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The Influence of Wealth on Academic Performance in Secondary Schools

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The Influence of Wealth on Academic Performance in Secondary Schools

A Thesis

By

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The thesis entitled **The Influence of Wealth and Academic Performance in Secondary Schools** presented by **DEAN R. BANZIGER**, a candidate for the degree of **Master of Science in Mathematics,** has been approved and is worthy of acceptance.

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ABSTRACT

The purpose of this study was to determine if wealth and financial investment in public education within communities plays a significant role in the academic performance of students in West Virginia secondary schools. West Virginia is an interesting example of academic success relative to the wealth of the state. The state of West Virginia has the third highest poverty rate (17.9%) and the second lowest Gross Domestic Product per capita of all fifty states and the District of Columbia (World Population Review, 2022). West Virginia ranks dead last in average SAT scores (College Board, 2022). This study seeks to determine if this relationship between wealth and achievement on the SAT holds true within the 55 specific school districts in West Virginia. It also examines the relationship between overall amounts of education funding (financial investment) and achievement on the SAT. Data was initially analyzed at the national level, and then drilled down into the fifty-five unique school districts (i.e. counties) in West Virginia. Multivariate Linear Regression models were created, with Math and ERW (English Reading and Writing) SAT Benchmark rates as the dependent variables. Models were also separated between measurements of wealth (Poverty Rate, Unemployment Rate, Average income, and GDP per captia) and measurements of financial investment (Teacher Salary / Average Income, Expenditures per Student, percent of GDP allocated to public education, and Student-Teacher Ratio) as the independent variables. The review of national data, correlation analyses, and MLR models all showed statistically significant relationships between Math and ERW (English Reading and Writing) SAT benchmark rates and measurements of wealth. The variables that had the highest significance were average income and GDP per capita The correlation analyses on WV school districts and state-level data as well as MLR models of WV school districts consistently show no statistically significant relationship between SAT

benchmark rates and measurements of financial investment used in this study. This study indicates that teacher salaries, percent of a school district's revenue spent on education, student-teacher ratios, and budgeted amount per student do not have a statistically significant relationship with SAT scores. To summarize, the research in this study demonstrates that socio-economic status, more specifically wealth of a school district, is a statistically significant predictor of success on the SAT. Furthermore, investing more in education through higher teacher salaries, lower student to teacher ratios, or higher overall expenditures on education is not shown in this study as a statistically significant predictor of success on the SAT.

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I have immense gratitude for all of the support that I received not only in completing this project but in all of the work leading up to it.

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I also want to thank my two adult children, Samantha and Drew Banziger. Samantha and Drew both earned their Bachelor's Degrees while I was taking courses at SSU. By enduring the COVID pandemic and other obstacles while pursuing their degree, they both motivated me to persist in my education as well. I did not want to be the only family member that was a college dropout. As a fellow mathematician and teacher, Samantha provided me additional support and insight from a younger teacher's perspective. In addition to their emotional support, Samantha

and Drew both earned significant scholarships, which helped offset the necessary financial resources to complete my degree.

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Lastly, I want to thank my parents. My father George Banziger has set an incredible example of passion and endurance in education by earning his PhD in Psychology, teaching in locations from Tanzania to Marietta College, shifting career paths when problems with his vocal chords prevented him from teaching in a classroom, and volunteering with, and mentoring to, other grant writers well into his 80's. My mother Gwen Banziger also provided an incredible example while serving professionally as a social worker, college professor, and elementary school teacher while being a supportive and nurturing mother. Honestly, my parents' persistent (yet productive) probing is a major reason that I am completing this project.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES

CHAPTER I: Introduction

Chapter 1 will explain the need to explore the relationship between wealth within a community and academic performance. The purpose of this study is to determine if the financial wealth of communities plays a significant role in the academic performance of students in secondary schools. The study will examine trends at a state by state basis and then drill further into this relationship for the 57 school districts in the state of West Virginia.

This chapter will clearly state the problem, explain the importance of exploring the problem further, lay out the design of the study, and provide a brief background of similar research.

Introductory Paragraph

For decades, the federal, state, and local governments have argued the importance of investing more in our public school system. Since the late 1960s, plaintiffs initiated litigation alleging that state officials violated their own constitution by establishing school finance systems that resulted in unequal per-pupil expenditures, depriving children in poor districts of equal educational opportunities (Russo, 2015). Public expenditures for K-12 spending are estimated at $800 billion per year (Hanson, 2023). This massive investment and contention in lawsuits and politics begs to answer some questions. Is there data that backs up this investment? Do impoverished communities have fewer effective schools? This research project serves to help answer these questions and help resolve these debates. Knowing the answers to these questions can help policy makers determine how much and where to invest funding to improve our public-school systems.

Background of the Problem

Over the past 70 years, trillions of dollars have been invested in the public education of children in the United States (Hanson, 2023). Much of this investment is invested disproportionately based on the wealth of the community surrounding those public schools (Russo, 2015). Countless publications explain the impact of this disproportionate investment on students in impoverished communities.

The book, *Saving K-12: What Happened to Our Public Schools? How Do We Fix Them?* (Price, 2017), explores 65 articles on financing the U.S. public school system. The author argues that public schools are a vast "money pit" in which education officials prefer inefficiency and mediocrity to effective education. While the book includes more opinions than statistical evidence, the author does demonstrate that spending more money on public schools does not independently equate to more successful students. It does point to the need to further analyze the tie between wealth and academic success.

In contrast, *The American Psychological Association* (2017) published a summary of the close relationship between education and economic investment. This summary consolidates 24 articles and research papers showing a close connection between the financial stability of families and communities and their ability to succeed academically and vocationally. Furthermore, the school systems in low-SES communities are often under-resourced, negatively affecting students' academic progress and outcomes. Inadequate education and increased dropout rates affect children's academic achievement, perpetuating the low-socio-economic status of the community. The authors argue that investing more in school systems and early intervention programs may help to reduce some of these risk factors.

West Virginia is an interesting example of academic success relative to the wealth of the state. The state of West Virginia has the third highest poverty rate (17.9%) and the second lowest Gross Domestic Product per capita of all fifty states and the District of Columbia (World Population Review, 2022). West Virginia ranks dead last in average SAT scores (College Board, 2022). This study seeks to determine if this relationship between wealth and achievement on the SAT holds true within specific school districts in West Virginia.

Statement of the Problem and Significance of the Study

The trillions of dollars invested in public education is disproportionately invested based on the wealth of that school district (Russo, 2015). As stated in the background section, countless publications explain the impact of this disproportionate investment on students in impoverished communities. However, our society still lacks a consensus on the impact of this disproportionate investment on student performance. As much money has been put into public education and common the value of investing in education is, there appears to be little statistical analysis of this relationship within U.S. states and school districts. For these reasons, analyzing the impact of a community's wealth on academic success can help determine the value of financial investments into education based on the wealth within that community.

Purpose of the study

The purpose of this study is to determine if wealth and financial investment in public education within communities plays a significant role in the academic performance of students in secondary schools. The study will focus on this relationship for the state of West Virginia.

The state of West Virginia was chosen for several reasons. First, the researcher resides and teaches in the state. Therefore, the researcher has a strong familiarity with the state and a vested interest in analyzing the data close to their home. Secondly, West Virginia divides its 55 school districts by county. Thus, socio-economic data at the county level can be matched to educational data at the school-district level. Lastly, West Virginia publicly provides all necessary educational information at the school district level, allowing straight-forward data consolidation.

Research Questions

This study will investigate the following questions:

1. For counties in the state of West Virginia, are measurements of wealth significant predictors of SAT scores? Wealth will be measured by:
    a) Poverty Rate
    b) GDP per capita
    c) Unemployment rate
2. For counties in the state of West Virginia, are measurements of financial investment in public education significant predictors of SAT scores? Financial investments in public education will be measured by the following variables:
    a) Average Teacher Salary/Average Income
    b) Percent of taxpayer revenue spent on education
    c) Student-teacher ratios
    d) School district's budgeted amount per student

Hypotheses

The hypotheses for the two research questions above are:

1. For counties in the state of West Virginia, there is no statistically significant relationship between standardized assessment (SAT) scores by the 55 public school districts and the wealth of that school district. Wealth is measured by:

    a) Poverty Rate.

    b) GDP per capita.

c) Unemployment rate.

2. For counties in the state of West Virginia, there is no statistically significant relationship between standardized assessment (SAT) scores by the 55 public school districts and the school district's financial investment in public education. Financial investments in public education will be measured by the following variables:

   a) Average Teacher Salary/Average Income

   b) Percent of taxpayer revenue spent on education

   c) Student-teacher ratios

   d) School district's budgeted amount per student (Not available at state level)

Research Design

County-wide data will be consolidated to perform a statistical model between all counties (i.e. school districts). Below are the variables and their sources:

Variable	**Source**
Average SAT Score	West Virginia Department of Education's Zoom WV Data Dashboard
Poverty Rate	U.S. Department of Agriculture
Gross Domestic Product (GDP) per capita	U.S. Department of Commerce
Unemployment Rate	Bureau of Labor Statistics
Average Teacher Salary in Public Schools	West Virginia Department of Education's Zoom WV Data Dashboard
Per Pupil Spending	West Virginia Department of Education's Zoom WV Data Dashboard

Average Taxable Income	U.S. Bureau of Economic Analysis
Student-teacher Ratio	West Virginia Department of Education's Zoom WV Data Dashboard
School District's Budgeted Amount per Student	West Virginia Department of Education's Zoom WV Data Dashboard

In 2019, the first national operational SAT validity study for the redesigned assessment produced many notable findings supporting the value of the SAT (College Board, 2019). The study was among the largest ever conducted on SAT validity, with data from more than 223,000 students across 171 four-year colleges and universities.

Results confirmed the value of the SAT:

- SAT scores are strongly predictive of college performance—students with higher SAT scores are more likely to have higher grades in college.
- SAT scores are predictive of student retention to their second year—students with higher SAT scores are more likely to return for their sophomore year.
- SAT scores and high school grade point average (HSGPA) both relate to academic performance in college, but they tend to measure slightly different aspects of academic preparation. Using SAT scores in conjunction with HSGPA is the most powerful way to predict future academic performance:
- On average, SAT scores add 15% more predictive power above grades alone for understanding how students will perform in college.
- SAT scores help to further differentiate student performance in college within narrow HSGPA ranges.

- Colleges can use SAT scores to identify students who may need academic support before and during college by monitoring predicted versus actual performance.

To thoroughly analyze the data, the below statistical analysis will be performed:

- Correlation analyses using SAT percent proficiency in mathematics and reading as dependent variables. Separate analyses will be conducted for mathematics and then for reading. Each of the wealth and financial investment metrics will be the independent variables. These wealth metrics are poverty rate, GDP per capita, unemployment rate, average teacher salary / average taxable income, percent of taxpayer revenue spend on education, student-teacher ratios, and school district's budgeted amount per student.
- Four Multivariate Linear Regression (MLR) models as outlined below:
    a. Math and Wealth MLR: math SAT proficiency rates is the dependent variable. Poverty rate, GDP, and Unemployment rate are the independent variables.
    b. Math and Financial Investment MLR: math SAT proficiency rates is the dependent variable. Average teacher salary / average taxable income, percent of tax payer revenue spend on education, student-teacher ratios, and school district's budgeted amount per student are the independent variables.
    c. Reading and Wealth MLR: reading SAT proficiency rates is the dependent variable. Poverty rate, GDP, and Unemployment rate are the independent variables.
    d. Reading and Financial Investment MLR: reading SAT proficiency rates is the dependent variable. Average teacher salary / average taxable income, percent of tax payer revenue spend on education, student-teacher ratios, and school district's budgeted amount per student are the independent variables.

- After correlations are analyzed for the models above, additional MLR's may be conducted by removing dependent variables deemed statistically insignificant.

Theoretical Framework

The theoretical framework for this project revolves around Max Weber's Theory of Social Stratification. Weber introduced three independent factors that form his theory of stratification: economic class, social status, and political power. He believed an individual's wealth, their status in their community, and their ability to influence their community unequally determined that individual's (or a community's) control over their own fate. Those with money, social status, and political power had considerable more influence over their continued success over those with less money, social status, and political power. Weber treated these three components as separate but related sources of power, each with different, but significant, effects on social action, such as education (Weber, 1920).

Weber's theory serves as the foundation of this research because Weber's description of wealth and power influencing social action is consistent with the topic and purpose of the project. Based on Weber's theories, school districts with money, high social status, and political power would yield the best results in education.

This research could support Weber's theory by demonstrating a direct relationship between wealth and measurable academic success through SAT scores. On the contrary, if this study shows no statistical significance between wealth and SAT scores, it would oppose Weber's theory. That is, the idea that economic, social, and political class has a measurable effect on student success would have less weight.

Assumptions, Limit, and Scope

This study assumes that the Scholastic Aptitude Test (SAT) is an accurate reflection of a student's ability to achieve academically. This study also assumes that the data collected by the College Board and federal government sources was conducted in a fair, unbiased way. Independent studies, such as the one discussed in the Research Design section of this chapter, support these assumptions, and validate the reliance on this data.

A pertinent limit for generalizability of this study could be a fluctuation in state requirements for SAT testing. For example, the percentage of students by state that take the SAT could fluctuate significantly from the 58% average (College Board, 2022). Some states may have specifically designed unique, standardized tests, use other standardized tests such as the ACT or CLT, or have no mandated standardized test. These states could have a small percentage of students taking the SAT, and a large amount of selection; that is, only students planning to attend college may take the SAT. Thus, scores could be inflated for these states. The percent of students completing the SAT will be collected for all levels of data. Caution will be taken in analyzing the results due to this limitation of generalizability outside of the state of West Virginia.

This study serves to identify the relationship between wealth within a community and academic success. The scope of this study is limited to West Virginia only. While the study only focuses on test takers of the Scholastic Aptitude Test, independent studies such as the one discussed in the Research Design section support generalizing to all secondary students and their readiness for college.

Definitions

Scholastic Aptitude Test (SAT): a standardized test designed, conducted, and reported by the College Board whose purpose is to determine the college readiness of secondary students.

The College Board: A not-for-profit membership organization founded more than 120 years ago. The college board pioneered programs like the SAT to expand opportunities for students and help them develop the skills they need.

Poverty Rate: Percent of a given population with annual income below the dollar amount set yearly by the U.S. Census Bureau. This study utilizes poverty rates set in 2022. For a single person in the continental United States, the 2022 federal poverty level is $13,590. For each additional person in the household, the federal poverty level increased by $4,720.

Gross Domestic Product (GDP) per capita: the sum of gross value added by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation of output, divided by mid-year population. Growth is calculated from constant price GDP data in local currency by the U.S. Department of Commerce. In this study, GDP per capita is used as a measure of wealth within a state or specific school district.

Student-Teacher Ratio: the relationship between the number of students enrolled in a school, district, or education system and the number of full-time teachers employed by the school, district, or system. This metric is calculated by taking the total students in each population and dividing by the number of full-time teachers in that same population as reported by the National Institute for Educational Research and the WV Department of Education.

Unemployment Rate: the number of unemployed people as a percentage of the labor force. The labor force is the sum of the employed and all of those seeking employment that are currently unemployed. The unemployment rate is calculated by the Bureau of Labor Statistics as: (Unemployed ÷ Labor Force) x 100%.

Taxable Income: All income reported to the Internal Revenue Service (IRS) on federal tax forms earned during a specific tax year.

Summary

Chapter 1 demonstrates the need for more research determining the influence of wealth on academic success in public schools. This study seeks to determine if wealth and financial investment in public education within communities plays a significant role in the academic performance of students in secondary schools. The study will examine trends on a state-by-state basis and then drill further into this relationship for the 57 school districts in the state of West Virginia. Furthermore, the study will assess if financial investment in public education relates to academic success at the same level as wealth.

Data analysis will involve simple and multivariate linear regression at the county level. These tests will analyze the relationship between SAT scores and poverty rate, GDP, unemployment rate, average teacher salary, and budgeted amount per student.

