EFFECTS OF STUDENT POPULATION ON ACADEMIC ACHIEVEMENT IN GEORGIA'S

PUBLIC HIGH SCHOOLS

by

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(Under the Direction of C. Kenneth Tanner)

ABSTRACT

Does the number of students attending a school affect student achievement? This question guided the study. Therefore, one purpose of this study was to determine if a relationship existed between the total high school population (net enrollment) and outcomes defined in terms of test scores of Georgia's Public High Schools. Another purpose was, assuming a statistical, Correlational relationship, was to focus on determining the statistical effect of student population size on student outcomes. Achievement was measured by scores from the Scholastic Aptitude Reasoning Test (SAT) and Georgia High School Graduation Test (GHSGT) data from standardized tests in English, Mathematics, Science, Social Studies, and Writing for the 2008-2009 school year. The 303 usable data sets were coded for statistical analysis using Statistical Package for Social Sciences (SPSS) software. Comparisons among school population and academic achievement measures were made through Pearson's r, multiple regression, and regression reduction. Alpha was set at the .05 level. Based upon the findings of this study, school size played no importance in the measures of academic achievement. Supporters of both large and small schools can equally say that in Georgia, size has little to no impact on academic achievement or graduation rates.

INDEX WORDS: Student population, Academic achievement, Georgia, Public high school

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DEDICATION

This dissertation is dedicated to my father, James P. (Bo) West, Sr.. Growing up in the 1920s and 1930s in rural Georgia did not allow him the opportunity to able to acquire a formal education above high school, he believed in its value greatly. He encouraged me to learn as much about my chosen field as possible and to reach for the highest educational goals possible. This paper is further dedicated to my wife and family members that continually encouraged me to pursue my dreams and follow them to completion. Without their support I would have not been able to complete my studies. I wish to thank them for their quiet concern and their vocal advocacy as I completed my degree. To each of them I am eternally grateful.

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CHAPTER I

INTRODUCTION

Many throughout the history of institutionalized education have questioned school size issues. For example, beginning in the 1950s, school size issues became slanted toward larger and larger schools. While the size of schools increased, the number of schools and school districts decreased. The trend began with publications made by James Conant, President of Harvard in the 1960s and was followed by an increase in the perceived need for larger schools. The space race and the perceived need for more, smarter students were driving forces in the trend for larger schools. Trends toward larger schools caused many smaller schools to be consumed and combined into bigger schools. According to the U. S. Department of Education, 70% of American high school students attend schools enrolling 1,000 or more students; nearly 50% of high school students attend schools enrolling more than 1,500 students. Some students attend schools enrolling as many as 4,000-5,000 students according to U.S. Department of Education Statistics (2006). Further study alleged that the large urban high school was the logical staging ground for launching civic-minded adults into the larger society (Allen, 2002). Others indicate that the advantages of larger schools include economies of scale (e.g., lower costs per student) and the capacity to offer a more varied and high quality curriculum (Howley, 2004).

The median enrollments in 2007- 2008 were 469 in elementary and 816 in high schools (National Center for Education Statistics, 2009). The number has increased in elementary and secondary schools, with 399 and 719 students respectively in 1982-1983.

Statement of the Problem

Does the number of students attending a school affect student achievement? Research conducted in Wales suggested that there was a significant school size effect on academic achievement, even after controlling for background variables and processes in Catholic schools (Mok & Flynn, 1996).

Conversely, analysis of school size data relating to mathematics scores and dropout rates have yielded mixed results; and the relationship between high school size and mathematics achievement growth was small, according to Werblow, 2009. For the student dropout rate, however, a powerful linear relationship with increases in school size was observed (Werblow, 2009).

Given the inconclusive findings in studies such as those cited above, the issue is not settled. Consequently, the relationship between net student enrollment and student achievement was the focus of this dissertation. New information on this topic form this study will add to the current body of knowledge, and may be very useful to school planners, school boards, administrators, and the public when they make decisions about constructing and remodeling schools.

Purpose of the Study

The purpose of this study was to determine if a relationship existed between the total high school population (net enrollment) and outcomes defined in terms of test scores. If a relationship existed, then what statistical effects might be attributed to school size? Achievement was measured by scores from the Scholastic Aptitude Reasoning Test (SAT) and Georgia High School Graduation Test (GHSGT). Data for the 2008-2009 school year were analyzed in this study.

Research Hypothesis

The hypothesis that guided this study was: There is no statistically significant relationship between the size of the student population in Georgia high schools and the academic achievement of their students as measured by seven variables: Scholastic Aptitude Test (SAT), the graduation rate per school, and average scores on the Georgia High School Graduation Tests in English, Mathematics, Science, Social Studies, and Writing. These were part of the Georgia testing program used to ensure that students qualifying for a diploma had mastered essential core academic content and skills.

Definition of Terms

For the purpose of this study, the following definitions were used:

Academic Achievement - Knowledge attained or skills developed in school subjects measured by test scores. In this study, scores from the Scholastic Aptitude Reasoning Test as reported by the Governor's Office of Student Achievement 2008-2009 K-12 Public Schools Annual Report Card.

Georgia High School Graduation Test (GHSGT) - Test administered to all Georgia high school students in the following subject areas: English, Mathematics, Social Studies, Science, and Writing.

Governor's Office of Student Achievement - The Governor's Office of Student Achievement (GOSA), established July 1, 2000, by the state law known as the A Plus Education Reform Act. The mission of GOSA is to provide accountability for all of Georgia's education system from pre-kindergarten through postsecondary levels that will result in improving student achievement and improving school completion.

Governor's Office of Student Achievement K-12 Public Schools Annual Report Card - The Governor's Office of Student Achievement (GOSA), publishes annual accountability report cards on K-12 Public Schools, the Department of Technical and Adult Education (DTAE), the Georgia Professional Standards Commission (GAPSC), Bright from the Start: Georgia Department of Early Care and Learning (DECAL), and the University System of Georgia. These report cards' Data are divided into seven sections: Accountability, Georgia Tests, National Tests, School Performance Indicators, Student and School Demographics, Personnel and Fiscal, and Comparisons.

High School - In this study, high school was defined as a campus having grades 9 through12.

Low socioeconomic status - For the purpose of this study, students qualifying for a free or reduced price lunch were considered low socioeconomic status. This study looked at the percentage of low socioeconomic status (SES) students enrolled at each school.

School size - The net student enrollment of a school is designated as the school size.

SAT - The SAT Reasoning Test, formerly called the Scholastic Aptitude Test and Scholastic Assessment Test, is a type of standardized test frequently used by colleges and universities in the United States to aid in the selection of incoming students. The test consists of mathematics, verbal, and writing sections. For the purpose of this study, the average of highest SAT scores for students was used.

Teacher Degree Level - The current degree level of those teaching within each school. These were: Bachelor's (T-4), Master's (T-5), Specialists (T-6), and Doctorate (T-7).

Teacher Experience - The years of teaching experience of those teaching within each school. These were: Less than 10 years, 11 to 20 years, 21 to 30 years, and over 30 years.

Data Sources

K-12 data are submitted to the Governor's Office of Student Achievement (GOSA) by the Georgia Department of Education. For the 2008 school year, Georgia Department of Education analyzed the test results according to specifications provided by GOSA in order that the state's Report Cards comply with both federal and state laws. Several other organizations and agencies provided information directly to GOSA or to Georgia Department of Education, and such data were used in this the 2008-2009 Report Card. These sources include: Board of Regents of the University System of Georgia, Georgia Department of Technical and Adult Education, Georgia Department of Labor, Georgia Department of Human Resources, The College Board, American College Testing Program, Georgia Student Finance Commission, Southern Association of Colleges and Schools, Georgia Migrant Education Agency, Department of Early Care and Learning - Bright From the Start, Professional Standards Commission, and Georgia Accrediting Commission.

Significance of the Study

This study was designed to investigate the relationship between the size of a high school's population and the academic achievement of its students. According to the literature review in the second chapter of this study, the arguments about school size and student achievement have not been settled. The literature continues to reveal conflicting evidence regarding whether the actual size of a school influences the students' outcomes. This study proposed to conduct a study whose findings might facilitate either the arguments for larger schools or the arguments for smaller schools.

Constraints of the Study

The following were constraints for the study:

1. The study was limited to Georgia secondary schools configured for grades nine through twelve on one campus. All schools meeting the criteria in the 2008-2009 school year were included.
2. All students were tested by valid means and the data were reported accurately.
3. School setting (rural, suburban, or urban) was not considered.
4. The unit of analysis was the school.
5. Socioeconomic status (SES) was used as the primary covariate in this study. This variable was represented as the percentage of students in each school receiving free and reduced price lunches. SES has been the variable that traditionally accounted for the largest amount of variance in educational studies (Brooks, 1998).

Organization of Study

This study is organized into five chapters. Chapter I included the introduction to the study, the statement of the problem, the purpose of the study, the research hypothesis, the definition of terms, the significance of the study, and the limitations of the study.

Chapter II presents a review of related literature including the history of school facilities, the condition of today's schools, and the learning environment, along with research on school size, class size, and density. A table listing research regarding school size, class size, and density completes this chapter.

Chapter III describes the methodology of the study. Included in this chapter is a description of the population, the procedures and criteria used to select the sample, the instrumentation, the hypothesis, a description of the data collection procedures, and the statistical techniques used to treat the data.

In Chapter IV, all findings related to the tested hypothesis are reported, and in Chapter V, a summary of the research is provided. Conclusions which can be supported by the findings are presented and recommendations are presented for further research.

CHAPTER II

REVIEW OF RELATED LITERATURE

Definitions of Size

Many sources attempt to describe school size as large or small. The consensus of the research data provided the following ranges for school size. On average, the research indicates that an effective size for an elementary school is in the range of 300-400 students and that 400-800 students is appropriate for a secondary school (7-8) (Cotton, 1996). For high schools 700 is small, while over 1000 is large. Elementary schools should have 25 per grade, Middle schools 50, and high schools 75 (Lawrence, et al., 2002). Data collected by the U.S. Department of Education denotes large schools as 1000 or more and small schools as 300 or less. This leaves a rather large area between the 300 and 1000 student size that are not regarded as either large or small. For the 2007-2008 school year (the last data set available), secondary schools in the United States had an average of 706 students. Georgia had an average of 1,137 for the same reporting period.

Large Schools vs. Small Schools

Larger schools have been described as the "American Way" of providing education. Our schools, especially high schools have evolved into complex organizations. In many cases, large urban high schools became the capstone of the Americanization process – efficient factories for producing citizen-workers employable in the well-run engines of US commerce (Allen, 2002).

The high school is far more than simply a place of learning; it may be one of the few entities that unify a community; it is likely a source of community pride and a central gathering place. As communities grow, they must choose between creating a second high school, or increasing the size of the existing school. More often than not, they choose the latter course, often for quite understandable reasons, few of which have anything to do with teaching and learning (Gregory, 2000). Research continued the trend started by Conant. Subsequently, researchers in the early 1970s called for increasingly larger schools, especially high schools with numbers over 2500 students. With the research pointing toward larger schools, school size became a matter of numbers. Schools are typically built with practical considerations that focus on accommodating particular numbers of students. Very seldom does logic drive answers to questions such as ‘‘what size high school might work best for the students?’’ and ‘‘what do we really want to accomplish as a school, and what is the optimal number of students to achieve these goals?’’ (Ready, Lee, and Welner, 2004)

Characteristics of Larger Schools

Larger student populations were touted as being ideal to provide a quality, well rounded education, with many opportunities for academic, and well as other forms of student achievement. Reasons for the increased school size include more competitive sports teams, bands, and other competitive groups within the school. In addition, the concept of larger schools provides a means of keeping the cohesive nature of a community. Lack of land or the significant expense of acquiring additional land also has prompted school size to grow, instead of school numbers. Land requirements for schools are a significant problem. For example, a 1000 student high school requires 40 acres of land (Langdon, 2000).

While growth in school size continued, many negative factors appeared. Increased levels of school violence are commonly associated with large schools. An example of this scenario is the Columbine High School incident, which occurred in a school of over 1,900 students.

Subsequent research by Keiser showed that of 13 high school shootings, 7 involved total school enrollments of more than 1,000 students. While these are just examples of school size and violence, as schools grow larger, research indicates an increase in unacceptable behavior. A National Center for Education Statistics project conducted by Heaviside, Rowand, Williams, and Farris in 1998 indicated that schools over 1000 students had moderate to serious problems with many discipline issues including tardiness, physical conflicts, robbery, vandalism, alcohol and drug offenses, and gang activity.

Characteristics of Smaller Schools

As accountability and improvement concerns mount, issues of class size and school size have resurfaced as important school improvement ideas for a variety of reasons. First the standards movement has encouraged the resurgence of the class size and school size debates. All U.S. states but one have academic standards, 36 use or plan to use test results to make high-stakes decisions about students. Second, class size and school size issues have resurfaced because of the increasing consensus among educators and the public that all students can learn. Third, following events of September 11, educators have a renewed appreciation for the importance of the basic freedoms we enjoy and the advantages that a democracy provides its citizens and that schools should strive to develop students capable of participating in that process (Wasley, 2002).

Researchers have recently begun to compile information on the benefits of small school sizes. Every facet of the large school problem has been countered with data that indicated that smaller schools are better. While some have begun to recognize this and decrease school size, many school districts continue to build fewer and therefore larger schools. This is especially evident in the area of high schools that have over 1000 students. Yet, evidence suggests that a total enrollment of 400 students is actually sufficient to allow a high school to provide an adequate curriculum (Howley, 1994).

