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GENDER DIFFERENCES IN READING AND MATH SCORES ON THE PENNSYLVANIA SYSTEM OF SCHOOL ASSESSMENT GRADE FIVE AND GRADE EIGHT TESTS

by

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Submitted in partial fulfillment of the requirements of the
Degree of Doctor in Education

Seton Hall University

2005

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Chapter 1

Introduction

Background and Study Rationale

The landmark study of Maccoby and Jacklin (1974) helped discover differences in the achievement level between males and females in educational settings. In the last 20 years, educators have been examining the differences of how boys and girls learn and achieve in different subjects.

Weaver-Hightower (2003) wrote that until recently, most policy, practice, and research on gender and education has focused on girls and girls' issues. This seemed to be the result of schools not dealing in an appropriate manner with the educational needs of girls, especially in the math and science areas. The perceived gender gap in math and science gathered much national attention when the American Association of University Women published *How Schools Shortchange Girls* (1992). This report stated that girls were being educationally deprived in both the math and science fields and that school leaders were not responding to rectify the situation. Weaver-Hightower wrote that on an international basis, there were many claims for the educational disadvantages of boys, based on various national standardized test scores in literacy. This was made more evident in the 2001 International PIRLS Study (Mullis, Martin, Gonzalez, & Kennedy, 2003) that reported the reading literacy results in 35 countries. In the gender reporting of this study, reading was assessed in both literacy and informational categories. In every country tested, the female students outscored male students in each of the two assessed areas, making it more evident that this weakness in male reading scores was an international issue.

The United States Department of Education in 2000 formed a Gender Equity Expert Panel to examine exemplary and promising gender equity programs. This panel was comprised of six subpanels, one of them representing mathematics, science, and technology. This particular panel addressed how exemplary math and science programs were addressing the needs of female students. The other subpanels dealt with core gender equity, disabilities, sexual and racial harassment, teacher education, and vocational education. None of the subpanels looked at reading and literacy skills.

The most recent statistics from The United States Department of Education listed in the Nation's Report Card (2003) showed academic results at the fourth and eighth grade level. In mathematics, based on a scoring scale of 500, the girls at Grade 4 nationally scored 233 while the boys scored 236, a difference of 3 points. At Grade 8, the girls scored 277 with the boys scoring 278 a difference of 1 point. The reading results showed a much larger discrepancy however, with the fourth grade girls scoring 222 to the boys 215, a difference of 7 points. In eighth grade, the gap continued to increase, with the girls scoring 269 to the boys 258, a difference of 11 points. Girls have outscored the boys each year in reading achievement for this particular nationwide reporting system since it began in 1969.

Many studies in the past decade have focused on this difference in mathematics achievement where girls are often found to be scoring below the level of boys. This is indeed an important topic for study and efforts are being made to help eliminate this gap. Unfortunately, little emphasis has been placed on boys lagging in the area of reading.

Weaver-Hightower (2003) wrote that parents are representing a significant factor in the request to examine the literacy achievement and skills of boys, rather than having the push come from educators where one would more likely expect. She went on to stress those important variables such as urbanity as opposed to rurality and student socioeconomic status should be carefully analyzed when studying the gender issue.

This researcher examined student results from the Pennsylvania State School Assessment (PSSA) that is given annually in Pennsylvania public schools. To date, there has been no research on the current Pennsylvania data to discover whether any significant differences exist between genders in the areas of reading and mathematics. A statistical analysis may indicate differences in gender achievement for reading and mathematics in the fifth and eighth grade tests.

This study also investigated how living in a rural or urban school district impacts the achievement levels of students. This variable has been the focus of studies such as Randhawa and Hunt (1984). They examined the effects of rural and urban schools, as well as gender differences, in achievement. The study included 4,918 students in Grades 4, 7, and 10. The results demonstrated that students from rural schools attained superior achievement in a majority of the subtests as well as a male superiority in the area of mathematics.

Another variable examined was the socioeconomic status (SES) of the school district's students in relation to test scores. Researchers have been interested in the academic achievement levels of students from the earliest days of schooling. A serious critique of conventional educational policies began in 1966 with the landmark study entitled *The Coleman Report*. James S. Coleman and his colleagues, (1966), published an analysis of the national survey of schools that Congress had authorized 2 years earlier. Their report, *Equality of Educational Opportunity (*commonly referred to as *The Coleman Report*), began to examine just what factors in particular were influencing student achievement.

Coleman et al. (1966) discovered that as little as 10% of the variation in student test scores was due to the school itself, while up to 90% of the variation occurred between students attending the same school. The clear implications of this study was that something was happening within schools that was causing some students to have different educational experiences than others in the same school. When he investigated why this was true, he found that differences in student achievement among schools associated largely with one factor, the SES of the pupils and the community in which the school was located. The usual factors thought to contribute to student achievement, such as textbook and curriculum quality, the school facility, and teacher experience appeared to have had little impact on student learning.

Cruickshank, Jenkins, and Metcalf (2003) claimed that a reanalysis of Coleman's findings continue to suggest that SES overshadows all other variables in its relationship to student achievement. It is reported that as much as 75% of a student's success in school seems to be a result of that student's socioeconomic, family, and cultural background. These are factors that teachers and administrators generally have little or no control over.

Conceptual Framework

Bourne and Ekstrand (1973) described a behavioristic approach presented by Albert Bandura that has been effective in describing the conditions under which certain aspects of the personality are learned. Much of this is done through observation and reinforcement and includes an interaction with biological development and social influences. Bandura (1986) wrote of this social cognitive theory to explain how various factors combine to help an individual develop personal traits.

Santrock (2001) described a gender schema theory where the behavior of boys and girls is guided by an internal motivation to conform to gender based sociocultural standards and stereotypes. This behavior begins in the elementary school years as soon as children begin to organize information according to what is considered appropriate or typical for males and females in society. This theory supports active construction of what is to be considered proper behaviors for boys and girls. Much research has been done over the years to look at gender similarities and differences and how they appear in the academic success levels within the school setting. Santrock wrote that in regard to this theory, we should not examine whether males are more successful than females or vice versa; rather, we should look closely at which particular groups, influenced by factors such as socioeconomic status, determine the success levels of males or females.

Several decades of research have indeed been focused on precisely what factors are impacting the performance of students. Pauly (1991) wrote that when a study of literature from the 1960s through the mid-1980s was reviewed, no known variables that consistently improved student achievement were discovered, which is what Coleman found. Many factors within each school started to become worthy of further investigation.

In conclusion, most of the research over the past 20 years has focused on the educational plight of girls. This has prompted educators to examine and rectify programs in order to help make the educational experience more successful for all female students. Currently, researchers are beginning to examine whether similar disadvantages exist for boys in the field of reading. This researcher analyzed reading and mathematics data from Pennsylvania to determine whether significant differences exist between particular groups of students.

The Statement of the Problem

Results from local, state, national, and international sources show male students lagging in the area of reading and literacy achievement. In the United States, research is quite limited in looking at the differences in reading achievement and what factors may be contributing to them. Little research has been conducted focusing on any aspect of the PSSA scores reported for school districts in Pennsylvania. The goal of this dissertation was to examine gender differences on the fifth and eighth grade state level PSSA tests given to all Pennsylvania public school students. In addition, two important factors, namely student socioeconomic status as well as rural and urban school district setting were examined to see how they may impact achievement levels. The results of this dissertation will help provide state legislators and educational leaders with information to make plans for a more effective instructional program in Pennsylvania. This could impact how state funding is provided to the particular groups of students that need it the most.

This quantitative, statistical study analyzed fifth and eighth grade student PSSA results. The number of school districts randomly chosen with regard to socioeconomic status and rural/urban status was of the same proportions as found throughout districts in Pennsylvania.

Statewide PSSA results available from the Pennsylvania Department of Education from the 2001-2002 school year were used. The research questions answered were:

1. How do gender differences influence reading and mathematics performance as measured by the PSSA fifth and eighth grade tests?
2. If there is a gap in reading or mathematics achievement related to gender, how much does the gap narrow or widen as students move from elementary to middle school?
3. How are gender differences in reading and mathematics achievement influenced by the geographical context? In other words, how does attending school in a rural or urban community impact gender differences?
4. What impact does the percentage of economically disadvantaged students in a school district have on the gender differences in reading and mathematics test scores?

Purpose of the Study

The purpose of this study was to describe and evaluate gender differences in fifth and eighth grade students in Pennsylvania. This dissertation examined the differences in male and female reading and math results within a grade as well as an examination of whether any gap increases or decreases as the students move from elementary to middle school. This examination was conducted for each of the four performance categories as defined in the PSSA tests. This study compared the gender results within rural and urban school district settings and also considered how the percentage of economically disadvantaged students in the district may impact student gender scores. The results helped answer which groups of students should be targeted for additional assistance and potential optional programs.

Hypotheses

The null hypotheses for the research problems presented are:

1. There are no significant gender differences in either reading or mathematics on the Pennsylvania System of School Assessment (PSSA) tests in Grade 5 or Grade 8 at each of the four defined performance levels: advanced, proficient, basic, and below basic.

2. The differences between male PSSA scores does not increase or decrease in the reading or mathematics tests when comparing the Grade 5 and Grade 8 passing and failing rate.

3. The differences between female PSSA scores does not increase or decrease in the reading or mathematics tests when comparing the Grade 5 and Grade 8 passing and failing rate.

4. There are no significant differences in student PSSA results when examined in terms of rural or urban districts at each of the four defined performance levels: advanced, proficient, basic, and below basic.

5. There are no significant gender differences in PSSA results when differences in school district SES status are considered.

Limitations/Delimitations

This study examined the achievement performance levels of males and females in the fifth and eighth grade on criterion-referenced state tests given in Pennsylvania in the spring of 2002. Examination of the gap between fifth and eighth grade students was based on a particular cohort and did not show the progress of a specific group as in a longitudinal study, but it showed the differences in achievement between two different groups of students at the same point in time. The fifth and eighth grade PSSA tests are designed to assess similar skill areas in both subjects.

Another major limitation for this study is the fact that gender results are only listed for the entire school district and not individual schools. Thus, several schools within a district may have very different PSSA results that will not be discovered when using the district gender figures.

Definition of Terms

Criterion-referenced Assessment--An assessment that determines what test takers can do and what they know based on a set of standards.

Rural District--As defined by The Center for Rural Pennsylvania (2003), a legislative agency of the Pennsylvania General Assembly—"A school district in Pennsylvania is designated rural when the number of persons per square mile within the school district is less than 274" (p. 1). At present, 243 of the 501 school districts in Pennsylvania are labeled rural.

Urban District--As defined by The Center for Rural Pennsylvania (2003), a legislative agency of the Pennsylvania General Assembly—"A school district in Pennsylvania is designated urban when the number of persons per square mile within the school district is 274 or greater" (p. 1). At present, 258 of the 501 school districts in Pennsylvania are labeled urban.

Economically Disadvantaged--This is defined in Pennsylvania as the percentage of district students that qualify for the Federal free or reduced-price lunch program.

PSSA test--This is the Pennsylvania System of School Assessment test administered throughout Pennsylvania in all of the 501 school districts.

Importance of the Study

The latest Nation's Report Card from the U.S. Department of Education called *Reading Highlights 2003*, presents reading scores disaggregated by gender. Grade 4 male students in 2000 scored 208 on a test ranging from 0 to 500. Female fourth graders scored 219 on the same test. The latest 2003 figures showed that males have increased to 215 whereas females have increased to 222. Females have outscored males in reading achievement during every testing session since it began being reported in 1969. Similar results are found in Grades 8 and 12. Grade 12 results in 2002 showed males scoring 279 nationwide with females scoring 295.

Results from this study will be useful in helping state legislators and educational leaders throughout Pennsylvania understand possible gender differences that may exist. This may prove to be an incentive to examine teaching strategies and methods to better meet the needs of particular groups of students.

Chapter II

Literature Review

Introduction

Inconsistent research findings have been reported when faced with the debate on the relationship between gender and student achievement. There is a claim that girls earn higher reading test scores (Marsh, Smith, & Barnes, 1985) with significantly more boys than girls attending literacy remedial classes (Alloway & Gilbert, 1997). On the other hand, Corson (1992) maintained that girls have similar literacy problems as boys, but that girls are more passive in the classroom and thus more frequently overlooked for remedial services.

Several years ago, the Educational Testing Service (ETS) was questioned by the Office for Civil Rights in the U.S. Department of Education regarding gender bias on its Preliminary Scholastic Assessment Test (PSAT). The PSAT is used to identify prospects for National Merit Scholarships. The test was consistently identifying more males than females. Rather than defending the fairness of the test, ETS agreed to modify the PSAT. The new version of the PSAT includes additional types of writing skills on which females are more or less guaranteed to do better than boys (Seligman, 1998).

In a study using data from more than 400 tests involving millions of students, Cole (1997) found results that were not quite as expected. There was not a dominant picture of either gender excelling academically with the average difference in performance across all subjects very small. The familiar mathematics and science advantage for males had grown significantly smaller than observed 30 years ago. The language advantage of females had remained relatively constant however. It was reported that patterns of gender differences are more closely related to male and female interests in out-of-school activities.

In a different report that analyzed 165 studies, Hyde and Linn (1988) examined data of 1,418,899 subjects. The conclusions revealed a slight female superiority in verbal ability performance, but it was a very small difference. An analysis by age revealed no striking changes in the magnitude of gender differences at various ages that countered a conclusion by Maccoby and Jacklin (1974) suggesting an emerging difference by the age of 11.

The American Association of UniversityWomen (1992) compiled a rather extensive report revealing a variety of ways that schools were shortchanging females. The results showed that classroom teachers indeed favored males in the amount of classroom attention. It was discovered that boys tend to call out answers up to eight times more often than girls. Girls are also more likely to be told to raise their hand when they call out without teacher permission. A loss of self-esteem by girls was revealed in other questions the study posed. This self-esteem gap began as males and females entered adolescence and grew wider as the age increased.

Kleinfeld (1998) referred to Maccoby and Jacklin's (1974) landmark study that found four areas of gender differences that were reasonably clear: (a) females score higher in verbal ability, (b) males score higher in spatial ability, (c) males score higher in mathematics, and (d) males are more aggressive. She showed how this research had now been reviewed with meta-analytic techniques used by Hyde and Linn (1988), and the newer analytic techniques showed rather small gender differences.

Kleinfeld (1998) presented data to support why males are over represented in the highest and lowest scores associated with the Scholastic Aptitude Test and the Graduate Record Exam. She found that more males scored at both the upper and lower ends of the IQ spectrum. This also helped explain the greater number of boys being labeled with learning difficulties. Sadker and Sadker (1994) reported that boys represent 58% of those in classes for the mentally retarded, 71% of the learning disabled, and 80% of those in programs for the emotionally disturbed.

