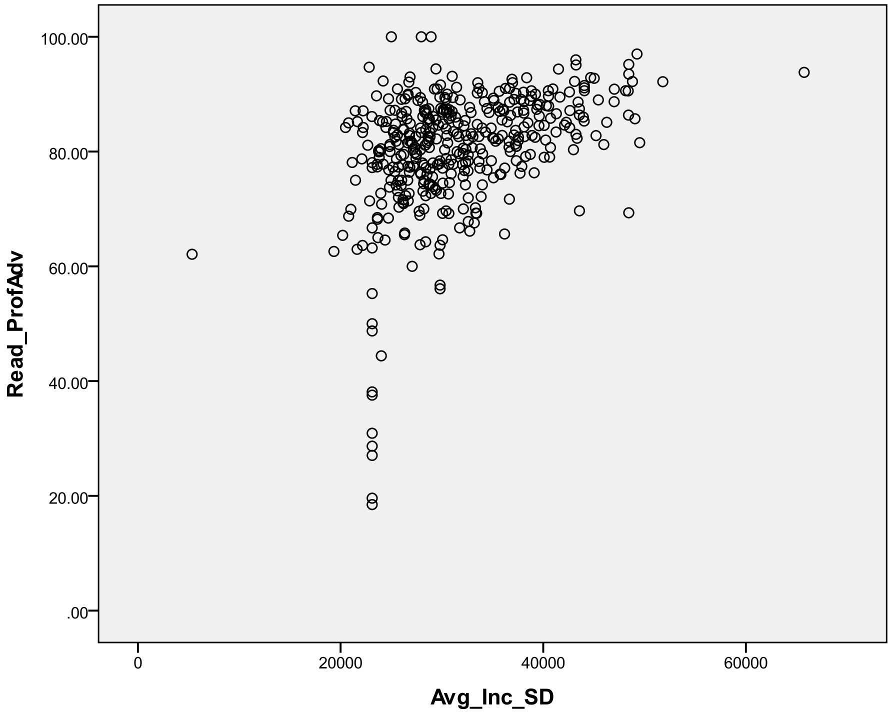
3. Spending per Pupil:



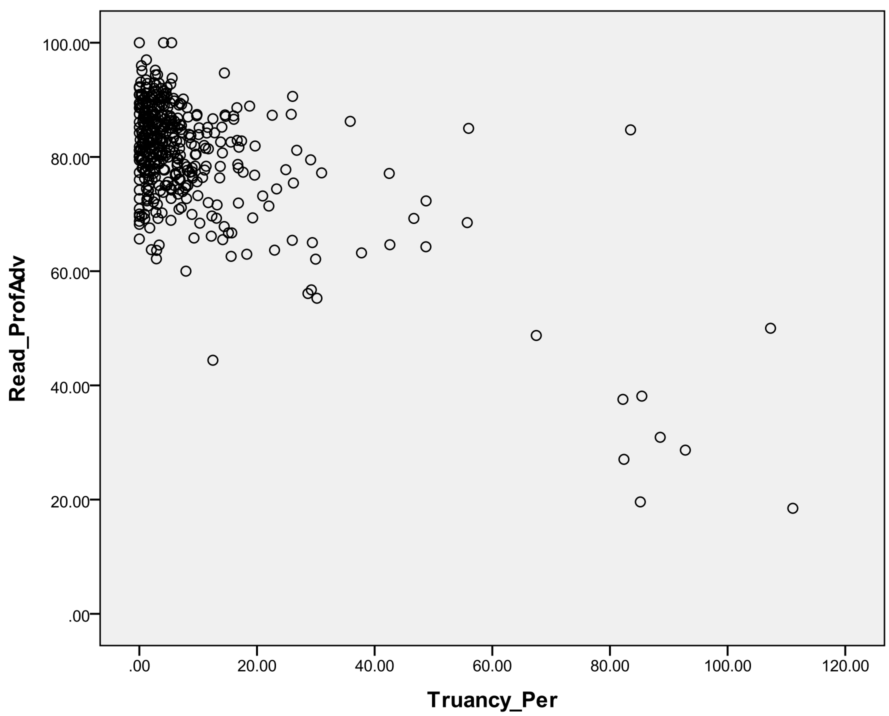
4. High School Enrollment:



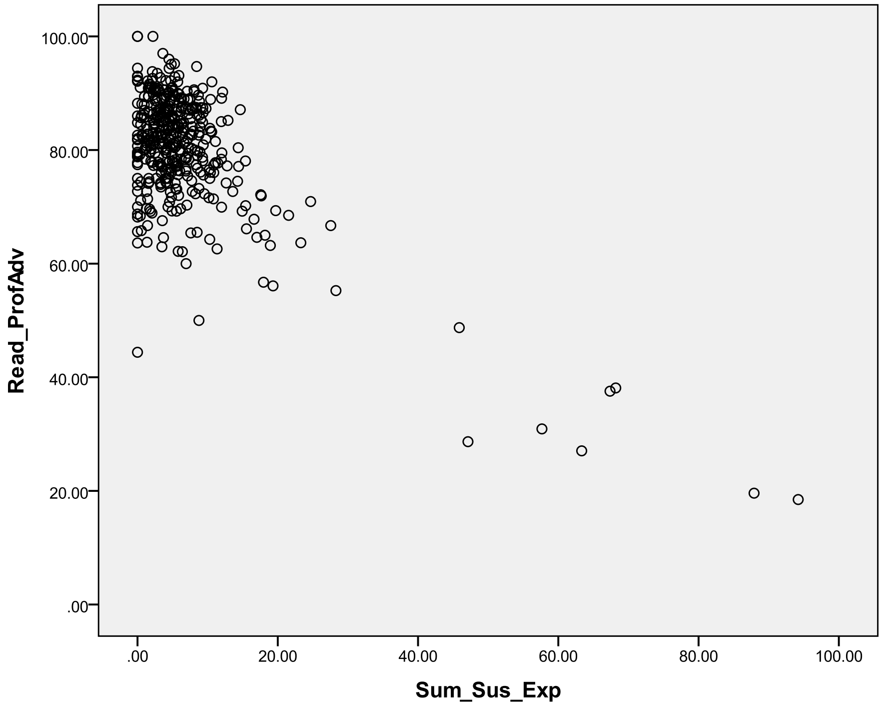
5. Parent Education Level (Average Income by School District):