When all else is held equal (particularly community or individual socioeconomic status), comparisons of schools and districts based upon differences in enrollment generally favor smaller units (Howley, 2002). Furthermore, small school size is also associated with lower high school dropout rates (Howley, 2002). Students drop out of small schools at lower rates than they do from large schools, and more students who graduate from small schools go on to post-secondary education than do their counterparts who graduate from large schools (Kent, 2002).

These benefits extend not only to achievement, but to aspects of behavior and attitude. Student attitudes and behavior improve as school size decreases. The social behavior of ethnic minority and low-SES students is even more positively impacted by small schools than that of other students (Cotton, 1996). Small school students took more responsibility and more varied positions in their school's settings (Barker & Gump, 1964). Additionally, small schools hold other benefits, especially to when considering the demographics of students. Small schools graduate a higher percentage of students. Student participation in extracurricular school activities is greater at small schools. Small schools, of course, are not effective simply because they are small.

This resulted in improved behavior among students and increased accountability of the staff. Accountability develops through relationships. We thrive on good ones. They motivate us, strengthen us, and reflect our best selves back to us. They hold us accountable daily. Now imagine that you spend most of your day with people you do not know well enough to trust, and that anxiety and alienation color your every interaction with them. Teacher morale and attendance also increases as school size decreases. This is a result in not only smaller school size, but also the accompanying smaller class sizes. Many students, teachers, and administrators in larger schools find it hard to form strong relationships in such impersonal settings (Lawrence 2004). It is the increase in teacher collaboration and team teaching, greater flexibility and responsiveness to student needs, and the personal connections among everyone within the system that make smaller schools work (Cutshall, 2003).

Real accountability comes from the daily interaction of people who know each other well. This kind of accountability, among teachers, students, administrators, parents, members of school boards, and those in the larger community, is only possible in schools small enough to promote good relationships (Lawrence 2004). Studies conducted over the past 10 to 15 years suggest that in smaller schools, students come to class more often, drop out less, earn better grades, participate more often in extracurricular activities, feel safer, and show fewer behavior problems (Viadero, 2001).

Information on the costs per student is a part of the size question research conducted on this issue provided the following results. The size of the student body is an important factor in relation to costs and outputs and that small academic and articulated alternative high schools cost among the least per graduate of all New York City high schools. Though these smaller schools have somewhat higher costs per student, their much higher graduation rates and lower dropout rates produce among the lowest cost per graduate in the entire New York City system (Stiefel, Iatarola, Fruchter, & Berne, 1998).

Socio-Economic Status

For this study, socio-economic status (SES) is noted as the percentage of those receiving free or reduced price lunches at each school. Past research has shown that SES influences academic achievement. A large gap between high and low socioeconomic status student test scores was found by Dills in 2006. In 1999, Munoz found that the percentage of students receiving free lunch impacted scores on standardized tests in Kentucky. SES has frequently and consistently been the variable accounting for the largest amount of variance in educational studies (Brooks, 1998).

Student Achievement

A New Jersey project estimated relationships of school size with test scores on High School Proficiency Tests (HSPT). The tests measured student success in mastering mathematics reading, and writing skills respectively. Passing rates on the three tests were dramatically higher depending on the size of the school. For instance, the passing rate on the mathematics portion of the HSPT was 9.5 percentage points higher, on average, in schools with 500 or fewer pupils than in schools with 1500 or more pupils. The differences in writing and reading were 9.1 and 14.5 percentage points respectively. (New Jersey, 2003)

For at least the past decade, a growing body of research has suggested that smaller high schools graduate more and better-prepared students than mega-sized schools (Hart, 2006). Barnett, Glass, Snowdon, & Stringer (2002) found that school performance was positively related to school size.

Small size is good for the performance of impoverished schools, but it now seems as well that small district size is also good for the performance of such schools in Georgia, where district size, in single-level analyses, had revealed no influence. Because of the consistency of school-level findings in previous analyses, we strongly suspect that the Georgia findings characterize relationships in most other states (Bickel & Howley, 2000).

While school size is important, the effects of the socioeconomic situation in a community must be considered. The socioeconomic effect has been broken into the large school and small schools areas. In research conducted on schools from Georgia, Ohio, Texas, and Montana, smaller schools reduce the negative effect of poverty on school performance by at least 20 percent and by as much as 70% and usually by 30-50& (Howley & Howley, 2002).

Current Trends

In the 2006 School Planning and Management Report, a trend for school population was noted. Of the new schools being constructed, one-quarter of all new elementary schools housed 484 or fewer students. One-quarter of middle schools were for 600 or fewer students, and one-quarter of new high schools were for 800 or fewer students — perhaps an indication that school districts are beginning to consider the value of providing smaller learning environments from the start, rather than building larger schools and then breaking them into smaller pieces.

Overview

Not all small schools consider smallness to be an advantage. An important distinction exists between schools that are small by design and those that are small by default. Much of the enthusiasm for small schools focuses on those small schools that want to be small, are staffed by innovative faculty, and are often schools of choice. However, the large majority of small U.S. high schools is small by default and often located in rural areas where populations are declining. Although we support the move toward smaller high schools, we offer a caution about the research based on this topic: The focus should be on empirically grounded studies, and there should be attention devoted to possible negative consequences (Ready, Lee, & Welner, 2004).

It cannot be said that we lack sufficient reliable evidence of the positive effects of small school size on student success to act upon it. In fact, there is enough evidence now of such positive effects – and the devastating effects of large size on substantial numbers of youngsters – that it seems morally questionable not to act upon it (Raywid, 1998). The research is clear:

Today's large high schools are not working for most students, and smaller schools are reaching those who have floundered in big schools (Ark, 2002). Are there any arguments to support large schools? For the past 30 years no credible researcher has advocated large schools; in fact, education researchers have demonstrated consistently that small schools are the best places in which to educate students, particularly those children marginalized by low income and/or race (Lawrence, 2004).

In other research, Meier noted that small schools were more successful for the following seven reasons:

- Governance. Ideally, a school's total faculty should be small enough to meet around one common table.
- Respect. Students and teachers in schools of thousands cannot know one another well. And if we do not know one another, we may mishear one another.
- Simplicity. One of the first things Ted Sizer told us when we started Central Park East Secondary School in 1985 was to keep the organizational side simple. Otherwise, he said, you'll be tempted to simplify the minds and hearts of the children and subject matter you intend to teach.
- Safety. Small schools offer what metal detectors and guards cannot: the safety and security of being where you are known well by people who care for you.
- Parent involvement. When the school is small enough, probably someone there knows your kid well enough, and maybe also likes him or her enough, to create a powerful alliance with you. Smallness doesn't guarantee such an alliance, but makes it reasonable to put time into creating one.
- Accountability. No one needs long computer printouts, statistical graphs, and educational mumbo jumbo to find out how a teacher, kid, or school is doing when the scale of the school is right. Parents can simply walk around the school, listen to teachers and kids, look at the young people's work, and raise questions. It's not hard to know how many kids graduated, who went on to college, and how many dropped out along the way.

- Belonging. In small schools, the other 70 percent belong. Every kid is known, every kid belongs to a community that includes adults.

Advocates for small schools have argued that they can:

- Raise students achievement, especially for minority and low-income students
- Reduce incidents of violence and disruptive behavior
- Combat anonymity and isolation and conversely, increase the sense of belonging
- Increase attendance and graduation rate
- Elevate teacher satisfaction
- Improve school climate
- Operate cost-effectively
- Increase parent and community involvement
- Reduce the amount of graffiti on school buildings

Each of these would be a major outcome. Taken together, they constitute a powerful array of improvements (Bracey, 2001).

A 1996 review of 103 studies identifies the relationship of school size to various aspects of schooling (Cotton, 1996):

- Academic achievement in small schools is at least equal, and often superior, to that of large schools. The effects of small schools on the achievement of ethnic minority students and students of low socioeconomic status (SES) are the most positive of all.
- Student attitudes toward school in general and toward particular school subjects are more positive in small schools.
- Student social behavior, as measured by truancy levels, discipline problems, violence, theft, substance abuse, and gang participation, is more positive in small schools.

- Levels of extracurricular participation are much higher and more varied in small schools than large ones.
- Student attendance is better in small schools than in large ones, especially with minority or poor students.
- A smaller percentage of students drop out of small schools than large ones.
- Students have a greater sense of belonging in small schools than in large ones. Interpersonal relations between and among students, teachers, and administrators are more positive in small schools than in large ones.
- Student academic and general self-regard is higher in small schools than in large schools.
- Students from small and large high schools perform comparably on college-related variables, such as grades, admissions, and graduation rates.
- Despite the common belief that larger schools have higher quality curricula than small schools, no reliable relationship exists between school size and curriculum quality.
- Larger schools are not necessarily less expensive to operate than small schools. Small high schools cost more money only if one tries to maintain the big-school infrastructure (e.g., a large bureaucracy).

Summary

When all the literature on small and large schools and the merits of each size are collected and reviewed, one can only come away from the arguments with one question: Can it be proven, with hard evidence, that the size of a school influences student outcomes? Some writers have based their conclusions more on emotion or qualitative evidence than hard facts backed up with valid and reliable research methods and data.

Perhaps this study will reveal findings based on method and hard data regarding school size and student outcomes – findings leading to a valid conclusion on school size and student outcomes.

CHAPTER III

METHODS AND PROCEDURES

Population and Sample

The study focused upon high schools in Georgia. Information was gathered from the GOSA web site**.** All schools meeting the criteria of enrollment of grades nine through twelve were selected and used as the sample.

Information on these schools included the number of students enrolled, percent of free and reduced price lunch recipients, number of years of teaching experience, percentages of the education levels of the teachers, and percentage of ethnicity. This information provided a demographic look at the students and the faculty of each school. Information regarding achievement included the average Scholastic Aptitude Test (SAT) score for each school. These scores included SAT total for mathematics, verbal, and writing for all students tested. Also included was information on the percentage that passed the individual segments of the Georgia High School Graduation Test. This information revealed an overall evaluation of the school's effectiveness.

Collection and Analysis of the Data

The data required for this study was obtained from the Technology Management office of the Georgia Department of Education. The data was requested as an Excel file. The data arrived in separate spreadsheets for each of the data points. The spreadsheets were combined, paying particular attention to maintaining the accuracy of the data as it relates to individual schools within the data set. The result was one spreadsheet containing all data points for each high school that met the description utilized for this study. The Excel spreadsheet was then coded and copied into the Statistical Package for Social Sciences (SPSS) program for analysis. SPSS provided the data computations and results utilized to reach the conclusions of the research.

The comparisons among school population and academic achievement measures were made through Pearson's r, multiple regression, and regression reduction. Alpha was set at the .05 level. Assuming significant correlations among selected variables, effects of school size on SAT and GHSGT scores were determined by taking the difference between R^2 of the full regression and the R^2 of the reduced regression models. The reduced regression included the two sets of test variables (SAT and GHSGT) and a proxy for socioeconomic status (The percentage of students receiving free and reduced price lunch - SES). SES is frequently used as a predictor of differences in achievement (Ferguson, 2002). Therefore, after testing relationships, it was estimated that the reduced regression would determine the statistical effect produced in test scores by SES.

The full regression included the two test variables (SAT and GHSGT), a proxy for socioeconomic status, and school size. That is, in the final analysis it was projected that scores on SAT and GHSGT would be predicted by SES and school size.

Chapter IV

PRESENTATION OF THE FINDINGS

Descriptive Statistics of the Data Set

There were 303 usable data sets out of 324 schools. The data set is included in Appendix A. Schools that were eliminated from the study had data flaws such as reporting no teachers with Bachelor's Degrees, even when they were serving over 1200 students. Other discrepancies were mathematical such as reporting scores over 100% when 100% was the maximum score. The summary data for this study are found in Table 4.1. The unit of analysis for this study was the school (a collective average for each item).

Regarding Table 4.1, SAT is the combined score of the mathematics, verbal, and writing portions of the SAT Reasoning Test. The test is a standardized test used frequently by colleges and universities to select incoming students. Student population is the number of students enrolled in the high school. Student population ranged from 284 to 4116. SES is the percent of students receiving free or reduced price lunch and is an indicator of school population poverty level. Graduation rate is the percentage of students that graduated the previous school year. This is calculated by dividing the number entering the ninth grade four years earlier into the number that graduated. The GHSGT test scores indicate the percentage of students that passed the individual portions of the GHSGT. Teacher education level is the number of teachers within each school that hold a certain degree level of certification. Teacher experience is the number of teachers within each school with a range of experience broken into 10 year increments.