The fact that females received higher grades in high school was one area that Kleinfeld (1998) said remained undisputed. Females in high school also accounted for higher class rank as well as more academic honors and scholarships. In short, females tended to surpass males in most high school competitions with the exception of sports, mathematics, and science. It was noted that females are closing the gap in the math and science areas.

Weaver-Hightower (2003) wrote that many Western and industrialized societies are experiencing a resurgence of concern for the education of boys. He shared that the debates about males in education are not limited to the United States, but rather it has become an international concern with the United Kingdom and Australia leading the way in improvement efforts. He noted that some scholars are feeling that efforts to examine male deficiencies will endanger reforms in place to assist the academic performance of females.

Connell (1996) mentioned that in Australia, there is a parliamentary inquiry into the educational progress of boys, and in Germany the number of educational programs dealing with gender issues has multiplied for males. He noted how gender first appeared on the educational scene as an equity issue, where change was sought to deal with a perceived injustice. The main educational response in the United States has been to set up programs for girls. Connell stated that advocates now cast educational issues about boys into that mold, defining boys as the disadvantaged group. He did not agree with the disadvantaged label, but did feel that there are gender disadvantages from which many males suffer in the schools of today. The goal is to pinpoint the particular boys that are most at-risk and then deal with these defined groups.

A recent article in Education Week announced that the U.S. Department of Education's office for civil rights is planning to re-examine a long-standing policy prohibiting publicly supported single-sex programs. They are hoping to be able to consider provisions in the No Child Left Behind (2001) law that encourage innovative approaches to educational programs. The article referred to cities such as Seattle, Washington, and Long Beach, California that have separated girls and boys within existing coeducational schools. It stated that the confluence of race and social class affects minority boys in alarming ways.

Conceptual Framework

Gender schema theory, according to Santrock (2001), states that an individual's attention and behavior are guided by an internal motivation to conform to gender-based sociocultural standards and stereotypes. This theory suggests that "gender typing" occurs when children are able to organize information along the lines of what is considered appropriate for males and females in society. This active construction of gender also includes individual society norms that help establish what is acceptable behavior for males and females.

Researchers such as Myra Barrs (1994) explained that males and females look at printed material from very different viewpoints. Girls seemed to look for relationships and often draw parallels with their own personal experiences. Boys, on the other hand, looked for action-packed adventure stories. Barrs said researchers have long been aware of the differences between boys and girls in reading in both the amount of time spent in the actual reading process and the types of materials selected for personal reading. She wrote that girls achieve more highly than boys in reading.

Skelton (2001) claimed that educating boys is currently seen, both globally and in the United Kingdom, to be in crisis. The major questions concerned the behavior and identities of boys in school. The search seemed to be for an understanding about gender relations in order to teach both boys and girls more effectively. She suggested an examination of the social and cultural differences of males and females that have an impact on gender differences.

In the *Social Foundations of Thought and Action: A Social Cognitive Theory*, Bandura (1986) advanced a theory called social learning theory in which personal behavior is the product of three factors. These are listed as a combination of behavior, personal factors, and environmental factors which, when combined, help shape the role of each individual. Bandura's social cognitive theory is in clear contrast to theories that overemphasize the role that environmental factors alone play in a person's behavior and subsequent learning. People learn not only from their own experiences, but also from observing the behaviors of others. Confident individuals anticipate successful outcomes and therefore become more skilled in the particular academic discipline. Bandura (1997) also used the concept of self-efficacy, that he introduced in 1977, to help explain how a student's academic belief indeed influences academic attainment. This concept of self-efficacy has proven to be a consistent predictor of academic outcomes. Students who believe they are capable of success in an academic task actually use more cognitive strategies to reach the desired level of attainment, regardless of previous achievement.

Hyde and Jaffe (1998) believe that teachers and students hold particular stereotypes and that these indeed have an influence on student achievement. Teachers use different amounts of praise, encouragement, and criticism to unconsciously control boys and girls in different ways. This includes accepting an ultimate lack of participation in certain subject areas when gender is a factor.

Reading, Writing, and Mathematics Achievement

The fact that females had higher grades in school in all or most subjects was a conclusion drawn by Halpern (1997) after an extensive review of literature on gender differences in cognitive tests. She concluded that current gender differences were now more likely to attract increased attention since The United States Congress had instituted the No Child Left Behind Act (2001) which requires mandatory yearly testing of all public school students in Grades 3 through 8. Halpern did report boys performed better in math, science, and mechanical reasoning while girls scored higher in reading, writing, foreign language, and speech articulation.

Kleinfeld (1998) added that females typically surpassed males in writing and reading on standardized achievement tests, while males produced superior scores in science and mathematics. Kleinfeld added that males were more apt to believe the school climate was hostile to them while at the same time claimed teachers provided less encouragement to perform well.

Data reported in The Nation's Report Card, Writing Highlights (2002) showed that females outperformed males on average by 17 points at Grade 4. These scores were based on a reporting scale of 0 to 300. The females outscored males at Grade 8 by 21 points and by 25 points by Grade 12. Between the 1998 and 2002 score reporting, a significant increase in the average writing score gap between male and female students was noted at Grade 12. Males at Grade 4 had 20% scoring at the proficient level while 36% of Grade 4 females scored proficient. At Grade 8, it was 21% of the males proficient with 42% of the females. Grade 12 had only 14% of the males proficient with 33% of the females.

Given the diversity of findings, should an educator conclude that tests accurately measure differences between groups of students such as males and females? Or, on the other hand, should one assume that due to the test content, format, or mode of testing, certain assessment instruments are favoring one group of students at the expense of others? Leder (2002) addressed a number of strategies that educators must consider in order to achieve equity in assessment. Achievement is affected by a complex set of interacting variables, including gender and student background. This makes fairness in test construction an important issue for today's schools.

In a recent article, Schoenfeld (2002) presented data gathered in Pittsburgh, Pennsylvania. This large, urban district offered a well-documented set of results from the implementation of a new mathematics curriculum. The data collected and analyzed to date suggested the new curriculum in use has helped to eliminate performance differences previously found in the student test results. The number of students scoring below the expected performance level has shown a definite decrease.

Sadker and Sadker (1991) claimed that in early schooling, females start out ahead of males in speaking, reading, and counting as well as being equal to males in math and science. Females then showed a significant decline in achievement scores while male scores continued to increase. They referred to three assessments conducted by the National Assessment of Educational Progress in reading achievement. The conclusions showed that even though females continued to outperform males, the achievement gap between the sexes had narrowed with the male scores continuing to increase.

Grissmer, Flanagan, Kawata, and Williamson (2000) presented evidence showing statistically significant gains in math scores for elementary students between 1990 and 1996. The grouping of more rural northern states generally had the highest achievement scores with the southern states among the lowest scores. An examination of the math scores showed gains in the eighth grade more significant than the gains noted in fourth grade.

Cultural expectations were the reasons presented for achievement differences by Johnson and Greenbaum (1980) in a review of research. They compared studies from the United States with those conducted in England, Germany, Canada, and Nigeria and presented evidence that boys may be scoring lower than girls in reading due to negative classroom treatment as well as dealing with cultural expectations of what boys are supposed to act like. This masculine expectation, according to the authors, often views reading as a more feminine activity.

On April 8, 2003, the International Association for the Evaluation of Educational Achievement issued its Progress in Reading Literacy Study (PIRLS), an international comparison of reading in 35 nations. Bracey (2003) reported only three other countries had scores higher than the United States that were statistically significant. An interesting feature of this study was that in all 35 countries, females had significantly higher scores than males in both areas of reading, which were defined as reading for literary content and reading for informational content.

Moss (2000) suggested that in order to make both males and females successful, schools should strive to build an active reading culture in the classroom. She referred to readers who can and do read freely versus those children who can, but do not choose to read. This second category was where more males than females tended to find themselves trapped. Moss pointed out that individual teachers have more control over the choosing not to read option than previously realized. It is true that learning to love reading is a very different concept than learning to read.

Scieszka (2002) has started a literacy program aimed at improving the reading opportunities for boys. The concept of his program is to get young males hooked on the types of stories that appeal to them and then gradually shift the content to more sophisticated stories. His first-hand experience as an elementary teacher helped confirm how many boys were simply not learning to love reading and thus were falling behind in this important content area.

Rural and Urban Education

Locating an acceptable definition of rural and urban proved interesting. Rios (1988) presented the difficulties in establishing a standard definition of just what the term rural means. It seemed that there were as many different definitions of rural as there were public agencies. Over a dozen definitions were presented, including ones from the U.S. Bureau of the Census, the U.S. Department of Housing and Urban Development, and the U.S. Department of Agriculture.

A decision was made to use rural and urban schools as defined by the Pennsylvania General Assembly in the Rural Pennsylvania Legislative Agency. According to the Center for Rural Pennsylvania (2003), a school district in Pennsylvania is termed rural when the number of persons per square mile within the school district is less than 274. This results in 243 of the 501 school districts in Pennsylvania designated as rural. School districts with a population per square mile of 274 or greater are termed urban. There are 258 Pennsylvania school districts in this category.

Some statistics from the Center for Rural Pennsylvania (2003) found approximately 584,000 of the 2.2 million school students attending rural school districts. In rural districts, 8% of the students were enrolled in private or non-public schools with 2% home schooled. In urban districts, 18% were enrolled in private or non-public schools with 1% home schooled. Rural school districts have seen a 2% increase in students between 1990 and 2000 whereas urban districts have seen a 14% increase.

Rural school districts reported 68% of the graduating class pursued a college degree while urban districts saw more than 77% as college bound. In 2000, fifth graders in more than 52% of rural school districts scored above the statewide average in the

PSSA state tests. However, by the eighth grade, less than 40% scored above the statewide average, and in eleventh grade, less than 33% scored above the statewide average. In comparison, more than 50% of students in urban school districts scored above the statewide average for each of these three grades (The Center for Rural Pennsylvania, 2003).

D'Agostino and Borman (1998) found evidence that students in rural first grade schools learned at significantly slower rates in reading and math in comparison to their urban peers. One of the outcomes from this study was a grave concern for the schooling of young, at-risk, rural students. It was concluded that these rural students enter first grade at significantly higher reading and math achievement levels than their urban peers, but then learn both subjects at lower rates over the first 2 years of school.

Schmidt (1994) found that among urban students, mathematics achievement test scores have risen slightly at the high school level while at the same time decreasing at the elementary and middle school level. The reading scores for these urban students have remained constant at each of the three levels. Casserly (2001) reported that an analysis of data using 57 major city school systems found both reading and math scores are below national averages, although he feels the gap may be narrowing when compared to earlier data. In an analysis of fifth grade data from the Missouri Mastery Achievement Test, Alspaugh (1992) found no significant difference between urban and rural schools in reading or math achievement.

In an article entitled "Funding Rural, Small Schools: Strategies at the Statehouse," Verstegen (1991) wrote that the funding of rural schools must be a priority since 51% of all schools in the United States are located in small towns or rural areas. She added that

40% of students nationwide attend either small-town or rural schools. Twenty-three states have 50% or more of their students in this rural category. The article demonstrated how 30 states included a factor in the school finance formula to help small, rural school districts compensate for additional costs to mount an effective educational program since many of the rural areas tended to be less wealthy than their urban counterparts.

The North Central Regional Educational Laboratory (2001) in an article on student mobility reported that an examination of U.S. Census Bureau data revealed that 4.3 million Americans moved between March 1999 and March 2000. This showed an increased mobility that the study reported was highly correlated with low family income. The current trend seemed to favor families moving to urban areas since a higher rate of poverty existed in rural communities. It was reported that rural workers on average only earn four fifths of their urban counterparts in salary. One of the conclusions was that the children in families of poverty are at a much higher risk of academic failure.

Pennsylvania Representative Jess Stairs from Westmoreland County introduced a resolution to the House Education Committee that would create a special commission to study rural education (Raffaele, 2003). This is due to the fact that nearly half of the school districts in Pennsylvania are defined as rural. These districts face many unique challenges such as transportation costs and the ability to recruit and maintain a qualified teaching staff. He cited the increased pay offerings of urban districts attracting the better teacher candidates. It is hoped that the commission will examine academic performance, spending, as well as access to postsecondary education programs.

Socioeconomic Status (SES)

The socioeconomic status of students seems to play an important factor when examining student success. Hunsaker, et al. (1995) stated that a positive correlation was found between socioeconomic status and a child's academic achievement. They concentrated on the study of family influences on the achievement of economically disadvantaged youth. They felt this presented a rather complex problem since many family factors influence student success. They discovered that family support of the educational program as well as family aspirations for a child's academic attainment played an important role.

In a study conducted by the Columbia University Mailman School of Public Health, The National Center for Children in Poverty, Gershoff (2003) found that children from low-income families lag significantly behind their more affluent peers by the time they began their formal schooling. The more income a family had, the better the children succeeded in school, not only academically, but also physically and socially. This research project showed a dramatic linear pattern between family income and the child's development. Children from low-income families, defined as having family income at 200% of the federal poverty level, scored well below average on math, reading, and general knowledge test scores as compared to children from more affluent families.

In an article from the U.S. Department of Education National Center for Education Statistics (2003), figures demonstrated that schools with more than 50% of their students eligible for free or reduced-price lunches had lower average scores than students in schools with 25% or fewer students eligible. This research conducted by the National Assessment of Educational Progress (NAEP) analyzed student achievement relative to the poverty level of the school as measured by the percentage of students eligible for the free or reduced-price lunch program. The research discovered that the difference in achievement by school-level poverty exists whether or not the students were personally eligible for the school lunch program. As the percentage of students in a school increased for the lunch program, the school academic scores decreased.

A study conducted in California called "Equal Resources, Equal Outcomes? The Distribution of School Resources and Student Achievement in California" (2000) demonstrated startling inequities between schools serving the state's poor children and those serving the more affluent. This study used a database of 7,321 schools and covered 98% of the public school children in California. The study concluded that the strongest predictor of test scores in a school is not teacher quality or curriculum, but the percentage of economically disadvantaged students. The results held consistent even when students with limited English proficiency (LEP) were excluded from the analysis. It stated that the poor performance of disadvantaged children appears to result largely from deeper problems rooted in our society, and educators need to find more effective ways to spend education dollars.

An article published in the Harvard University Gazette reported about a study commissioned by the Civil Rights Project at Harvard University. The study, "High Stakes Tests are Counterproductive to Economically Disadvantaged Students" (2000) claimed that the new nationwide testing policies that require students to pass state level standardized exams only deepen educational inequity between affluent and impoverished students. Many top performing schools are reported as receiving cash bonuses while low-performing schools are subject to public hearings and ultimately, state level takeover. The findings have shown that the curriculum in many high-poverty schools has been reduced to little more that test preparation with many important subjects such as science and social studies being neglected.

In 1994, the Kellogg Foundation invited all of the middle schools in the state of Michigan to participate in a School Improvement Self-Study Survey that was being conducted by the Center for Prevention Research and Development. The responses included over 3,300 teachers and over 34,000 students. The results showed schools making the largest gains in student achievement had implemented interdisciplinary teaming projects within the middle schools that seemed to make curriculum planning more effective. One of the interesting correlations was that the largest student gains in achievement scores occurred in schools where at least 60% of the student population received free or reduced price lunch.