The study will be informed by Max Weber's Theory of Social Stratification and will ultimately aim to determine whether wealth and financial investment relate to academic success of secondary public schools. This information could then potentially help determine the value and need for financial assistance to public schools in impoverished communities.

CHAPTER II: Literature Review

Chapter 2 will review literature relevant to the relationship between wealth and academic performance. The chapter will explain the history and purpose of the Scholastic Aptitude Test (SAT), the validity and reliability of SAT Scores, and the role of the SAT in college admissions. This chapter will also detail prior studies linking socio-economic status and financial investments in public education to academic performance. This review will include research conducted internationally, across the country, and will delve into the demographics of West Virginia, as this study drills down into all fifty-five public school districts in the state.

The purpose of this chapter is threefold. First, the chapter will explain the reasoning behind using SAT scores to measure academic success, including its advantages and limitations. This literature review also explains what research has already been conducted on the relationship between wealth and academic performance and the impact of this research on education. Most importantly, the chapter emphasizes the need for this study to solidify a relationship between wealth and academic success in the Gaps of Research section.

Background of the Problem

Over the past 70 years, trillions of dollars have been invested in the public education of children in the United States (Hanson, 2023). Much of this investment is disproportionately based on the wealth of the community surrounding those public schools (Russo, 2015). Countless publications explain the impact of this disproportionate investment on students in impoverished communities.

The book, Saving K-12: What Happened to Our Public Schools? How Do We Fix Them? (Price, 2017), explores 65 articles on financing the U.S. public school system. The author argues that public schools are a vast “money pit” in which education officials prefer inefficiency and mediocrity to effective education. While the book includes more opinions than statistical evidence, the author does demonstrate that spending more money on public schools does not independently equate to more successful students. It does point to the need to further analyze the tie between wealth and academic success.

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The SAT as a Measure of Academic Performance

The Scholastic Aptitude Test (SAT) has an extensive history. Originally developed in 1926, the earliest version had little resemblance of today's exam. It contained nine subtests: seven with verbal content (definitions, classification, artificial language, antonyms, analogies, logical inference, and paragraph reading) and two with mathematical content (number series and arithmetical problems). The emphasis was placed on completing computations as quickly as one could with very stringent time limits. In just 97 minutes, test takers were expected to respond to 315 questions. (Lawerence, 2002).

In early revisions, the number of questions was diminished. In 1929, test takers were given 115 minutes to complete just 7 sub tests. Despite test time increasing to 120 minutes and the number of questions reduced to 100 questions by 1943, there was still a strong emphasis on speed. The directions that year included "Work steadily and as quickly as is consistent with accuracy. The time allowed for each subtest has been fixed so that very few test-takers can finish it." (Lawerence, 2002, p. 6).

Gradually, there was more emphasis placed on comprehension in the verbal (English and Language Arts) and mathematical portions of the exam as opposed to computational speed. By the 1950s about half of the testing time in the verbal section was devoted to reading followed by comprehension questions on those readings (Lawerence 2002). Major revisions in 1994, such as removal of matching word definitions, the inclusion of reading questions that emphasize analytical and evaluative skills, and more mathematical "real world" word problems were designed to focus on critical thinking, comprehension, and reasoning skills (Lawerence, 2002).

Clearly, the SAT today is a much different, but still comprehensive evaluation of a student's readiness for college. The focus of the exam has shifted from computational speed to understanding, critical thinking, and problem solving. The verbal portion of today's SAT is now a measure of one's ability to construct meaning out of the English language primarily through critical reading. The mathematical sections now measure a student's ability to use mathematical concepts and skills to engage in problem solving. It challenges students to apply strong problem-solving techniques to use the math they do know in flexible ways (Lawerence, 2002).

The SAT is far from the only standardized exam to measure academic potential. In Europe, standardized tests have historically been the key to unlocking a post-secondary education. In France, all students must take a standardized state exam, the baccalaureate, and the roughly 60% that pass are admitted to most French universities. Great Britain has a similar exam called the "eleven-plus" (Amberg, 2001). Several states, like the PEAKS in Alaska, offer a separate standardized assessments that all students must take (Alaska Department of Education 2024). 1.4 million high school students, or 37% of the class of 2023 took the ACT (Nam, 2024).

Despite the availability of other standardized exams, the SAT is the most used, nationally. Nearly two million students in the U.S., or 50% of the graduating class of 2023, took the exam while in high school (Nam, 2024). This number is considerably higher in the twenty states like West Virginia (95% of students), that use the exam as their required, standardized test (WVDE, 2023). The ACT is the second most commonly used standardized test, but trails considerable at 37% of graduating students (Nam, 2024). Only seven states require their students to take the ACT as their standardized test (Nam, 2024).

It is worth noting that the importance of standardized testing like the SAT has diminished significantly in recent years. Due to the closing of schools during COVID and other factors, many colleges shifted away from standardized tests. In 2022, just 4% of colleges that use the common app require a standardized test like the SAT (Churchill, 2023). Forbes reported that 80% of colleges would not require a standardized test score for 2023 admissions (Nietzel, 2022).

However, that trend has started to reverse. Elite universities such as Dartmouth, Yale, and MIT have all announced that they are reinstating the requirement of a standardized test for fall 2024 admissions (Shipley, 2024). Shipley explains that many universities view the SAT as one critical predictor of academic success to use in conjunction with other components such as recommendations, essay analyses, and extracurricular participation.

The SAT also plays an important role in scholarships and other post-secondary opportunities. For example, West Virginia offers the Promise Scholarship to students that meet certain academic measurements including a 1080 composite and 510 Math and Reading/Writing Scores on the SAT. Recipients of this scholarship earn $5,200 towards college expenses for four years (WVDE, 2023). US News' national college rankings also still use SAT scores in their formulas as well as a majority of these college's Honor's programs (Public University Honors 2022).

The other, most commonly used metric used by college admissions and government officials to measure academic success is grade point average (GPA). One downside of GPA is that it is far from a standardized measure. Some secondary schools inflate GPA for honors or college prep courses while others give as much weight for a gym course as an advanced math course. GPAs also weigh heavily on teacher's opinions or on different percentages for different grades. For example, a cut-off for an A may be 93% at one school, and 90% at another. (Warne 2014)

Multiple sources also report an inflation in GPA in future years. The New York Times reported that 47% of all high school students graduate with an A average (Donahue, 2023). American College Testing reported that the average high school GPA increased 6 percent from 3.17 in 2010 to 3.36 in 2021. "Grade inflation is real, it is widespread, and it weakens the value of student transcripts as a single measure of what students know and are able to do," said ACT CEO Janet Godwin. "The study shows that grade inflation is a persistent, systemic problem, common across classrooms, districts, and states." (Ciaramella, 2022)

The research in this section serves to support the decision to use the SAT as the measure for academic success. Despite controversy and a dip in use between 2020 and 2023, the SAT is still the most common and most relied on standardized metric of academic success in the United

States. The use of the SAT is also predicted to rise again based on the reinstatement of requiring standardized tests at many colleges and universities (Shipley, 2024). Over a century of use and adaptation amplify the reliability and validity of this metric.

Measuring Socioeconomic Status (SES) and Its Relationship with Education

For the purpose of this study, socioeconomic status (SES) refers to a group's social standing or position within society based on a combination of factors including income, education, occupation, and social status. SES is the primary measurement of wealth used in most studies outlined in this section.

SES is a multidimensional construct that encompasses economic resources, social prestige, and access to opportunities and resources. It is often used as an indicator of one's relative advantage or disadvantage in society and can influence various aspects of life, including health outcomes, educational attainment, and access to social services.

Measuring SES is a complex endeavor due to its multidimensional nature. Researchers and policymakers use various indicators to capture different aspects of SES, aiming to provide a comprehensive understanding of individuals' or groups' social and economic standing within society. Some common measurements of SES include income, education, occupation, and wealth, among others.

Income is one of the most used indicators of SES. It reflects individuals' or households' financial resources and their ability to afford necessities and participate in social and economic activities. Income can be measured on an individual or household basis, including wages, salaries, investment income, and government assistance.

The master’s thesis, School Districts and Academic Achievement: Socio-Economic Structure and Social Reproduction in Ohio (Kilpatrick, 2012) measures SES by household income. The study uses income data from the 2007-2009 American Community Survey and the Ohio Department of Education to help explain differences in standardized test proficiency. The study compares poorer students in wealthier districts to poorer students in poorly-funded school districts. The results show that students classified as economically disadvantaged have substantially higher proficiency levels in wealthier districts, compared to disadvantaged students attending poorer schools.

Poverty rate (or level) is a specific measurement of income common in SES analyses. In the United States, poverty is mostly measured by the percentage of a population below poverty income levels set by the federal government. One academic journal, The Journal of Poverty, focuses all their articles and research specifically on the effects of poverty on subjects like education. As of March of 2024, a search of this journal on Shawnee State’s library system found over 300 articles and studies on education and its relationship with poverty.

One such study, *College Students from Poverty: Academic Success and Authenticity*, sought to connect poverty with success in college (Lewine, 2022). This was a longitudinal study of the academic performance of 54 college students coming from families with incomes below 150% of the federally designated poverty level, residing in Kentucky. The analysis reviewed 4-year retention rates and drop-out rates of those in the study compared to average rates for each student’s home university. The students that the study followed had no greater histories of trauma, psychological disturbance, difficulties, or academic problems while in college. The study actually showed significantly better retention rates (75.9%) than their college peers (63.2%) (Lewine, 2022).

A doctoral dissertation, Addressing the Math Achievement Gap of Socio-Economical Disadvantaged students through intervention (Ayala, 2020), explores the use of direct student math interventions to help economically disadvantaged students achieve academic success. Economically disadvantaged students were identified as being below 100% of the federally designated poverty level. This case study analyzes the practices of three intervention teachers who taught a six-week summer math intervention for 8th grade socio-economic disadvantaged students. Results revealed a positive correlation between student success the following year and the summer intervention. Qualitative data was collected in the form of intervention teacher surveys. The surveys were coded for themes and patterns, which determined consistent practices and strategies amongst all three intervention teachers. These specific strategies and practices used during the six-week intervention were directly related to improved mathematics achievement of sixty-three 8th grade student of low socio-economic status. The study demonstrated that additional financial investment in summer intervention programs may improve academic performance.

At a macro-level, gross domestic product per capita is also a common SES metric. A quick search on Shawnee State's library system resulted in over 20 studies analyzing the relationship between gross domestic product and education.

One study analyzing gross domestic product was recently published in the Sustainability Journal. The study utilized the European Union's NUTS (Nomenclature of territorial units for statistics) classification for dividing up the economic regions of the EU and the UK by socioeconomic status: NUTS 1, major socio-economic regions; NUTS 2, basic regions for the application of regional policies; NUTS 3, small regions for specific diagnoses. Gross domestic product is the primary metric for the classification. (Marto, 2022).

The study, conducted in all basic (NUTS 2) regions of the European Union (EU), sought to determine the influence of post-secondary education on each region's wealth as measured by gross domestic product. This study used a DEA (Data Envelopment Analysis) to determine not only the regional differences within the countries, but also the regions where the percentages of people with post-secondary education significantly influenced the levels of GDP per capita (Marto, 2022). The capital of Portugal, Lisbon, was determined as the most efficient region by demonstrating the strongest relationship between post-secondary education and gross domestic product.

There have also been analyses within the United States linking Gross Domestic Product to Education. One such study published in Policy Sciences investigated the relationship between education and economic growth in US states while controlling for the effects of the other leading predictors of economic growth such as infrastructure development and population growth (Baldwin, 2008). The results indicate that spending on higher education demonstrate a positive association with growth in per capita income, while kindergarten through 12th grade (K-12) spending and pupil–teacher ratios demonstrate a negative association with income growth from 1988 to 2005. This study is of particular interest because it conflicts with many other studies in this chapter demonstrating a positive relationship between investment in education and economic growth.

Unemployment is also a common factor used to determine socio-economic status. Over 800,000 studies and articles have been written on this subject according to Shawnee State's search engine. While a majority of these studies focus on a weak educational background increasing risk of unemployment, there are some studies that link parental unemployment with academic success of their children.

One such study, published in the International Journal of Manpower, sought to determine the impact of unemployment on Greek secondary school grades (Drydakis 2023). The 2007 Great Recession led to large unemployment world-wide, but especially in Greece where the unemployment rate exceeded 25% by 2012. This study claimed to be the first multi-variate assessment of the association between parental unemployment and adolescents' grades in Greece. Results of the study confirmed that parental unemployment was associated with a decline in their child's grades. The biggest impact occurred during periods of economic decline (2011 – 2013), with an even stronger association to unemployed parents that did not own homes.

Education of family and community members is another critical component of SES measurement. Education of those around a student influences a student's access to and attainment of knowledge and skills through formal education systems. Education levels, such as attainment of degrees or certifications, are often used as proxies for socioeconomic status, as they are associated with higher earning potential, better job opportunities, and greater social mobility.

Several studies have examined the relationship between education of family members and academic success of their children. One such study is *The Relationship between Parents' Education and Their Children's Academic Achievement* (Idris 2020). This study explored the relationship between fathers’ and mothers’ educational levels and the academic achievement of their children. The results of five hundred and ten ninth grade annual examinations were randomly sampled from a population of over 17,000 high school students at District Mardan in Pakistan. Through a self-developed questionnaire, the level of education from these students was determined and compared to the scores. The findings of the study revealed that high levels of parental education strongly correlated to their children’s scores on the examinations. The strongest difference was noted in children of illiterate parents (116 students with a 57% pass rate) compared to children who had at least one parent with post-graduate degree (73 students with a 88% pass rate).

Similar studies with similar results were conducted in India (Khan 2015) and Germany (Steinmar, 2010). The Indian study also used ninth grade proficiency tests and surveys of parental education. The German study utilized Grade Point Average of tenth grade students. Both studies used t-test to show a 95% confidence interval of a relationship between high levels of parental education and academic success.

Studies on this topic have been conducted in the United States as well. One such study examined the process of how socioeconomic status, specifically parents' education and income, indirectly relates to children's academic achievement through parents' beliefs and behaviors (Davis-Kean, 2005). Data from a national, cross-sectional study of children were used for this study. The subjects were 868 8-12-year-olds, divided approximately equally across gender (436 females, 433 males). Using structural equation modeling techniques, the author found that the socioeconomic factors were related indirectly to children's academic achievement through parents' beliefs and behaviors. More specifically, parents' years of schooling also was found to be an important socioeconomic factor to take into consideration in both policy and research when looking at school-age children.

Another similar study analyzed data from the Norwegian (n = 996) and American (n = 641) samples in the Adult Literacy and Life Skills Survey (Lundetrae, 2011). The purpose was to examine whether parents' level of education predicted drop-out for 16–24-year-olds when accounting for basic skills. Stepwise logistic regression showed that parents' educational level was a significant predictor of early school leaving in both countries but explained significantly more of the variance in USA than in Norway. Mothers' educational level predicted early school leaving in USA also when accounting for youth's basic skills, but this was not the case in Norway.

Another factor to consider for socioeconomic status is the availability and accuracy of the metrics used. Robert Hauser, a professor and Child Development expert at the University of Wisconsin, explains this well: “while keeping the burden of data collection within bounds, it is important to focus on characteristics that will be relatively easy to measure, that can be measured by every child in the survey, and that will probably not vary greatly over the short term” (Hauser, 1994). While the study in this project pulls statistical data rather than survey results, the principles in the quote above still applies.

It is essential to recognize that no single measure can fully capture the complexity of socioeconomic status. Each indicator has its strengths and limitations, and researchers often employ multiple measures to provide a more comprehensive understanding of individuals' or groups' social and economic positions within society. Moreover, SES is dynamic and can change over time due to various factors such as economic fluctuations, policy interventions, and individual life events. Therefore, ongoing research and data collection efforts are crucial for monitoring and addressing socioeconomic inequalities effectively.

An example of a metric that combine multiple indicators of SES is the economic, social, and cultural status index (ESCS). The PISA index of economic, social and cultural status (ESCS) was created using student reports on parental occupation, the highest level of parental education, and an index of home possessions related to family wealth, home educational resources and possessions related to “classical” culture in the family home (Esen & Adiguzel, 2023).