Table 4.1 A Summary of Data Collected for This Study (N = 303)

Variables	Min	Max	Mean		Std. Deviation
			Statistic	Std. Error	Statistic
SAT	1083.7	1743.8	1411.758	7.344	127.827
Student Population	284	4116	1370.71	39.206	682.451
SES - % of Free and Reduced Lunch Per School	.031	.940	.484	.011	.198
Graduation Rate	53.0	100.0	80.208	.517	9.004
English	.770	1.000	.917	.003	.046
Mathematics	.813	1.000	.947	.002	.038
Science	.640	1.000	.898	.004	.063
Social Studies	.550	1.000	.872	.004	.075
GHSGT Writing	.683	1.000	.901	.003	.058
Teachers With BS Degree	8	74	33.23	.908	15.804
Teachers With Master's Degree	1	46	12.48	.454	7.899
Teachers With Specialist Degree	4	115	39.70	1.175	20.447
Teachers With Doctoral Degree	0	12	2.29	.126	2.188
Experience < 10 Years	6	113	39.22	1.300	22.629
11 to 20 Years Experience	2	80	24.89	.669	11.650
21 to 30 Years Experience	0	55	15.02	.446	7.770
30 + Years Experience	1	21	4.67	.167	2.906

Correlational Relationships Among School Size and Academic Tests and Measurements

Table 4.2 reveals the possible relationships among size of the school (student population) and variables representing student achievement. For example, the correlation between students' SAT scores and school size (STUPOP) was $r = .327$, $\alpha = .001$. This may lead to the tentative and perhaps erroneous finding that as the school size increases there is a significant chance that the students' SAT scores will also increase. Conversely, as the size of the student population increases, the probability of a school having a lower SES is significant (α = .001). Hence, r = -381, α = .001 suggested a negative correlation between school size and SES (Free and Reduced Price of Lunch). This data set is unique to Georgia High Schools; and since the statistics are descriptive, judgment must be withheld about significant relationships until the next steps in the statistical analysis is completed. Thus, the purpose of this section was to provide an overview of descriptive statistics that might continue to show a trend with further analysis.

Table 4.2 Correlations Among the Variables (Pearson's r)
(N = 303)

Correlations

Variables as Coded		SAT	Grad Rate	English	Mathematics	Science	Social Stu	GHSGT Writing	SES	Stu Pop
SAT	Pearson r	1	.570**	.700**	.691**	.696**	.705**	.644**	-.800**	.327**
	p 2-tailed		.000	.000	.000	.000	.000	.000	.000	.000
Grad Rate	Pearson r	.570**	1	.645**	.551**	.606**	.681**	.657**	-.671**	.245**
	p 2-tailed	.000		.000	.000	.000	.000	.000	.000	.000
English	Pearson r	.700**	.645**	1	.832**	.835**	.869**	.735**	-.750**	.338**
	p 2-tailed	.000	.000		.000	.000	.000	.000	.000	.000
Mathematics	Pearson r	.691**	.551**	.832**	1	.867**	.823**	.623**	-.691**	.242**
	p 2-tailed	.000	.000	.000		.000	.000	.000	.000	.000
Science	Pearson r	.696**	.606**	.835**	.867**	1	.885**	.656**	-.719**	.238**
	p 2-tailed	.000	.000	.000	.000		.000	.000	.000	.000
Social Studies	Pearson r	.705**	.681**	.869**	.823**	.885**	1	.724**	-.737**	.317**
	p 2-tailed	.000	.000	.000	.000	.000		.000	.000	.000
GHSGT Writing	Pearson r	.644**	.657**	.735**	.623**	.656**	.724**	1	-.674**	.429**
	p 2-tailed	.000	.000	.000	.000	.000	.000		.000	.000
SES	Pearson r	-.800**	-.671**	-.750**	-.691**	-.719**	-.737**	-.674**	1	-.381**
	p 2-tailed	.000	.000	.000	.000	.000	.000	.000		.000
Stu Pop	Pearson r	.327**	.245**	.338**	.242**	.238**	.317**	.429**	-.381**	1
	p 2-tailed	.000	.000	.000	.000	.000	.000	.000	.000	

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

The correlation between the school's graduation rate and school size (STUPOP) was r =.245, α = .001. This may lead to a speculative finding that as the school size increases there is a significant chance that the graduation rate will also increase. The correlation between the student's score on the English, Mathematics, Science, Social Studies, and Writing portions of the Georgia High School Graduation Test and school size (STUPOP) was r =.338, r = .242, r = .238, r = .317, and r = .429 respectively, all at $\alpha = .001$. This may also lead to the provisional finding that as the school size increases there is a significant chance that the student's scores for these tests will also increase.

Controlling for Variables That May Influence Student Achievement

The discussion and data in the preceding tables dealt with basic, Pearson correlations. Now consider this question: What if several variables are linked together to determine the influence of school size on student achievement? To begin this analysis, data in Table 4.3 were generated from the data set found in Appendix A. The objective was to find a defensible predictor or a set of significant predictors of student accomplishments from variables such as SES, experience levels of teachers, and the education levels of teachers. The question of concern was: What variable identified in this study and data set, other than school size, might influence student outcomes? The first model to assist in answering this question is shown in Table 4.3. The model included all variables in the data set except the size of the school (student population) since it was the dependent variable of concern or focus for this study. That is, how does school size (size of the student population in a school) influence student outcomes?

Power analysis was the technique employed to select the control variables (Table 4.3), a statistical test for making a decision as to whether or not to reject the null hypothesis when the alternative hypothesis is true (i.e. that a Type II error will be avoided). According to Cohen (1988), as power increases, the chances of a Type II error decrease. The probability of a Type II error is referred to as the false negative rate (β). Therefore, power is equal to $1 - \beta$. This analysis was conducted with the standard α = .05, meaning that there is a 95% chance, or higher, of accepting the null hypothesis when it is true. Thus, the index of power shown in Table 4.4, reveals that SES is the only significant predictor variable in the data set. This was anticipated before the study was conducted as noted in Chapter I.

SES was found to be a significant predictor of student outcomes; α = .9999 or 1.0; and it was selected to serve as an independent variable in each test of the seven research questions generated from the research hypothesis. An observed power of .95 or higher was the decision index employed to select or reject a variable as a significant predictor. While the variable “teachers having a doctoral degree’ had a power of .947, it was assumed that this variable, according to the decision criteria, was not close enough to include as a significant predictor. If this variable had earned a power of .951, it would have been included as a significant predictor. Note at this stage in the analysis, school size had not been considered, since it was to be included with all other variables that might significantly influence student achievement or outcomes as defined in this study.

Table 4.3 Selecting Control Variables (N = 303)
Descriptive Statistics

Variables as Coded	Range	Minimum	Maximum	Mean	
	Statistic	Statistic	Statistic	Statistic	Std. Error
SAT	660.1	1083.7	1743.8	1411.758	7.344
Stu Pop	3832	284	4116	1370.71	39.206
SES	.910	.031	.940	.484	.011
Grad Rate	47.0	53.0	100.0	80.208	.517
English	.230	.770	1.0000	.917	.003
Mathematics	.187	.813	1.0000	.947	.002
Science	.360	.640	1.0000	.898	.004
Social Stu	.450	.550	1.0000	.872	.004
GHSGT Writing	.317	.683	1.0000	.901	.003
Teacher BS	66	8	74	33.23	.908
Teacher MS	45	1	46	12.48	.454

Variables as Coded	Range	Minimum	Maximum	Mean	
	Statistic	Statistic	Statistic	Statistic	Statistic
Teacher SP	111	4	115	39.70	1.175
Teacher Doc	12	0	12	2.29	.126
T less 10years	107	6	113	39.22	1.300
T 11 to 20 years	78	2	80	24.89	.669
T 21 to 30years	55	0	55	15.02	.446
T 30 Plus	20	1	21	4.67	.167

Table 4.4 Power Analysis (Wilks'Lambda)

Effect	Value	F	Sig.	Observed Power
Intercept	.011	3721.666	.000	1.000
SES	.299	96.010	.000	1.000
Teacher BS	.988	.516	.822	.223
Teacher MS	.954	1.967	.059	.768
Teacher SP	.946	2.347	.024	.850
Teacher Doc	.929	3.150	.003	.947
T less 10 years	.974	1.097	.365	.471
T 11 to 20 years	.949	2.224	.032	.826
T 21 to 30 years	.952	2.078	.046	.795
T 30 Plus	.967	1.394	.208	.589

Determining the Correlation Coefficients Between Student Outcomes and the Independent Variables in the Prediction Model

In statistical analysis, the coefficient of determination, R^2 is used in models whose main purpose is the prediction of future outcomes on the basis of other related information. It is the proportion of variability in a data set that is accounted for by the statistical model. The R^2 provides a measure of how well future outcomes are likely to be predicted by the model. This study employed R^2 in the context of linear regression; and R^2 is the square of the correlation coefficient between the outcomes and their predicted values, or in the case of simple linear regression in this study, the correlation coefficient between the outcome and the values being used for prediction. In such cases, the values vary from 0.0 to 1.0 (Steel & Torrie, 1960).

Since the power analysis defined the free and reduced price school lunch (SES) as the only significant predictor of student outcomes, the next step entailed the calculation of R^2 for this prediction model by including SES, first, and then school size. The analysis pertaining to the influence of SES is found in Table 4.5. As shown in Table 4.5, the analysis of the dominant independent variable, free or reduced cost of a school lunch, a proxy for socioeconomic status (SES), was analyzed through regression procedures that included comparisons with the seven dependent variables (measuring student outcomes). The R^2 per dependent variable to be included in the analysis is found at the end of Table 4.6 (Regression), for example, the R^2 for SAT was .640.

Table 4.5 Establishing R^2 for SES per Variable

	Mean	Std. Deviation
Grad Rate	80.208	9.004
English	.917	.046
Mathematics	.947	.038
Science	.898	.063
Social Stu	.872	.075
GHSGT Writing	.901	.058
SAT	1411.758	127.827

(Wilks' Lambda) [a]

Effect	Value	F	Hypothesis df	Error df	Sig.	Observed Power α
Intercept	.003	12011.940[a]	7.000	295.000	.000	1.000
SES	.259	120.669[a]	7.000	295.000	.000	1.000

[a] Design: Intercept + SES

Table 4.6 Regression

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Observed Power[b]
Corrected Model	Grad Rate	11018.564[a]	1	11018.564	246.355	.000	1.000
	English	.359[c]	1	.359	387.254	.000	1.000
	Mathematics	.204[d]	1	.204	274.890	.000	1.000
	Science	.627[e]	1	.627	321.459	.000	1.000
	Social Stu	.934[f]	1	.934	357.105	.000	1.000
	GHSGT Writing	.458[g]	1	.458	250.300	.000	1.000
	SAT	3.159E6	1	3.159E6	535.672	.000	1.000
Intercept	Grad Rate	390318.073	1	390318.073	8726.807	.000	1.000
	English	43.346	1	43.346	46732.918	.000	1.000
	Mathematics	44.215	1	44.215	59573.663	.000	1.000
	Science	44.090	1	44.090	22615.377	.000	1.000
	Social Stu	43.951	1	43.951	16804.622	.000	1.000
	GHSGT Writing	42.965	1	42.965	23496.095	.000	1.000
	SAT	1.195E8	1	1.195E8	20260.953	.000	1.000
SES	Grad Rate	11018.564	1	11018.564	246.355	.000	1.000
	English	.359	1	.359	387.254	.000	1.000
	Mathematics	.204	1	.204	274.890	.000	1.000
	Science	.627	1	.627	321.459	.000	1.000
	Social Stu	.934	1	.934	357.105	.000	1.000
	GHSGT Writing	.458	1	.458	250.300	.000	1.000
	SAT	3.159E6	1	3.159E6	535.672	.000	1.000
Error	Grad Rate	13462.625	301	44.726			
	English	.279	301	.001			
	Mathematics	.223	301	.001			
	Science	.587	301	.002			
	Social Stu	.787	301	.003			
	GHSGT Writing	.550	301	.002			
	SAT	1.775E6	301	5897.895			
Total	Grad Rate	1.974E6	303				
	English	255.203	303				
	Mathematics	272.366	303				
	Science	245.598	303				
	Social Stu	232.055	303				
	GHSGT Writing	247.156	303				
	SAT	6.088E8	303				
Corrected Total	Grad Rate	24481.189	302				
	English	.638	302				
	Mathematics	.427	302				
	Science	1.214	302				
	Social Stu	1.721	302				
	GHSGT Writing	1.008	302				
	SAT	4.935E6	302				

a. R Squared = .450 (Adjusted R Squared = .448) – Graduation Rates

c. R Squared = .563 (Adjusted R Squared = .561) - English

d. R Squared = .477 (Adjusted R Squared = .476) - Mathematics

e. R Squared = .516 (Adjusted R Squared = .515) - Science

f. R Squared = .543 (Adjusted R Squared = .541) – Social Studies

g. R Squared = .454 (Adjusted R Squared = .452) - Writing

h. R Squared = .640 (Adjusted R Squared = .639) - SAT

Determining the Significance of SES and School Size on Student Outcomes

This first step was straightforward in that its purpose was to isolate the R^2 for the independent variable (SES) and the seven independent variables. Therefore, the set of R^2 s per the seven independent variables represents the "full regression" (Table 4.7). Next, the information needed to determine the effect is of school size was determined. Table 4.8 shows the R^2 for the full regression.