Results from the 2001 Wisconsin Third Grade Reading Comprehension test showed that 59% of the economically disadvantaged students who took the exam scored at the proficient level. These students were defined economically disadvantaged by their qualification for the free and reduced lunch program. This percentage, even though commendable, was in sharp contrast to the 84% of students who were not economically disadvantaged. It was reported that districts with high numbers of economically disadvantaged students had either sustained or improved performance levels from previous testing years.

In Texas, the Center for Public Policy Priorities presented testimony to the Texas State Senate Education Committee that voiced concern with the effect of how state and local policies impacted the educational programs of low to moderate income Texas families. They presented data that revealed a continuing gap in performance between economically disadvantaged students and all other students in measures of academic achievement. The Center requested the State Education Department to address the issue of closing the achievement gap for disadvantaged youth. Much of the discussion dealt with how funds were distributed to schools with the greatest number of at-risk students.

The state of California used an Academic Performance Index (API) in the study "Equal Resources, Equal Outcomes," (2000) to compare an individual school's performance on standardized academic tests to other schools in the state. One of the more significant findings in comparing scores on the 2001 Stanford 9 Reading test was the huge difference in the scores of economically disadvantaged students and non-economically disadvantaged students.

Summary

Gender inequality in education appears to be a complex issue. A review of literature shows more intense study over the past 25 years centered on how females have been shortchanged in particular areas of the educational picture. Much of the interest is focused on the lower female achievement scores in the mathematics and science areas. There seems to be much less emphasis on the seemingly larger gap that exists in the reading scores between males and females.

In a recent article, Conlin (2003) wrote about a new gender gap that seems to be emerging among males and females today. Schools are blamed for losing sight of these perceived needs of boys and the resulting neglect of looking for ways to improve the widening gap. The strides that females have made over the years in education are recognized and applauded, but a serious need is issued to examine the discipline of reading and what, if anything, can be done to help keep our male students on track.

This particular study will examine the mathematics and reading results of fifth and eighth graders in Pennsylvania. All schools are putting a great deal of effort into student success with the Federal No Child Left Behind Act (2001). Schools are now held responsible for ensuring that every student, without exception, is capable of success by the year 2014. This study is designed to shed additional light on the success of male and female students and how achievement levels may be influenced by students living in a rural/urban school district as well as their identified socioeconomic status.

Chapter III

Methodology

Introduction

The purpose of this study was to describe and analyze gender differences in fifth and eighth grade students in Pennsylvania. The differences in male and female reading and math scores were examined within each of the two grade levels as well as whether any gap increased or decreased between fifth and eighth grade. This examination was conducted for each of the four performance categories as reported in the Pennsylvania System of School Assessment (PSSA) tests.

The state scores used in this dissertation were available to the public on the Pennsylvania Department of Education website. The gender scores were also controlled for student socioeconomic status. This was based on the state department's percentage of students in the school district that were eligible for the federal free or reduced lunch program. These figures were available to the public. Another controlled variable was whether living in a rural or urban school district had an impact on student scores.

Instrument

Pennsylvania System of School Assessment (PSSA) Test

In 1999, Pennsylvania adopted academic standards for reading, writing, speaking and listening, and mathematics designed to identify what students should know and be able to do at selected grade levels. The resulting tests to measure these standards are called the Pennsylvania System of School Assessment (PSSA) tests. This is a standards based criterion-referenced assessment used to measure the attainment of the established academic standards. The assessments take place in April of each school year.

The Pennsylvania Department of Education has established four performance level descriptors based upon student results:

Advanced—The advanced level reflects superior academic performance.

Proficient—The proficient level reflects satisfactory academic performance and indicates a solid understanding of the material.

Basic—The basic level reflects marginal academic performance and indicates only a partial understanding of the skills as defined in the standards.

Below Basic—The below basic level reflects inadequate academic performance with little understanding and minimal display of the skills as defined in the standards.

Each student receives a scaled score to more precisely indicate achievement within one of the four defined performance levels. The scaled scores used in Grade 5 are displayed in Table 1.

Table 1

Grade 5 Scaled Reading and Mathematics Scores

Grade 5	Scaled Scores	
	Mathematics	Reading
Advanced	1460 and above	1480 and above
Proficient	1300--1459	1300--1479
Basic	1170--1299	1160—1299
Below basic	1169 and below	1159 and below

Table 2 shows the scaled scores for the Grade 8 proficiency levels.

Table 2

Grade 8 Scaled Reading and Mathematics Scores

Grade 8	Scaled Scores	
	Mathematics	Reading
Advanced	1510 and above	1400 and above
Proficient	1300--1509	1280--1489
Basic	1180--1299	1130—1279
Below Basic	1179 and below	1129 and below

Pennsylvania has established state standards in mathematics and reading in Grades 3, 5, 8, and 11. The statewide PSSA tests were only given to students in Grades 5, 8, and 11 starting with the first assessment in 1998-99. The third grade level PSSA test in mathematics and reading was added in the 2002-03 school year.

As outlined in the Chapter 4 regulations of the Pennsylvania School Code, the following purposes of the PSSA tests are defined (Handbook for Report Interpretation, 2003):

1. Provide students, parents, educators, and citizens with an understanding of student and school performance.

2. Determine the degree to which school programs enable students to attain proficiency of academic standards.

3. Provide results to school districts for consideration in the development of strategic plans.

4. Provide information to state policymakers including the General Assembly and the State Board of Education on how effective schools are in promoting and demonstrating student proficiency of academic standards.

5. Provide information to the general public on school performance.

Each school district receives a complete set of scores by grade level with a variety of variables listed, one of which is gender. The data available from the State Department is reported in terms of the percentage of students scoring in each of the four performance categories.

PSSA Validity

As reported in the Pennsylvania Department of Education 2003 PSSA *Handbook for Report Interpretation*, the major validity interest focuses on traditional "content validity" considerations. "The content validity of these assessments has at its foundation the judgments of Pennsylvania content area experts" (p.53). These individuals are generally teachers and curriculum experts from demographically diverse and geographically balanced school districts across Pennsylvania.

"These content area experts construct item specifications (and in the case of reading, select passages), write items (or in the case of writing, develop prompts), develop scoring rubrics, and determine the proportion of items to be assessed in each academic standard by grade level" (Handbook for Report Interpretation, 2003, p.53). These committees also review the results of field test data, including examples of actual student written work, to further determine the item's content suitability for possible inclusion on the PSSA exam.

PSSA Reliability

In 2003, a student's score was based on the total number of test items that appeared in each of the reading and mathematics portions of the PSSA. For mathematics, 70 multiple-choice and three open-ended items comprised the total score at each grade level. For reading, 52 multiple-choice and two open-ended items comprise the total score at Grade 5 whereas Grade 8 had 72 multiple-choice and two open-ended items.

Table 3 lists the internal consistency estimate of reliability (Cronbach's Coefficient Alpha) for mathematics and reading at Grades 5 and 8 (Handbook for Report Interpretation, 2003).

Table 3

Internal Consistency Reliability Coefficients for the 2003 PSSA Tests

	Reliability Coefficients	
Subject	Grade 5	Grade 8
Mathematics	.94	.93
Reading	.90	.91

Subjects

Gender scores from 120 school districts were examined in reading and mathematics from the Grade 5 and Grade 8 PSSA 2001-02 tests. Student socioeconomic status appeared to be the variable most recognized by researchers (U.S. Department of Education National Center for Education Statistics, 2003) as having an impact on student achievement. In order to control for socioeconomic status, this researcher sorted 500 of the 501 school districts (one district did not have student SES calculated) by the percentage of students identified as economically disadvantaged. In Pennsylvania, this is reported according to the percentage of district students eligible for the federal free or reduced-price lunch program. The SPSS computer program was used to calculate the mean and standard deviation. The mean score was 27.79 and the standard deviation was 16.96.

This finding resulted in 267 school districts below the mean of 27.79 and 233 school districts above the mean. Further analysis found that 180 school districts were within one standard deviation lower than the mean and 87 school districts were greater than one standard deviation lower than the mean. One hundred sixty school districts were within one standard deviation higher than the calculated mean and 73 school districts were more than one standard deviation above the mean. Figure 1 presents the relationships.

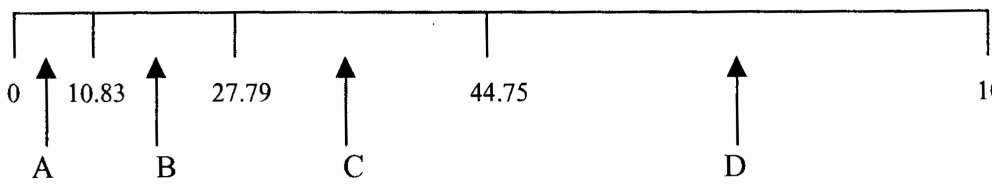

Figure 1. Percentage of students eligible for free or reduced lunch

The area marked "A" represents school districts more than one standard deviation below the mean score of 27.79. There were 87 school districts in this category or 17.4% of the school districts in Pennsylvania.

The area marked by "B" represents school districts within one standard deviation lower than the calculated mean of 27.79. There were 180 school districts in this category or 36% of the school districts in Pennsylvania.

The area marked by "C" represents school districts within one standard deviation above the calculated mean of 27.79. There were 160 school districts in this category or 32% of the school districts in Pennsylvania.

The area marked by "D" represents school districts more than one standard deviation above the calculated mean of 27.79. There were 73 school districts in this category or 14.6% of the school districts in Pennsylvania.

This researcher also chose to control for whether the school district was listed by the Pennsylvania Department of Education as a rural or an urban school district. All schools that fell within the above four areas were coded rural and urban with the following results discovered. Of the 87 school districts in area "A", 12 were rural (14%) and 75 were urban (86%), 180 school districts in area "B", 88 were rural (49%) and 92 were urban (51%), 160 school districts in area "C", 115 were rural (72%) and 45 were urban (28%), and 73 school districts in area "D", 29 were rural (40%) and 44 were urban (60%).

One hundred and twenty school districts were selected from the 501 public school districts throughout Pennsylvania for this study. Determination of the number of school districts in each of the four categories was representative of the actual percentage of districts in the four designated categories across the state. This resulted in 21 school districts being selected from "A", 43 school districts being selected from "B", 38 school districts being selected from "C" and 18 school districts being selected from "D".

Since the researcher also controlled for rural and urban, the correct percentage of rural and urban school districts within each of the four categories was also selected. This resulted in the following number of rural and urban districts to be included within each of the four categories. Category "A" had 3 rural (14%) and 18 urban (86%) school districts randomly selected, category "B" had 21 rural (49%) and 22 urban (51%) school districts randomly selected, category "C" had 27 rural (72%) and 11 urban (28%) school districts randomly selected, and category "D" had 7 rural (40%) and 11 urban (60%) school districts randomly selected for study.

Data Analysis

The first research question stated, "How do gender differences influence reading and mathematics performance as measured by the PSSA fifth and eighth grade tests?" To address this question, the proportion of students scoring in each of the four categories, advanced, proficient, basic, and below basic were compared using *z* scores. Scores above plus or minus 1.96 were considered significant. Confidence intervals at the 95% level were calculated to indicate the degree of this difference.

The second research question was "If there is a gap in reading or mathematics achievement related to gender, how much does the gap narrow or widen as students move from elementary to middle school?" This was designed to determine if there is a significant difference between Grade 5 and Grade 8 males in both areas of reading and mathematics. To compare the proportion of students in fifth grade who passed to the proportion in eighth grade who passed, *z* scores were used. This was repeated for the proportion that failed. The same procedure was conducted with the females who passed and failed in reading and mathematics. The importance of this second research question was to determine if the males or females showed increased or decreases in the proficiency scoring ranges.

Hierarchical linear regression models were used to examine the third and fourth research questions. Research question three stated, "How are gender differences in reading and mathematics achievement influenced by the geographical context?" Question four stated, "What impact does the percentage of economically disadvantaged students in a school district have on the gender differences in reading and mathematics test scores?" In other words, how does attending school in a rural or urban community impact gender differences and how does the percentage of low socioeconomic students in a school district impact gender differences? As each dependent variable was examined, the effects of two additional variables were controlled for. Table 4 shows the independent variables that were included in each of the two hierarchical linear regression models.

Table 4

Independent Variables for Regression Models

Variable	Measured
SES	Percentage of students in district receiving free or reduced lunch
Rural/Urban	Rural--District with less than 274 persons per square mile Urban--District with 274 or greater persons per square mile. Dummy Coded Rural 1, Urban 2
Size of District	Actual number of students in district
Dollars Spent	Actual dollars spent per student in district

As can be seen in Table 5, Model 1 started with the independent variable socioeconomic status, which is thought by most researchers (U.S. Department of Education National Center for Education Statistics, 2003) to be an important factor in student success. Model 2 added three school district factors.

Table 5

Hierarchical Linear Regression Models with Independent Variables

Model 1

Socioeconomic Status of School District

Model 2

Socioeconomic Status of School District

Rural/Urban Status of School District

School District Size

Dollars Spent per Student by School District

Chapter IV

Results

This study was designed to determine if there are gender differences in fifth and eighth grade student performance as measured by the Pennsylvania System of School Assessment (PSSA) tests. Research has shown that achievement differences do exist with males usually lagging behind that of females in reading and literacy. This difference does not exist with all males, however the key is in discovering which particular groups of males are behind. The sample for the study consisted of fifth and eighth grade testing results from 120 of the 501 Pennsylvania public school districts. An attempt was made to control for socioeconomic status since it is the variable most recognized by researchers (U.S. Department of Education National Center for Educational Statistics, 2003) as having an impact on student achievement. The 120 school districts selected resulted in 16,047 males and 15,395 females from fifth grade and 15,774 males and 15,584 females from eighth grade.

The results of the study are presented in two parts. The first part will address research questions one and two:

1. How do gender differences influence reading and mathematics performance as measured by the PSSA fifth and eighth grade tests?
2. If there is a gap in reading or mathematics achievement related to gender, how much does the gap narrow or widen as students move from elementary to middle school?

These two research questions are addressed by examining the proportion of students that scored in the four PSSA categories, Advanced, Proficient, Basic, and Below Basic. Students are considered in Pennsylvania to have passed the exam if they scored at either the Advanced or Proficient levels. They are considered to have not passed the exam if they scored at either the Basic or Below Basic levels. Confidence intervals and *z* scores were calculated on these student scoring levels in order to examine the gender difference between the boys and the girls.

The second part will address research questions three and four:

3. How are gender differences between males and females in reading and mathematics achievement influenced by the geographical context? In other words, how does attending school in a rural or urban community impact gender differences?

4. What impact does the percentage of economically disadvantaged students in a school district have on the gender differences in reading and mathematics test scores?