One study in Turkey sought to determine the predictive relationship between ESCS and academic achievement of seven thousand students in 12 regions and 186 school districts (Esen& Adiguzel, 2023). The findings revealed that the ESCS index is a significant predictor of students’ reading, mathematics, and science literacy scores in terms of both public and private schools. When using a simple regression analysis, ESCS was shown to be a moderate predictor of reading and mathematics with a correlation of .33 and .32, respectively ($p<.01$). This study indicates a modest correlation between wealth and academic achievement and demonstrates the need for further research and analysis.

The research in this section demonstrates that no single measure of SES can independently measure wealth well. Therefore, consistent to successful analyses outlined in this section, this study uses a combination of metrics: poverty rate, gross domestic product (GDP) per capita, unemployment rate, and average taxable income as measurements of SES (i.e. wealth) analyzed in this study. All of these metrics were available for all states and school districts and from reliable sources discussed in more detail in the methodology section.

Measuring Investment in Education and Its Relation to Academic Success

As stated in the introduction, the purpose of this study is to determine if SES and financial investment in public education within communities plays a significant role in the academic performance of students in secondary schools. The purpose of this section is to explain past research conducted on financial investment in education and its relationship with academic success.

One such study proposed a question very similar to the research question in this study: *Does Spending More on Education Improve Academic Achievement?* (Lips, 2008). The study sought to identify how much the United States paid on public education and then to determine if higher spending resulted in higher academic achievement. Pulling data from the National Center for Education Statistics, authors determined that $553 billion, or 4.2% of the nation's gross domestic product was spent on education in 2006 and 2007. This represents an average spending of $9,266 per pupil. For the same period, state government provided the largest share of public education revenues (46.9%), local governments (44%) next, and the federal government provided 9.2%. The study also analyzed trends, with spending increasing 23.5% from 1994 through 2004 (2.3% annually, adjusted for inflation) nationwide.

In terms of measuring academic success, the study analyzed several factors. While spending per pupil has more than doubled from 1970 to 2004, reading scores on the long-term National Assessment of Educational Progress (NAEP) examination have remained flat. High school graduation rates modestly increased from 73.7% in 1990-1991 to 74.7% in 2004-2005. Despite the key focus on disadvantaged minorities in public education spending, there was little improvement in NEP test scores of minorities as well. In addition, graduation rates for white students (80.6 percent), remained significantly higher than the graduation rates of black students (59.1 percent) and Hispanic students (61.4 percent). It is worth noting that this study was funded by The Heritage Foundation, an organization known for strong, conservative positioning (Lips, 2008).

Some studies drilled down within a state, as this study will do with West Virginia school districts. One such study examined the relationship between high school student achievement, per pupil expenditure, school district enrollment, geographical location within the state and other student demographics such as race, ethnicity, and limited English proficiency within the state of Tennessee (Bibb 2012). The study used standardized writing assessments (ACT and the Tennessee Comprehensive Assessment Program) to measure academic achievement among the 119 school systems that operate at least one high school in Tennessee. This research determined that per pupil expenditure did not have a significant relationship to ACT scores or to the TCAP Writing Assessment scores. Only 1% of the variance in ACT scores is explained by the combination of district enrollment and per pupil expenditures. Despite revealing no relationship between expenditures and student success in this study, the authors encourage more research to determine if there are specific ways that money can be spent to improve academic success.

An example of a study that looked at specific investments in education was conducted by Harold Wenglinsky (1997). His study analyzed financial investment in schools specifically geared towards improving the social school environment. The research demonstrated that when economic resources were used by school districts to socially improve the school environment with actions such as reducing class size, performance on eight grade standardized math tests improved significantly. Wenglinsky also reports that "the failure of previous studies to distinguish among different types of spending proved to be important, in that this study found that some types of spending were associated with achievement while other types were not." To Wenglinsky the solution was not to spend more, but to spend what you have in places that improve the school environment such as reducing class size. The main hypothesis of his study, that school environment is associated with mathematics achievement, is confirmed, with a positive, statistically significant standardized coefficient of .22.

All of these studies on per pupil investment imply a consistent conclusion: more money in education does not, by itself, equate to academic success. Some additional studies imply that specific investments to improve the social school environment, such as reducing class size, can lead to higher standardized test scores. However, no study on financial investment on public funding could be found within the state of West Virginia. Hence, this study seeks to fill this gap between financial investment in education and school districts within WV. This study will also analyze student-teacher ratios within school districts of WV to determine if smaller class sizes lead to academic success.

As documented in the above studies, most analyses of financial expenditures utilized per pupil spending as a metric of financial investment. There were some studies that analyzed teacher salary specifically, and its relationship with academic success.

Most studies analyzing teacher pay focus on the effectiveness of performance pay. Performance pay is a system where teachers that demonstrate effectiveness in helping students learn are rewarded with higher pay. Measurements of this effectiveness include student performance on standardized tests, student, administrative, and/or peer evaluations, and engagement (such as teacher attendance or participation in professional development).

A doctoral dissertation, A Casual Comparative Study of Performance Pay for Teachers in Ohio, (Hoelzle, 2018), focuses on this correlation between performance pay and academic success. Specifically, the study seeks to determine if a performance-based pay scale increases student performance on standardized tests. Along with increasing the students' performance, the dissertation analyzes teacher performance as measured by peer-teacher evaluations. Teacher pay scales, average standardized test scores, and de-identified evaluation data was pulled from 16 Ohio school districts identified in an independent study (Willis & Ingle, 2016) as having performance-based pay for teachers. The data for each district was compared to the same date from other similar districts in the state that had traditional pay scales. The study concluded that there was no significant difference between student and teacher performance in performance-based school districts compared to traditionally paying school districts.

This study is one of several demonstrating the effectiveness of performance-based pay for teachers. Michael Podgursky and Mathew Springer conducted a thorough review of research on this topic (Podgursky & Springer, 2006). The direct evaluation literature on incentive plans is slender, focused on short-run motivational effects, and highly diverse in terms of methodology, targeted populations, and programs evaluated. Nonetheless, the authors reported consistent, positive program effects, although it is not at present sufficiently robust to prescribe how systems should be designed. The review called for more extensive field trials and policy experiments in combination with careful follow-up evaluations.

Interestingly, little research was found that analyzed the effectiveness of raising pay uniformly for teachers, regardless of performance. National news regularly reports on a national teacher shortage and that average teacher salaries lag significantly behind wages in other fields, exacerbated further by the COVID pandemic. According to the ADP Research Institute, the 2023 average teacher salary is 8% below the average wage for all workers nationally, not just those with college degrees (Nezaj, 2024). The report also demonstrated that this gap is widening. In 2018, teachers made just 3% less than the average employee. One purpose of this study is to provide clarity on the benefit of increasing teacher salaries uniformly to maintain consistency with other professions and incentivize the choice to teach.

The research in this section shows that several different measures of investment in education have been tested to determine a relationship with academic success. Therefore, this study uses a combination of Average Teacher Salary in Public Schools and Per Pupil Spending as measurements of financial investment in education.

The Gaps in Research on Wealth and Academic Success

Several studies in the previous section highlight the gap, or lack of consistent evidence showing that education expenditures are related to academic achievement. Put quite bluntly in the Backgrounder Magazine, “there is a lack of consistent evidence on whether education expenditures are related to academic achievement” (Lips, 2008).

Different studies also report conflicting and unclear results on financial investment and academic success. Eric Hanushek has studied the effect of per-pupil expenditures on academic outcomes, finding either no relationship or a relationship that is either weak or inconsistent. (Burtless 1996). However, researchers Larry V. Hedges and Rob Greenwald analyzed the same data used by Hanushek and concluded that increasing per-pupil expenditures has a significant positive impact on student achievement. The purpose of this study is to close that gap and provide more clarity between the relationship of wealth (as measured by SES and financial investment) and academic success.

There is also minimal evidence on the effect of teacher pay and academic success. Most research on teacher pay focuses on performance pay, not increasing the traditional salary structures used in the state of West Virginia and in 90% of all school districts nationwide (Nezaj, 2024). Analyzing average pay between the fifty states and drilling into the 55 school districts in West Virginia will either support or diminish the value of increasing teacher pay to improve academic performance.

The research in this section also highlights a gap of studies within West Virginia. West Virginia offers an opportunity for research that many other states lack. The state divides its school districts directly into counties so that financial statistics such as taxable income, tax revenue, poverty rates, GDP per capita, and unemployment rates can be compared to educational data such as average teacher salaries and standardized test scores at the school district level. Since 97% of all West Virginia high school juniors (WVDE, 2023) take the SAT as juniors, SAT results at the school district level are highly reliable. Despite these advantages, very little research on wealth and academic success is currently derived from West Virginia data.

Summary

The purpose of this chapter was to explain the reasoning behind using SAT scores to measure academic success and consolidate the research that had already been conducted on the relationship between wealth and academic performance. Of equal importance, the chapter served to document many research gaps in the relationship between wealth and academic success, especially gaps in studying the state of West Virginia, that this study.

As explained in the introduction, the theoretical framework of this study is Max Weber's Theory of Social Stratification. Weber believed an individual's wealth, their status in their community, and their ability to influence their community unequally determined that individual's (or a community's) control over their own fate. The literature in this chapter provides inconclusive evidence on this theory and the clear need for more research, as this study intends to provide.

The review strategy for this chapter involved searching multiple databases including Google Scholar, Ohiolink.com, and Shawnee State's online library and using various terms to identify relevant articles published in the recent past. Each study or article was reviewed thoroughly for relevance to this study, and references to each source were searched for authenticity and for additional related material. Reports considered biased, or leaning due to political or other conflicting interests were noted as such in this chapter.

CHAPTER III: Methodology

The purpose of this chapter is to outline the method of collecting and analyzing the data used to determine a relationship between wealth and academic success. This chapter will explain these methods in a clear, transparent way so that an experienced investigator may understand the process and replicate the study. In addition, this chapter will provide documentation on the validity and reliability of the data collected.

The purpose of this study is to determine if wealth and financial investment in public education within communities plays a significant role in the academic performance of students in secondary schools. The study will examine trends on a state-by-state basis and then drill further into this relationship for the 55 school districts in the state of West Virginia.

I. *Research Questions*

As explained in the introduction, this study will investigate the following questions:

1. For counties in the state of West Virginia, are measurements of wealth significant predictors of SAT scores? Wealth will be measured by:
    a) Poverty Rate
    b) GDP per capita
    c) Unemployment rate
2. For counties in the state of West Virginia, are measurements of financial investment in public education significant predictors of SAT scores? Financial investments in public education will be measured by the following variables:
    a) Average Teacher Salary/Average Income

b) Percent of taxpayer revenue spent on education

c) Student-teacher ratios

d) School district's budgeted amount per student

II. *Hypotheses*

The hypotheses for the two research questions above are:

1. For counties in the state of West Virginia, there is no statistically significant relationship between standardized assessment (SAT) scores by the 55 public school districts and the wealth of that school district. Wealth is measured by:

   d) Poverty Rate.

   e) GDP per capita.

   f) Unemployment rate.

2. For counties in the state of West Virginia, there is no statistically significant relationship between standardized assessment (SAT) scores by the 55 public school districts and the school district's financial investment in public education. Financial investments in public education will be measured by the following variables:

   e) Average Teacher Salary/Average Income

   f) Percent of taxpayer revenue spent on education

   g) Student-teacher ratios

   h) School district's budgeted amount per student (Not available at state level)

III. *Participants and Setting*

Prior to a thorough analysis of data within West Virginia, an initial comparison of SAT scores in comparable states will be conducted. This comparison is conducted for determining the generalizability of the study in other states. When initially analyzing data, a large discrepancy in participation by state was evident. Some states had 1% of high school graduates taking the SAT while other states had 97% of high school graduates participating. See the table on the following page (College Board, 2023).

The participation rates were directly related to state regulations on the SAT. All 11 states with a participation rate of 90% or higher require the test, with some exceptions for home schooling students or students with special needs (College Board, 2023). West Virginia is one of those 11 states with 90% participation.

Average SAT scores also changed significantly when participation levels decreased. For example, even though New Hampshire's participation is just 8% below the 90%, New Hampshire's average SAT score (1008) is 39 points above the weighted average of the 11 states with 90%+ participation (969). This was even more true when comparing those over 90% with the lowest participating states. The five states with 1% participation had a weighted average (1218) two hundred and forty nine points higher than the weighted average of the 90%+ participation states.

Table 1: SAT Participation by State

State	SAT Takers[1]	High School Graduates[2]	Total HS Graduates	Percent of Graduates	Avg Total Score
MI	102,466	106,030	114,064	97%	967
IL	142,769	148,120	160,618	96%	970
DE	10,368	10,890	12,199	95%	958
ID	21,813	22,930	23,888	95%	970
RI	10,745	11,340	13,027	95%	958
IN	78,001	76,810	82,943	94%	971
NM	20,068	21,290	22,899	94%	901
CT	40,405	43,530	49,774	93%	1007
CO	57,293	63,460	68,410	90%	996
FL	205,159	227,860	255,940	90%	966
WV	16,154	17,850	18,513	90%	923
NH	12,390	15,050	15,050	82%	1035
MD	51,825	72,950	72,950	71%	1008
TX	278,151	392,010	392,010	71%	978
NJ	73,353	115,260	115,260	64%	1066
NY	128,296	207,780	207,780	62%	1039
MA	44,441	78,180	78,180	57%	1112
GA	64,316	121,190	121,190	53%	1054
SC	27,195	54,450	54,450	50%	1028
VA	47,211	96,700	96,700	49%	1113
PA	69,075	143,720	143,720	48%	1078
VT	2,958	6,510	6,510	45%	1099
ME	5,649	14,790	14,790	38%	1080
WA	28,078	76,250	76,250	37%	1081
AK	2,453	8,210	8,210	30%	1082
HI	4,546	15,140	15,140	30%	1114
CA	122,914	495,930	495,930	25%	1083
NC	27,803	114,610	114,610	24%	1127
OR	10,020	42,040	42,040	24%	1125
OH	23,823	130,560	130,560	18%	1044
OK	8,158	44,430	44,430	18%	953
AZ	8,689	80,570	80,570	11%	1183
NV	2,047	32,680	32,680	6%	1166
MT	477	9,940	9,940	5%	1193
TN	3,207	73,310	73,310	4%	1191
AL	1,512	51,770	51,770	3%	1161
LA	1,278	50,380	50,380	3%	1194
MN	2,159	68,890	68,890	3%	1201
MO	2,100	71,620	71,620	3%	1191
AR	683	33,000	33,000	2%	1192
IA	817	37,840	37,840	2%	1208
KS	683	36,970	36,970	2%	1245
KY	962	50,250	50,250	2%	1208
UT	828	48,250	48,250	2%	1239
WI	1,340	66,640	66,640	2%	1236
MS	398	30,770	30,770	1%	1184
ND	83	7,710	7,710	1%	1287
NE	331	25,640	25,640	1%	1252
SD	150	10,320	10,320	1%	1208
WY	85	6,110	6,110	1%	1200

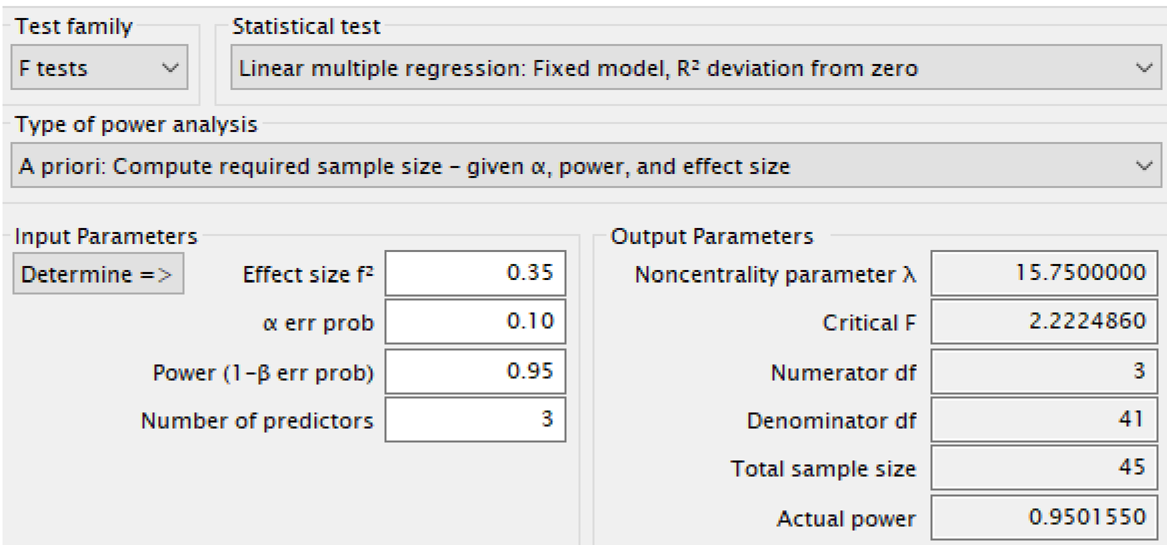
Source: College Board, SAT Annual Report 2023
[1]SAT Takers are 2023 high school graduates who took the current SAT during high school.
[2]Projection from Knocking at the College Door (College Board, 2020)

The principal at play in these discrepancies is self-selection bias. Self-selection bias, or volunteer bias, occurs when individuals are allowed to choose whether they want to participate in a research study (Holland, 1997). When individuals choose to participate, the population is no longer representative of the entire population. In the case of the SAT data by state, higher average SAT scores correspond with lower participation. One could imply that students in low participation states are the strongest and most motivated test takers and the weaker and less motivated test takers chose not to participate in the test. Regardless of the reason, the weighted averages above clearly show that lower participation rates relate to higher SAT scores.