Table 4.7
Establishing R^2 for SES and Size of the School
A. Descriptive Statistics

	Mean	Std. Deviation
Grad Rate	80.208	9.003
English	.917	.046
Mathematics	.947	.038
Science	.898	.063
Social Stu	.872	.075
GHSGT Writing	.901	.058
SAT	1411.758	127.827

(Wilks' Lambda) [a]

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Intercept	.009	4864.098[a]	7.000	294.000	.000	.991	34048.688	1.000
SES	.294	100.669[a]	7.000	294.000	.000	.706	704.683	1.000
Stu Pop	.893	5.016[a]	7.000	294.000	.000	.107	35.110	.997

[a] Design: Intercept + SES + STU POP

4.8 Regression

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Obsvd. Power[b]
Corrected Model	Grad Rate	11021.991[a]	2	5510.995	122.838	.000	.450	245.676	1.000
	English	.361[c]	2	.181	195.498	.000	.566	390.996	1.000
	Mathematics	.204[d]	2	.102	137.283	.000	.478	274.567	1.000
	Science	.628[e]	2	.314	161.133	.000	.518	322.266	1.000
	Social Stu	.937[f]	2	.468	179.099	.000	.544	358.198	1.000
	GHSGT	.493[g]	2	.246	143.386	.000	.489	286.771	1.000
	Writing								
	SAT	3.162E6	2	1.581E6	267.634	.000	.641	535.267	1.000
Intercept	Grad Rate	160521.903	1	160521.903	3577.967	.000	.923	3577.967	1.000
	English	17.409	1	17.409	18844.518	.000	.984	18844.518	1.000
	Mathematics	18.154	1	18.154	24403.719	.000	.988	24403.719	1.000
	Science	18.279	1	18.279	9373.233	.000	.969	9373.233	1.000
	Social Stu	17.608	1	17.608	6733.489	.000	.957	6733.489	1.000
	GHSGT	16.360	1	16.360	9522.209	.000	.969	9522.209	1.000
	Writing								
	SAT	4.822E7	1	4.822E7	8161.441	.000	.965	8161.441	1.000
SES	Grad Rate	9556.678	1	9556.678	213.014	.000	.415	213.014	1.000
	English	.288	1	.288	312.083	.000	.510	312.083	1.000
	Mathematics	.179	1	.179	240.974	.000	.445	240.974	1.000
	Science	.559	1	.559	286.874	.000	.489	286.874	1.000
	Social Stu	.763	1	.763	291.876	.000	.493	291.876	1.000
	GHSGT	.307	1	.307	178.801	.000	.373	178.801	1.000
	Writing								
	SAT	2.633E6	1	2.633E6	445.766	.000	.598	445.766	1.000
Stu Pop	Grad Rate	3.427	1	3.427	.076	.782	.000	.076	.059
	English	.002	1	.002	2.199	.139	.007	2.199	.315
	Mathematics	.000	1	.000	.308	.579	.001	.308	.086
	Science	.002	1	.002	.907	.342	.003	.907	.158
	Social Stu	.003	1	.003	1.042	.308	.003	1.042	.174
	GHSGT	.035	1	.035	20.367	.000	.064	20.367	.994
	Writing								
	SAT	2923.097	1	2923.097	.495	.482	.002	.495	.108
Error	Grad Rate	13459.198	300	44.864					
	English	.277	300	.001					
	Mathematics	.223	300	.001					

	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Obsvd. Power[b]
	Science	.585	300	.002					
	Social Stu	.785	300	.003					
	GHSGT Writing	.515	300	.002					
	SAT	1.772E6	300	5907.811					
Total	Grad Rate	1.974E6	303						
	English	255.203	303						
	Mathematics	272.366	303						
	Science	245.598	303						
	Social Stu	232.055	303						
	GHSGT Writing	247.156	303						
	SAT	6.088E8	303						
Corrected Total	Grad Rate	24481.189	302						
	English	.638	302						
	Mathematics	.427	302						
	Science	1.214	302						
	Social Stu	1.721	302						
	GHSGT Writing	1.008	302						
	SAT	4.935E6	302						

a. R Squared = .450 (Adjusted R Squared = .447) – Graduation Rate
c. R Squared = .566 (Adjusted R Squared = .563) - English
d. R Squared = .478 (Adjusted R Squared = .474) - Mathematics
e. R Squared = .518 (Adjusted R Squared = .515) - Science
f. R Squared = .544 (Adjusted R Squared = .541) – Social Studies
g. R Squared = .489 (Adjusted R Squared = .485) – GHSGT Writing
h. R Squared = .641 (Adjusted R Squared = .638) - SAT

The Impact of School Size on Student Outcomes

School size in this study was used interchangeably with the student population size. However, size as used in this study did not include architectural square footage per school. That distinction may be used in a future study where square footage in considered.

The difference in the R^2 per variable (Compare the difference between R-Squares in Table 4.6 and Table 4.8) represents the statistical effect that school size (size of the student population) has on each independent variable. Effect size is a measure of the strength of the relationship between two variables in a statistical population, or a sample-based estimate of that quantity. An effect size calculated from data is a descriptive statistic that conveys the estimated magnitude of a relationship (Wilkinson, 1999). By testing the significance of difference between two R- Squares, the effect of adding the independent variable (school size) to the model can be determined. In this study, the difference between the two R- Squares is the effect of adding school size as found in Table 4.9.

Table 4.9
The Effect of School Size on Student Achievement

Variable	$R^{2\ \text{SES and School Size}}$ When SES and School Size Are Included	$R^{2\ \text{SES}}$ When SES is Included	Effect (Change in $R^{2)}$ $R^{2\ \text{SES and School Size}} - R^{2\ \text{SES}}$	Significance of Effect [a] $\alpha \leq .05$
SAT	.641	.640	.001	.482
Graduation Rate	.450	.450	.000	.782
English	.566	.563	.003	.139
Mathematics	.478	.477	.001	.579
Science	.518	.516	.002	.342
Social Studies	.544	.543	.001	.308
GHSGT Writing	.489	.454	.035	.001 **

[a] Calculations for the significance of each R^2 change (Effect) are found in Appendix B.
** Significant at the .001 level.

In this study of 303 high schools in Georgia, school size had no effect on the SAT, high school graduation rate, English scores, mathematics scores, science scores, and scores on social studies tests. However, when the writing test was considered, the $\alpha = .001$ revealed that the effect of .035 was statistically significant. This statistic might lead to the conclusion that the larger the high school in Georgia, the higher the probability that students will make better scores in writing. Since this was the only significant finding out of seven variables, we may deliberate whether this was a random effect or whether the effect was actually significant.

Chapter V

Summary of the Findings, Conclusions, and Recommendations

A Review of the Research Hypothesis and Research Questions in This Study

The hypothesis that guided this study was: There is no statistically significant effect of student population size in Georgia high schools on the academic achievement of their students as measured by seven variables: Scholastic Aptitude Test (SAT), the graduation rate per school, and average scores on the Georgia High School Graduation Tests in English, Mathematics, Science, Social Studies, and Writing. These were part of the Georgia testing program used ensure that students qualifying for a diploma have mastered essential core academic content and skills.

The research questions that guided the study were:

1. Is there a significant relationship between school size and a student's score on the SAT?
2. Is there a significant relationship between school size and a student's graduation rate from high school?
3. Is there a significant relationship between school size and a student's score on the English portion of the Georgia High School Graduation Test?
4. Is there a significant relationship between school size and a student's score on the Mathematics portion of the Georgia High School Graduation Test?
5. Is there a significant relationship between school size and a student's score on the Social Studies portion of the Georgia High School Graduation Test?
6. Is there a significant relationship between school size and a student's score on the Science portion of the Georgia High School Graduation Test?

7. Is there a significant relationship between school size and a student's score on the Writing portion of the Georgia High School Graduation Test?

Therefore, if significant correlations were found, could the effect also be significant? Correlations were statistically significant, but the effect based on the results of reduced regression led to the conclusions that school size does influence student outcomes in Georgia high schools.

Findings

From the data generated in Table 4.9, school size had an effect on SAT scores of .001. This is contrary to findings of the Texas policy report (Texas Education Agency, 1999) that indicated that larger schools had a positive effect upon SAT scores.

The effect upon graduation rate was 0.0. This disagrees with Cotton's summary of research that found that size did affect dropout rate and therefore graduation rate (Cotton, 1996).

The effect upon the GHSGT in English was .003. The effect on the GHSGT in Mathematics was .001. The effect on GHSGT in Science of .002, and the GHSGT in Social Studies was .001. These results also agree with Cotton's summary of research that no difference is noted in student achievement based upon school size (Cotton, 1996). Gardner also found the same results in studying high schools in Maine using a similar testing system (Gardner, 2001).

The effect of school size on the Writing portion of the GHSGT was found to be .035. As previously stated, this is significant, but cannot be ruled out as random effect.

Conclusion

Based upon the findings of this study, school size plays little importance in the measures of academic achievement researched in the 303 Georgia schools. Supporters of both large and small schools can equally say that in Georgia, size has little to no impact on academic achievement or graduation rates.

Recommendations

Further study may be completed using subsequent years' data. Study in related areas concerning individual class size within each school, school location (urban or rural), or school size versus community size could also be conducted.

REFERENCES

Agron, J. (April, 2003). Size matters. *American School and University 29th annual Official Education Construction Report.*

Allen, R. (2002). Big schools: The way we are. *Educational Leadership 59*(5), 36-41.

Amberson, P. (2006). 11th Annual School Construction Report. School Planning & Management website. www.webspm.com

Ark, T. (2002).The case for small high schools. *Educational Leadership*,59(5), 55. Retrieved Saturday, November 18, 2006 from MasterFILE Premier database.

Barker, R. G. & Gump, P.V. (1964). Big school, small school: high school size and student behavior. Stanford, CA: Stanford University Press.

Barnett, R., Glass, J. Snowden, R. & Stringer, K. (2002). Size, performance, and effectiveness: cost-constrained measures of best-practice performance and secondary-school size. *Education Economics*, (10)3, 291-311.

Bickel, R., & Howley, C. (2000). The influence of scale on school performance: a multi-level extension of the Matthew principle. Education Policy Analysis Archive 8)22. Retrieved from EPAA website http://epaa.asu.edu/epaa/v8n22/ on November 12, 2006.

Bracey, G. (2001). Small Schools, great strides. *Phi Delta Kappan*, 82(4), 413. Retrieved Saturday, November 18, 2006 from MasterFILE Premier database.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Cotton, K. (May, 1996). School size, school climate, and student performance. Retrieved July 5, 2003, from http://www.nwrel.org/scpd/sirs/10/c020.html.

Cutshall, S. (2003). Is smaller better? When it comes to schools, size does matter. *Techniques 78*(3), 22-25.

Dills, Angela K. (2006). Trends in the relationship between socioeconomic status and academic achievement. Available at SSRN: http://ssrn.com/abstract=886110

Ferguson, R. F. (2002), "What doesn't meet the eye: Understanding and addressing racial disparities in high-achieving suburban schools", North Central Regional Educational Laboratory, Chicago, Illinois, Retrieved November 10, 2009 from http://www.ncrel.org/gap/ferg/index.html

Gardner, V. A. (April 2001). Does high school size matter for rural schools and students. Paper presented at the meeting of the New England Educational Research Organization, Portsmouth, NH.

Garrett Z, Newman M, Elbourne D, Bradley S, Noden P, Taylor J, West A. (2004). Secondary school size: A systematic review. In: Research Evidence in Education Library. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

Great schools issue paper: School size. Retrieved July 5, 2003, from http://www.weac.org/GreatSchools/Issuepapers/schoolsize.htm.Gregory, T. (December, 2001). School reform and the no-man's-land of high school size. Paper presented at the Journal of Curriculum Theorizing Conference, Bloomington, ID.

Harrison. R.S. (2003). School size, violence, cost and achievement. A Report of The Commission on Business Efficiency of the Public Schools Commission's Post Analysis and Executive Summary New Jersey.

Hart, P. (2006). Size matters. *Texas Monthly*, pp. 64, 75. Retrieved Saturday, November 18, 2006 from MasterFILE Premier database.

Heaviside, S., Rowand, C., Williams, C., Farris, E., & Westat. (1998). Violence & discipline problems in U.S. public schools: 1996-97, NCES 98-030. *Violence & Discipline Problems in U.S. Public Schools: 1996-97, NCES 98-030*, Retrieved from SocINDEX with Full Text database.

Howley, C. (1994). The academic effectiveness of small-scale schooling (an update). Charleston, West Virginia: ERIC Clearinghouse on Rural Education and Small Schools. (Eric Document No. ED372 897).

Howley, C.B., & Howley, A.A. (2002). Size, excellence, and equity. A report on Arkansas schools and districts. Athens, OH: Ohio University, College of Education, Educational Studies Department.

Kaiser, D. (2005). School Shootings, high school size, and neurobiological considerations. *Journal of Neurotherapy*, *9*(3), 101-115. doi:10.1300/J184v09n03.07.

Langdon, P. (2000). Stopping school sprawl. *Planning, 66*(5), 10-11.

Lawrence, B. (2004). For authentic accountability think small. *Journal of Education*, 185(3), 41-50. Retrieved Saturday, November 18, 2006 from MasterFILE Premier database.

Lawrence, B., Bingler S., Diamond, B., Hill, B., Hoffman J., Howley, C.B., & Mitchell, S. et al. (2002). Dollars & sense: The cost effectiveness of small schools. *The Rural School and Community Trust*. Washington, DC.

Meier, D. (1996). The big benefits of smallness. *Educational Leadership 54*(1), 12-15.

Mok, M. & Flynn, M. (1996). School size and academic achievement in the hsc examination: Is there a relationship? *Issues in Educational Research 6*(1), 57-78.

Munoz, M., Clavijo, K., & Koven, S. (1999). Educational equity in a reform environment: The effect of socio-economic status on student achievement. Retrieved from ERIC database.

Public Schools of North Carolina. (2000). School size and its relationship to achievement and behavior. State Board of Education, Department of Public Instruction, Office of Instructional and Accountability Services, Division of Accountability Services, Evaluation Section.