These two research questions were addressed by using hierarchical linear regression models. Predictors used in the regression models in addition to the rural/ urban and socioeconomic levels were the size of the school district, and the dollars per student spent by the individual school districts (see Table 4 and Table 5).

Presentation of Z Score Findings

Findings for Research Question 1

Fifth grade reading and mathematics. To determine if a gender difference existed in the reading and mathematics portions of the PSSA tests, the actual number of males and the actual number of females that scored in each of the test scoring ranges: advanced, proficient, basic, and below basic were compared. This was determined by using *z* scores and confidence intervals. Scores were considered significant at the $p < .05$ level if they were greater than + or – 1.96. The actual number of students that scored in each proficiency range appears in Table 6.

Table 6

Fifth Grade Reading Results

	Actual number of students in each scoring proficiency range	
	Males	Females
Advanced	2,891	3,403
Proficient	6,603	6,230
Basic	3,524	3,336
Below Basic	3,029	2,425
Total Students	16,047	15,395

The *z* scores and confidence intervals comparing the fifth grade males and females in each of the scoring proficiency ranges are presented in Table 7. The *z* scores were considered significant if they were + or – 1.96.

Table 7

Fifth Grade Reading Statistical Analysis

	z score	Confidence Interval
Advanced	-9.07154 *	-.04102 to -.04088
Proficient	1.22673	.006711 to .006893
Basic	.624799	.002893 to .002983
Below Basic	7.313072 *	.031175 to .031304

Note. * indicates a significant difference

Table 7 suggests that a significant difference existed between the number of males that scored advanced in reading and the number of females advanced in reading. The negative *z* score indicated that significantly more females scored in the advanced PSSA range than males. The confidence interval suggested that females outnumbered males in the advanced scoring range by about 4%.

A significant difference also existed between the number of males scoring below basic in reading and the number of females scoring below basic in reading. The positive *z* score indicated that significantly more males scored in the below basic PSSA range than females. The confidence interval suggested that males outnumbered females in the below basic scoring range by about 3.1%.

The fifth grade mathematics results for each of the scoring proficiency ranges are presented in Table 8.

Table 8

Fifth Grade Math Results

	Actual number of students in each scoring proficiency range	
	Males	Females
Advanced	4,882	4,006
Proficient	4,457	4,499
Basic	3,230	3,583
Below Basic	3,478	3,307
Total Students	16,047	15,395

The *z* scores and confidence intervals comparing the fifth grade males and females in each of the scoring proficiency ranges for mathematics are presented in Table 9. The *z* scores were considered significant if they were + or – 1.96.

Table 9

Fifth Grade Mathematics Statistical Analysis

	z score	Confidence Interval
Advanced	8.664592 *	.043936 to .044098
Proficient	-2.84597 *	-.01457 to -.01441
Basic	-6.76749 *	-.03153 to -.03138
Below Basic	.415506	.001857 to .002000

Note. * indicates a significant difference

The findings presented in Table 9 suggest that a significant difference existed between the number of males scoring advanced in math and the number of females scoring advanced in math. The positive *z* score indicated that significantly more males scored in the advanced PSSA range than females. The confidence interval suggested that males outnumbered females in the advanced scoring range by about 4.4%.

In the proficient scoring range, a significant difference existed between the number of males and the number of females. The negative *z* score indicated that more females scored proficient than the number of males. The confidence interval suggested that females outnumber males in the proficient scoring range by about 1.4%.

In the basic scoring range, a significant difference existed between the number of males and the number of females in the basic PSSA scoring range. The negative *z* score indicated that more females are scoring basic than the number of males scoring basic. The confidence interval suggested that females outnumbered males in the proficient scoring range by about 3.1%.

Eighth grade reading and mathematics. The eighth grade reading results showing the actual number of males and females that scored in each of the proficiency ranges appear in Table 10.

Table 10

Eighth Grade Reading Results

	Actual number of students in each scoring proficiency range	
	Males	Females
Advanced	3,174	3,906
Proficient	6,223	6,366
Basic	3,120	3,147
Below Basic	3,257	2,165
Total Students	15,774	15,584

The *z* scores and confidence intervals comparing the eighth grade males and females in each of the reading scoring proficiency ranges are presented in Table 11. The *z* scores were considered significant if they were + or - 1.96.

Table 11

Eighth Grade Reading Statistical Analysis

	z score	Confidence Interval
Advanced	-10.4666 *	-.04950 to -.04935
Proficient	-2.52616 *	-.01408 to -.01389
Basic	-.91753	-.00421 to -.00407
Below Basic	15.81639 *	.067489 to .06762

Note. * indicates a significant difference

The *z* score in the advanced scoring range suggested that a significant difference existed between the number of males in reading and the number of females in reading. The negative *z* score indicated that significantly more females scored in the advanced

PSSA range than males. The confidence interval suggested that females outnumbered males in the advanced scoring range by about 4.9%. This eighth grade *z* score was even higher than the significant difference seen in the fifth grade scores, which suggested males were even less likely than females to score advanced in reading.

In the proficient scoring range, a significant difference existed between the number of males in reading and the number of females in reading. The negative *z* score indicated that significantly more females scored in the proficient PSSA range than males. The confidence interval suggested that females outnumbered males in the proficient scoring range by about 1.4%.

In the below basic scoring range, a significant difference existed between the number of males scoring below basic and the number of females scoring below basic in reading. The positive *z* score indicated that significantly more males scored in the below basic PSSA range than females. The confidence interval suggested that males outnumbered females in the below basic scoring range by about 6.7%. Comparing this significance level to the one noted in fifth grade reading, males were more likely than females to score below basic at the eighth grade level.

The actual number of eighth grade students in each scoring proficiency range for mathematics appears in Table 12.

Table 12

Eighth Grade Math Results

	Actual number of students in each scoring proficiency range	
	Males	Females
Advanced	3,354	2,950
Proficient	5,542	5,737
Basic	3,110	3,397
Below Basic	3,759	3,500
Total Students	15,774	15,584

The *z* scores and confidence intervals comparing the eighth grade males and females in each of the reading scoring proficiency ranges are presented in Table 13. The *z* scores were considered significant if they were + or 1.96.

Table 13

Eighth Grade Math Statistical Analysis

	z score	Confidence Interval
Advanced	5.154465 *	.023262 to .023402
Proficient	-3.0988 *	-.01688 to -.01671
Basic	-4.41892 *	-.02032 to -.02018
Below Basic	2.878841 *	.013369 to .013789

Note. * indicates a significant difference

In the advanced scoring range, a significant difference existed between the number of males scoring advanced in math and the number of females scoring advanced in math. The positive *z* score indicated that significantly more males scored in the advanced PSSA range than females. The confidence interval suggested that males outnumber females in the advanced scoring range by about 2.3%. Comparing this significant difference to the one noted in fifth grade suggested that more females were able to score in the advanced range when tested at the eighth grade level.

In the proficient scoring range, a significant difference existed between the number of males and the number of females. The negative *z* score indicated that more females scored proficient than the number of males proficient. The confidence interval suggested that females outnumber males in the proficient scoring range by about 1.6%.

In the basic scoring range, a significant difference existed between the number of males and the number of females. The negative *z* score indicated that more females were scoring basic than the number of males scoring basic. The confidence interval suggested that females outnumbered males in the basic scoring range by about 2%.

In the below basic scoring range, a significant difference existed between the number of males and the number of females. The positive *z* score indicated that more males were scoring below basic than the number of females scoring below basic. The confidence interval suggested that males outnumbered females in the below basic scoring range by about 1.3%. It should be noted that no significance was noted in the fifth grade below basic math, but one does emerge in the eighth grade test.

These results allow us to reject H_{01} which stated that there would be no significant gender differences in either reading or mathematics in Grade 5 or Grade 8 PSSA scores at the four scoring levels: advanced, proficient, basic, or below basic. Significant differences were evident in both reading and mathematics in each of the grade levels studied. Of the 16 scoring proficiency levels considered, there were significant differences noted in 12 of them. Of particular interest to this researcher are the males that seemed to be doing poorly in reading.

Kleinfeld (1998), Weaver-Hightower (2003), and Skelton (2001) are researchers interested in helping male students become more successful in school. They stressed it is not all boys who struggle, however, and the most important strategy is to determine which groups of males are more at risk. Research questions three and four will help isolate some of those factors.

Findings for Research Question 2

This research question examined the number of fifth grade males passing and failing both the reading and mathematics tests compared to the number of eighth grade males passing and failing to determine if this number increased or decreased. The same factors were considered for females in the reading and mathematics area. The procedure used involved totaling the number of students scoring advanced and proficient to get the actual number of students that passed. The actual number of students scoring basic and below basic were combined to calculate the number of students that did not pass. Confidence levels and z scores were also calculated for these comparisons.

Number of Grade 5 males passing (failing) compared to Grade 8 males. The actual number of male students that passed or failed the PSSA reading test in fifth grade was compared to the number of male students that passed or failed in eighth grade. The z scores and confidence intervals are also included for the comparisons. The results appear in Table 14.

Table 14

Male PSSA Reading Pass and Fail Rates

	Grade 5	Grade 8	*z* score	Confidence Interval
Number Passed	9,494	9,397	-.74273	-.00418 to -.00400
Number Failed	6,553	6,377	.74272	.00400 to .00418
Total Males	16,047	15,774		

Note. * indicates a significant difference

These results indicated that there was no significant difference between the number of males passing or failing the fifth grade PSSA reading test and the number of males passing or failing the eighth grade PSSA reading test. This suggested that eighth grade males were passing at a similar rate as fifth grade males.

The actual number of fifth and eighth grade male students that passed and failed the PSSA mathematics test are included in Table 15.

Table 15

Male PSSA Mathematics Pass and Fail Rates

	Grade 5	Grade 8	*z* score	Confidence Interval
Number Passed	9,399	8,896	3.24777 *	.017921 to .018103
Number Failed	6,708	6,878	-3.24777 *	-.018103 to -.017921
Total Males	16,047	15,774		

Note. * indicates a significant difference

These results indicated that there was a significant difference between the number of males passing the fifth grade PSSA math test and the number of males passing the eighth grade PSSA math test. The results suggested that males at the eighth grade level were doing more poorly than males at the fifth grade level. The confidence interval suggested that 1.7% more males were passing at fifth grade than at eighth grade.

This also indicated that there was a significant difference between the number of males failing the fifth grade PSSA math test and the number of males failing the eighth grade PSSA math test. The results suggested that males at the eighth grade level were failing at a greater rate than males at the fifth grade level. The confidence interval suggested that 1.8% more males were failing in eighth grade than in fifth grade.

Number of Grade 5 females passing (failing) compared to Grade 8 females. The actual number of female students that passed or failed the PSSA reading test in fifth grade was compared with the female students in eighth grade. The *z* scores and confidence intervals are also included for the comparisons. The results appear in Table 16.

Table 16

Female PSSA Reading Pass and Fail Rates

	Grade 5	Grade 8	*z* score	Confidence Interval
Number Passed	9,634	10,272	-6.12398*	-.03344 to -.03326
Number Failed	5,761	5,312	6.12398*	.03326 to .03344
Total Females	15,395	15,584		

Note. * indicates a significant difference

This indicated that there was a significant difference between the number of females passing the fifth grade PSSA reading test and the number of females passing the eighth grade PSSA reading test. The results suggested that females at the fifth grade level were doing more poorly than females at the eighth grade level. The confidence interval suggested that 3.3% more females were passing at eighth grade than at fifth grade.

The results also indicated that there was a significant difference between the number of females failing the fifth grade PSSA reading test and the number of females failing the eighth grade PSSA reading test. The results suggested that females were scoring better on the PSSA exam with significantly more females passing at the eighth grade level than at the fifth grade level. The confidence interval suggested that 3.3% more females were passing at eighth grade than at fifth grade.

The actual number of fifth and eighth grade female students that passed and failed the PSSA mathematics test are included in Table 17.

Table 17

Female PSSA Mathematics Pass and Fail Rates

	Grade 5	Grade 8	z score	Confidence Interval
Number Passed	8,505	8,687	-.88160	-.00507 to -.00488
Number Failed	6,890	6,897	.88160	.00488 to .00507
Total Females	15,395	15,584		

Note. * indicates a significant difference

The findings indicated that there was no significant difference between the number of females passing the fifth grade PSSA math test and the number of females passing the eighth grade PSSA math test. The results also indicated that there was no significant difference between the number of females failing the fifth grade PSSA math test and the number of females failing the eighth grade PSSA math test.

These results would suggest that H_{02} and H_{03} could be rejected. H_{02} had stated that there would be no difference between male passing and failing PSSA rate when comparing Grade 5 to Grade 8. H_{03} had stated that there would be no difference between female passing and failing PSSA rates when comparing Grade 5 to Grade 8.

This analysis helped establish the fact that male students are not being as successful in mathematics when comparing fifth grade PSSA results to eighth grade PSSA results. Eighth grade male students did significantly poorer than fifth grade students when looking at the overall passing and failing rates. Female students, on the other hand, continued to be significantly more successful in reading when comparing fifth grade PSSA results to the eighth grade PSSA results. Eighth grade females had a significantly higher passing rate than the fifth grade students.

Presentation of Findings for Hierarchical Linear Regression

Hierarchical linear regression models were used with the data from each of the 120 school districts. In all, 16 models were run for Grade 5 performance data, and 16 models were run for Grade 8 performance data. More detail of the models can be found in Table 4. The 32 SPSS runs consisted of a two-model hierarchical linear regression construction. Model 1 was comprised of one of the designated dependent variables with the independent variable Socioeconomic Status (SES). This is the percentage of students in the school district that participate in the Federal Free and Reduced lunch program. Model 2 also included SES, but added in three more independent school variables:

1. Size of the School District—This was based upon the total number of students enrolled in the entire school district K-12.

2. Dollars Spent per Student—This was the reported amount of money spent per student in the entire school district.

3. Rural or Urban Status—Each of the 120 districts was listed as rural if there was less than 274 people per square mile living within the school district boundaries, and urban if there was 274 or more people per square mile living within the school district boundaries. These are the calculations used by the Pennsylvania General Assembly for school district purposes.

Of the 32 SPSS hierarchical linear regression models, seven proved to be significant for rural/urban, and 31 of 32 proved to be significant for socioeconomic status. Of the seven significant rural/urban models, four were from fifth grade student performance data, and three were from eighth grade student performance data.

Fifth Grade SES and Rural/Urban Findings

There were four significant fifth grade rural/urban findings. They were for the dependent variables male proficient math, female proficient math, female basic math, and female basic reading. These were based on the actual number of students in each scoring category.