To prevent self-selection bias from polluting this study, the participants for the state-by-state comparison were those from the 11 states with 90% or higher participation rates. The data from these states represents over 700,000 test takers or 39.94% of all high school graduates that took the SAT. Each comparable state has at least 10,000 SAT Test Takers, with Delaware being the smallest at 10,368. Since only mean scores by state were analyzed, the population size is eleven. Due to the small population size, only correlation analyses (not MLR models) will be conducted on the statewide data.

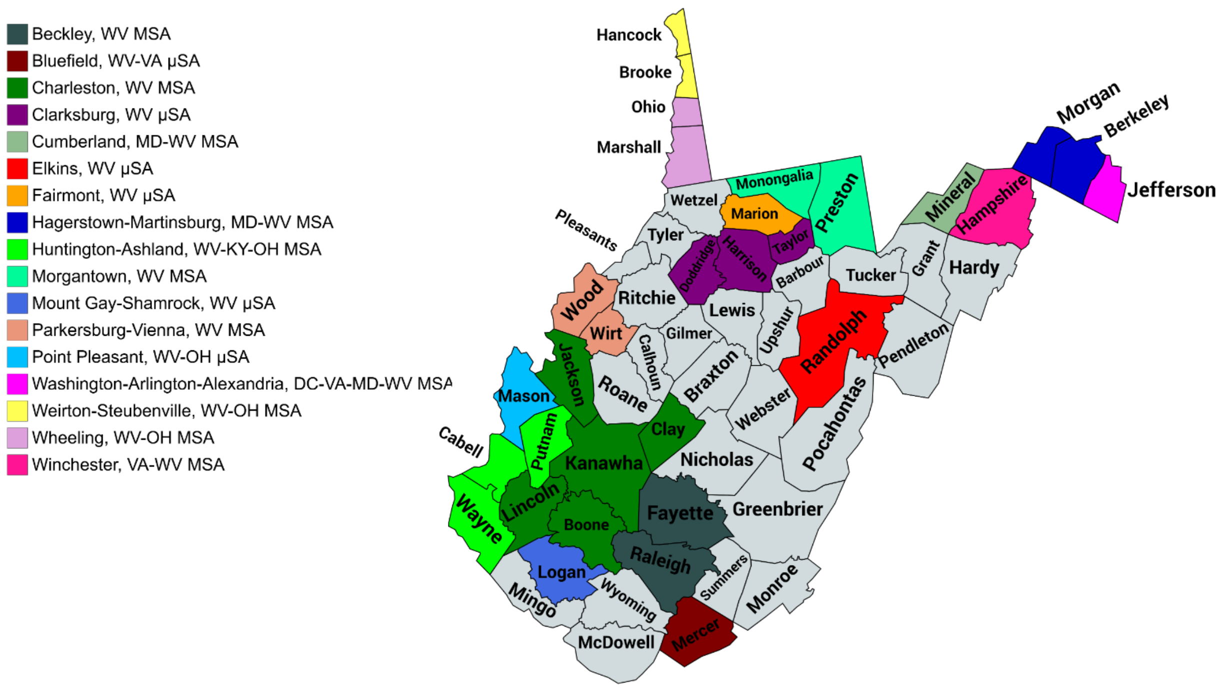
For the two research questions, the intent is to compare school districts within the state of West Virginia. An initial power analysis based on 4 predictors, a large effect size ($f^2 = .35$), and a type-1 error rate of .10 calculated a required sample size of 50. Since there are 55 counties (i.e. unique public school districts) in West Virginia, the sample size is sufficient for analysis of 4 predictors. Please see Figure 1 for power calculations completed by G*Power (version 3.1.9.7).

Figure 1: Power Calculation for SAT Score and Wealth (3 predictors) in WV



The population density within West Virginia is another important consideration for this study. Therefore, counties (i.e. school districts) were consolidated by the 17 Core-based statistical areas that have been delineated by the federal Office of Management and Budget (OMB, 2023). Please see the map below in Figure 2. There are 28 very rural counties with no statistical area (gray counties on the map) that were combined as “rural.” The analysis in Chapter 4 will include comparisons between these rural counties and the other, more metropolitan areas.

Figure 2: Core-based Statistical Areas from The U.S. Office of Management and Budget



IV. *Instrumentation and Procedures*

The instrumentation of this study involved the consolidation of SAT scores as a measurement of academic success with state and school district level data on wealth. Below are the variables and their sources.

Variable	**Source**
Average SAT Score	College Board of Education (State Level) West Virginia Department of Education (WV School District Level)
Poverty Rate	U.S. Department of Agriculture
Gross Domestic Product (GDP) per capita	U.S. Department of Commerce
Unemployment Rate	Bureau of Labor Statistics
Average Teacher Salary in Public Schools	NEA Ranking and Estimate Report West Virginia Department of Education (WV School District Level)
Per Pupil Spending	US Census (State Level) West Virginia Department of Education (WV School District Level)
Average Taxable Income	U.S. Bureau of Economic Analysis
Student-teacher Ratio	National Center for Education Statistics (agency of the U.S. Department of Education) West Virginia Department of Education (WV School District Level)

The validity of SAT scores is discussed thoroughly in Chapters 1 and 2. All other state level data sources were federal government entities that are held by other branches of government and their constituents to high levels of scrutiny and thorough review. All data collected from the College Board and federal government is publicly available online and anonymized to protect the identity of all participants.

West Virginia School District data was obtained from the WV Department of Education's online database entitled ZoomWV (WVDE 2023). ZoomWV is the state's single source for accurate, high-quality education information pertaining to students in pre-kindergarten through grade 12. ZoomWV helps drive educational initiatives to improve instruction and student performance in West Virginia, in part by making information available in reports at the state, regional, county (district), and school level. As with the state-level data, the data is available online to the public and anonymized to protect the identity of all students.

Since the data for this project is provided to the public and anonymized, there was no consent needed, nor was there a need to review by Shawnee State University's Internal Review Board (IRB). This information was confirmed by Brian Richards, PhD, the Director of the Shawnee State University's IRB on October 23, 2023 during a Blackboard Collaborate (online meeting) session that was recorded. The fact that no review is needed for publicly available anonymized data is also confirmed on Shawnee State University's IRB online flow chart, https://www.shawnee.edu/sites/default/files/documents/type-of-review.pdf.

V. *Data Processing and Analysis*

All statistical analyses were conducted using R (R Core Team, 2020). For generalizability outside of West Virginia, correlations will be analyzed with the mathematics and ERW (English Reading and Writing) SAT score as the dependent variable and each measurement of wealth (poverty rate, GDP per capita, and unemployment rate) as dependent variables and financial investment (average teacher salary, taxpayer revenue, student/teacher ratio, and school district's budgeted amount per student) as the independent variables. See Tables 5 and 6 of Chapter 5 for details.

To initially analyze the variance between SAT scores at the state and WV school district level, correlations will be analyzed for each of the three measurements of wealth (poverty rate, GDP per capita, and unemployment rate and for the four measurements of financial investment (average teacher salary, taxpayer revenue, student/teacher ratio, and school district's budgeted amount per student). Once the significance of variance in all metrics is determined, Four Multivariate Linear Regression (MLR) models as outlined below. MLR models, enable researchers to find the best possible weighting of two or more independent variables to yield a maximum correlation with a single dependent variable (Ary et al, 2014):

a. Math and Wealth MLR: math SAT proficiency rates is the dependent variable. Poverty rate, GDP, and Unemployment rate are the independent variables.
b. Math and Financial Investment MLR: math SAT proficiency rates is the dependent variable. Average teacher salary / average taxable income, percent of tax payer revenue spend on education, student-teacher ratios, and school district's budgeted amount per student are the independent variables.

c. Reading and Wealth MLR: reading SAT proficiency rates is the dependent variable. Poverty rate, GDP, and Unemployment rate are the independent variables.
d. Reading and Financial Investment MLR: reading SAT proficiency rates is the dependent variable. Average teacher salary / average taxable income, percent of tax payer revenue spend on education, student-teacher ratios, and school district's budgeted amount per student are the independent variables.

All hypotheses examined in this study were tested at the 95% confidence level, corresponding to an alpha level of .05 (Warner, 2013).

Below are the testing processes for the assumptions for multivariate regression:

- The dependant variable, SAT score, is discrete, but averages by state and school district are on a continuous scale.
- There are two or more independent variables for all multivariate tests as described in the hypotheses section of this chapter.
- Testing for a linear or exponential relationship will be conducted using a scatterplot that will be reported in Chapter 4 Results.
- Homoscedasticity, that the line of best fit is not dissimilar from the data points will be checked by producing standardized residual plots against the unstandardized predicted values.
- The absence of multicollinearity will be checked using Variance-inflation-factor values.

- Spurious outliers were removed by the state-to-state comparison based on participation rates. Outliers will also be checked using a box and whisker plot at the WV school district level and reported in Chapter 4, Results.
- The normal distribution of residuals (errors) will be checked by a histogram and by plotting the standardized residuals.

VI. *Limitations*

Several limitations of the study must be addressed. One limitation is that population of SAT takers may not reflect the true population of all high school students. This limitation is minimized by including only states and school districts with 90% participation or higher. However, it is possible that this population of test takers varies significantly from the 39 other states excluded from this study due to their limited participation in the SAT test.

A similar limitation applies to the school district data within the state of West Virginia. While this study is aided by the 1 to 1 correlation between school district and county-wide data, the WV data could vary significantly from other states. For this reason, this study cannot be reproduced for most school districts outside of the state of West Virginia.

Another limitation is the inclusion of private school students in statewide SAT data. The College Board does not separate private school students from public school students in the reports available to the general public. Since this study is focused on public school students, the inclusion of data from private school students may pollute the data. Some studies indicate that private school students perform differently on the SAT than public school students. One such study (Gibbons, 1991), found that public school students performed better on the math portion of the SAT, on average. The WV school-district data only includes public schools. Therefore, the limitation of inclusion of private school data applies only to the state-by-state analyses.

Private school students make up less than 10% of all high school students in the U.S. (National Center for Education Statistics, 2021) and no more than 13% for every state incorporated in this study. The table below reports the number of private school high school graduates and their percentage of total graduates:

	Public High School Graduates[1]	Private High School Graduates[2]	Private School Graduates (percent of total)
CO	63,460	4,950	7%
CT	43,530	6,244	13%
DE	10,890	1,309	11%
FL	227,860	28,080	11%
ID	22,930	958	4%
IL	148,120	12,498	8%
IN	76,810	6,133	7%
MI	106,030	8,034	7%
NM	21,290	1,609	7%
RI	11,340	1,687	13%
WV	17,850	663	4%

[1]Projection from Knocking at the College Door (College Board, 2020)
[2]U.S. Department of Education, National Center for Education Statistics, Private School Universe Survey (PSS), 2021–22.

Other potentially confounding variables which were unavailable in the data and not controlled for include test-taking accommodations for students eligible for test modifications, potential differences between SAT paper tests and digital versions (no data available to differentiate), and multiple test attempts among students. These variable could have impacted the validity of the study and introduced potential bias. These limitations and important considerations should not be overlooked when interpreting the results of this study.

VII. *Summary*

Chapter 3 provided a detailed description of the methodology employed in detrmining the relationship between SAT scores and wealth. The research design, setting and participants, instrumentation, procedure, data processing and analysis and limitations were each addressed in relation to the research. The state-level SAT scores were reported by the College Board. SAT score data reported by WV Department of Education was used for the WV school district analysis. All wealth statistics were collected by federal agencies as outlined in section III of this chapter. The data analysis involves analyzing (Pearson) correlation coefficients and multivariate linear regression. The study has acknowledged limitations and the necessity to interpret the findings with caution. Despite these limitations, the methodology chapter established the framework that will serve as a foundation for the subsequent analysis and interpretation of the research findings.

CHAPTER IV: RESULTS

In this chapter, the results of the study on the relationship between academic success and wealth are presented. A brief recap of the participants, setting, instruments, and procedures used in the study will open this chapter.

Participants and Setting

For academic success data, participants of the study were completers of the Scholastic Aptitude Test (SAT) administered by the College Board. Benchmark average SAT rates were collected in West Virginia by county (i.e. school district).

For all wealth and financial investment data, participants were all residents of the 11 states with 90% or higher participation in the SAT score, and all residents of the State of West Virginia. All wealth and financial investment data was collected from federal agencies described in the next section.

Instrumentation and Procedures

The instrumentation of this study involved the consolidation of benchmark SAT rates as a measurement of academic success with state and school district level data on wealth.. The SAT benchmark scores represent a 75% likelihood of a student achieving at least a C grade in a first-semester, credit-bearing college course in mathematics or English reading and writing (ERW). For the 2023 school year, the year that data is pulled, the math SAT benchmark score was set to 480 and ERW was 530 (College Board, 2023).

Below are the variables used and their sources:

Variable	**Source**
Benchmark SAT Rates	College Board of Education (State Level) West Virginia Department of Education (WV School District Level)
Poverty Rate	U.S. Department of Agriculture
Gross Domestic Product (GDP) per capita	U.S. Department of Commerce
Unemployment Rate	Bureau of Labor Statistics
Average Teacher Salary in Public Schools	NEA Ranking and Estimate Report West Virginia Department of Education (WV School District Level)
Per Pupil Spending	US Census (State Level) West Virginia Department of Education (WV School District Level)
Average Taxable Income	U.S. Bureau of Economic Analysis
Student-teacher Ratio	National Center for Education Statistics (agency of the U.S. Department of Education) West Virginia Department of Education (WV School District Level)

The validity of SAT scores is discussed thoroughly in Chapters 1 and 2. All other state level data sources were federal government entities that are held by other branches of government and their constituents to high levels of scrutiny and thorough review. All data collected from the College Board and federal government is publicly available online and anonymized to protect the identity of all participants. See Appendix A for state level raw data used in this study.

West Virginia School District data was obtained from the WV Department of Education's online database entitled ZoomWV (WVDE 2023). ZoomWV is the state's single source for accurate, high-quality educational information pertaining to students in pre-kindergarten through grade 12. ZoomWV helps drive educational initiatives to improve instruction and student performance in West Virginia, in part by making information available in reports at the state, regional, county (district), and school level. As with the state-level data, the data is available online to the public and anonymized to protect the identity of all students. See Appendix B for all WV school district raw data used in this study.