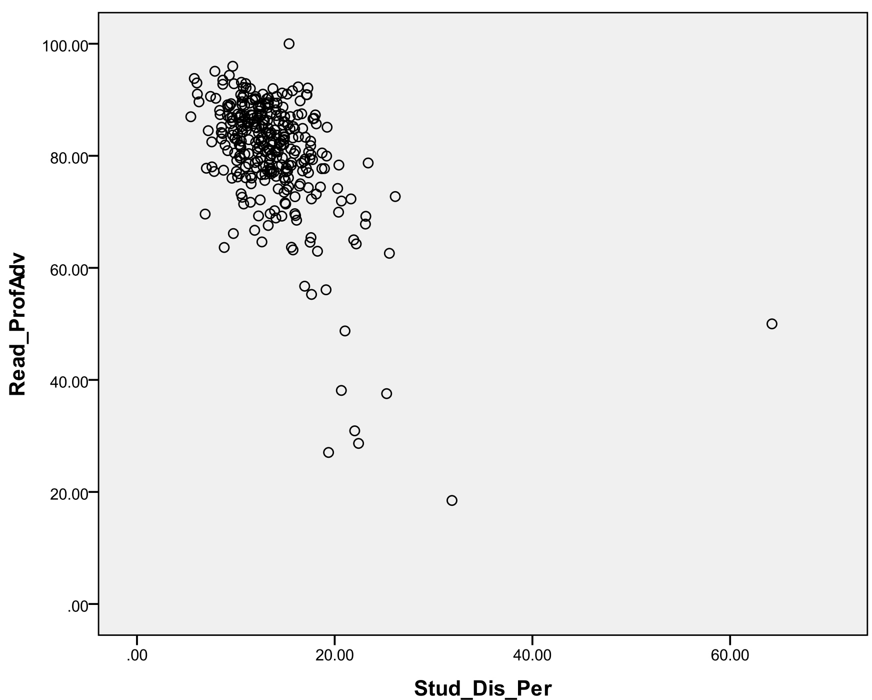
6. Truancy:



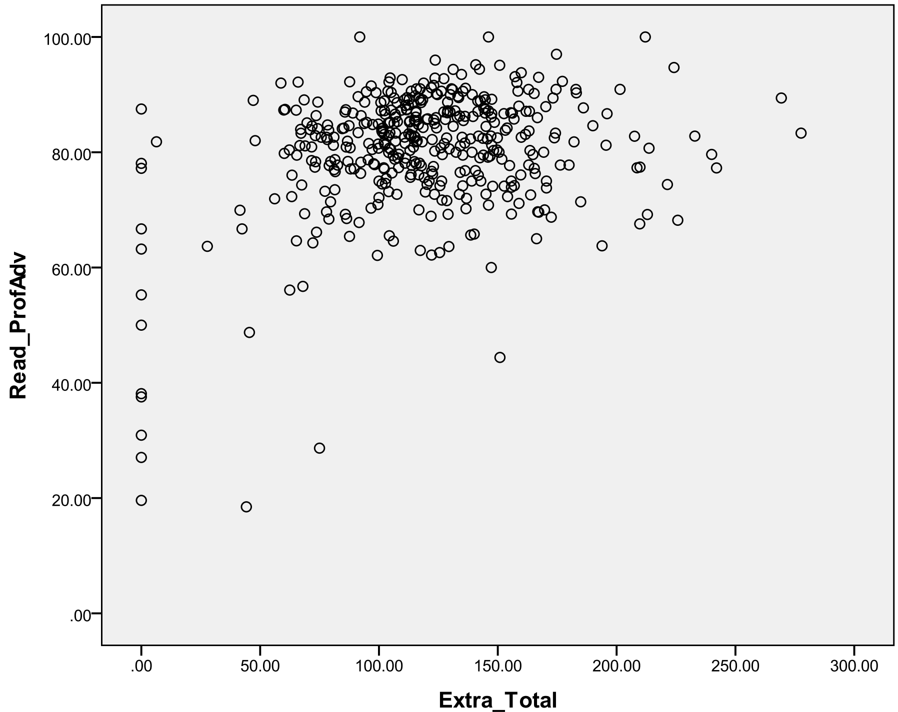
7. Suspensions & Expulsions:



8. Students with Disabilities:



9. Extra/Co-curricular Participation Index:



APPENDIX D

FACTOR_1 & FACTOR_2 COMPONENT MATRIX

Component Matrix[a]		
	Component	
	1	2
Students_Color_Per	.868	.318
Income_1000	-.567	.798
FRRL_Per	.872	-.387
Truancy_Per	.880	.273
Sum_Sus_Exp	.863	.315
Extraction Method: Principal Component Analysis.		
a. 2 components extracted.		