Fifth Grade Proficient Models Significant for SES and Rural/Urban

Fifth Grade Male Proficient Math. The first model that proved significant for the rural/urban independent variable and SES was male proficient math. The R^2 for the model was .189, and the adjusted R^2 was .182, indicating that 18.2% of the variance in the percentage of Grade 5 males scoring in the proficient range can be explained by the independent variable SES. This regression analysis revealed that the model did significantly predict the dependent variable Grade 5 male proficient math: $F(1,118)=27.455$ with $p=.000$ which was statistically significant at the $p<.05$ level.

Model 2 also significantly predicted the dependent variable $F(4,115)=8.998$ with $p=.000$. The strongest predictor for Model 2 was still SES with $\beta=-.395$ which was significant at $p=.000$. The rural/urban $\beta=.192$ which was significant at $p=.032$. This was the second strongest predictor in Model 2. The R^2 for Model 2 equaled .238, and the adjusted R^2 was .212 which meant that 21.2% of the variance in the percent of Grade 5 males scoring in the proficient range was explained by the independent variables. This model was significant at the $p=.000$ level. Based on the R^2 strength of Model 2 and the statistical significance, both independent variables SES and rural/urban were important predictors of the percentage of males who were proficient in mathematics in fifth grade.

Fifth Grade Female Proficient Math. The R^2 for the first model was .200, and the adjusted R^2 was .193, indicating that 19.3% of the variance in the percentage of Grade 5 females scoring in the proficient range can be explained by the independent variable SES. This first regression model did significantly predict the dependent variable: $F(1,118)=29.455$ with $p=.000$ which was statistically significant at the $p<.05$ level.

Model 2 continued to significantly predict the dependent variable $F(4,115)=9.983$ with $p=.000$. SES was still the strongest predictor for the percent of Grade 5 females scoring proficient with $\beta = -.416$ which was significant at the .000 level. The rural/urban independent variable was the second strongest predictor in Model 2 with $\beta=.231$ which was significant at $p=.009$.

The R^2 for Model 2 equaled .258, and the adjusted R^2 was .232 which meant that 23.2% of the variance in the percent of Grade 5 females scoring in the proficient range was explained by the independent variables. This model was significant at the $p=.000$ level. Based on the R^2 strength of Model 2 and the statistical significance, both independent variables, SES and rural/urban, were important predictors of the percentage of females who were proficient in mathematics in fifth grade.

Fifth Grade Basic Models Significant for SES and Rural/Urban

The other two fifth grade models that proved significant for rural/urban were in the basic range, and this is considered failing in Pennsylvania. Both of these models were for females. They were for the dependent variables basic female mathematics and basic female reading. Another important feature was that the female basic math model was the only one out of 32 SPSS models that did not have SES prove significant.

Fifth Grade Female Basic Math. The R^2 for this model was .018, and the adjusted R^2 was .009, indicating that 0.9% of the variance in the percent of Grade 5 females in basic math can be explained by the independent variable SES. This regression analysis revealed that the model did not significantly predict the dependent variable, percentage of Grade 5 females scoring in the basic range. It should be noted that this was the only model of 32 regression runs that did not have SES show significance in the first model.

Model 2 did significantly predict the dependent variable $F(4,115)$ 4.980 with p=.001. The R^2 was .148, and the adjusted R^2 was .118 which meant that 11.8% of the variance for this dependent variable can be explained by the independent variables. The strongest predictor for this model was rural/urban with β= -.250 which was significant at p=.008. The second strongest predictor for Model 2, and the only other significant independent variable, was the dollars spent per student. This independent variable had a β=-.209 which was significant at p=.026. It is important to note that this is only one of two results where the rural students significantly outperformed the urban students, however this scoring category is in the failing range.

Fifth Grade Female Basic Reading. The R^2 for this model was .175, and the adjusted R^2 was .168, indicating that 16.8% of the variance in the percentage of Grade 5 females in basic reading can be explained by the independent variable SES. This regression analysis revealed that the model did significantly predict the percentage of Grade 5 females scoring in the basic category: $F(1,118)$=25.103 with p=.000 which was statistically significant at the p<.05 level.

Model 2 also significantly predicted the dependent variable $F(4,115)$=8.661 with p=.000. The R^2 for Model 2 was .232, and the adjusted R^2 was .205 which meant that 20.5 % of the variance in this dependent variable can be explained by the independent variables. The strongest predictor for Model 2 was still SES with β=.419 which was significant at p=.000. The rural/urban β=-.180 which was significant at p=.045. This was the only other significant independent variable in Model 2. It is important to note that this is only one of two results where the rural students significantly outperformed the urban students, however this scoring range is in the failing category.

Eighth Grade SES and Rural/Urban Findings

Three of the hierarchical linear regression models proved significant for the rural/urban independent variable in eighth grade. These included male advanced mathematics, female advanced mathematics, and female advanced reading. The independent variable SES proved significant in all 16 of the Grade 8 models. Details of the three rural/urban and SES significant models are presented.

Eighth Grade Advanced Models Significant for SES and Rural/Urban

Eighth Grade Male Advanced Mathematics. The R^2 for Model 1 was .327, and the adjusted R^2 was .322, indicating that 32.2% of the variance in the percentage of Grade 8 males scoring in advanced math can be explained by the independent variable SES. This regression analysis revealed that the model did significantly predict the dependent variable: $F(1,118)$=57.416 with p=.000 which was statistically significant at the p<.05 level.

Model 2 also significantly predicted the dependent variable $F(4,115)$=27.017 with p=.000. The R^2 for Model 2 was .484, and the adjusted R^2 was .467 which meant that 46.7% of the variance in the percentage of Grade 8 males in advanced math can be explained by the independent variables. The strongest predictor for Model 2 was still SES with β=-.590 which was significant at p=.000. The rural/urban β=.179 which was significant at p=.015. A third independent variable was significant in Model 2. This was the dollars spent per student with β=.302 which was significant at p=.000. This suggests that the dollars spent per student was actually the second strongest predictor in Model 2 with the significant variable rural/urban being the third strongest predictor.

Eighth Grade Female Advanced Mathematics. The R^2 for the model was .276, and the adjusted R^2 was .270, indicating that 27.0% of the variance in the percentage of Grade 8 females scoring advanced can be explained by the independent variable SES. This regression analysis revealed that the model did significantly predict the dependent variable: $F(1,118)$=45.068 with p=.000 which was statistically significant at the $p<.05$ level.

Model 2 also significantly predicted the dependent variable $F(4,115)$=23.616 with p=.000. The R^2 for model 2 was .451, with an adjusted R^2 of .432. This meant that 43.2% of the variance in the dependent variable can be explained by the independent variables. The strongest predictor for Model 2 was still SES with β=-.537 which was significant at p=.000. The rural/urban β=.222 which was significant at p=.004. A third independent variable was significant in Model 2. This was the dollars spent per student with β=.281 which was significant at p=.000. This suggested that the dollars spent per student was actually the second strongest predictor in Model 2 with the significant variable rural/urban being the third strongest predictor.

Eighth Grade Female Advanced Reading. The R^2 for the model was .382, and the adjusted R^2 was .377, indicating that 37.7% of the variance in the percentage of Grade 8 females scoring advanced can be explained by the independent variable SES. This regression analysis revealed that the model did significantly predict the dependent variable: $F(1,118)=72.872$ with $p=.000$ which was statistically significant at the $p<.05$ level.

Model 2 also significantly predicted the dependent variable $F(4,115)=25.398$ with $p=.000$. The R^2 for Model 2 was .469, with an adjusted R^2 of .451. This meant that 45.1% of the variance in the dependent variable can be accounted for by the independent variables. The strongest predictor for Model 2 was still SES with $\beta=-.624$ which was significant at $p=.000$. The rural/urban $\beta=.164$ which was significant at $p=.028$. A third independent variable was significant in Model 2. This was the dollars spent per student with $\beta=.188$ which was significant at $p=.011$. This suggested that the dollars spent per student was actually the second strongest predictor in Model 2 with the significant variable rural/urban being the third strongest predictor.

Findings for Research Question Three

The primary interest in research question 3 is estimating the effect of the rural/urban predictor variable when controlling for other variables. This was found to be significant in four models at the fifth grade level and three models at the eighth grade level. Beta tables are presented in this section for each of the significant models.

Beta Tables for Fifth Grade Male and Female Proficient Math

As illustrated in Table 18, a hierarchical linear regression analysis was performed for the dependent variable Grade 5 male proficient math and the four independent variables.

Table 18

Hierarchical Regression Results Grade 5 Male Proficient Math (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-1.47	.028	-.434 *
Model 2			
SES	-.134	.028	-.395 *
Rural/Urban	2.410	1.110	.192 *
Size of Dist.	-8.E-05	.000	-.055
$ per Student	-.001	.000	-.184 *

Note. R^2 =.189 for Model 1; R^2 =.238 for Model 2, R^2 Change=.050 for Model 2
*p<.05

The positive standardized betas for rural/urban suggested that urban Grade 5 male students significantly outperformed their rural counterparts in the math proficient scoring range of the PSSA test. It is interesting to compare the betas in Table 18 with those that appear in Table 19 for the Grade 5 female proficient mathematics scores.

Table 19

Hierarchical Regression Results Grade 5 Female Proficient Math (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.178	.033	-.447 *
Model 2			
SES	-.165	.033	-.416 *
Rural/Urban	3.413	1.286	.231 *
Size of Dist.	.000	.000	-.145
$ per Student	-.001	.000	-.102

Note. R^2=.200 for Model 1; R^2=.258 for Model 2, R^2 Change=.058 * for Model 2
*p<.05

The positive beta for Grade 5 female proficient math was similar to that found in the Grade 5 male proficient math model suggesting that the urban students significantly outperformed their rural counterparts in Grade 5 proficient math. The unstandardized beta for rural/urban in Table 19, Model 2 for females was 3.413 compared to 2.410 in Table 18 for male students. This suggested that the rural/urban independent variable was a stronger predictor for female Grade 5 students than for male Grade 5 students, even though it proved to be a significant predictor in each case.

Beta Tables for Fifth Grade Female Basic Mathematics and Reading

The betas for fifth grade females scoring in the basic category for mathematics appear in Table 20.

Table 20

Hierarchical Regression Results Grade 5 Female Basic Math

(*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.051	.035	.133
Model 2			
SES	.052	.034	.134
Rural/Urban	-3.564	1.329	-.250 *
Size of Dist.	6.8E-05	.000	.040
$ per Student	-.001	.000	-.209 *

Note. R^2=.018 for Model 1; R^2=.148 for Model 2, R^2 Change=.130 * for Model 2
$^*p<.05$

The negative betas for rural/urban in this hierarchical linear regression analysis suggested that rural students significantly outperformed urban students in this Grade 5 female basic math scoring category. Of the seven significant rural/urban models, this was one of only two models in which rural students outperformed urban students.

Table 21 illustrates the betas for fifth grade females in the basic reading scoring category.

Table 21

Hierarchical Regression Results Grade 5 Female Basic Reading (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.174	.035	.419 *
Model 2			
SES	.174	.035	.419 *
Rural/Urban	-2.764	1.365	-.180 *
Size of Dist.	.000	.000	.108
$ per Student	-.001	.000	-.124

Note. R^2=.175 for Model 1; R^2=.232 for Model 2. R^2 Change=.056 * for Model 2
*p<.05

The negative betas for rural/urban in this hierarchical linear regression analysis suggested that rural students significantly outperformed urban students in this Grade 5 female basic reading category. This was the second of only two models where rural students significantly outperformed urban students. Schools in the rural category had a greater proportion of female students in the basic (failing) range for both mathematics and reading. The unstandardized beta for rural/urban in Table 20, Model 2 was –3.564 compared to –2.764 in Table 21. This suggested that the rural/urban independent variable was a stronger predictor for mathematics than for reading for these females in the basic scoring range.

Beta Tables for Eighth Grade Male and Female Advanced Math

As illustrated in Table 22, a hierarchical linear regression analysis was performed for the dependent variable Grade 8 male advanced math and the seven independent variables.

Table 22

Hierarchical Regression Results Grade 8 Male Advanced Math

(N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.355	.047	-.572 *
Model 2			
SES	-.366	.042	-.590 *
Rural/Urban	4.129	1.672	.179 *
Size of Dist.	1.8E-05	.000	.006
$ per Student	.003	.001	.302 *

Note. R^2=.327 for Model 1; R^2=.484 for Model 2, R^2 Change=.157 * for Model 2
*p<.05

The positive rural/urban betas suggested that urban Grade 8 male students significantly outperformed rural Grade 8 males in the advanced math scoring range. The eighth grade female advanced betas are shown in Table 23.

Table 23

Hierarchical Regression Results Grade 8 Female Advanced Math (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.328	.049	-.526 *
Model 2			
SES	-.335	.044	-.537 *
Rural/Urban	5.127	1.735	.222 *
Size of Dist.	9.2E-05	.000	.033
$ per Student	.002	.001	.281 *

Note. R^2=.276 for Model 1; R^2=.451 for Model 2, R^2 Change=.175 * for Model 2
*p<.05

The rural/urban beta=.201 which was significant at p=.008. The positive rural/urban betas suggested that urban Grade 8 female students significantly outperformed rural Grade 8 females in the advanced math scoring range. In comparing the male unstandardized beta=4.129 for rural/urban in Table 22, Model 2 with that for the female beta=5.127 as shown in Table 23, the rural/urban effect was greater for females than for males.

Beta Table for Female Eighth Grade Advanced Reading

The final hierarchical linear regression model showing significance for the rural/urban independent variable is shown in Table 24.

Table 24

Hierarchical Regression Results Grade 8 Female Advanced Reading (N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	-.374	.044	-.618 *
Model 2			
SES	-.377	.042	-.624 *
Rural/Urban	3.672	1.654	.164 *
Size of Dist.	8.6E-05	.000	.032
$ per Student	.002	.001	.188 *

Note. R^2=.382 for Model 1; R^2=.469 for Model 2, R^2 Change=.087 * for Model 2
*p<.05

The rural/urban beta=.149 which was significant at p=.047. The positive rural/urban betas suggested that urban Grade 8 female students significantly outperformed rural Grade 8 females in the advanced reading scoring range.

Research question number three was designed to determine if attending school in a rural or urban community had an impact on gender differences in Grade 5 and Grade 8 PSSA scores. For male students this proved to be significant in 2 of the 16 performance levels tested. Fifth grade males scoring in the proficient math category and eighth grade males scoring in the advanced math category had a significance level of p<.05 in respect to the rural/ urban independent variable. Female students had five scoring categories prove significant when examining the rural and urban school district status. Fifth grade females scoring in the proficient and basic categories in mathematics and the basic category of reading all proved significant at the p<.05 level. Eighth grade females scoring in the advanced reading and advanced mathematics categories all proved significant.

Of these seven significant rural/urban findings, an examination of the positive and negative betas suggested that rural students significantly outperformed their urban counterparts in only two of the proficiency bands, that being female Grade 5 basic reading and basic math. It is worthy to note that both of these scoring categories are considered failing in Pennsylvania. The other five scoring categories that proved significant suggested that the urban students significantly outperformed their rural counterparts. All five of these results were in the proficient and advanced scoring ranges and are considered passing in Pennsylvania.