Research Questions and Hypotheses

The hypotheses for this study included:

1. For counties in the state of West Virginia, there is no statistically significant relationship between standardized assessment (SAT) scores by the 55 public school districts and the wealth of that school district. Wealth is measured by:
   a) Poverty Rate.
   b) GDP per capita.
   c) Unemployment rate.

2. For counties in the state of West Virginia, there is no statistically significant relationship between standardized assessment (SAT) scores by the 55 public school districts and the school district's financial investment in public education. Financial investments in public education will be measured by the following variables:
    a) Average Teacher Salary/Average Income
    b) Percent of taxpayer revenue spent on education
    c) Student-teacher ratios
    d) School district's budgeted amount per student (Not available at state level)

Financial Data from the College Board

The tables below review nationwide statistics from the College Board. The College Board is the entity that administers the SAT and surveys participants prior to testing.

Table 1. Median Family Income (All SAT Participants, nationwide)

		Test Takers		Met Benchmarks		
	Income Range	Number	Percent	ERW	Math	None
1	Lowest Quintile ($0 - $53,263)	203,941	11%	38%	16%	61%
2	2nd Lowest Quintile ($53,264 - $69,092)	227,256	12%	49%	25%	49%
3	Middle Quintile ($69,093 - $86,073)	256,127	13%	58%	33%	40%
4	2nd Highest Quintile ($86,074 - $113,340)	337,245	18%	68%	44%	30%
5	Highest Quintile (> $113,340)	504,985	26%	83%	64%	15%
NA	Unknown	384,188	20%	54%	42%	41%

From College Board 2023 Annual Report (all states):
"Median family income" refers to the median family income of students' home census tracts as report by the College Board.
"ERW" refers to the English Reading and Writing component of the SAT.

With just five levels of data, not much analysis can be performed. However, the plot and correlation tables below indicate a statistically significant relationship between income and SAT benchmark rates.

Chart 1: SAT Benchmark Rates by Median Income (in Quintiles)

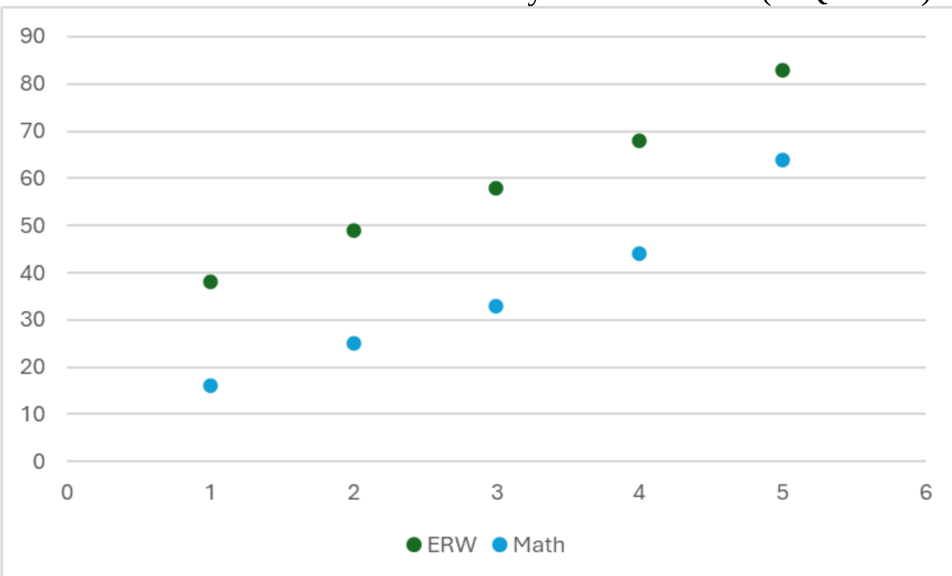


Table 2: Correlations between Income Quintiles and SAT Benchmark Rates

SAT Section	p-value	Pearson Correlation Coefficient
Math	.0004	.9955
ERW (Reading)	.0034	.9799

Table 3 reports the same College Board data for participants in the state of West Virginia. It is worth noting that the weighted average incomes from these tables (WV = $69,800, nationwide = $113,600), Math (WV = 23%, nationwide = 42%), and ERW (WV = 47%, nationwide = 64%) benchmark rates are all lower than national averages. A thorough analysis of the WV data is conducted later in this chapter.

Table 3. Median Family Income in West Virginia

		Test Takers		Met Benchmarks		
	Income Range	Number	Percent	ERW	Math	None
1	Lowest Quintile ($0 - $53,263)	2,882	18%	43%	15%	56%
2	2nd Lowest Quintile ($53,264 - $69,092)	4,352	27%	48%	20%	51%
3	Middle Quintile ($0 - $53,262)	3,185	20%	55%	26%	44%
4	2nd Highest Quintile ($86,074 - $113,340)	1,709	11%	63%	32%	36%
5	Highest Quintile (> $113,340)	665	4%	76%	48%	23%
NA	Unknown	3,361	21%	29%	9%	71%

From College Board 2023 Annual Report (all states):
"Median family income" refers to the median family income of students' home census tracts as reported by the College Board.
"ERW" refers to the English Reading and Writing component of the SAT.

The Relationship between Wealth and SAT Results in Other States

The next two tables report correlations between measurements of wealth and SAT Benchmark Score rates for the eleven states with 90% or higher participation in the SAT. These states are Colorado, Connecticut, Delaware, Florida, Idaho, Illinois, Indiana, Michigan, New Mexico, Rhode Island, and West Virginia. States with high participation were included to minimize self-selection bias. This principle is explained in detail in Chapter 3. Benchmark Scores, set by the College Board, represent the section scores on each assessment that students should meet or exceed to be considered on track for college and career readiness (College Board 2023). The means of each measurement of wealth and benchmark SAT scores were consolidated by each state and then analyzed for correlation. These statistics are included as a comparison to correlations further explored at the county level in West Virginia.

Table 4: Correlations between Wealth and Math SAT Benchmark Rates for States with Comparable SAT Participation rates

Measurement of Wealth	p-value	Pearson Correlation Coefficient
Poverty Rate	.5704	.1047
GDP per capita	.2953	.0924
Unemployment rate	.8471	-.1781
Average Teacher Salary/Average Income	.3614	-.4290
Percent of taxpayer revenue spent on education	.6071	-.2984
Student-teacher ratios	.9420	.2148
Average Income	.2221	.4006

Note that the budgeted amount per student was not available at the state level.
States included above were CO, CT, DE, FL, ID, IL, IN, MI, NM, RI, and WV

Table 5: Correlations between Wealth and ERW (Reading) SAT Benchmark Rates for States with Comparable SAT Participation rates

Measurement of Wealth	p-value	Pearson Correlation Coefficient
Poverty Rate	.7594	-.1926
GDP per capita	.7870	.3473
Unemployment rate	.6003	.06605
Average Teacher Salary/Average Income	.6831	-.1203
Percent of taxpayer revenue spent on education	.7007	-.2138
Student-teacher ratios	.5260	.2495
Average Income	.4401	.2600

Note that the budgeted amount per student was not available at the state level.
States included above were CO, CT, DE, FL, ID, IL, IN, MI, NM, RI, and WV

These tables report inconsistent results than the median income data from the College Board. While the College Board charts and correlations indicated a strong relationship between income and benchmark SAT rates, no measurements of wealth correlated significantly (no p-value < .05) with the ERW (Reading) nor Math SAT Benchmark Rates.

The Relationship between Wealth and SAT Results in West Virginia

After initially analyzing national trends, the attention of the study now moves to directly addressing the research questions. For counties in the state of West Virginia, is there a statistically significant relationship between standardized assessment (SAT) scores by the 55 public school districts and the wealth (research question 1) or financial investment (research question 2) in education of that school district?

The next two tables report correlations between measurements of wealth and SAT Benchmark Score rates for the 55 counties in West Virginia. The means of each measurement of wealth and benchmark SAT scores were consolidated by county and then analyzed for correlation.

Table 6: Correlations between Wealth and Math SAT Benchmark Rates for WV Counties

Measurement of Wealth	Mean	STD	p-value for coefficient	Pearson Correlation Coefficient
Math SAT Benchmark Rate (%)	18.86	6.74		
Poverty Rate (%)	18.06	4.63	.8594	.0244
GDP per capita	$27,369	$33,849	**.0099**	.3451
Unemployment rate (%)	4.81	1.55	.1124	-.2108
Average Teacher Salary / Average Income	1.1438	.1652	.1682	-.1885
Percent of taxpayer revenue spent on education	7.33	4.44	.1162	-.0772
Student-teacher ratios	12.86	1.17	.4485	.2121
School district budgeted amount per student	$15,387	$2,347	.2336	.1633
Average Income	$46,312	$7,544	**.0116**	.3338

Table 7: Correlations between Wealth and ERW SAT Benchmark Rates for WV Counties

Measurement of Wealth	Mean	STD	p-value for coefficient	Adjusted R^2	Pearson Correlation Coefficient
Reading SAT Benchmark Rate (%)	46.05	8.43			
Poverty Rate (%)	18.06	4.63	.6497	.0039	-.0626
GDP per capita	$27,369	$33,849	**.0006**	.2021	.4495
Unemployment rate (%)	4.81	1.55	.3227	.0185	-.1358
Average Teacher Salary / Average Income	1.1438	.1652	.1482	.0390	-.1976
Percent of taxpayer revenue spent on education	7.33	4.44	**.0493**	.0710	-.2527
Student-teacher ratios	12.86	1.17	.7785	.0015	.0453
School district budgeted amount per student	$15,387	$2,347	.7830	.0014	.0380
Average Income	$46,312	$7,544	**.0119**	.1134	.3368

The Math (p-value = .0099) and ERW (p-value = .0006) benchmark rates correlate significantly with the Gross Domestic Product per capita. Average Income was also analyzed due to this close relationship between GDP per capita and SAT scores. Average Income correlated significantly with both the Math (p-value = .0116) and ERW (p-value = .0119) benchmark rates. This indicates that the amount of capital that a school district generates and the average income of residents within that school district are predictors of success on both the math and ERW portions of the SAT.

Additionally, the correlation analyses indicate a significant relationship between ERW Benchmark rates and percent of taxpayer revenue spend on education (p-value of .04929). This indicates that the percent of revenue in a school district spent on education is a predictors of success on the ERW portion of the SAT.

It is also worth noting that none of the measurements of financial investment in education (teacher salary, taxpayer revenue spent on education, student-teacher ratios, or budgeted amount per student) showed any statistically significant relationship with SAT Benchmark rates.

Multivariate Linear Regression Models

For the WV data by school district, multiple regression analyses were conducted to examine the relationship between Math (mean = 18.86%, standard deviation = 6.74) and EDW (mean = 46.05%, standard deviation = 8.43) Benchmark SAT rates and the measurements of wealth. Four Multivariate Linear Regression (MLR) models were created, as outlined below:

1) Math and Wealth MLR: Math SAT benchmark rate is the dependent variable. Poverty rate, GDP, Unemployment rate, and average income are the independent variables. Average Income was added due to the close relationship between GDP per capita and SAT scores discovered in the correlation analyses.

2) Math and Financial Investment MLR: Math SAT benchmark rate is the dependent variable. Average teacher salary / average taxable income, percent of taxpayer revenue spent on education, student-teacher ratios, and school district's budgeted amount per student are the independent variables.

3) ERW (Reading) and Wealth MLR: Reading SAT benchmark rate is the dependent variable. Poverty rate, GDP, Unemployment rate, and Average Income are the independent variables. As with the Math SAT and Wealth MLR, Average Income was added due to the close relationship between GDP per capita and SAT scores discovered in the correlation analyses.

4) ERW (Reading) and Financial Investment MLR: Reading SAT benchmark rate is the dependent variable. Average teacher salary / average taxable income, percent of taxpayer revenue spent on education, student-teacher ratios, and school district's budgeted amount per student are the independent variables.

No cases had missing data. Therefore, the results were calculated on the full sample, n = 55 (number of WV counties/school districts). Since the number of cases per predictor is close to 15 (Field, 2012), there was no concern about sample size. Analysis was performed using R (Version 4.4.0, 2024).

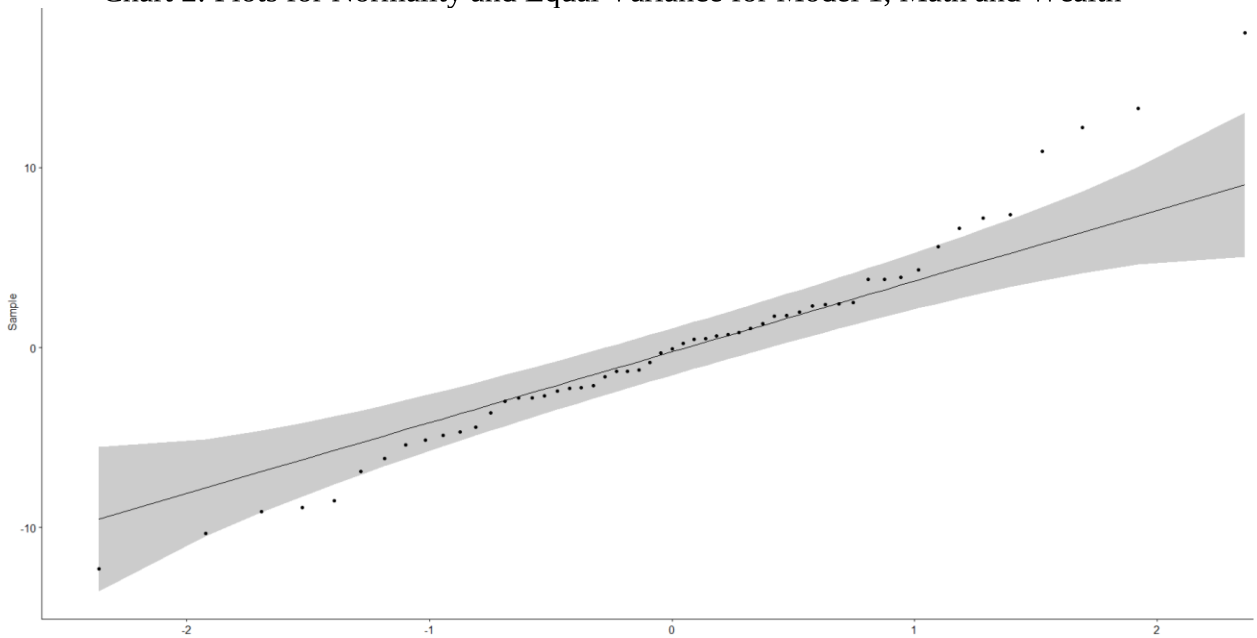
Results of the evaluation of the assumptions indicated no concerns with independence, normality or error terms, equal error variances, or multicollinearity. Independence was verified with the Durbin-Watson test. Shapiro's test for normality revealed no concerns. See Table 8 below for the results on the Durbin-Watson and Shapiro's test for each of the four MLR models.

Table 8: Test Results for Independence and Normality of MLR Models

Model Number	Model Name	D-W Statistic	D-W p-value	Shapiro Statistic	Shapiro p-value
1	Math and Wealth	2.3956	.1240	.9685	.1571
2	Math and Financial Investment	2.4071	.1140	.9601	.0651
3	ERW and Wealth	2.1541	.5340	.9850	.7219
4	ERW and Financial Investment	2.2030	.4660	.9840	.6730

Additional plots that were used to check the normality and equal variance assumptions are presented in Charts 2 through 5. A separate chart was created for each of the four MLR models. Multicollinearity was examined using Variance Inflation Factors. Those factors ranged from 1.47 (GDP per Capita) to 2.58 (Income per Capita).