Raywid, M. (1998). Small Schools – a reform that works. *Educational Leadership*, 55(4), 34-39. Retrieved Saturday, November 18, 2006 from MasterFILE Premier database.

Ready, D. Lee, V. & Welner, K. (2004). Educational equity and school structure: school size, overcrowding, and schools-within-schools. *Teachers College Record* Volume 106 Number 10, 2004, p. 1989-2014 Retrieved Tuesday, November 14, 2006 from Academic Search Premier database.

Steel, R. G., & Torrie, J. H. (1960). *Principles and procedures of statistics with special reference to the biological sciences*. New York: McGraw-Hill.

Stiefel, L., Iatarola, P., Fruchter, N., & Berne, R. (1998). The effects of size of student body on school costs and performance in New York City high schools. New York University: Institute for Education and Social Policy, Robert F. Wagner Graduate School of Public Service.

Texas Education Agency. (1999). School size and class size in Texas public schools. Document Number GE9-600-03. Austin, TX.

United States Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "Public Elementary/Secondary School Universe Survey," 2007–08, Version 1a.

United States Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "Public Elementary/Secondary School Universe Survey," 1982–83 through 2007–08. (This table was prepared September 2009.)

United States Department of Statistics (2006). School size. Available at: http://www.ed.gov/about/offices/list/ovae/pi/hs/schoolsize.html Retrieved August 18, 2009

Viadero, D. (2001). Research: Smaller is better. *Education Week-American Education's Newspaper of Record 21*(13), 28-30.

Wasley, P. (2002). Small classes, small schools: the time is now. *Educational Leadership*, 59(5),6. Retrieved Saturday, November 18, 2006 from MasterFILE Premier database.

Werblow, J., & Duesbery, L. (2009, February). The impact of high school size on math achievement and dropout rate. *High School Journal*, *92*(3), 14-23. Retrieved July 22, 2009, from Academic Search Complete database.

Wilkinson, L. (1999). Statistical methods in psychology journals. *American Psychologist*, *54*(8), 594. Retrieved April 14, 2010, from Academic Search Complete database.

APPENDICES

Appendix A
Data Set

Data are in order from left to right as follows:

System; School ID; SAT; Student Population; SES; Graduation Rate; English; Social Studies;

GHSGT Writing; BS; MS; SP; DOC; Less than 10 years; 11 to 21 Years; 21 to 30 Years; over 30

Years. Note that there is a wrap around per row. There are two rows per case.

squ	0103	1377.3	506	.7391	71.6	.8000	.8810	.8214	.7619	.8171	12	7
	15	0	8	11	8	4						
761	4058	1206.0	1722	.8153	83.2	.8286	.8130	.7054	.7325	.9142	27	19
	51	3	47	24	20	10						
761	4560	1498.2	1313	.4524	94.9	.9410	.9705	.9305	.9125	.9696	27	10
	41	2	42	24	10	3						
761	0182	1342.0	1752	.6844	89.0	.9066	.9189	.8919	.8765	.9458	40	9
	47	4	52	16	17	4						
761	0192	1375.0	1088	.5607	78.0	.8905	.8952	.8278	.9055	.9227	24	8
	37	4	40	16	10	5						
761	0186	1243.6	918	.8704	82.8	.8901	.8736	.7611	.8046	.8919	29	11
	25	2	30	20	5	2						
761	4568	1184.0	1324	.8165	80.7	.8043	.8143	.7500	.7249	.9048	26	7
	39	4	31	23	12	8						
603	0302	1529.4	448	.4621	66.1	.9038	.9327	.8750	.8614	.9239	12	9
	13	1	8	16	9	1						
605	0189	1371.6	1435	.5672	69.7	.9673	.9796	.9551	.9212	.9213	42	5
	49	2	42	24	16	6						
607	3052	1434.0	1685	.4409	74.8	.9271	.9444	.9233	.8566	.9106	47	19
	48	1	62	34	12	1						
606	0199	1396.0	886	.5632	78.9	.8989	.9251	.8936	.8913	.9162	23	9
	26	2	31	13	15	1						
607	0101	1425.9	1610	.4689	78.1	.9161	.9387	.8867	.8721	.9107	38	18
	54	1	52	35	12	6						
608	0105	1454.0	939	.4494	76.9	.8910	.9573	.8768	.8309	.8612	24	15
	24	2	28	22	10	3						
608	0577	1506.8	1527	.4990	76.9	.8983	.9559	.8980	.8785	.8858	48	6
	36	1	44	26	14	6						
608	0198	1437.0	1794	.3824	75.4	.8978	.9525	.8869	.8824	.9117	47	18

	45	2	58	38	13	2						
609	0291	1301.9	861	.7213	77.4	.8663	.9244	.8663	.8214	.7833	25	10
	27	0	17	26	11	5						
610	0101	1338.6	860	.5756	78.5	.8900	.9426	.9238	.8641	.9175	24	9
	27	0	12	22	8	7						
611	0186	1381.2	1119	.6836	67.3	.8517	.8708	.8252	.7681	.8295	32	7
	30	0	29	18	13	6						
611	0286	1147.1	883	.8494	59.6	.7919	.8456	.7718	.6575	.7975	27	5
	16	0	23	11	8	1						
611	0204	1279.7	1125	.5387	64.5	.9124	.9312	.8341	.8411	.9068	28	5
	33	0	32	18	10	4						
611	0386	1143.0	855	.9404	53.0	.7698	.8489	.7122	.5496	.6828	30	3
	24	0	22	8	10	8						
611	0198	1315.8	1293	.6543	64.2	.8816	.9039	.7807	.8222	.8247	43	7
	29	1	33	23	12	4						
611	0303	1201.1	380	.7711	71.2	.9091	.9242	.7727	.8689	.9615	9	1
	11	0	8	7	6	1						
612	0105	1483.4	744	.4933	83.2	.9669	.9801	.9735	.9139	.9430	19	10
	21	2	11	20	12	4						
613	1050	1341.6	1005	.4955	67.9	.8772	.9348	.9043	.8509	.8846	17	10
	30	0	23	17	10	6						
763	0201	1470.6	499	.1784	91.9	.9704	.9481	.9407	.9254	.9127	8	5
	20	0	8	17	7	1						
614	2050	1206.5	668	.7006	69.7	.9450	.9541	.9358	.9266	.8547	24	5
	16	0	13	12	14	1						
615	0502	1314.9	519	.5453	74.5	.8980	.9286	.8776	.8125	.8812	15	3
	18	1	20	10	5	1						
615	0182	1572.0	1455	.1643	88.9	.9474	.9672	.9470	.9311	.9486	44	6
	36	3	39	26	13	7						
764	0191	1454.7	857	.3699	87.7	.9745	.9618	.9869	.9346	.9146	16	12
	27	0	25	15	12	1						
616	2054	1464.5	1472	.4932	78.7	.9192	.9758	.9309	.8912	.9367	30	13
	35	4	31	23	21	1						
617	0288	1348.3	1359	.7881	68.9	.8321	.9357	.7626	.7316	.7965	45	9
	30	1	38	29	13	2						
618	0190	1312.0	1061	.4929	77.5	.9211	.9737	.9105	.9076	.9220	30	4
	30	1	37	18	9	2						
765	3050	1457.6	904	.4602	91.5	.9290	.9727	.9290	.9006	.9474	21	18
	21	3	27	19	14	3						
620	0295	1446.1	2935	.3193	82.6	.9305	.9763	.9164	.9186	.9194	53	39
	80	9	66	65	33	13						
621	0101	1303.0	518	.6197	78.9	.8454	.9691	.9072	.8247	.9213	17	4
	18	3	16	11	8	5						
622	3050	1514.0	476	.5609	89.1	.9140	.9462	.8710	.8889	.9381	8	7
	13	1	11	6	6	5						
622	2052	1410.5	1144	.4668	76.7	.8584	.9087	.8889	.8598	.8371	32	18

	27	0	33	21	17	2						
622	0189	1371.9	618	.5599	79.1	.8962	.8868	.7736	.8039	.8624	16	5
	17	2	20	7	5	3						
622	5054	1372.0	1543	.5379	84.9	.9187	.9397	.8826	.8489	.8903	44	11
	40	1	45	23	17	4						
766	1050	1469.0	1204	.3912	84.6	.9262	.9631	.9041	.9057	.9109	20	18
	28	3	32	24	11	2						
767	2050	1466.0	1049	.3699	84.3	.9192	.9594	.9293	.8788	.9598	22	17
	27	1	22	21	17	6						
623	1052	1651.0	1019	.3768	75.1	.8961	.9394	.8961	.8767	.9250	19	23
	21	0	26	19	8	10						
623	4052	1482.0	1161	.3376	75.5	.9357	.9717	.9150	.8436	.9203	21	19
	33	2	28	29	13	6						
624	0287	1360.9	766	.5744	80.6	.8889	.9658	.9145	.9123	.8534	14	8
	23	1	22	14	5	3						
625	2052	1112.4	1037	.7715	65.7	.8970	.8976	.7818	.7170	.8093	35	5
	28	1	35	17	11	3						
625	3056	1260.4	1383	.5727	69.6	.9144	.9683	.8834	.8524	.7886	35	9
	50	2	30	40	17	4						
625	5060	1335.3	1581	.4940	73.3	.9443	.9685	.9303	.8705	.9317	49	14
	41	3	48	33	16	6						
625	0101	1317.0	1579	.4934	74.8	.9398	.9402	.8880	.8902	.8828	32	9
	55	2	46	21	21	6						
625	0499	1711.0	730	.1247	98.9	1.0000	1.0000	1.0000	1.0000	1.0000	16	8
	31	2	22	18	10	4						
625	0399	1098.3	1039	.7757	58.3	.7727	.8168	.6512	.5726	.7561	30	6
	27	5	24	19	17	4						
625	5070	1356.0	1345	.4297	74.6	.9535	.9770	.9539	.9074	.8821	41	2
	36	1	31	17	13	3						
627	1050	1346.8	739	.6252	63.3	.8471	.9290	.8000	.7394	.6932	23	12
	18	1	20	14	11	7						
628	5050	1527.1	2102	.2940	76.3	.9576	.9735	.9572	.9548	.9517	53	26
	62	2	69	35	30	3						
628	0176	1548.0	2092	.1597	84.7	.9929	.9952	.9905	.9928	.9862	55	26
	50	5	54	36	35	8						
628	0191	1572.1	1624	.1336	93.6	.9596	.9832	.9731	.9561	.9803	38	21
	51	2	43	32	24	7						
628	0197	1573.4	2311	.2168	85.1	.9833	.9856	.9832	.9856	.9908	55	17
	76	3	73	49	23	5						
769	0201	1392.1	461	.1432	97.2	.9623	.9623	.9429	.9596	.9375	14	7
	7	0	11	4	8	4						
629	0102	1394.7	1567	.7262	61.4	.9163	.9412	.9068	.8772	.8456	38	11
	57	3	53	24	17	5						
629	5556	1434.0	1495	.6789	68.7	.8453	.9057	.8321	.7743	.8768	36	7
	53	6	58	18	19	3						
631	1054	1282.0	1554	.7130	84.2	.8608	.9068	.8390	.8391	.8444	50	9

	31	2	57	15	7	3						
631	1056	1320.3	1280	.6328	76.4	.8816	.9167	.8428	.8000	.9091	34	11
	38	2	47	22	8	1						
631	0190	1294.0	1845	.6249	80.1	.8507	.8922	.8078	.7932	.8883	56	9
	52	1	65	25	17	5						
631	4058	1232.0	1753	.6606	79.5	.8980	.9145	.8322	.7925	.8824	47	11
	54	2	65	27	7	3						
631	0290	1329.2	1729	.7045	74.8	.8697	.9389	.8506	.8228	.9237	45	13
	50	2	61	27	8	7						
631	0104	1236.0	1825	.7068	86.1	.9288	.9231	.8787	.8829	.9549	48	8
	45	2	44	28	7	1						
631	2052	1253.0	1542	.6835	76.2	.8725	.9236	.8316	.7986	.9220	36	7
	44	5	50	23	7	2						
631	0377	1272.0	1690	.7136	78.2	.8640	.9066	.8157	.7805	.9018	51	7
	44	1	55	26	8	4						
632	1050	1321.0	503	.6362	75.0	.8675	.8916	.8690	.8916	.8391	22	2
	10	0	17	9	4	2						
633	1054	1475.0	2195	.5649	75.9	.9011	.9616	.8443	.8319	.9069	65	8
	81	7	84	49	14	6						
633	0192	1595.5	2421	.0434	96.2	.9879	.9948	.9896	.9615	.9844	54	15
	70	2	62	46	19	7						
633	0103	1499.8	1807	.2092	87.7	.9736	.9934	.9648	.9289	.9680	59	7
	56	1	72	26	20	1						
633	0101	1551.0	2469	.1920	89.2	.9615	.9856	.9489	.9368	.9620	58	25
	74	4	74	54	22	8						
633	0381	1658.0	2002	.0664	96.4	.9933	1.0000	.9820	.9887	.9908	51	10
	69	4	53	38	27	6						
633	1064	1386.0	2309	.4465	81.5	.9510	.9673	.9204	.8718	.9167	70	5
	68	4	81	34	15	10						
633	2056	1431.7	2632	.3321	82.9	.9458	.9558	.9127	.9188	.9485	68	8
	82	6	89	46	19	4						
633	2066	1285.4	1741	.7771	74.4	.8539	.8917	.6857	.6548	.8766	59	8
	56	4	79	21	11	4						
633	4066	1300.3	2094	.6318	83.0	.9040	.9395	.8087	.7778	.9032	59	9
	62	2	82	28	4	4						
633	0188	1655.7	1832	.0562	94.9	.9901	.9975	.9926	.9851	.9900	47	27
	50	3	52	34	30	7						
633	3056	1348.0	2130	.5977	77.3	.9029	.9549	.8984	.8302	.8998	59	21
	66	5	93	35	17	3						
633	0373	1459.2	1717	.2900	84.5	.9437	.9731	.9167	.8986	.9579	58	15
	54	3	78	33	15	5						
633	0175	1722.0	2632	.0308	97.8	.9904	.9984	.9920	.9920	.9809	48	31
	77	7	67	41	30	15						
633	1069	1639.6	1951	.3450	81.9	.9595	.9810	.9502	.9498	.9882	64	13
	62	9	77	32	24	11						
634	0195	1302.0	1490	.5872	68.8	.9121	.9588	.9036	.8427	.8125	44	11