The seven regression models presented all indicated that the rural/urban independent variable was significant in respect to the corresponding models. This would support rejecting H_{04} that stated there are no significant differences in student PSSA results when examined in terms of rural and urban school districts.

Findings for Research Question 4

Research question four was designed to determine if the percentage of economically disadvantaged students in a school district had a significant effect on the gender differences in reading and mathematics test scores. An examination of the SPSS data from the 32 regression models confirmed how strong a predictor this variable really is in respect to student success. Of the 32 models, SES proved significant in 31 of the scoring categories (see Appendix A for Grade 5 results and Appendix B for Grade 8 results). The only scoring category that did not prove significant was Grade 5 female basic math. More detail of this particular model, in which SES was not a significant predictor, can be found in Table 20, since this model was one of the seven that did prove significant for the rural/urban independent variable.

Four tables are presented in the SES findings to help describe the results. This data was chosen to illustrate how R^2 varies for each of the hierarchical linear regression models. The betas were included to help show the direction of the relationship between the independent variable SES and each of the dependent variables. The R^2 for Model 1 and Model 2 in each of the 32 regression models are presented in Tables 25 through 28. The R^2 is the proportion of variance in the dependent variable which can be predicted from the independent variable. In the case of Model 1, the independent variable was SES only. The R^2s for Model 2 are displayed since SES and three additional variables are included.

The betas for SES in Model 1 and Model 2 are also listed in Tables 25 through 28. This is done to help demonstrate how significant particular scoring categories are in relation to others. Table 25 presents the R^2s and SES betas for the eight Grade 5 regression runs that were in the advanced and proficient ranges. These are the ranges considered passing in Pennsylvania.

Table 25

Grade 5 Model R^2 and SES β for Passing PSSA Tests

	Model 1		Model 2	
	R^2	β	R^2	β
Male Advanced Reading	.184	-.428*	.267	-.448*
Female Advanced Reading	.228	-.478*	.298	-.491*
Male Advanced Math	.255	-.505*	.361	-.533*
Female Advanced Math	.211	-.459*	.328	-.468*
Male Proficient Reading	.389	-.624*	.405	-.605*
Female Proficient Reading	.221	-.471*	.255	-.458*
Male Proficient Math	.189	-.434*	.238	-.395*
Female Proficient Math	.200	-.447*	.258	-.416*

Note. $*p<.05$

It should be noted that every SES Beta proved significant in the passing ranges for Grade 5 students. The R^2s for Model 1 ranged from .184 in male advanced reading to .389 in male proficient math. The betas increased in each category when the four independent variables were run in Model 2. They ranged from .238 in male proficient math to .405 in male proficient reading. It is also worthy to note that every beta in this passing range for Grade 5 has a negative value which suggests that the greater the percentage of SES students in the school district, the fewer the number of students will be in each of the identified passing ranges on the PSSA test.

The corresponding scoring ranges in the Grade 5 results for the basic and below basic scoring ranges are presented in Table 26. These eight scoring ranges are considered failing in Pennsylvania.

Table 26

Grade 5 Model R^2 and SES β for Failing PSSA Tests

	Model 1		Model 2	
	R^2	β	R^2	β
Male Basic Reading	.056	.236*	.118	.237*
Female Basic Reading	.175	.419*	.232	.419*
Male Basic Math	.082	.287*	.171	.285*
Female Basic Math	.018	.133	.148	.134
Male Below Basic Reading	.587	.766*	.598	.765*
Female Below Basic Reading	.397	.630*	.421	.632*
Male Below Basic Math	.391	.626*	.432	.639*
Female Below Basic Math	.436	.660*	.468	.667*

Note. * $p<.05$

An examination of the Model 1 R^2 values demonstrated that the four lowest below basic scoring categories had the strongest R^2 values. This suggested that SES is a very strong predictor for students in Grade 5 scoring in the below basic category. The listed betas for the below basic categories were also the most significant in either Grade 5 table, ranging from .626 in male below basic math to .766 in male below basic reading. It is also interesting that every beta in each model had a positive value. This suggests that the greater the percentage of low SES students in the school district, the greater the number of students will be found scoring in the failing PSSA test categories.

Table 27 illustrates the same PSSA passing ranges for Grade 8 students.

Table 27

Grade 8 Model R^2 and SES β for Passing PSSA Tests

	Model 1		Model 2	
	R^2	β	R^2	β
Male Advanced Reading	.337	-.581*	.404	-.603*
Female Advanced Reading	.382	-.617*	.469	-.624*
Male Advanced Math	.327	-.572*	.484	-.590*
Female Advanced Math	.276	-.526*	.451	-.537*
Male Proficient Reading	.246	-.496*	.257	-.493*
Female Proficient Reading	.088	-.297*	.178	-.302*
Male Proficient Math	.314	-.560*	.330	-.562*
Female Proficient Math	.230	-.480*	.278	-.493*

Note. *p<.05

The Grade 8 results follow a similar pattern found in the Grade 5 results in that every beta had a negative value, suggesting that the greater the percentage of low SES students in the school district, the fewer the number of students will be in each of the identified passing ranges on the PSSA test. Also, the R^2 values in the Grade 8 scoring ranges were much stronger than the corresponding R^2 values found in the advanced Grade 5 ranges. This suggested that SES is a stronger predictor for the Grade 8 advanced ranges than the Grade 5 advanced.

The Grade 8 failing ranges are presented in Table 28.

Table 28

Grade 8 Model R^2 and SES β for Failing PSSA Tests

	Model 1		Model 2	
	R^2	β	R^2	β
Male Basic Reading	.174	.417*	.216	.424*
Female Basic Reading	.265	.514*	.297	.522*
Male Basic Math	.141	.375*	.262	.396*
Female Basic Math	.061	.247*	.187	.270*
Male Below Basic Reading	.403	.635*	.421	.649*
Female Below Basic Reading	.382	.618*	.424	.623*
Male Below Basic Math	.408	.639*	.421	.644*
Female Below Basic Math	.422	.649*	.446	.654*

Note. * $p<.05$

Following the same pattern found in the Grade 5 failing ranges, every beta had a positive value. This suggests that the greater the percentage of low SES students in the school district, the greater the number of students will be found scoring in the failing PSSA test categories. Also, the four strongest betas were found in the below basic ranges, suggesting that SES continued to be a very strong predictor in the lowest of the failing PSSA ranges for both reading and mathematics.

Thus, even though SES was significant in 31 of the 32 regression models, this particular independent variable seemed to be a stronger predictor for the students that scored in the lowest of the PSSA scoring ranges. This would support rejecting H_{05} that stated there are no significant differences in student gender PSSA results when differences in school district socioeconomic status are considered.

Chapter V

Summary, Implications, Recommendations

Summary

The purpose of this study was to determine if gender differences existed in the Pennsylvania State School Assessment (PSSA) exam. Scoring performance levels of Grade 5 and Grade 8 students from 120 of the 501 Pennsylvania school districts were selected. The 120 school districts selected resulted in 16,047 males and 15,395 females from fifth grade and 15,774 males and 15,584 females from eighth grade being included. The PSSA test is a standards based criterion-referenced assessment used to measure the attainment of the established Pennsylvania academic standards.

In selecting the schools for the study, an attempt was made to control for socioeconomic status since it is the variable most widely recognized by researchers to have an impact on student achievement. The main independent variables in the study examined whether living in a rural/urban school district or student socioeconomic status (SES) had a significant impact on student achievement. Control variables included in the study were based upon school district factors thought to have a relationship to student achievement such as size of the school district or the amount of money spent per pupil by the school district.

The importance of the present study was to identify whether significant gender differences exist and if so, which particular groups of students were more successful in reading or mathematics and what variables can be identified to help predict the student groups that are needy. Gender research from many countries outside of the United States seemed to focus on the large number of males that are being unsuccessful with reading and literacy in the elementary grades.

Most of the United States educational research over the past 20 years has centered on female student weaknesses in the science and mathematics areas and what can be done to close the identified gap. There was limited research in the United States addressing the gender gap in reading and literacy for elementary male students. This study helped establish the fact that indeed significant gender gaps exist in the student PSSA test scoring ranges and also helps identify some of the variables that contribute to the differences.

To determine if a gender difference existed in the reading and mathematics portions of the PSSA tests, the actual number of males and the actual number of females that scored in each of the test scoring ranges: advanced, proficient, basic, and below basic were compared. This was determined by using *z* scores and confidence intervals. The *z* scores were considered significant at the $p < .05$ level if they were greater than + or – 1.96.

The fifth grade reading results revealed a significant difference in the advanced reading category where females are outperforming male students. The other significant finding in fifth grade reading was found in the below basic category where males were found to outnumber female students. Current research in the United States has not addressed this significant gender difference in reading. Other countries such as Australia and England have started programs to target male students that are weak in reading and literacy.

Weaver-Hightower (2003) has written that many Western and industrialized societies are experiencing a resurgence of concern for the education of males. He applauded the advances made by the UK and Australia and reported educating males to be an international concern. This is being followed up with different programs and strategies in countries such as the UK and Australia to address a long-standing significant problem with male students. He also noted the reluctance of some education scholars to examine male deficiencies with the fear that reforms put in place to assist females in the areas of mathematics and science will be endangered.

The eighth grade reading results demonstrated the same patterns with significantly more females in the advanced category and significantly more males in the below basic category. The eighth grade reading also added an additional significant finding. The female students were also found to significantly outnumber males in the proficient scoring range. Thus, in eighth grade, females were found to significantly outnumber males in both the advanced and proficient scoring ranges which are the only two ranges considered passing in Pennsylvania. These results concurred with findings by Kleinfeld (1998) that stated females are typically surpassing males in reading and writing achievement, while males are superior in science and mathematics.

The fifth grade mathematics results revealed three of the four scoring ranges with significant differences. Significantly more males were found to be scoring in the advanced range. The proficient and basic ranges were reversed in the findings with significantly more females than males in each of the groups. The eighth grade math results mirrored the fifth grade results with the significant differences found in the same scoring categories with the same results as discovered in fifth grade.

The significant differences found in this study of the PSSA test differed from the conclusions drawn by Cole (1997) stating there was not a dominant picture of either gender excelling academically with the average difference in performance across all subjects very small. Hyde and Lynn (1988) had also drawn the conclusion of a slight female superiority in verbal ability performance, but stated that it was indeed very small.

The second research question examined the number of fifth grade males passing (and failing) both the reading and mathematics tests compared to the number of eighth grade males passing (and failing) to determine if this number increased or decreased. The same factors were considered for females in the reading and mathematics areas. The procedure involved totaling the advanced and proficient scores for all groups to get the actual number of students that passed. The actual number of basic and below basic scores was combined to calculate the number of students that did not pass. Confidence levels and *z* scores were also calculated for these comparisons.

There were no significant findings with the male reading thus suggesting a similar proportion of males at each grade level passing and failing the PSSA exam. There were significant differences found in the male mathematics however. Significantly more male students were passing the PSSA math in fifth grade than in eighth grade as well as significantly more males failing in eighth grade than in fifth grade. One possible explanation is the writing component for the open-ended math problems. Students are expected to write out and describe how questions were solved. Since male students are often less successful with writing, it may be causing math scores at the eighth grade level to suffer.

Female students showed a nearly opposite trend than the male students. In reading where there was no significance found for males, the females did show a significant difference between fifth grade and eighth grade. There were significantly more female students passing the PSSA reading test in eighth grade than in fifth grade as well as significantly more females failing in fifth grade than in eighth grade. The male students had shown a significant difference in mathematics, whereas the females did not. This seems to not follow the trend of many articles from the research suggesting that female students are continuing to perform poorly in mathematics today despite efforts to reverse the trend.

The primary interest in research question 3 was estimating the effect of the rural/urban predictor variable when controlling for other variables. This was found to be significant in four models at the fifth grade level and three models at the eighth grade level. Looking at the results from a gender perspective, the findings for male students proved to be significant in two out of the sixteen proficiency scoring levels tested. Fifth grade males scoring in the proficient math category and eighth grade males scoring in the advanced math category had a significance level of $p<.05$ in respect to the rural/ urban independent variable. Both of these significant male categories suggested urban students were outperforming rural students. This supports findings by The Center for Rural Pennsylvania (2003) claiming that rural Pennsylvania students are performing at lower levels than urban students and the achievement success gap continues to widen as the students progress through the school years. This study also supports a request from Pennsylvania State Representative Jess Stairs from Westmoreland County to the House Education Committee to create a special commission in Pennsylvania to study rural education in Pennsylvania. The Center for Rural Pennsylvania offers annual grants to professors in the 14 state universities to conduct research on rural Pennsylvania education.

Female students had five scoring categories prove significant when examining the rural and urban school district status. Fifth grade females scoring in the proficient and basic categories in mathematics and the basic category of reading all proved significant at the $p<.05$ level. Eighth grade females scoring in the advanced reading and advanced mathematics categories all proved significant. Of these seven significant findings, an examination of the positive and negative betas suggested that rural students significantly outperformed their urban counterparts in only two of the scoring areas, that being female Grade 5 basic reading and female Grade 5 basic math. Both of these scoring categories were in the failing range.

The other five scoring categories that proved significant suggested that the urban students significantly outperformed their rural counterparts. All five of these results were in the proficient and advanced scoring ranges and are the only two ranges considered passing in Pennsylvania. These findings support current research from the Center for Rural Pennsylvania that suggests rural students are not performing at the same level as urban students. One interesting finding was that rural/ urban did not prove significant for any of the male scoring categories in reading. Female students on the other hand, had two reading categories significant.

Research question four was designed to determine if the percentage of economically disadvantaged students in a school district had a significant effect on the gender differences in reading and mathematics test scores. Student socioeconomic status

(SES) proved to be significant in 31 of the 32 scoring categories. The only scoring category that did not prove significant was Grade 5 female basic math.

The data analysis suggested that the higher the percentage of low SES students in the school district, the fewer students in both Grade 5 and Grade 8 will be scoring in the advanced and proficient ranges. The advanced and proficient ranges are the only two ranges considered passing in Pennsylvania. The results also suggested that the higher the percentage of low SES students in the school district, the greater the number of students in Grades 5 and 8 who will be scoring in the basic and below basic ranges. The basic and below basic ranges are considered failing in Pennsylvania.

Even though SES is significant for 31 of the 32 scoring categories, the results suggest that student SES is a very strong predictor for students scoring in the lowest PSSA category of below basic. These results supported current research that suggests SES is an important factor in determining student achievement. These findings support information released by the U.S. Department of Education National Center for Education Statistics (2003) showing that school districts with more than 50% of low SES students had significantly lower achievement scores than schools with 25% or fewer low SES students.