Chart 2: Plots for Normality and Equal Variance for Model 1, Math and Wealth



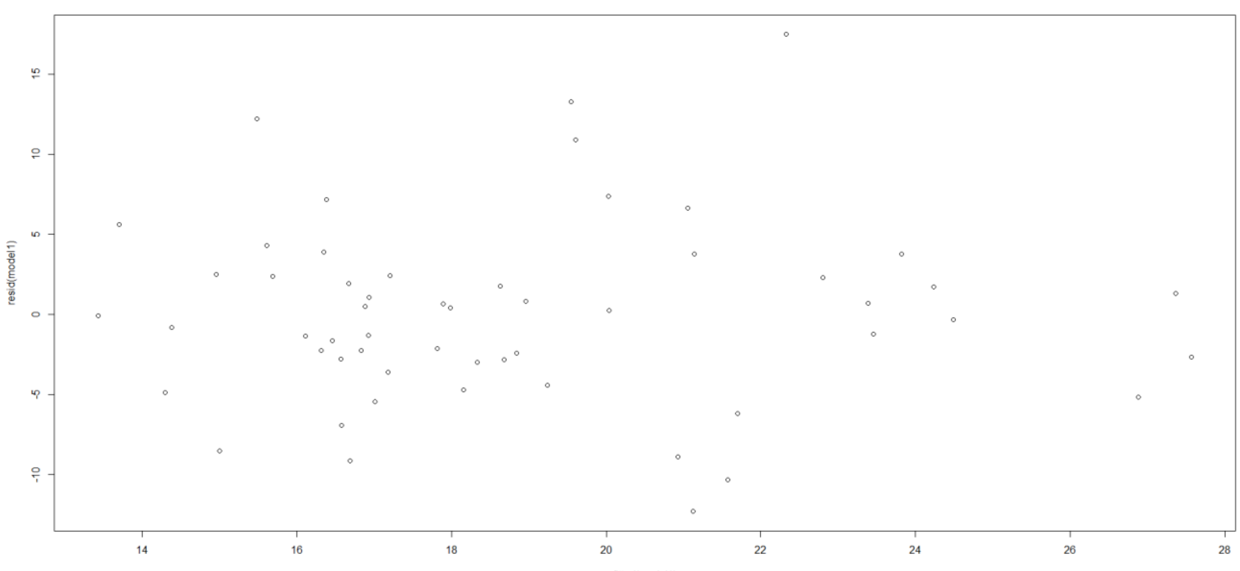
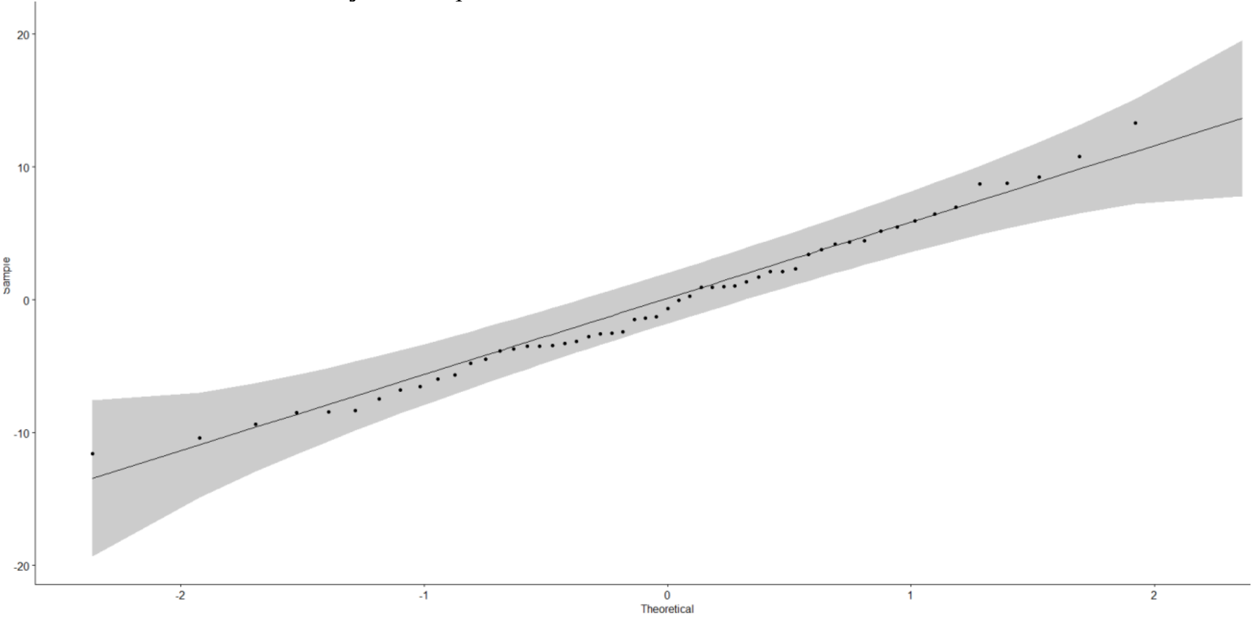


Chart 3: Plots for Normality and Equal Variance for Model 2, Math and Financial Investment



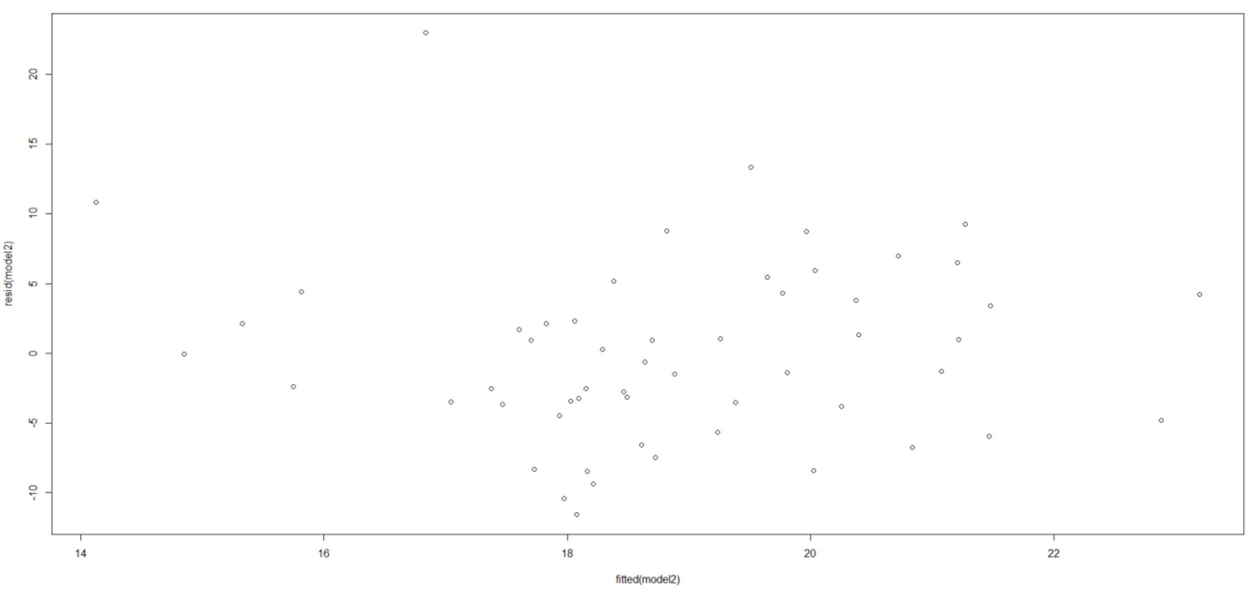
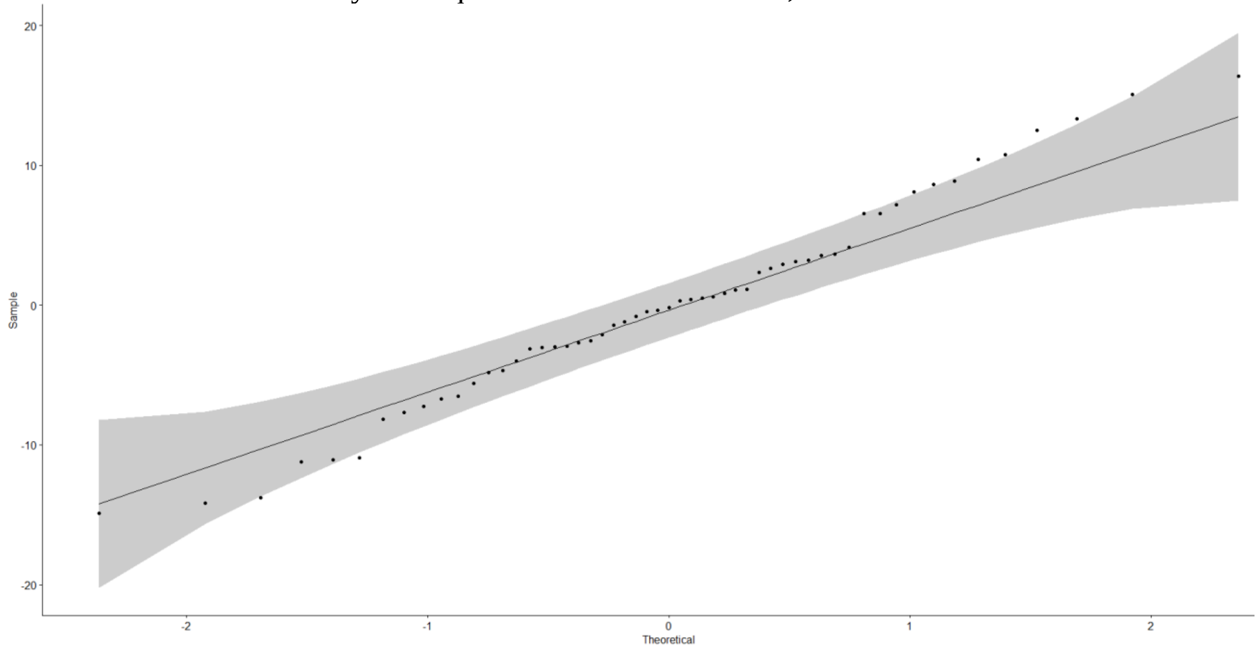


Chart 4: Plots for Normality and Equal Variance for Model 3, ERW and Wealth



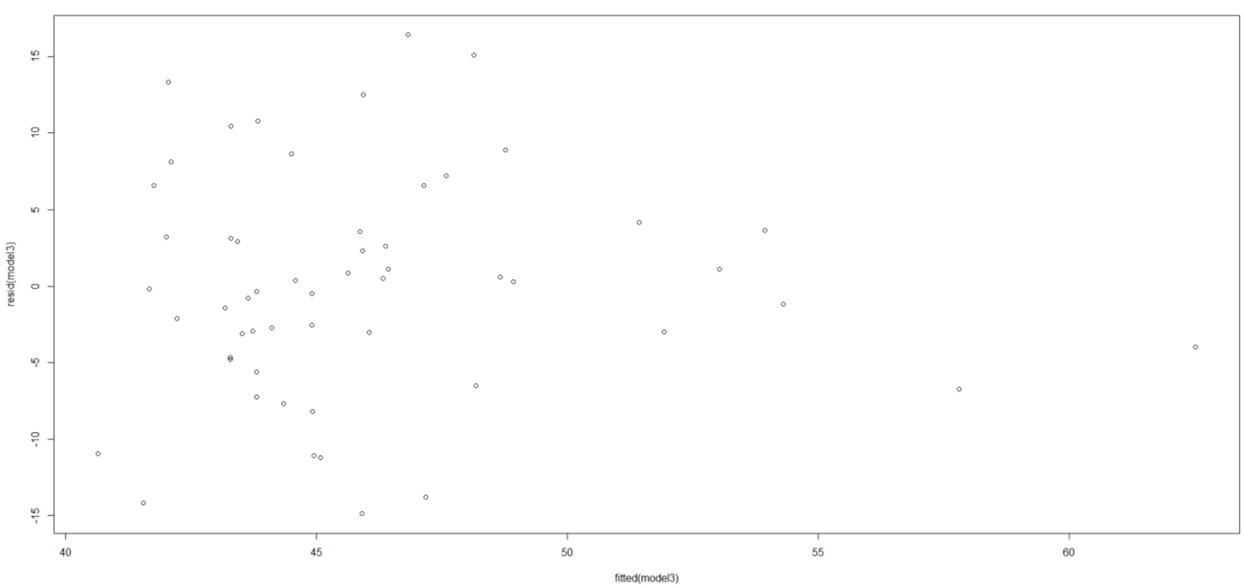
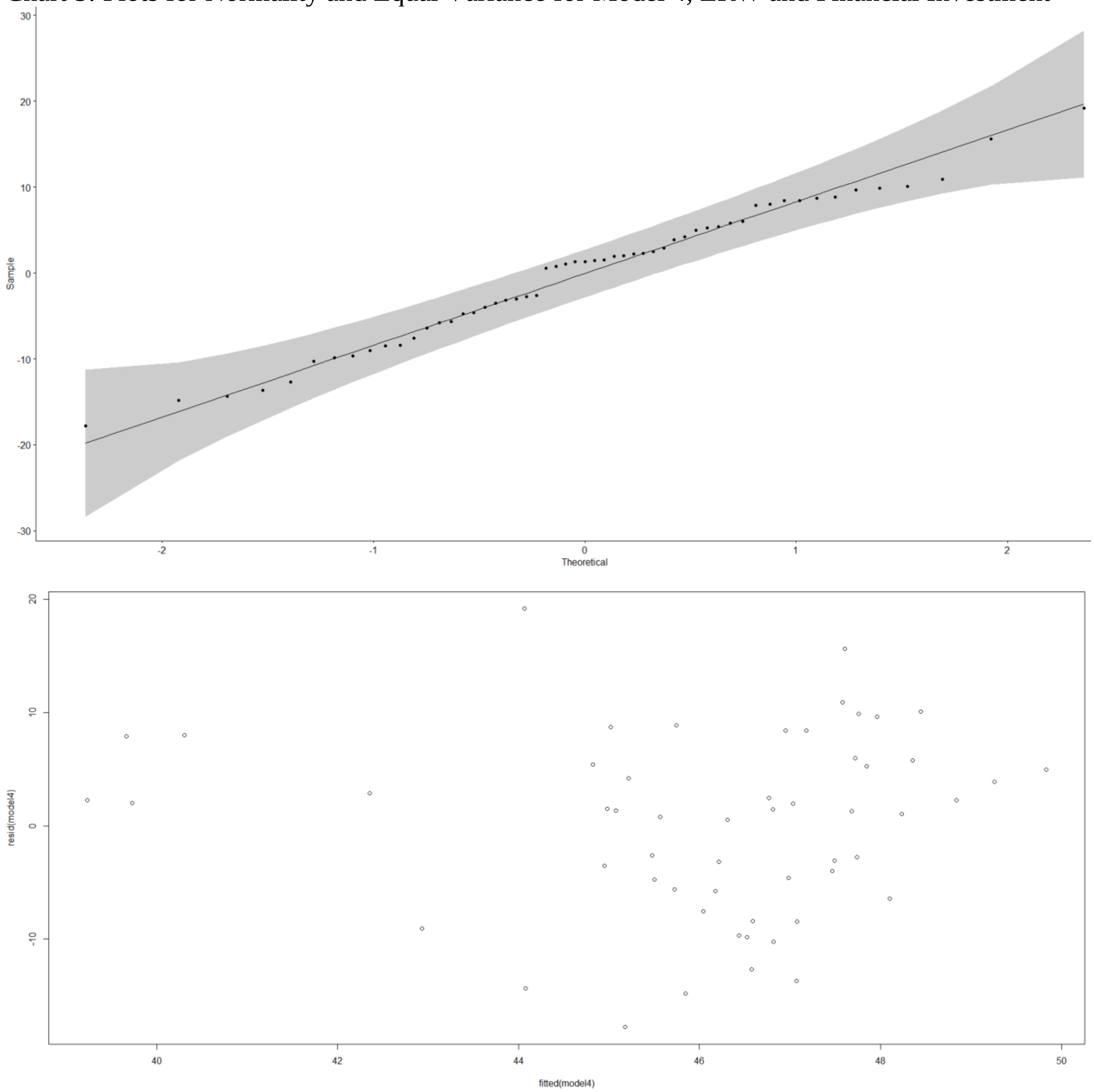


Chart 5: Plots for Normality and Equal Variance for Model 4, ERW and Financial Investment



Tables 9 through 12 display the correlations, standardized regression coefficients (B), standard errors (SE), means, and standard deviations of all independent variables. Means and standard deviations of all independent variables are shown only for the first two (Math) models to avoid showing duplicates on the (ERW) other models. The tables also contain the adjusted R^2 for each MLR model. In examining outliers, the GDP per capita for Kanawha County ($188,239) was 7 times the mean ($27,000) and $58,000 more than the next highest value. Kanawha County contains the state capital of Charleston and is known to generate significantly more capital than other counties. Since the data was accurate and a true reflection of the wealth distribution in the state, this data was included in the models. Examination of other outlier cases, high standardized residuals, and influential cases led to no other significant findings and the deletion of no cases.