	53	2	35	28	24	11						
635	1554	1430.0	2294	.5789	75.3	.9165	.9736	.9341	.8852	.8768	57	28
	72	2	56	52	35	11						
636	4050	1466.7	1943	.2254	82.4	.9412	.9694	.9371	.9243	.9295	38	17
	53	0	44	35	25	9						
636	0197	1526.2	2079	.0856	88.1	.9731	.9959	.9731	.9647	.9754	41	18
	55	4	60	37	16	3						
636	0183	1406.7	1227	.4368	66.0	.9254	.9783	.9383	.9009	.9190	31	7
	37	0	38	19	14	2						
636	0189	1599.7	1644	.1679	89.8	.9741	.9827	.9799	.9628	.9744	29	25
	40	0	34	28	25	4						
771	2050	1478.3	416	.4447	80.7	.9762	.9524	.9294	.9518	.9250	9	3
	20	1	13	9	4	4						
637	2050	1340.0	820	.5707	69.4	.9065	.9640	.9281	.8623	.9237	15	9
	32	0	17	16	15	6						
638	0389	1493.5	2437	.3147	81.9	.9604	.9846	.9295	.9233	.9567	74	15
	45	3	71	34	17	3						
638	5054	1517.8	2206	.4148	75.5	.9428	.9818	.9096	.9177	.9115	43	10
	74	0	62	28	26	10						
638	0196	1541.8	1775	.1701	89.3	.9597	.9848	.9470	.9362	.9494	36	14
	53	0	47	40	9	4						
639	0193	1380.0	547	.6362	63.6	.9057	.9159	.8113	.7573	.7857	15	4
	16	0	12	8	11	2						
640	0196	1339.0	1151	.6751	69.2	.8883	.9227	.9227	.8389	.8985	27	14
	31	2	20	25	15	9						
641	0195	1399.6	777	.3707	75.9	.8750	.9057	.8428	.8718	.9085	19	2
	24	2	17	14	7	6						
772	4050	1502.0	1603	.6120	84.9	.9623	.9748	.9538	.9412	.9409	22	35
	46	5	40	35	29	3						
642	0198	1458.3	996	.2922	85.1	.9498	.9680	.9498	.9390	.9375	20	10
	33	0	16	23	19	3						
643	3050	1370.9	1622	.5752	70.0	.9032	.9450	.9058	.8562	.9223	35	10
	45	6	29	34	26	6						
773	3050	1577.0	757	.3038	88.1	.9702	.9762	.9226	.8929	.9412	13	4
	39	2	27	21	8	4						
644	1051	1151.7	705	.8014	80.3	.8240	.8880	.8095	.8430	.8182	21	1
	22	1	18	12	8	1						
644	0172	1185.2	1250	.7008	80.8	.8491	.8947	.7965	.8128	.8940	32	5
	36	2	33	17	15	4						
644	5052	1662.0	1546	.3603	94.4	.9524	.9629	.9523	.9547	.9505	34	3
	55	7	45	28	17	4						
644	4053	1200.7	939	.8285	69.8	.8407	.9286	.8242	.7874	.8587	28	4
	35	0	25	21	6	6						
644	2054	1222.7	1306	.6953	84.0	.8686	.9007	.8566	.7932	.8619	23	12
	41	7	42	19	13	4						
644	4054	1249.4	818	.8472	81.4	.8412	.9529	.8876	.8571	.8354	24	5

	31	6	26	23	9	4						
644	0400	1589.0	284	.3204	97.9	1.0000	1.0000	.9828	.9655	1.0000	11	2
	13	2	11	7	3	2						
644	2055	1521.9	1404	.4915	89.2	.9347	.9656	.9072	.9338	.9320	30	5
	45	3	46	21	10	1						
644	5055	1533.5	1589	.2933	92.0	.9180	.9645	.9151	.8778	.9231	30	3
	60	3	50	20	13	6						
644	3060	1598.0	1689	.3250	92.8	.9384	.9623	.9486	.9278	.9614	35	10
	51	4	33	37	17	6						
644	0202	1224.7	1654	.6729	82.2	.8725	.8634	.8070	.7715	.8936	27	5
	59	2	47	26	13	7						
644	0103	1229.0	2034	.6229	83.7	.8871	.9215	.8226	.8140	.9019	47	7
	58	3	62	36	10	2						
644	0176	1287.9	1512	.6832	88.6	.9200	.9356	.9040	.9137	.8841	31	13
	34	6	38	20	17	6						
644	5067	1341.4	1855	.5353	89.0	.8962	.9187	.8851	.8463	.9138	33	14
	54	6	58	24	19	7						
644	0497	1272.1	1856	.5496	85.7	.9242	.9431	.8504	.8622	.9319	38	9
	61	5	57	29	14	5						
644	0276	1185.0	1445	.7869	90.6	.9231	.9398	.9064	.9463	.9014	33	7
	40	3	51	20	8	1						
644	4069	1198.0	1035	.7469	72.9	.7965	.8628	.7577	.7018	.7573	25	4
	32	4	39	14	6	2						
644	1070	1306.0	1487	.5306	89.0	.9147	.9184	.8669	.8927	.9220	32	9
	40	4	33	28	13	9						
645	0103	1447.4	963	.6303	88.8	.9076	.9511	.9239	.8022	.8497	28	6
	28	0	25	17	12	5						
647	4062	1376.1	1364	.5601	83.7	.9384	.9348	.9094	.8650	.8901	32	6
	36	0	29	22	23	1						
648	0187	1434.0	1915	.3264	86.4	.9499	.9635	.8973	.8807	.9202	61	11
	45	0	50	28	20	6						
648	0100	1347.4	1883	.3925	81.9	.9178	.9422	.8533	.8529	.8973	60	6
	48	1	57	27	12	3						
648	4050	1310.0	1994	.5627	73.5	.8889	.9007	.8208	.8103	.8308	65	13
	43	2	72	23	14	6						
648	0175	1321.0	1851	.5640	73.7	.8740	.9182	.8522	.7978	.9088	44	12
	55	2	53	33	12	6						
774	3050	1274.7	804	.6766	79.4	.8596	.9181	.9294	.7778	.9029	19	13
	22	0	16	14	16	5						
649	2050	1235.0	672	.6771	79.4	.9195	.9662	.8986	.8592	.8808	21	3
	26	3	13	22	10	6						
651	0390	1427.0	1730	.3434	77.8	.9121	.9669	.8929	.8911	.8698	50	12
	49	2	55	31	19	5						
651	0197	1458.8	1503	.2096	82.6	.9188	.9566	.9070	.8820	.8797	35	4
	47	2	31	27	14	5						
652	0176	1454.4	1039	.5756	68.2	.9324	.9903	.9372	.8955	.8773	28	14

	25	1	30	18	17	2						
653	0189	1339.0	853	.6835	73.9	.8798	.9399	.8743	.8462	.8785	21	12
	30	1	21	27	9	4						
654	2050	1290.6	500	.7260	77.5	.8125	.9099	.8036	.6757	.7899	16	3
	15	1	16	7	7	1						
655	0176	1471.3	938	.4733	85.3	.9302	.9302	.9070	.8756	.9238	20	21
	19	2	24	24	9	4						
656	0398	1451.7	1533	.2433	89.9	.9631	.9765	.9463	.9352	.9535	30	17
	49	2	35	27	24	11						
656	0182	1631.9	1686	.0949	92.6	.9833	.9917	.9778	.9778	.9836	38	21
	40	3	45	30	21	5						
656	0192	1501.6	1343	.2040	92.6	.9769	.9835	.9637	.9467	.9828	32	12
	41	3	28	38	21	2						
656	0198	1632.5	1642	.0566	97.5	.9720	.9832	.9748	.9887	.9669	33	22
	41	6	34	48	12	5						
656	0105	1501.0	1713	.0846	96.4	.9690	.9786	.9499	.9475	.9713	44	12
	43	3	44	33	17	4						
657	0401	1588.2	640	.2781	81.2	.8923	.9767	.9063	.8462	.8857	13	7
	22	2	17	10	12	3						
657	5050	1539.0	746	.4504	76.7	.9329	.9697	.9085	.9006	.9107	16	10
	27	1	17	15	13	8						
657	0107	1551.5	904	.4569	77.0	.9096	.9468	.9149	.8457	.9048	16	20
	24	2	15	24	17	5						
658	5050	1502.7	1522	.2116	81.8	.9735	1.0000	.9795	.9732	.9469	45	16
	53	4	43	50	22	5						
658	0195	1542.1	2026	.1876	83.6	.9565	.9839	.9677	.9165	.9668	50	22
	62	4	78	41	12	4						
658	0190	1621.9	2669	.0843	92.4	.9727	.9949	.9589	.9674	.9702	60	14
	85	6	90	48	17	2						
659	3050	1391.0	1113	.3729	70.6	.9031	.9476	.8777	.8978	.8853	30	17
	19	2	28	23	11	3						
660	0205	1685.8	2180	.0917	90.9	.9814	.9938	.9814	.9772	.9669	67	9
	64	5	85	36	17	4						
660	0176	1177.0	1794	.7263	79.6	.8617	.9038	.8161	.8361	.8680	45	10
	62	2	63	23	15	4						
660	0198	1614.2	2033	.2145	88.9	.9536	.9653	.9417	.9551	.9855	48	9
	78	6	80	36	12	5						
660	0392	1677.8	2245	.0811	97.5	.9912	.9947	.9859	.9839	.9821	68	14
	56	2	64	32	28	8						
660	0291	1262.4	2652	.6814	80.4	.8986	.9026	.8526	.8431	.9123	71	14
	66	3	79	36	14	4						
660	0106	1657.0	2338	.0462	95.8	.9716	.9787	.9733	.9714	.9838	51	7
	74	3	65	41	20	2						
660	4062	1544.5	1350	.3785	88.0	.9477	.9515	.8997	.9115	.9102	35	10
	42	3	55	21	9	4						
660	0203	1722.0	2791	.0394	97.9	.9821	.9955	.9835	.9729	.9837	58	17

	91	2	86	45	21	4					
660	3066	1688.1	1363	.2399	93.4	.9665	.9591	.9248	.9476	.9489	30	7
	40	4	43	17	8	4					
660	0191	1671.0	2429	.1779	90.9	.9626	.9902	.9684	.9542	.9627	64	17
	81	4	86	42	26	6					
660	0691	1332.6	1868	.7350	77.4	.8743	.8876	.8352	.7816	.9146	51	20
	52	1	67	27	10	5					
660	5069	1307.9	2357	.4777	87.3	.9161	.9286	.8460	.8694	.9323	60	5
	55	3	69	26	15	2					
776	3050	1428.3	1310	.6344	73.3	.9784	1.0000	.9267	.9134	.9519	30	16
	51	1	44	32	14	5					
661	0196	1476.0	1202	.4925	88.2	.9134	.9784	.9437	.9107	.8875	29	31
	26	2	34	16	28	11					
663	3552	1452.0	1822	.4704	67.4	.9132	.9446	.9343	.8912	.8916	44	9
	59	1	43	36	21	7					
663	4752	1493.0	1750	.3291	75.9	.9752	.9752	.9508	.9595	.9099	38	17
	50	0	32	26	30	7					
664	0286	1395.0	868	.5323	76.9	.8705	.9692	.8918	.8691	.8095	17	20
	31	1	28	22	15	6					
665	1050	1359.0	1187	.4954	80.9	.8720	.9004	.8594	.7854	.9134	22	10
	34	0	18	21	23	4					
667	1050	1385.0	3177	.7088	77.5	.8938	.9393	.8808	.8849	.9281	72	26
	96	6	100	55	28	5					
667	0182	1625.0	3494	.1634	95.5	.9698	.9842	.9763	.9631	.9844	57	34
	111	7	78	45	55	21					
667	3750	1475.0	2832	.5847	75.9	.9381	.9602	.9224	.9148	.9605	56	28
	84	9	77	47	31	11					
667	0195	1528.7	3689	.2562	88.7	.9548	.9734	.9543	.9386	.9671	65	35
	113	8	90	60	53	5					
667	4052	1505.0	2414	.3152	87.3	.9448	.9654	.9329	.9209	.9633	45	24
	71	3	64	43	21	2					
667	5550	1568.0	2308	.4038	81.7	.9701	.9750	.9472	.9643	.9280	45	27
	68	2	56	33	27	14					
667	0101	1494.0	3331	.2660	88.2	.9473	.9569	.9552	.9294	.9416	63	33
	99	7	113	58	20	3					
667	0187	1346.0	2348	.8194	69.0	.9099	.9219	.8809	.8698	.8927	49	12
	84	12	98	39	13	3					
667	0105	1541.9	4116	.2240	89.7	.9654	.9744	.9540	.9521	.9516	72	45
	115	11	111	80	34	2					
667	0103	1558.0	3036	.5399	80.4	.9531	.9629	.9294	.9116	.9345	65	46
	71	5	85	54	30	8					
667	4556	1573.3	3176	.1968	85.3	.9609	.9740	.9636	.9358	.9649	63	32
	88	7	100	37	33	10					
667	0176	1596.0	2648	.2579	90.8	.9376	.9667	.9473	.9444	.9578	57	28
	67	6	66	36	34	11					
667	0805	1552.6	3167	.2349	91.1	.9742	.9833	.9515	.9482	.9721	71	29