Implications

Policy

This gender study of the Pennsylvania PSSA testing program has helped establish that indeed significant differences exist between males and females. With the No Child Left Behind (2001) regulations playing such an important role in public education today, the time seems ideal to not only look at weak and struggling schools, but to focus on which groups of students are failing and what can be done to improve the matter. The results from this gender study will lend support to ensuring males struggling in the area of reading and literacy can receive the attention and support that has been extended to female students over the past 15 years who struggle in the math and science disciplines.

Since the rural/urban variable has been found to be significant, further studies should help establish the reasons for this trend and possibly allow programs to be developed to target specific groups of students. This also holds true for the SES variable. Under the No Child Left Behind (2001) regulations, children in low performing schools often found in areas of low SES concentrations are to be granted the ability to switch to schools that are higher performing. This moving to another school building may not be the strategy that most effectively addresses the real root of the problem. Educators must begin to target specific groups of students with particular programs to assist children, not simply shuffle them from school to school with no plan for effective remediation. This should involve topics such as extending the school day and extending the school year as well as developing more effective remediation programs designed to target particular groups of students.

The current trend in the United States results in more males being forced into special education programs. Currently in our country, male students represent 71 % of all identified learning disabled students, 80 % of all emotionally disturbed students, and 58 % of all mentally retarded students. This trend in allowing our male students to struggle extends to the high school level where female students show higher graduation rates, higher class averages, lower dropout rates, as well as receiving more class academic scholarships.

Martin (2002) in a final report to the Department of Education in Australia stated that there are indeed gender differences in school achievement and motivation, with boys performing more poorly in most areas. His report entitled Improving the Educational Outcome of Boys discussed the fact that literacy consistently emerges as a distinguishing feature of male and female educational outcomes. This report helps confirm the Australian government Lighthouse Schools for the Education of Boys project that has been underway since 2003. This program is responding to evidence that males are significantly under-performing in key educational areas.

Research

The results from this study will allow further research to be conducted to help determine which groups of students to target. Research in discovering the factors that are contributing to the poor performance of certain male students will help drive new programs designed to assist in providing proper support. A thorough analysis of what has been taking place in the male reading and literacy improvement programs of countries such as the UK, Australia, and Germany may provide guidance in similar trends here in the United States.

The Gender Equity Expert Panel assembled in 2000 by the United States Department of Education examined carefully how female students were performing in the areas of math and science. This has been the area of intense focus in our country for over a decade. Figure 2 shows the math scores of male and female students in Grade 4 as reported in the *Nation's Report Card, Math Highlights 2003*. The figure lists the scores for male and female students over a range of years starting in 1990. There is a distinct male advantage as noted in the figure for each testing year. The scores are based upon a scale from 0 to 500. The greatest difference in math scores is noted in the years 2000 and 2003. These two particular reporting years revealed a 3 point difference each year.

	1990	1992	1996	2000	2003
Male	214	221	224	227	236
Female	213	219	223	224	233
Male Advantage	1	2	1	3	3

Figure 2. Grade 4 math highlights 2003, Nation's Report Card

Figure 3 shows the respective male and female math results in Grade 8 as reported in the *Nation's Report Card* (2003). As in Grade 4, there is a rather close male advantage in each of the testing years with the exception of 1992 where female students actually outscored male students by one point.

	1990	1992	1996	2000	2003
Male	263	268	271	274	278
Female	262	269	269	271	277
Male Advantage	1	-1	2	3	1

Figure 3. Grade 8 math highlights 2003, Nation's Report Card

It is clear to see that female students are performing very close to the level of male students and this is a credit to the attention provided by educators to ensure that female students are successful in mathematics. It is interesting to compare the above math scores and differences with those noted in the area of reading. Figure 4 presents the Grade 4 reading results from the years 1992 through 2003 as reported in the *Nation's Report Card* (2003). There is a reverse trend in the reading scores with a distinct female advantage in each of the reported testing years.

	1992	1994	1998	2000	2003
Female	221	220	217	219	222
Male	213	209	212	208	215
Female Advantage	8	11	5	11	7

Figure 4. Grade 4 reading highlights 2003, Nation's Report Card

The point difference in each of the reported testing years is much larger than any of the differences in the Grade 4 math testing years. This female advantage becomes more significant when the Grade 4 results are compared to the Grade 8 results. Each testing year in Figure 5 reveals a larger female advantage in Grade 8 than noted in Grade 4.

	1992	1994	1998	2000	2003
Female	267	267	270	269	269
Male	254	252	257	260	258
Female Advantage	13	15	13	9	11

Figure 5. Grade 8 reading highlights 2003, Nation's Report Card

These scores from the *Nation's Report Card* (2003) support the findings in this study examined in research question number 2. It is more interesting to note that the Gender Equity Panel assembled by the U.S. Department of Education in 2000 chose to carefully examine the gender difference in mathematics to ensure females were being successful and did not conduct a similar examination of the reading results, an area in which male students are at a more pronounced deficit.

Male students doing more poorly in reading is not confined to the United States. The International Association for the Evaluation of Educational Achievement issued its Progress in Reading Literacy Study (Mullis et al., 2003) in which male and female students from 35 countries were tested. In the two areas of reading that were tested, females outscored males in each of the 35 countries in both of the testing areas.

This researcher suggests it is time to research why male students are performing more poorly in reading than female students and what can be done to help close the achievement gap. This commitment should be equal in effort to that invested in the research and program development that surrounded female achievement in mathematics. Skelton (2001) claimed that educating male students in literacy should be seen to be in crisis. She supports research to more effectively understand gender relations in order to better educate both male and female students throughout the world.

Practice

Moss (2000) has suggested that to make both male and female students more successful, schools need to develop a more active reading culture in the classroom. She has examined methods that individual classroom teachers need to use in order to help students develop a love for reading. Scieszka (2002) also supported developing reading programs designed to help students, particularly males, to develop a deeper love for reading books. It seems that in many cases, our educators are more concerned about teaching reading concepts and then falling short in helping students develop the love of reading. Moss (2000) pointed out the large gap that develops in students that know how to read, but choose not to become an active reader versus students that learn how to read and develop a love for reading.

This researcher intends to make it clear that not all male students are doing poorly in reading and literacy. The goal is to identify which groups of male students are performing below the expected level of achievement and then implement strategies to improve the matter. This supports the findings of Connell (1996) who stated the educational goal is to pinpoint the particular male students most at-risk and then deal with the defined groups. Halpern (1997) has concluded that the No Child Left Behind (2001) regulations in the United States may help deal with the gender differences present in our country.

The gender difference noted in reading and literacy abilities must be addressed and recognized. This should not detract from efforts being made to help female students be successful in mathematics, but the facts demonstrate that male students suffer more in reading skills today than female students suffer in mathematics. New strategies and teaching methods must be developed to help correct this problem. Pre-service teachers at the university level must become aware of this problem and be taught how to deal with it. In-service teachers need to learn how to more effectively deal with struggling male readers and what can be done to make them more successful.

Recommendations

This researcher would be particularly interested in continued gender education studies. These results need to be brought to the attention of our educational leaders with a focus on what can be improved or modified to help the learning process of particular groups of students. Examination of the Australian program would be an excellent starting point for consideration of a similar program in the United States. Our national leaders seem committed to education and helping support children in school success.

Developing short and long-range plans to help make every child successful is a goal of the federal government with our No Child Left Behind (2001) legislation.

Continued study with the impact that early-intervention programs have on male students should be considered. These findings combined with the results from full-day kindergarten programs compared to half-day kindergarten programs must be examined in an effort to make all of our students become successful in school.

One point that needs to be clarified is that this gender research is not attempting to suggest that all boys or all girls are doing poorly in a given area. The goal is to discover which particular groups of males or females are struggling the most. This information will then be able to drive progress in educational strategies that teachers will be able to use in the effort to make every child successful. This goal from our federal and state lawmakers to make 100% of the students in the United States successful in school needs to be based upon data analysis such as this. Developing new programs to help the most struggling learners will be a step forward for education in the United States.

References

Alloway, N., & Gilbert, P. (1997). Boys and literacy: Lessons from Australia. *Gender and Education, 9*, 49-58.

Alspaugh, J. (1992). Socioeconomic measures and achievement: Urban vs. rural. *Rural Educator, 13 (3)*, 2-7.

American Association of University Women (AAUW). (1992). *How schools shortchange girls: A study of major findings on girls and education*. New York: The Wellesley College Center for Research on Women.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Barrs, M. (1994). Introduction: Reading the difference. In M. Barrs & S. Pidgeon (Eds.), *Reading the difference: Gender and reading in elementary classrooms* (pp. 1-11). York, ME: Stenhouse Publishers.

Bourne, L., Jr., & Ekstrand, B. (1973). *Psychology: Its principles and meanings*. Hinsdale, IL: The Dryden Press.

Bracey, G. (2003). PIRLS before the press. *Phi Delta Kappan, 84 (10)*, 795.

Casserly, M. (2001). *Beating the odds II: A city-by-city analysis of student performance and achievement gaps on state assessments, spring 2001 results*. Washington, DC. (ERIC Document Reproduction Service No. ED467115)

The Center for Rural Pennsylvania. (2003). *Pennsylvania's rural counties and municipalities*. Harrisburg, PA: Pennsylvania General Assembly.

Cole, N. (1997). *The ETS gender study: How females and males perform in educational settings*. Princeton, NJ: Educational Testing Service.

Coleman, J., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfeld, F., & York, R. (1966). *Equality of educational opportunity*. Washington, DC: National Center for Educational Statistics.

Conlin, M. (2003, May). The new gender gap. *BusinessWeek*, 74-82.

Connell, R. (1996). Teaching the boys: New research on masculinity, and gender strategies for schools. *Teachers College Record, 98* (2), 81-96.

Corson, D. (1992). Language, gender, and education: A critical review linking social justice and power. *Gender and Education, 4*, 229-254.

Cruickshank, D., Jenkins, D., & Metcalf, K. (2003). The effective teacher. In *The act of teaching* (pp. 329-348). New York: McGraw Hill.

D'Agostino, J., & Borman, G. (1998). Longitudinal achievement and Chapter 1 coordination in high-poverty schools: A multilevel analysis of the prospects data. *Journal of Education for Students Placed At Risk, 3 (4)*, 401-420.

Equal resources, equal outcomes? The distribution of school resources and student achievement in California. Retrieved March 7, 2004, from http://www.ppic.org

Family influences on the achievement of economically disadvantaged students: Implications for gifted identification and programming. Retrieved February 9, 2004, from http://www.gifted.uconn.edu

Gershoff, E. (2003). *Low income and the development of America's kindergartners* (Research Brief No. 4). New York: Columbia University, National Center for Children in Poverty.

Grissmer, D., Flanagan, A., Kawata, J., & Williamson, S. (2000). *Improving student achievement: What state NAEP scores tell us*. Santa Monica, CA: RAND.

Halpern, D. (1997). Sex differences in intelligence: Implications for education. *American Psychologist, 52 (10)*, 1091-1102.

Handbook for report interpretation, (2003). Harrisburg, PA: Pennsylvania Department of Education.

"High stakes" tests are counterproductive to economically disadvantaged students. (2000, January 20). *Harvard University Gazette.*

Hunsaker, S., Frasier, M., King, L., Watts-Warren, B., Cramond, B., & Krisel, S. (1995). *Family influences on the achievement of economically disadvantaged students: Implications for gifted identification and programming.* Retrieved February 9, 2004, from http://www.gifted.uconn.edu

Hyde, J., & Jaffee, S. (1998). Perspectives from social and feminist psychology. *Educational Researcher, 27*(5), 14-16.

Hyde, J., & Linn, M. (1988). Gender differences in verbal ability: A meta-analysis. *Psychological Bulletin, 104 (1)*, 53-69.

Johnson, C., & Greenbaum, G. (1980). Are boys disabled readers due to sex-role stereotyping? *Educational Leadership, 37 (6)*, 492-496.

Kleinfeld, J. (1998). Why smart people believe that schools shortchange girls: What you see when you live in a tail. *Gender Issues, 16*, 47-63.

Leder, G. (2002). Sex differences in achievement scores: Can we design assessments that are fair, meaningful, and valid for girls and boys? *Issues in Education, 8 (1)*, 55-63.

Maccoby, E., & Jacklin, C. (1974). *The psychology of sex differences*. Stanford, CA: Stanford University Press.

Marsh, H., Smith, I., & Barnes, J. (1985). Multidimensional self-concepts: Relations with sex and academic achievement. *Journal of Educational Psychology, 77*, 581-596.

Martin, A. (2002). *Improving the educational outcomes of boys.* Tuggeranong, Australia: Department of Education, Youth and Family Services.

Moss, G. (2000). Raising boys' attainment in reading: Some principles for intervention. *Reading, 34 (3)*, 101-106.

Mullis, I., Martin, M., Gonzalez, E., & Kennedy, A. (2003). *PIRLS 2001 international report*. Chestnut Hill, MA: International Study Center, Lynch School of Education, Boston College.

National Center for Education Statistics. (2002). *Fourth and eighth-grade students make gains in writing since 1998* (Institute of Education Sciences). Washington, DC: U.S. Department of Education.

National Center for Education Statistics. (2003). *The nation's report card mathematics highlights 2003* (Institute of Education Sciences). Washington, DC: U.S. Department of Education.

National Center for Education Statistics. (2003). *The nation's report card reading highlights 2003* (Institute of Education Sciences). Washington, DC: U.S. Department of Education.

Nelson, B. (2003). *Lighthouse schools for the education of boys.* Sydney, Australia: Australian Government Minister for Education.

No Child Left Behind Act of 2001, P.L. 107-110, 115 STAT. 1425 (2001).

Pauly, E. (1991). *The classroom crucible what really works, what doesn't, and why.* New York: Basic Books.

Raffaele, M. (2003, February 5). Committee discusses state of rural education. *Williamsport Sun-Gazette*, p. 20.

Randhawa, B., & Hunt, D. (1984). *Sex and jurisdiction differences in achievement.* Saskatchewan, Canada: Science, Mathematics and Environmental Education. (ERIC Document Reproduction Service No. ED242534)

Rios, B. (1988). *Rural--A concept beyond definition?* Las Cruces, NM: U.S. Department of Education. (ERIC Document Reproduction Service No. ED296820)

Sadker, M., & Sadker, D. (1991). *Teachers, schools, and society* (2nd ed.). New York: McGraw-Hill, Inc.

Sadker, M., & Sadker, D. (1994). *Failing at fairness: How America's schools cheat girls.* New York: Macmillan Publishing Company.

Santrock, J. (2001). *Adolescence.* New York: McGraw-Hill Higher Education.

Schmidt, P. (1994). Urban school results linked to funding woes. *Education Week, 14 (5)*, 3.

Schoenfeld, A. (2002). Making mathematics work for all children: Issues of standards, testing, and equity. *Educational Researcher, 31 (1)*, 13-25.

School improvement self-study survey. (1994). Retrieved February 15, 2004, from http://www.cprd.uiuc.edu/kellogg.html

Scieszka, J. (2002). Getting guys to read. *NEA Today, 20 (6)*, 23.