Table 9. Correlations from Math SAT Benchmark and Wealth, MLR Model 1

Variable	Poverty Rate	GDP per Capita	Unemployment Rate	Average Income	B	SE
Poverty Rate		-.21	.28	-.69	.67*	.25
GDP per Capita ($10,000's)			-.32	.51	.26	.29
Unemployment Rate				-.35	-.46	..58
Avg. Income ($10,000's)					4.90**	1.74
Intercept					-1.43	1.18
Means	18.06	$27,369	4.81%	$46,312		
Stand. Devs.	4.63	$33,849	1.55%	$7,544		
Adjusted R^2 = 20.4%						
$F(4, 50) = 4.47, p < .01$						

Note: * significant at the .05 level; ** significant at the .01 level; *** significant at the .001 level

Table 10. Correlations from Math SAT Benchmark and Financial Investment, MLR Model 2

Variable	Cost per Pupil	Student-Teacher Ratio	Revenue Spent on Ed.	Teacher Salary / Avg Income	B	SE
Cost per Pupil ($10,000's)		-.63	-.07	-.03	3.47	5.08
Student-Teacher Ratio			-.09	-.05	-.27	1.02
Revenue Spent on Ed.				.58	-.23	.26
Teacher Salary / Avg Income					-3.87	6.83
Intercept					23.11	20.54
Means	$15,387	12.86	7.33%	1.14		
Stand. Devs.	$2,347	1.17	4.44%	.17		
Adjusted R^2 = .2%						
$F(4, 50) = 1.02, p > .05$						

Note: No statistical significance on any predictors.

Table 11. Correlations from ERW SAT Benchmark and Wealth, MLR Model 3

Variable	Poverty Rate	GDP per Capita	Unemployment Rate	Average Income	B	SE
Poverty Rate		-.21	.28	-.69	.41	.32
GDP per Capita ($10,000's)			-.32	.51	.84*	.37
Unemployment Rate				-.35	.13	.73
Average Income ($10,000's)					8.19	2.21
Intercept					1.87	1.49
Means	18.06	$27,369	4.81%	$46,312		
Stand. Devs.	4.63	$33,849	1.55%	$7,544		
Adjusted R^2 = 18.5%						
$F(4, 50) = 4.06, p < .01$						

Note: * significant at the .05 level; ** significant at the .01 level; *** significant at the .001 level

Table 12. Correlations from Math SAT Benchmark and Financial Investment, MLR Model 2

Variable	Cost per Pupil	Student-Teacher Ratio	Revenue Spent on Ed.	Teacher Salary / Avg Income	B	SE
Cost per Pupil ($10,000’s)		-.63	-.07	-.03	1.90	6.36
Student-Teacher Ratio			-.09	-.05	.36	1.28
Revenue Spent on Ed.				.58	-.43	.32
Teacher Salary / Avg Income					-2.92	8.55
Intercept					45.00	25.71
Means	$15,387	12.86	7.33%	1.14		
Stand. Devs.	$2,347	1.17	4.44%	.17		
						Adjusted $R^2 < 1.0\%$
						$F(4, 50) = 1.01$, $p > .05$

Note: No statistical significance on any predictors.

Based on the correlations and MLR models above, there appears to be no statistically significant relationship between SAT Benchmark rates and the measurements of Financial Investment outlined in Tables 10 and 12. None of the measurements of financial investment in education (teacher salary, taxpayer revenue spent on education, student-teacher ratios, or budgeted amount per student) showed any statistically significant relationship with SAT Benchmark rates.

However, both MLR Models on Wealth report a statistically significant relationship with SAT benchmark rates. The Math SAT model reported a linear relationship with the wealth variables (p-value = .00362) with 20.4% of the Math SAT benchmark rate attributed to the wealth variables. The ERW model also showed a relationship between the wealth variables and success on the SAT (p-value = .0063) with 18.5% of the SAT benchmark rate attributed to a relationship with the wealth variables.

The two wealth MLR Models did vary on which specific variables had the biggest impact. The Math model showed average income and poverty rate as the most significant predictors (p-values of .0070 and .0104 respectively) and the ERW model showed GDP per capita as the most significant predictor (p-value = .028).

These models indicate that socio-economic factors such as poverty rates and average incomes play an important role in academic success, as measured by SAT scores. There is consistently no evidence that a school district's investment in education measured by teacher salaries, education spending, or student-teacher ratios have any impact on performance on the SAT.

Conclusion

This study examined the relationship between measurements of wealth and financial investment in education and rates at which students achieved benchmark scores on the ERW (reading) and Math portions of the SAT. Data was initially analyzed at the national level, and then drilled down into the fifty-five unique school districts (i.e. counties) in West Virginia. The goal was to determine if a relationship existed between academic success and the wealth or financial investment in education. The study investigated the two research questions:

1. For counties in the state of West Virginia, are measurements of wealth significant predictors of SAT scores? Wealth will be measured by:
   a) Poverty Rate
   b) GDP per capita
   c) Unemployment rate
   d) Average income

2. For counties in the state of West Virginia, are measurements of financial investment in public education significant predictors of SAT scores? Financial investments in public education will be measured by:
   a) Average Teacher Salary/Average Income
   b) Percent of taxpayer revenue spent on education
   c) Student-teacher ratios
   d) School district's budgeted amount per student

For the first research question, the review of national College Board data, correlation analyses, and MLR models all showed statistically significant relationships between SAT benchmark rates and measurements of wealth outlined above. The variables that had the highest significance did vary with average income and GDP per capita having the highest impact. Therefore, the hypothesis that these measurements of wealth are not significant predictors of SAT scores is rejected.

For the second research question, correlation analyses on WV school districts and state-level data as well as MLR models of WV school districts consistently show no statistically significant relationship between SAT benchmark rates and measurements of financial investment used in this study. This study indicates that teacher salaries, percent of a school district's revenue spent on education, student-teacher ratios, and budgeted amount per student do not have a statistically significant relationship with SAT scores. Therefore, the hypothesis that these measurements of financial investment in education are not significant predictors of SAT scores is accepted.

To summarize, the research in this study demonstrates that socio-economic status, more specifically wealth of a school district, is a statistically significant predictor of success on the

SAT. Furthermore, investing more in education through higher teacher salaries, lower student to teacher ratios, or higher overall expenditures on education is not shown in this study as a statistically significant predictor of success on the SAT.

The next chapter will discuss these findings and place the results within the context of existing literature on wealth and academic success. Chapter 5 will also address the study's limitations, economic and educational policy implications, and suggestions for future research.

CHAPTER V: SUMMARY

The purpose of this study is to determine if wealth and financial investment in public education plays a significant role in the academic performance of students in secondary schools. Furthermore, the study examined specific measures of wealth, such as average income in a school district, and financial investment, such as average teacher salary, to determine which measurements had the biggest impact on academic success. The study focused on this relationship for the 55 counties / school districts within the state of West Virginia.

For decades, the federal, state, and local governments have argued the importance of investing more in our public school system. Since the late 1960s, plaintiffs initiated litigation alleging that state officials violated their own constitution by establishing school finance systems that resulted in unequal per-pupil expenditures, depriving children in poor districts of equal educational opportunities (Russo, 2015). Public expenditures for K-12 spending are estimated at $800 billion per year (Hanson, 2023). Determining the relationship between wealth and academic success can help policy makers determine how much and where to invest funding to best improve our public-school systems.

In this final chapter, a discussion of this study's major findings will be presented on the relationship between wealth and success in secondary schools of West Virginia. Furthermore, it frames the findings in context of the theoretical framework and existing literature explained in earlier chapters. This chapter also outlines limitations, recommendations for future research on wealth and academic success, and economic and educational policy implications.

Interpretation of Findings

Research Question 1: "For counties in the state of West Virginia, are measurements of wealth significant predictors of SAT scores?" Wealth is measured by poverty rate, GDP per capita, unemployment rate, and average income at the state and school district level, as reported by U.S. federal agencies outlined in Chapter 3.

For this first research question, the review of national College Board data, correlation analyses, and MLR models all showed statistically significant relationships between SAT benchmark rates and measurements of wealth outlined above.

The Math SAT model reported a linear relationship with the wealth variables (p-value = .00362) with 20.4% of the Math SAT benchmark rate attributed to the wealth variables. The ERW model also showed a relationship between the wealth variables and success on the SAT (p-value = .0063) with 18.5% of the SAT benchmark rate attributed to a relationship with the wealth variables.

The two wealth MLR Models did vary on which specific variables had the biggest impact. The Math model showed average income and poverty rate as the most significant predictors (p-values of .0070 and .0104 respectively) and the ERW model showed GDP per capita as the most significant predictor (p-value = .028).

These models indicate that socio-economic factors such as poverty rates and average incomes play an important role in academic success, as measured by SAT scores. Therefore, the hypothesis that these measurements of wealth are not significant predictors of SAT scores is rejected.

Research Question 2: "For counties in the state of West Virginia, there is no statistically significant relationship between standardized assessment (SAT) scores by the 55 public school districts and the school district's financial investment in public education." Financial investments in public education will be measured by Average Teacher Salary/Average Income, Percent of taxpayer revenue spent on education, Student-teacher ratios, and School district's budgeted amount per student.

For this second research question, correlation analyses on WV school districts and state-level data as well as MLR models of WV school districts consistently show no statistically significant relationship between SAT benchmark rates and measurements of financial investment used in this study. All of the measurements of financial investment in education (teacher salary, taxpayer revenue spent on education, student-teacher ratios, or budgeted amount per student) showed p-values well above a p-value of 5%. The p-value for the MLR model predicting Math SAT benchmark rates from the four measurements of financial investment was 40.56% ($F[50,4] = 1.02$) with .15% of the Math SAT benchmark rate attributed to the financial investment predictors (adjusted $R^2 = .0015$). The p-value for the MLR model predicting ERW (Reading) SAT benchmark rates from the four measurements of financial investment was 40.93% ($F[50,4] = 1.01$) with .10% of the Math SAT benchmark rate attributed to the financial investment predictors (adjusted $R^2 = .0010$).

This study indicates that teacher salaries, percent of a school district's revenue spent on education, student-teacher ratios, and budgeted amount per student do not have a statistically significant relationship with SAT scores. Therefore, the hypothesis that these measurements of financial investment in education are not significant predictors of SAT scores is accepted.

Connections to Existing Literature

The results of the study were consistent with much of the research reviewed Chapter 2. The master's thesis, School Districts and Academic Achievement: Socio-Economic Structure and Social Reproduction in Ohio (Kilpatrick, 2012) showed that students classified as economically disadvantaged have substantially higher test proficiency levels in wealthier districts, compared to disadvantaged students attending poorer schools.

Similarly, this study showed that wealth of a school district was a statistically significant predictor of both math and ERW SAT benchmark rates. The Math model showed average income and poverty rate as the most significant predictors (p-values of .0070 and .0104 respectively) and the ERW model showed GDP per capita as the most significant predictor (p-value = .028).

This study also aligned with other research on GDP and academic success. Studies in European Union (Marto, 2022) and in the United States (Baldwin, 2008) both independently demonstrated strong relationships between post-secondary education and gross domestic product (see Chapter 2 for details).

This study's results also aligned with the book, *Saving K-12: What Happened to Our Public Schools? How Do We Fix Them?* (Price, 2017) that explores 65 articles on financing the U.S. public school system. The author concludes that these articles demonstrate that spending more money on public schools does not independently equate to more successful students. Consistently with this study, it demonstrates that investing more in education does not directly correlate to more academic success.

Another interesting comparison to this study is *The American Psychological Association* (2017) summary of the close relationship between education and academic success. This summary consolidates 24 articles and research papers showing a close connection between the financial stability of families and communities and their ability to succeed academically and vocationally, consistently with this study. However, the APA study authors argue that investing more in school systems and early intervention programs may help to improve academic achievement. This argument is in direct contrast to this study that showed no connection between academic achievement and financial investment in schools through teacher salaries, overall spending in education, and student-teacher ratios.

There were some notable differences between past research and this study. One such study, *College Students from Poverty: Academic Success and Authenticity*, found a different connection between poverty and success in college (Lewine, 2022). The analysis reviewed 4-year retention rates and drop-out rates of those in the study compared to average rates for each student's home university. The study showed significantly better retention rates (75.9%) than their college peers (63.2%) (Lewine, 2022). The notable differences between Lewine's study and this one that could explain the different connection between poverty and academic success are (1) using retention rates in college rather than SAT scores, (2) following the success of individual students as opposed to the averages by school district in this study, and (3) following students that had already demonstrated success in high school, the financial means to attend college, and an interest in learning by seeking post-secondary education.

Another conflicting study is the doctoral dissertation, Addressing the Math Achievement Gap of Socio-Economical Disadvantaged students through intervention (Ayala, 2020). It explored the use of direct student math interventions to help economically disadvantaged students achieve academic success. The dissertation demonstrated that additional financial investment in summer intervention programs may improve academic performance. A notable distinction that could explain the different results is the dissertation's focus on the financial investment into one intervention as opposed to this study that focused on overall educational spending. The dissertation does not dispute this study's conclusion that spending more overall on education does not directly result in academic success.

Implications for Theory and Research

The theoretical framework for this project revolves around Max Weber's Theory of Social Stratification. Weber introduced three independent factors that form his theory of stratification: economic class, social status, and political power. He believed an individual's wealth, their status in their community, and their ability to influence their community unequally determined that individual's (or a community's) control over their own fate. Those with money, social status, and political power had considerable more influence over their continued success over those with less money, social status, and political power. Weber treated these three components as separate but related sources of power, each with different, but significant, effects on social action, such as education (Weber, 1920).

Weber's theory serves as the foundation of this research because Weber's description of wealth and power influencing social action is consistent with the topic and purpose of the project. Based on Weber's theories, school districts with money, high social status, and political power would yield the best results in education.

This research supports Weber's theory by demonstrating a direct relationship between wealth and academic success through SAT scores. Wealth, measured in this study by GDP per capita, poverty rates, unemployment rates and average income was shown to be a statistically significant predictor of both Math and EDW SAT benchmark rates.

Furthermore, Weber's theory implies that overcoming disparities in wealth is extremely challenging. This study also confirms this implication by showing that financial investments in education through teacher salaries, stent to teacher ratios, and overall expenditures in education are not statistically significant predictors of academic success as measured by Math and EDW SAT benchmark rates. This is consistent with Weber's theory by demonstrating that financial investments in education do not offset the impact of wealth on academic success.

Limitations of The Study

Several limitations of the study were addressed in Chapter 3 and are restated here. One limitation is that the population of SAT takers may not reflect the true population of all high school students. This limitation is minimized by including only states and school districts with 90% participation or higher. However, it is possible that this population of test takers varies significantly from the 39 other states excluded from this study due to their limited participation in the SAT test.

A similar limitation applies to the school district data within the state of West Virginia. While this study is aided by the 1 to 1 correlation between school district and county-wide data, the WV data could vary significantly from other states. For this reason, the conclusions of this study cannot be generalized outside of the state of West Virginia.

Another limitation is the inclusion of private school students in statewide SAT data. The College Board does not separate private school students from public school students in the reports available to the general public. Since this study is focused on public school students, the inclusion of data from private school students may pollute the data. Some studies indicate that private school students perform differently on the SAT than public school students. One such study (Gibbons, 1991), found that public school students performed better on the math portion of the SAT, on average. The WV school-district data only includes public schools. Therefore, the limitation of inclusion of private school data applies only to the state-by-state analyses.