	87	9	108	42	23	6						
667	0185	1400.0	1954	.5169	86.7	.9219	.9497	.8844	.9003	.9160	36	22
	54	3	57	35	16	4						
667	2558	1414.0	2778	.4827	78.6	.9370	.9454	.9202	.9140	.9597	59	21
	79	2	84	37	27	4						
668	2052	1441.8	1346	.3663	78.0	.9173	.9602	.9101	.8901	.8928	24	22
	42	2	32	31	22	4						
669	0102	1494.2	1127	.4312	81.2	.9408	.9882	.9176	.8765	.9396	34	7
	39	1	43	24	10	2						
669	1552	1390.7	1003	.6810	77.3	.9161	.9677	.9161	.9026	.8528	25	17
	36	0	32	30	10	6						
669	0202	1462.6	1441	.2901	86.3	.9441	.9720	.9437	.9081	.9007	38	19
	32	6	48	32	11	1						
669	4752	1428.4	1114	.5898	80.1	.9382	.9944	.9270	.9261	.9130	22	22
	33	1	30	25	18	4						
669	1556	1484.4	1102	.2269	88.9	.9631	1.0000	.9677	.9209	.9144	21	19
	32	3	20	25	24	3						
669	0189	1477.0	1083	.4958	87.6	.9497	1.0000	.9423	.9333	.9286	23	16
	34	5	33	19	16	7						
670	0288	1083.7	404	.5817	87.5	.9703	.9901	.9505	.8687	.8125	13	9
	9	1	12	11	4	3						
671	3050	1373.0	1097	.4357	75.5	.8664	.9078	.8802	.8592	.8074	29	8
	32	0	29	18	16	9						
672	0299	1488.4	1599	.3008	87.0	.9443	.9845	.9470	.8931	.9482	39	9
	44	1	34	39	13	2						
675	0105	1432.4	1604	.3348	84.6	.9444	.9583	.9417	.9382	.9402	37	7
	43	4	51	25	8	1						
675	0391	1538.6	1159	.3287	80.6	.9111	.9333	.9018	.8919	.9375	28	12
	33	3	31	22	8	5						
675	3050	1298.5	998	.5721	77.2	.8663	.9186	.8639	.8084	.8444	31	7
	21	1	24	18	12	5						
675	0104	1395.1	2154	.3839	79.1	.9527	.9367	.9613	.9269	.9351	61	15
	45	2	72	28	9	6						
675	0101	1481.6	1689	.1717	92.3	.9806	.9833	.9722	.9607	.9824	30	22
	54	3	40	33	29	4						
676	0192	1513.6	2278	.1975	87.7	.9674	.9804	.9565	.9559	.9023	61	28
	51	3	70	34	26	6						
676	2052	1521.0	1955	.5187	79.7	.9580	.9636	.9440	.9129	.9114	46	13
	68	0	60	31	27	5						
676	1054	1484.8	1195	.4494	86.4	.9506	.9713	.9713	.9585	.9313	35	10
	28	4	32	30	9	3						
676	4056	1498.7	2152	.4122	82.5	.9511	.9730	.9364	.9330	.9192	54	19
	55	3	46	35	27	13						
677	2050	1359.1	482	.5996	66.1	.9208	.9604	.8515	.7959	.8077	17	6
	17	1	18	12	7	2						
678	0191	1474.6	946	.3562	79.1	.9045	.9648	.9246	.9388	.8768	25	14

	25	5	34	19	11	2						
680	0199	1455.0	753	.5458	77.3	.8941	.9647	.9176	.8698	.8448	22	12
	14	1	19	11	13	6						
681	0196	1265.0	948	.8449	73.4	.8680	.8985	.8737	.7592	.8416	24	5
	32	2	26	20	7	4						
779	0174	1562.0	690	.2536	91.4	.9226	.9935	.9419	.9091	.9820	9	20
	17	1	15	16	12	5						
684	0192	1400.0	1195	.3849	77.9	.9154	.9245	.8994	.8585	.8955	27	15
	39	0	27	29	20	5						
685	0175	1362.0	723	.6279	69.0	.9161	.9371	.8252	.8806	.8750	22	3
	21	0	23	16	5	1						
686	0201	1375.0	456	.6469	69.6	.8750	.9659	.9080	.8837	.8876	19	4
	12	0	14	12	6	2						
687	0197	1259.5	671	.6796	68.3	.8601	.9021	.8951	.8175	.8299	20	7
	27	5	18	22	15	2						
687	3054	1368.0	1183	.4049	77.6	.9104	.9517	.8881	.8859	.8528	26	17
	24	2	19	32	11	2						
688	0193	1483.1	1345	.2877	80.9	.9574	.9858	.9544	.9449	.9444	35	10
	42	1	27	29	19	10						
689	0105	1355.1	1935	.5173	76.7	.9155	.9264	.8583	.7944	.9193	44	12
	43	2	42	27	23	3						
689	0192	1401.8	1246	.4687	77.0	.9373	.9684	.9216	.8300	.8901	19	13
	36	3	29	19	15	3						
690	0201	1332.5	454	.5551	86.4	.8824	.9216	.8824	.8247	.8900	16	8
	12	0	11	8	12	3						
691	0205	1299.0	629	.5962	80.2	.9040	.9921	.9291	.8525	.9256	19	6
	12	0	18	10	3	1						
692	5050	1442.0	2839	.3272	81.7	.9412	.9646	.9192	.9197	.9079	48	26
	85	4	51	62	39	11						
693	0101	1514.0	1103	.3672	92.9	.9265	.9655	.9216	.9036	.8720	29	13
	28	0	35	22	11	1						
694	2060	1189.4	514	.7918	69.1	.8018	.8829	.8198	.8019	.7451	15	4
	14	0	10	9	6	4						
695	5050	1404.0	1448	.4689	70.3	.8904	.9635	.8571	.8322	.8660	36	21
	31	5	39	28	18	1						
781	0101	1514.4	2078	.5236	83.7	.9132	.9352	.8848	.8920	.9192	39	28
	72	5	58	47	26	8						
696	0275	1335.7	451	.6120	84.0	.9348	.9674	.9239	.9565	.8830	13	5
	9	0	11	6	7	4						
697	0192	1392.2	905	.5083	77.6	.9404	.9745	.9489	.9052	.8623	29	17
	26	1	24	22	21	7						
699	0300	1232.6	417	.7290	71.2	.8571	.8442	.8052	.7237	.8133	10	2
	15	0	14	11	0	2						
699	4050	1229.0	556	.5612	73.5	.8191	.9149	.8936	.8152	.8468	27	4
	10	0	29	6	6	1						
700	0201	1248.9	342	.5468	89.0	.9277	.9277	.9036	.8889	.8519	11	1

	13	0	8	7	6	2						
702	0184	1417.0	1168	.4769	76.0	.9342	.9549	.9303	.9289	.9375	22	9
	33	2	25	20	17	5						
703	0201	1360.7	293	.6519	76.1	.9048	.9683	.9683	.9355	.8525	10	3
	7	1	6	9	3	2						
704	1050	1358.0	1022	.4247	87.3	.8984	.9415	.8556	.8722	.8367	27	9
	32	3	32	19	15	4						
705	0190	1454.5	1997	.5588	70.8	.8991	.9437	.8431	.8005	.8626	43	29
	49	3	55	40	18	8						
706	5052	1192.0	1115	.8233	66.3	.8883	.8984	.8670	.7845	.8230	39	16
	24	1	35	18	18	9						
706	3054	1697.3	1283	.1551	98.5	1.0000	1.0000	1.0000	.9966	1.0000	24	18
	35	2	20	30	17	9						
706	2062	1397.9	1543	.4887	92.0	.9099	.9626	.8354	.8558	.8932	31	14
	44	0	39	29	12	4						
706	5062	1188.9	929	.8041	65.0	.8627	.8808	.8170	.7973	.7081	22	13
	29	0	28	24	14	4						
706	0203	1403.0	1274	.2182	94.1	.9416	.9709	.9307	.8959	.9438	20	18
	37	4	32	24	15	3						
706	0278	1263.0	1285	.4086	80.2	.9339	.9421	.8792	.8802	.9398	28	13
	38	1	33	30	13	2						
707	0295	1396.1	1404	.3647	87.7	.9596	.9866	.9602	.9457	.9671	42	6
	41	1	49	26	7	1						
707	0173	1371.3	2149	.6012	78.6	.9418	.9471	.9278	.9022	.9327	45	15
	66	2	73	28	11	2						
708	0293	1555.0	1113	.1626	92.9	.9571	.9785	.9676	.9382	.9408	23	18
	39	3	26	30	24	2						
709	2050	1513.6	764	.4594	75.1	.9108	.9682	.9172	.9026	.9464	26	8
	17	0	24	15	5	3						
710	0292	1402.0	1900	.2105	82.4	.9643	.9644	.9356	.9228	.9554	45	21
	44	2	64	36	12	3						
710	0101	1386.9	1713	.3333	80.5	.9478	.9627	.9198	.9116	.9219	48	15
	46	1	71	27	9	5						
710	2552	1382.5	1483	.4221	70.9	.9049	.9396	.8678	.8455	.9523	38	13
	42	2	59	26	11	3						
711	2052	1232.0	1133	.6505	74.0	.8481	.9049	.8556	.7806	.7893	32	6
	35	2	36	18	16	4						
784	0101	1416.0	410	.6073	68.4	.8852	.8852	.8667	.8500	.8636	17	4
	12	0	13	8	6	2						
712	0198	1455.5	1261	.4029	80.2	.9174	.9654	.9000	.9009	.8702	36	24
	31	0	25	29	22	10						
713	0182	1439.1	977	.4719	84.4	.9384	.9763	.9526	.9231	.8874	15	17
	31	0	22	25	12	3						
715	5050	1502.6	1076	.5009	75.9	.8925	.9299	.9159	.8578	.9437	35	13
	29	1	36	29	12	1						
715	0102	1406.0	813	.4477	74.0	.8896	.9355	.9156	.8421	.8790	20	12

	20	0	20	20	7	5						
717	0276	1357.0	756	.6323	75.0	.8742	.9497	.8987	.8344	.8488	14	3
	36	0	21	18	7	7						
719	0177	1459.0	660	.5288	86.0	.9272	.9470	.9272	.9034	.9281	18	8
	26	1	11	18	16	6						
720	0201	1319.4	445	.8809	68.5	.8696	.9451	.8043	.7889	.8300	15	4
	15	1	10	9	5	3						
721	4060	1350.0	1464	.4993	69.0	.9112	.9084	.8571	.8281	.8819	42	8
	31	2	43	22	14	5						
721	1052	1165.7	1174	.7317	59.3	.7709	.8258	.6404	.6215	.7895	31	8
	26	3	36	16	14	4						
721	0100	1379.1	1333	.5004	75.0	.8897	.9407	.8487	.8276	.9113	13	14
	45	7	33	30	14	3						
721	4562	1743.8	683	.1742	100.0	1.0000	1.0000	1.0000	1.0000	.9882	18	9
	19	1	15	19	11	2						
721	3054	1166.8	1016	.7549	67.3	.8025	.8148	.6848	.6500	.8333	27	12
	27	2	27	23	14	5						
721	2056	1384.8	1186	.4781	71.3	.8784	.8829	.8063	.7738	.9048	26	8
	41	0	40	21	11	5						
721	3556	1539.0	380	.4263	100.0	1.0000	1.0000	.9881	1.0000	1.0000	8	4
	16	3	9	7	11	4						
721	3756	1210.2	858	.8403	63.3	.8438	.8642	.7516	.7452	.8125	22	9
	31	2	28	13	17	6						
721	2574	1490.0	863	.4380	74.4	.9042	.9461	.8750	.8364	.8342	28	13
	18	0	24	15	12	8						
722	0176	1473.0	1688	.3951	84.1	.9781	.9781	.9561	.9561	.9179	34	4
	51	4	46	27	12	10						
722	3052	1371.6	1862	.5263	81.5	.9484	.9683	.9524	.9440	.9157	37	19
	57	6	65	36	14	5						
722	0192	1378.2	1644	.4568	83.3	.9911	.9911	.9690	.9422	.9769	42	13
	41	6	61	26	13	3						
785	0193	1584.7	1475	.5837	73.5	.9139	.9663	.9216	.8491	.9448	27	29
	39	2	35	28	21	10						
723	0101	1400.3	681	.4758	90.0	.9615	.9740	.9744	.9481	.9221	15	7
	19	1	11	15	12	2						
724	4052	1305.3	886	.7449	78.6	.8872	.9385	.9436	.8462	.8639	24	11
	28	1	21	21	16	4						
725	0196	1353.3	827	.6941	72.4	.8586	.8900	.8200	.7959	.8077	19	9
	31	1	17	18	16	9						
786	0300	1516.3	501	.4132	89.4	.9100	.9500	.9200	.8485	.8667	11	5
	20	0	23	8	6	2						
726	0187	1310.8	1526	.6717	62.6	.8913	.9164	.8768	.8394	.8759	37	10
	44	2	42	23	18	2						
726	0101	1445.0	1344	.4688	78.4	.9323	.9549	.9060	.9004	.9015	32	4
	39	1	41	19	13	2						
727	5050	1459.3	1169	.4705	78.6	.9020	.9216	.9020	.8564	.8991	29	17