Seligman, D. (1998). *Gender and brains.* Retrieved July 31, 2003, from http://pediatricservices.com

Skelton, C. (2001). *Schooling the boys: Masculinities and primary education.* Buckingham, UK: Open University Press.

Testimony on compensatory education. (1999). Retrieved January 26, 2004, from http://www.cppp.org

Understanding student mobility. (2001). Retrieved January 5, 2004, from http://www.ncrel.org

U.S. Department of Education. (2000). *Gender equity expert panel* (ORAD 2001-1000). Jessup, MD: U.S. Department of Education.

Verstegen, D. (1991). *Funding rural, small schools: Strategies at the statehouse*. Charleston, WV: ERIC Digests. (ERIC Document Reproduction Service No. ED335205)

Weaver-Hightower, M. (2003). Crossing the divide: Bridging the disjuncture between theoretically oriented and practice-oriented literature about masculinity and boys at school. *Gender And Education, 15*(4), 407-423.

Wisconsin reading comprehension test. (2002). Retrieved January 30, 2004, from http://www.weac.org

APPENDIX A

Hierarchical Linear Regression Results for Grade 5

Table A1

Hierarchical Regression Results Grade 5 Male Advanced Reading (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.221	.043	-.428*
Model 2			
SES	-.231	.042	-.448*
Rural/Urban	2.106	1.655	.110
Size of Dist.	.000	.000	-.055
$ per Student	.002	.001	.248*

Note. R^2=.184 for Model 1; R^2=.267 for Model 2, R^2 Change=.083 * for Model 2
*p<.05

Table A2

Hierarchical Regression Results Grade 5 Female Advanced Reading (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.296	.050	-.478*
Model 2			
SES	-.304	.049	-.491*
Rural/Urban	3.024	1.945	.132
Size of Dist.	.000	.000	-.061
$ per Student	.002	.001	.207*

Note. R^2=.228 for Model 1; R^2=.298 for Model 2, R^2 Change=.070 * for Model 2
*p<.05

Table A3

Hierarchical Regression Results Grade 5 Male Advanced Math

(*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.384	.060	-.505*
Model 2			
SES	-.406	.058	-.533*
Rural/Urban	1.994	2.282	.071
Size of Dist.	1.3E-05	.000	.004
$ per Student	.003	.001	.298*

Note. R^2=.255 for Model 1; R^2=.361 for Model 2, R^2 Change=.106 * for Model 2
*p<.05

Table A4

Hierarchical Regression Results Grade 5 Female Advanced Math (*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.317	.056	-.459*
Model 2			
SES	-.335	.054	-.486*
Rural/Urban	2.378	2.119	.093
Size of Dist.	1.6E-05	.000	.005
$ per Student	.003	.001	.302*

Note. R^2=.211 for Model 1; R^2=.328 for Model 2, R^2 Change=.117 * for Model 2
*p<.05

Table A5

Hierarchical Regression Results Grade 5 Male Proficient Reading (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.305	.035	-.624*
Model 2			
SES	-.296	.036	-.605*
Rural/Urban	1.832	1.414	.101
Size of Dist.	.000	.000	-.066
$ per Student	-.001	.001	-.091

Note. R^2=.389 for Model 1; R^2=.405 for Model 2, R^2 Change=.016 for Model 2
*p<.05

Table A6

Hierarchical Regression Results Grade 5 Female Proficient Reading (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.225	.039	-.471*
Model 2			
SES	-.219	.039	-.458*
Rural/Urban	.750	1.550	.042
Size of Dist.	.000	.000	-.144
$ per Student	-.001	.001	-.102

Note. R^2=.221 for Model 1; R^2=.255 for Model 2, R^2 Change=.033 for Model 2
*p<.05

Table A7

Hierarchical Regression Results Grade 5 Male Proficient Math (N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	-.147	.028	-.434*
Model 2			
SES	-.134	.028	-.395*
Rural/Urban	2.410	1.110	.192*
Size of Dist.	-8.E-05	.000	-.055
S per Student	-.001	.000	-.184*

Note. R^2=.189 for Model 1; R^2=.238 for Model 2, R^2 Change =.050 for Model 2
*p<.05

Table A8

Hierarchical Regression Results Grade 5 Female Proficient Math (N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	-.178	.033	-.447*
Model 2			
SES	-.165	.033	-.416*
Rural/Urban	3.413	1.286	.231*
Size of Dist.	.000	.000	-.145
$ per Student	-.001	.000	-.102

Note. R^2=.200 for Model 1; R^2=.258 for Model 2, R^2 Change=.058 * for Model 2
*p<.05

Table A9

Hierarchical Regression Results Grade 5 Male Basic Reading

(*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.086	.033	.236*
Model 2			
SES	.087	.032	.237*
Rural/Urban	-2.393	1.285	-.177
Size of Dist.	.000	.000	.066
$ per Student	-.001	.000	-.147

Note. R^2=.056 for Model 1; R^2=.118 for Model 2, R^2 Change=.062 * for Model 2
*p<.05

Table A10

Hierarchical Regression Results Grade 5 Female Basic Reading (*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.174	.035	.419 *
Model 2			
SES	.174	.035	.419 *
Rural/Urban	-2.764	1.365	-.180 *
Size of Dist.	.000	.000	.108
$ per Student	-.001	.000	-.124

Note. R^2=.175 for Model 1; R^2=.232 for Model 2, R^2 Change=.056 * for Model 2
*p<.05

Table A11

Hierarchical Regression Results Grade 5 Male Basic Math

(N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	.104	.032	.287*
Model 2			
SES	.103	.031	.285*
Rural/Urban	-2.162	1.240	-.161
Size of Dist.	.000	.000	-.116
$ per Student	-.001	.000	-.138

Note. R^2=.082 for Model 1; R^2=.171 for Model 2, R^2 Change=.089 * for Model 2
*p<.05

Table A12

Hierarchical Regression Results Grade 5 Female Basic Math

(N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	.051	.035	.133
Model 2			
SES	.052	.034	.134
Rural/Urban	-3.564	1.329	-.250*
Size of Dist.	6.8E-05	.000	.040
$ per Student	-.001	.000	-.209*

Note. R^2=.018 for Model 1; R^2=.148 for Model 2, R^2 Change=.130 * for Model 2
*p<.05

Table A13

Hierarchical Regression Results Grade 5 Male Below Basic Reading (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.443	.034	.766*
Model 2			
SES	.442	.035	.765*
Rural/Urban	-1.774	1.375	-.083
Size of Dist.	.000	.000	.061
$ per Student	.000	.000	-.044

Note. R^2=.587 for Model 1; R^2=.598 for Model 2, R^2 Change=.011 for Model 2
*p<.05

Table A14

Hierarchical Regression Results Grade 5 Female Below Basic Reading (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.328	.037	.630*
Model 2			
SES	.328	.038	.632*
Rural/Urban	-1.843	1.485	-.096
Size of Dist.	.000	.000	.132
$ per Student	.000	.001	-.067

Note. R^2=.397 for Model 1: R^2=.421 for Model 2, R^2 Change=.024 for Model 2
*p<.05

Table A15

Hierarchical Regression Results Grade 5 Male Below Basic Math (N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	.428	.049	.626*
Model 2			
SES	.437	.049	.639*
Rural/Urban	-2.219	1.932	-.088
Size of Dist.	.000	.000	.084
$ per Student	-.002	.001	-.167*

Note. R^2=.391 for Model 1; R^2=.432 for Model 2, R^2 Change=.041 * for Model 2
*p<.05

Table A16

Hierarchical Regression Results Grade 5 Female Below Basic Math (N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	.438	.046	.660*
Model 2			
SES	.443	.046	.667*
Rural/Urban	-2.199	1.817	-.089
Size of Dist.	-1.5E-05	.000	.005
$ per Student	-.001	.001	-.133

Note. R^2=.436 for Model 1; R^2=.468 for Model 2, R^2 Change=.032 for Model 2
*p<.05

APPENDIX B

Hierarchical Linear Regression Results for Grade 8

Table B1

Hierarchical Regression Results Grade 8 Male Advanced Reading (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.330	.043	-.581*
Model 2			
SES	-.343	.042	-.603*
Rural/Urban	1.297	1.647	.061
Size of Dist.	-5.E-05	.000	-.019
$ per Student	.002	.001	.239*

Note. R^2=.337 for Model 1; R^2=.404 for Model 2, R^2 Change=.067 * for Model 2
*p<.05

Table B2

Hierarchical Regression Results Grade 8 Female Advanced Reading (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.374	.044	-.618*
Model 2			
SES	-.377	.042	-.624*
Rural/Urban	3.672	1.654	.164*
Size of Dist.	8.6E-05	.000	.032
$ per Student	.002	.001	.188*

Note. R^2=.382 for Model 1; R^2=.469 for Model 2, R^2 Change=.087 * for Model 2
*p<.05

Table B3

Hierarchical Regression Results Grade 8 Male Advanced Math

(N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.355	.047	-.572*
Model 2			
SES	-.366	.042	-.590*
Rural/Urban	4.129	1.672	.179*
Size of Dist.	1.8E-05	.000	.006
$ per Student	.003	.001	.302*

Note. R^2=.327 for Model 1; R^2=.484 for Model 2, R^2 Change=.157 * for Model 2
*p<.05

Table B4

Hierarchical Regression Results Grade 8 Female Advanced Math (N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.328	.049	-.526*
Model 2			
SES	-.335	.044	-.537*
Rural/Urban	5.127	1.735	.222*
Size of Dist.	9.2E-05	.000	.033
$ per Student	.002	.001	.281*

Note. R^2=.276 for Model 1; R^2=.451 for Model 2, R^2 Change=.175 * for Model 2
*p<.05

Table B5

Hierarchical Regression Results Grade 8 Male Proficient Reading (N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	-.232	.037	-.496*
Model 2			
SES	-.230	.038	-.493*
Rural/Urban	.105	1.512	.006
Size of Dist.	.000	.000	-.094
$ per Student	.000	.001	-.036

Note. R^2=.246 for Model 1; R^2=.257 for Model 2, R^2 Change=.011 for Model 2
*p<.05

Table B6

Hierarchical Regression Results Grade 8 Female Proficient Reading (N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	-.142	.042	-.297*
Model 2			
SES	-.144	.041	-.302*
Rural/Urban	-.648	1.622	-.037
Size of Dist.	-.001	.000	-.273*
$ per Student	.000	.001	-.044

Note. R^2=.088 for Model 1; R^2=.178 for Model 2, R^2 Change=.090 * for Model 2
*p<.05

Table B7

Hierarchical Regression Results Grade 8 Male Proficient Math (*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.296	.040	-.560*
Model 2			
SES	-.297	.041	-.562*
Rural/Urban	-1.190	1.623	-.061
Size of Dist.	.000	.000	-.071
$ per Student	.000	.001	-.047

Note. R^2=.314 for Model 1; R^2=.330 for Model 2, R^2 Change=.017 for Model 2
*p<.05

Table B8

Hierarchical Regression Results Grade 8 Female Proficient Math (*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	-.252	.042	-.480*
Model 2			
SES	-.259	.042	-.493*
Rural/Urban	-.179	1.674	-.061
Size of Dist.	.000	.000	-.199*
$ per Student	.000	.001	.023

Note. R^2=.230 for Model 1; R^2=.278 for Model 2, R^2 Change=.047 for Model 2
*p<.05

Table B9

Hierarchical Regression Results Grade 8 Male Basic Reading

(N = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.156	.031	.417*
Model 2			
SES	.158	.031	.424*
Rural/Urban	-1.281	1.241	-.092
Size of Dist.	-7.E-05	.000	-.042
$ per Student	-.001	.000	-.139

Note. R^2=.174 for Model 1; R^2=.216 for Model 2, R^2 Change=.042 for Model 2
*p<.05

Table B10

Hierarchical Regression Results Grade 8 Female Basic Reading (*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.215	.033	.514*
Model 2			
SES	.218	.033	.522*
Rural/Urban	-1.450	1.316	-.093
Size of Dist.	5.5E-05	.000	.029
$ per Student	-.001	.000	-.136

Note. R^2=.265 for Model 1; R^2=.297 for Model 2, R^2 Change=.032 for Model 2
*p<.05

Table B11

Hierarchical Regression Results Grade 8 Male Basic Math

(N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	.159	.036	.375*
Model 2			
SES	.168	.034	.396*
Rural/Urban	-1.484	1.364	-.095
Size of Dist.	.000	.000	-.083
$ per Student	-.002	.000	-.276*

Note. R^2=.141 for Model 1; R^2=.262 for Model 2, R^2 Change=.122 * for Model 2
*p<.05

Table B12

Hierarchical Regression Results Grade 8 Female Basic Math

(N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	.102	.037	.247*
Model 2			
SES	.112	.035	.270*
Rural/Urban	-1.759	1.397	-.115
Size of Dist.	-6.E-05	.000	-.031
$ per Student	-.002	.001	-.294*

Note. R^2=.061 for Model 1; R^2=.187 for Model 2, R^2 Change=.126 * for Model 2
*p<.05

Table B13

Hierarchical Regression Results Grade 8 Male Below Basic Reading (*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.406	.046	.635*
Model 2			
SES	.415	.046	.649*
Rural/Urban	-.125	1.827	-.005
Size of Dist.	.000	.000	.110
$ per Student	-.001	.001	-.105

Note. R^2=.403 for Model 1; R^2=.421 for Model 2, R^2 Change=.018 for Model 2
*p<.05

Table B14

Hierarchical Regression Results Grade 8 Female Below Basic Reading (*N* = 120)

Variable	*B*	*SE B*	β
Model 1			
SES	.300	.035	.618*
Model 2			
SES	.303	.035	.623*
Rural/Urban	-1.606	1.383	-.089
Size of Dist.	.000	.000	.203*
$ per Student	.000	.000	-.075

Note. R^2=.382 for Model 1; R^2=.424 for Model 2, R^2 Change=.042 * for Model 2
*p<.05

Table B15

Hierarchical Regression Results Grade 8 Male Below Basic Math (N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	.493	.055	.639*
Model 2			
SES	.496	.056	.644*
Rural/Urban	-1.540	2.202	-.054
Size of Dist.	.000	.000	.095
$ per Student	-.001	.001	-.064

Note. R^2=.408 for Model 1; R^2=.421 for Model 2, R^2 Change=.012 for Model 2
*p<.05

Table B16

Hierarchical Regression Results Grade 8 Female Below Basic Math (N = 120)

Variable	B	$SE\ B$	β
Model 1			
SES	.479	.052	.649*
Model 2			
SES	.483	.052	.654*
Rural/Urban	-2.338	2.061	-.085
Size of Dist.	.000	.000	.129
$ per Student	-.001	.001	-.085

Note. R^2=.422 for Model 1; R^2=.446 for Model 2, R^2 Change=.025 for Model 2
*p<.05