Other potentially confounding variables which were unavailable in the data and not controlled for include test-taking accommodations for students eligible for test modifications, potential differences between SAT paper tests and digital versions (no data available to differentiate), and multiple test attempts among students. These variables could have impacted the validity of the study and introduced potential bias. These limitations and important considerations should not be overlooked when interpreting the results of this study.

It is also important to note that this study analyzes average SAT and wealth statistics by school district and does not track individuals on a case-by-case basis. We can conclude that wealth of a school district is a predictor of average SAT benchmark rates for that school district, but not that an individual's wealth relates to their specific SAT scores.

Recommendations for Future Research

The research in this study demonstrates that socio-economic status, more specifically wealth of a school district, is a statistically significant predictor of success on the SAT. Furthermore, investing more in education through higher teacher salaries, lower student to teacher ratios, or higher overall expenditures on education is not shown in this study as a statistically significant predictor of success on the SAT. This section explains several recommendations to confirm this relationship and to expound in more detail to the relationship between wealth, financial investment in education and academic success.

While the literature review and results of this study indicate that SAT scores are a proven and reliable measure of academic success, it could be beneficial to analyze other measurements of academic performance. Other measurements of academic success could include graduation rates, college retention rates, grade point average, and the percent of students placed in full-time careers or colleges directly after high school.

In addition, valuable relationships could be found by studying individuals on a case-by-case basis. This would allow for ANOVA and other statistical analyses to confirm the connection between wealth and academic success.

Furthermore, since this study focuses on school districts within West Virginia, value can be added by similar studies conducted in other states, or nationwide. Future studies could gather academic success and wealth statistics at the individual level to avoid the issue of school districts not aligning with the level of collected wealth data (like counties and metropolitan areas). As stated earlier, individual level data would also open opportunities for further statistical analyses such as ANOVA.

Since this study finds no correlation between financial investment and SAT scores in West Virginia, one could conclude that current strategies for spending money on education in West Virginia are not resulting in higher test scores. Future studies could focus on specific interventions, rather than overall spending, that could have a direct impact on academic success. The doctoral dissertation, Addressing the Math Achievement Gap of Socio-Economical

Disadvantaged (Ayala, 2020) is one example of such a study that shows impactful funding of (summer) interventions that improve academic performance.

Since this study did find correlations between wealth and academic success, one can conclude that parents and caregivers earning that wealth have a significant impact on student success. More research could be conducted to determine the specific factors attributed to high-income families that lead to academic success. These factors could include parental education, parental involvement in school and community activities, and parental attitudes about education (collected through surveys).

Drilling down on school districts that are showing strong academic results despite low wealth could also be beneficial. For example, Mingo County had the highest Math SAT benchmark rate (39.82%) and the second highest ERW rate (63.23%) but ranked 33rd out of the 55 counties on GDP per capita. See Appendix B for Mingo and other county's specific financial and SAT data. Analyzing Mingo County's education expenditures and educational practices may help determine any specific strategies that led to their success.

Conclusion and Policy Implications

This study examined the relationship between measurements of wealth and financial investment in education and rates at which students achieved benchmark scores on the ERW (reading) and Math portions of the SAT. Data was initially analyzed at the national level, and then drilled down into the fifty-five unique school districts (i.e. counties) in West Virginia. The goal was to determine if a relationship existed between academic success and the wealth or financial investment in education.

The review of national data, correlation analyses, and MLR models all consistently reported statistically significant relationships between SAT benchmark rates and measurements of wealth outlined above. The measurements of wealth used in this study were poverty rate, GDP per capita, unemployment rate, and average income at the state and school district level, as reported by U.S. federal agencies outlined in Chapter 3. Average income and GDP per capita had the highest statistical impact.

Different results were found regarding measurements of financial investment in education and its relationship with SAT benchmark rates. The measurements of financial investment used in this study were Average Teacher Salary/Average Income, Percent of taxpayer revenue spent on education, Student-teacher ratios, and School district's budgeted amount per student. Correlation analyses on WV school districts and state-level data as well as MLR models of WV school districts consistently show no statistically significant relationship between SAT benchmark rates and these measurements of financial investment used in this study. This study indicates that teacher salaries, percent of a school district's revenue spent on education, student-teacher ratios, and budgeted amount per student do not have a statistically significant relationship with SAT scores.

To summarize, the research in this study demonstrates that socio-economic status, more specifically wealth of a school district, is a statistically significant predictor of success on the SAT. Furthermore, financial investments in education, specifically teacher salaries, student to teacher ratios, or education expenditures per student, are not shown in this study as a statistically significant predictor of success on the SAT in West Virginia's 55 public school districts.

Since this study shows no relationship between financial investment and academic success, one may conclude that policy implications call for reducing funding in education. Due to limitations of this study, such as its focus primarily on West Virginia school districts and the use of average scores and wealth data, caution is recommended before cutting educational funding. Additional research should be conducted to further establish a lack of impact on financial investment in education on academic success and find specific interventions that can positively impact academic success. Additional research suggestions are outlined in the recommendations section of this chapter.

Focusing on school districts with low measurements of wealth but have achieved high levels of success on SAT scores or other academic measures may also offer opportunities for productive funding of education. As explained in the Recommendations for Further Research section of this chapter, Mingo County had the highest Math SAT benchmark rate (39.82%) out of all West Virginia school districts and the second highest ERW rate (63.23%) but ranked 33rd out of the 55 counties for highest GDP per capita (see Appendix B for Mingo and other county's specific data). Interviewing Mingo County's education policy makers, administrators, and educators may help determine specific strategies that led to their success and can be duplicated in other school districts.

Despite the caution offered regarding financial investment results, this study does offer helpful information regarding policy reform. This study shows a clear connection between the wealth of a community and the academic success of its public schools. Therefore, public policies that improve the wealth of a community could also improve academic performance. For example, the encouragement of industrial growth, technical innovations that require skilled professionals, and creations/expansion of technical and career centers could increase average incomes and GDP per capita as well as decrease poverty and unemployment rates. As this study indicates, these improvements in wealth could, in turn, result in improved school performance through higher scores on standardized tests, like the SAT.

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Appendices

Appendix A: Raw Data for States with 90% SAT Participation

State	Poverty Rate	GDP (millions)	Population	Unemploy-ment Rate	Avg Teacher Salary	Per Pupil Spending	Average Income	Student-Teacher Ratio	Met SAT ERW BM	Met SAT Math BM	SAT Takers	Percent of Graduates
CO	9.7%	$520,389	5,877,646	3.2%	$60,803	$11,602	$78,918	16.3	59.0%	36.0%	57,293	90.0%
CT	10.1%	$340,181	3,615,936	3.8%	$81,185	$21,346	$87,447	12.2	59.0%	38.0%	40,405	93.0%
DE	11.5%	$93,595	1,031,897	4.0%	$67,795	$17,235	$65,392	14.0	51.0%	28.0%	10,368	95.0%
FL	13.2%	$1,579,503	22,610,651	2.9%	$51,735	$9,937	$68,248	17.7	58.0%	28.0%	205,159	90.0%
ID	10.8%	$118,791	1,964,740	3.1%	$56,405	$8,272	$59,035	17.5	54.0%	32.0%	21,813	95.0%
IL	12.1%	$1,082,968	12,549,693	4.5%	$72,315	$17,293	$70,953	13.4	51.0%	33.0%	142,769	96.0%
IN	12.1%	$497,036	6,862,197	3.3%	$66,850	$10,935	$60,038	15.6	51.0%	32.0%	78,001	99.7%
MI	13.0%	$658,992	10,037,278	3.9%	$64,884	$13,072	$59,714	16.7	53.0%	31.0%	102,466	97.0%
NM	17.7%	$130,202	2,114,384	3.8%	$56,411	$11,332	$54,428	14.8	66.0%	41.0%	20,068	94.0%
RI	12.1%	$77,322	1,095,955	3.0%	$76,852	$16,857	$66,480	12.9	51.0%	28.0%	10,745	95.0%
WV	16.8%	$99,511	1,770,081	3.9%	$52,234	$12,375	$52,585	13.5	47.0%	20.0%	16,154	90.0%

Appendix B: West Virginia Raw Data by School District

County	Math SAT Benchmark Rate	ERW SAT Benchmark Rate	Teacher Count	Average Teacher Salary	Education Expenditures per Pupil	Overall Poverty Rate	Child Poverty Rate	GDP Per Capita	School District Population	Average Income	Unem-ployment Rate (%)
Barbour	13.79%	38.48%	160	51,729	12,035.62	19.70	27.50	11,825.22	15,414	40,399	5
Berkeley	15.36%	49.24%	1,433	52,986	12,954.40	9.90	12.70	77,983.38	129,490	52,264	3.3
Boone	12.05%	49.40%	272	52,318	15,237.96	24.70	28.20	15,838.61	20,968	41,275	3.9
Braxton	18.63%	42.85%	123	49,788	14,563.29	21.30	29.00	7,316.12	12,185	40,079	6.5
Brooke	11.59%	44.98%	184	54,410	16,952.28	13.00	18.80	16,631.54	21,733	50,324	5.2
Cabell	25.97%	57.60%	890	54,421	15,499.04	19.00	23.90	97,582.49	92,730	51,125	3.5
Calhoun	9.68%	33.87%	83	49,544	15,567.87	23.80	32.00	2,712.92	6,068	40,741	10.8
Clay	14.79%	41.76%	121	50,141	15,600.03	22.30	31.00	3,043.63	7,814	38,450	7.2
Doddridge	27.69%	55.38%	99	56,784	22,854.13	18.10	23.40	12,794.06	7,698	39,087	3.7
Fayette	14.83%	43.04%	397	52,922	14,396.77	19.90	23.60	24,706.45	39,487	44,814	4.9
Gilmer	19.64%	46.43%	64	49,778	18,403.60	25.30	23.80	4,699.32	7,325	35,411	6
Grant	17.38%	38.63%	120	51,105	13,862.40	15.20	21.90	9,613.89	10,968	46,333	4
Greenbrier	20.29%	49.00%	334	51,090	16,334.50	18.90	24.50	23,584.90	32,435	47,304	4.3
Hampshire	18.54%	46.34%	211	50,093	14,358.36	15.90	25.20	9,879.07	23,468	46,303	2.8
Hancock	18.42%	48.25%	287	53,859	15,502.18	14.90	20.10	18,971.18	28,172	50,824	6.5
Hardy	15.62%	43.46%	148	50,778	13,154.60	17.50	22.00	14,410.38	14,192	43,795	4.8
Harrison	24.17%	54.14%	765	53,295	14,486.46	14.60	20.20	73,381.96	64,915	59,058	3.7
Jackson	23.57%	54.60%	321	53,028	14,357.89	15.40	21.60	17,493.53	27,716	45,467	4.9
Jefferson	25.11%	57.65%	582	51,371	14,633.75	9.70	10.90	29,359.54	58,979	63,434	2.5
Kanawha	28.69%	58.54%	1,764	53,979	14,068.42	15.90	20.60	188,238.74	175,515	57,174	3.7
Lewis	7.56%	36.56%	161	51,126	14,152.82	17.90	24.20	11,937.47	16,767	43,632	5.6
Lincoln	17.45%	48.32%	239	50,221	14,882.27	20.30	26.70	6,414.81	19,901	36,763	5.2
Logan	8.82%	33.41%	355	51,576	14,087.30	23.50	30.20	33,024.27	31,316	42,308	3.8
Marion	24.94%	47.56%	562	50,923	14,103.19	31.70	40.20	15,504.99	17,850	34,283	6.1
Marshall	19.79%	53.71%	367	56,436	18,302.67	15.10	19.30	44,248.69	55,952	48,998	4.1
Mason	16.42%	49.26%	304	51,204	14,492.26	16.40	22.40	53,177.57	29,752	48,766	6.5
County	Math SAT Benchmark	ERW SAT Benchmark	Teacher Count	Average Teacher	Education Expenditures	Overall Poverty	Child Poverty	GDP Per Capita	School District	Average Income	Unem-ployment

	Rate	Rate		Salary	per Pupil	Rate	Rate		Population		Rate (%)
McDowell	17.99%	38.20%	192	50,760	13,692.77	18.60	24.70	16,463.60	25,000	42,115	4.7
Mercer	20.40%	46.84%	607	51,961	14,060.12	18.10	26.00	37,978.96	58,700	44,763	4.3
Mineral	13.57%	36.68%	317	52,604	14,600.08	13.50	19.80	19,624.77	26,855	48,818	4.1
Mingo	39.82%	63.23%	271	51,852	14,760.72	31.10	35.80	14,201.32	22,573	36,646	5.1
Monongalia	21.74%	51.09%	830	55,973	15,668.66	18.30	15.40	130,054.62	106,869	55,218	2.9
Monroe	13.56%	29.71%	122	50,915	14,434.35	15.30	21.70	5,226.57	12,296	40,382	3
Morgan	6.49%	27.40%	151	53,033	17,457.62	12.80	18.00	7,398.99	17,430	45,105	3.2
Nicholas	14.59%	40.77%	266	49,643	14,291.91	19.80	25.10	15,764.65	24,335	40,599	5
Ohio	24.90%	53.13%	388	56,714	16,265.35	14.70	18.90	53,808.56	41,447	66,701	4.2
Pendleton	15.52%	31.03%	84	49,224	19,490.72	16.00	22.60	3,400.42	6,011	54,365	2.9
Pleasants	14.06%	53.13%	92	53,349	16,895.42	14.30	18.10	11,209.34	7,586	49,208	7.1
Pocahontas	30.51%	33.90%	87	52,076	18,596.74	16.20	26.80	5,251.02	7,819	50,751	4
Preston	9.41%	40.10%	307	50,541	12,743.22	14.30	19.50	17,616.28	34,172	42,407	4.6
Putnam	32.84%	63.24%	679	56,465	14,103.95	10.10	12.30	51,961.42	57,015	55,827	3.3
Raleigh	27.60%	55.58%	809	52,465	13,169.27	22.00	25.80	64,831.86	72,882	48,285	3.9
Randolph	15.69%	36.76%	281	51,228	12,848.36	17.60	23.80	18,514.32	27,600	45,636	5.2
Ritchie	22.22%	41.67%	105	49,991	16,334.27	19.20	25.60	10,030.44	8,207	54,852	4.6
Roane	19.31%	50.22%	138	49,439	14,447.79	18.20	26.30	7,308.16	13,834	39,056	7.4
Summers	11.27%	46.48%	109	46,855	15,075.28	24.80	29.90	4,899.20	11,762	43,026	3.9
Taylor	15.87%	44.44%	157	50,092	15,178.07	16.00	19.30	12,003.49	16,342	49,161	4.4
Tucker	27.69%	58.46%	81	50,584	15,561.14	14.70	20.60	5,964.16	6,568	55,157	3.4
Tyler	27.40%	54.79%	100	51,750	21,924.34	14.00	21.90	18,362.89	8,183	56,445	6.7
Upshur	14.83%	40.40%	259	49,210	12,738.34	18.60	25.20	16,733.52	23,712	41,230	4.8
Wayne	19.94%	53.74%	478	50,445	14,350.93	16.20	23.10	23,599.53	37,998	41,922	4.3
Webster	20.24%	45.24%	96	50,798	14,145.85	25.20	36.30	4,226.95	8,167	32,597	4.7
Wetzel	18.08%	42.37%	241	53,981	23,335.62	16.40	24.70	21,593.14	14,025	45,280	7.9
Wirt	13.34%	41.51%	81	50,355	16,332.46	17.70	28.10	1,756.36	5,091	39,663	7.6
Wood	24.10%	48.97%	894	53,655	13,740.78	14.70	20.10	61,292.14	83,340	58,325	4.8
Wyoming	13.47%	41.41%	288	48,728	15,171.25	25.00	28.40	19,861.70	20,527	35,181	4.1

BIBLIOGRAPHY

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7/11/2024

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