	37	4	32	28	24	5						
729	0105	1311.9	960	.8156	75.6	.8824	.9114	.8229	.8090	.8228	19	4
	25	5	24	16	13	2						
732	0194	1369.0	911	.6773	78.7	.8703	.9516	.8378	.7747	.8453	23	11
	25	0	22	14	13	7						
733	0201	1385.0	448	.6763	71.6	.8462	.9121	.8222	.7753	.7640	8	7
	14	0	9	10	9	2						
734	0201	1420.6	422	.6185	78.5	.9789	.9579	.9053	.8152	.7979	19	6
	9	0	13	13	4	3						
735	0105	1111.0	380	.5421	75.5	.8537	.9146	.8889	.7500	.8675	11	5
	11	3	6	12	8	5						
736	0191	1424.0	1609	.5227	82.3	.9270	.9675	.8967	.8655	.9133	44	13
	41	2	47	23	22	3						
745	0195	1338.7	1462	.5219	73.1	.8945	.9527	.8764	.8619	.9060	40	15
	34	2	29	22	25	10						
789	4052	1317.0	753	.6308	74.9	.9044	.9037	.8296	.8258	.8043	29	3
	31	4	20	21	17	7						
737	0199	1416.0	1410	.5567	79.9	.8983	.9505	.8931	.8389	.9063	36	17
	31	3	25	37	18	3						
738	0192	1432.0	756	.6759	74.6	.8970	.9273	.8848	.8634	.9118	28	4
	25	1	18	20	14	1						
739	0204	1425.0	332	.3855	95.9	.8906	.9219	.8125	.8281	.8507	9	6
	11	2	8	11	4	3						
740	3050	1403.0	588	.6531	66.3	.8788	.8507	.7910	.6923	.7857	12	7
	22	0	15	14	9	2						
791	0301	1595.9	360	.1750	95.2	1.0000	1.0000	1.0000	.9759	.9753	11	6
	14	0	11	12	6	2						
741	0201	1346.9	798	.5689	75.0	.9030	.9474	.8409	.7879	.9143	18	10
	29	1	25	18	11	2						
741	1052	1458.6	1320	.4939	79.9	.9690	.9956	.9646	.9462	.9534	28	11
	44	2	31	20	20	9						
741	0387	1457.1	1293	.5174	73.7	.9378	.9644	.9156	.8955	.8932	27	16
	44	1	32	24	20	9						
742	3050	1308.0	421	.5796	83.6	.8721	.9302	.8721	.8256	.7582	12	7
	14	0	11	11	9	4						
743	0201	1201.0	340	.7382	69.6	.9259	.9259	.8519	.7547	.8966	16	3
	4	1	13	2	5	3						
744	0101	1459.0	694	.4280	89.3	.9574	.9504	.9433	.9433	.8699	15	14
	26	0	21	20	11	5						
792	0273	1366.0	1986	.5655	71.5	.8880	.9302	.8904	.8092	.8024	69	22
	51	0	68	31	25	8						
793	0273	1429.0	673	.5215	79.6	.9173	.9624	.9179	.8947	.9412	19	9
	17	3	19	19	8	3						
746	0198	1461.0	1188	.5168	67.6	.8712	.9399	.8745	.7937	.8487	32	5
	38	0	35	17	15	6						
746	0190	1564.0	1324	.5974	64.7	.9000	.9348	.8690	.8150	.8419	36	18

	39	0	44	27	16	5						
747	0199	1472.2	2046	.1735	85.0	.9501	.9895	.9763	.9312	.9638	36	20
	63	1	58	34	20	3						
747	0205	1356.0	1464	.5417	61.8	.9277	.9447	.9103	.8498	.8926	34	14
	51	3	38	36	15	4						
748	0195	1316.1	1430	.5580	73.6	.9004	.9360	.8805	.8171	.8889	43	21
	27	1	31	24	19	9						
748	0194	1443.5	490	.3122	100.0	1.0000	1.0000	1.0000	1.0000	.9783	9	8
	15	0	8	10	13	1						
750	1052	1370.0	1107	.6025	71.9	.8661	.9498	.9205	.8511	.8648	29	11
	23	1	33	12	14	2						
751	0101	1391.8	1426	.5035	79.5	.9191	.9559	.9594	.8989	.8638	35	15
	42	4	38	26	21	7						
754	0105	1477.0	787	.3888	90.8	.9107	.9733	.9375	.9095	.9425	19	14
	19	2	21	20	10	3						
755	0175	1499.4	1765	.4040	84.1	.9613	.9871	.9677	.9253	.9620	29	25
	44	8	37	31	25	8						
755	0275	1466.0	1293	.6504	77.4	.9357	.9798	.8916	.9221	.9259	29	17
	36	2	36	19	19	4						
756	0201	1383.1	383	.7050	72.1	.8701	.9103	.8333	.6923	.9398	12	7
	7	0	9	7	5	5						
757	0173	1365.0	478	.6339	88.7	.9552	.9851	.9701	.9403	.9342	9	2
	23	1	14	12	7	1						
759	0176	1404.0	1112	.5504	71.6	.9421	.9842	.8526	.8226	.8860	27	8
	32	0	31	16	12	7						

Appendix B
Statistical Analysis of Effect (R Square Change)
(N = 303)

	Mean	Std. Deviation
SAT	1411.758	127.827
SES	.484	.198
STU POP	1370.71	682.451

Correlations

		SAT	SES	STU POP
Pearson Correlation	SAT	1.000	-.800	.327
	SES	-.800	1.000	-.381
	STU POP	.327	-.381	1.000
Sig. (1-tailed)	SAT	.	.000	.000
	SES	.000	.	.000
	STU POP	.000	.000	.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.801[a]	.641	.638	76.862	.641	267.634	2	300	.000
2	.800[b]	.640	.639	76.798	-.001	.495	1	300	.482

a. Predictors: (Constant), STU POP, SES
b. Predictors: (Constant), SES

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.162E6	2	1.581E6	267.634	.000[a]
	Residual	1.772E6	300	5907.811		
	Total	4.935E6	302			
2	Regression	3.159E6	1	3.159E6	535.672	.000[b]
	Residual	1.775E6	301	5897.895		
	Total	4.935E6	302			

a. Predictors: (Constant), STU POP, SES
b. Predictors: (Constant), SES
c. Dependent Variable: SAT

	Mean	Std. Deviation
Grad Rate	80.208	9.004
SES	.484	.198
STU POP	1370.71	682.451

Correlations

		GRADRTE	SES	STUPOP
Pearson Correlation	Grad Rate	1.000	-.671	.245
	SES	-.671	1.000	-.381
	STU POP	.245	-.381	1.000
Sig. (1-tailed)	Grad Rate	.	.000	.000
	SES	.000	.	.000
	STU POP	.000	.000	.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.671[a]	.450	.447	6.698	.450	122.838	2	300	.000
2	.671[b]	.450	.448	6.688	.000	.076	1	300	.782

a. Predictors: (Constant), STU POP, SES

b. Predictors: (Constant), SES

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11021.991	2	5510.995	122.838	.000[a]
	Residual	13459.198	300	44.864		
	Total	24481.189	302			
2	Regression	11018.564	1	11018.564	246.355	.000[b]
	Residual	13462.625	301	44.726		
	Total	24481.189	302			

a. Predictors: (Constant), STU POP, SES

b. Predictors: (Constant), SES

c. Dependent Variable: Grad Rate

	Mean	Std. Deviation
English	.917	.046
SES	.484	.198
STU POP	1370.71	682.451

Correlations

		English	SES	STUPOP
Pearson Correlation	English	1.000	-.750	.338
	SES	-.750	1.000	-.381
	STU POP	.338	-.381	1.000
Sig. (1-tailed)	English	.	.000	.000
	SES	.000	.	.000
	STU POP	.000	.000	.

Model Summary

Model					Change Statistics				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.752[a]	.566	.563	.03	.566	195.498	2	300	.000
2	.750[b]	.563	.561	.03	-.003	2.199	1	300	.139

a. Predictors: (Constant), STU POP, SES
b. Predictors: (Constant), SES

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.361	2	.181	195.498	.000[a]
	Residual	.277	300	.001		
	Total	.638	302			
2	Regression	.359	1	.359	387.254	.000[b]
	Residual	.279	301	.001		
	Total	.638	302			

a. Predictors: (Constant), STU POP, SES
b. Predictors: (Constant), SES
c. Dependent Variable: English

	Mean	Std. Deviation
Mathematics	.947	.038
SES	.484	.198
STU POP	1370.71	682.451

Correlations

		Mathematics	SES	STUPOP
Pearson Correlation	Mathematics	1.000	-.691	.242
	SES	-.691	1.000	-.381
	STU POP	.242	-.381	1.000
Sig. (1-tailed)	Mathematics	.	.000	.000
	SES	.000	.	.000
	STU POP	.000	.000	.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.691[a]	.478	.474	.027	.478	137.283	2	300	.000
2	.691[b]	.477	.476	.027	-.001	.308	1	300	.579

a. Predictors: (Constant), STU POP, SES
b. Predictors: (Constant), SES

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.204	2	.102	137.283	.000[a]
	Residual	.223	300	.001		
	Total	.427	302			
2	Regression	.204	1	.204	274.890	.000[b]
	Residual	.223	301	.001		
	Total	.427	302			

a. Predictors: (Constant), STUPOP, SES
b. Predictors: (Constant), SES
c. Dependent Variable: Mathematics

	Mean	Std. Deviation
Science	.898	.063
SES	.484	.198
STU POP	1370.71	682.451

Correlations

		Science	SES	STUPOP
Pearson Correlation	Science	1.000	-.719	.238
	SES	-.719	1.000	-.381
	STUPOP	.238	-.381	1.000
Sig. (1-tailed)	Science	.	.000	.000
	SES	.000	.	.000
	STUPOP	.000	.000	.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.720[a]	.518	.515	.044	.518	161.133	2	300	.000
2	.719[b]	.516	.515	.044	-.001	.907	1	300	.342

a. Predictors: (Constant), STUPOP, SES

b. Predictors: (Constant), SES

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.628	2	.314	161.133	.000[a]
	Residual	.585	300	.002		
	Total	1.214	302			
2	Regression	.627	1	.627	321.459	.000[b]
	Residual	.587	301	.002		
	Total	1.214	302			

a. Predictors: (Constant), STU POP, SES

b. Predictors: (Constant), SES

c. Dependent Variable: Science

	Mean	Std. Deviation
Social Stu	.872	.075
SES	.484	.198
STU POP	1370.71	682.451

Correlations

		SocialStu	SES	STUPOP
Pearson Correlation	Social Stu	1.000	-.737	.317
	SES	-.737	1.000	-.381
	STU POP	.317	-.381	1.000
Sig. (1-tailed)	Social Stu	.	.000	.000
	SES	.000	.	.000
	STU POP	.000	.000	.

Model Summary

Model				Std. Error	Change Statistics				
	R	R Square	Adjusted R Square	of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.738[a]	.544	.541	.051	.544	179.099	2	300	.000
2	.737[b]	.543	.541	.051	-.002	1.042	1	300	.308

a. Predictors: (Constant), STUPOP, SES

b. Predictors: (Constant), SES

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.937	2	.468	179.099	.000[a]
	Residual	.785	300	.003		
	Total	1.721	302			
2	Regression	.934	1	.934	357.105	.000[b]
	Residual	.787	301	.003		
	Total	1.721	302			

a. Predictors: (Constant), STU POP, SES

b. Predictors: (Constant), SES

c. Dependent Variable: Social Stu

	Mean	Std. Deviation
GHSGT Writing	.901	.058
SES	.484	.198
STUPOP	1370.71	682.451

Correlations

		GHSGTWriting	SES	STUPOP
Pearson Correlation	GHSGT Writing	1.000	-.674	.429
	SES	-.674	1.000	-.381
	STUPOP	.429	-.381	1.000
Sig. (1-tailed)	GHSGT Writing	.	.000	.000
	SES	.000	.	.000
	STUPOP	.000	.000	.

Model Summary

Model					Change Statistics				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.674[a]	.454	.452	.043	.454	250.300	1	301	.000
2	.699[b]	.489	.485	.041	.035	20.367	1	300	.000

a. Predictors: (Constant), SES

b. Predictors: (Constant), SES, STU POP

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.458	1	.458	250.300	.000[a]
	Residual	.550	301	.002		
	Total	1.008	302			
2	Regression	.493	2	.246	143.386	.000[b]
	Residual	.515	300	.002		
	Total	1.008	302			

a. Predictors: (Constant), SES

b. Predictors: (Constant), SES, STU POP

c. Dependent Variable: GHSGT Writing