THE IMPACT OF MUSIC EDUCATION ON ACADEMIC ACHIEVEMENT, ATTENDANCE RATE, AND STUDENT CONDUCT ON THE 2006 SENIOR CLASS IN ONE SOUTHEAST VIRGINIA PUBLIC SCHOOL DIVISION

George Darryl Waller

Dissertation submitted to the faculty at the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Educational Leadership and Policy Studies

Travis W. Twiford, Chairperson
James R. Craig
Christine Hill
Rosalie Martin

March 29, 2007
Blacksburg, Virginia

Keywords: Music Education, Academic Achievement, Attendance Rate,
Student Conduct, Secondary Education, Brain Research (The Mozart Effect)

THE IMPACT OF MUSIC EDUCATION ON ACADEMIC ACHIEVEMENT, ATTENDANCE RATE, AND STUDENT CONDUCT ON THE 2006 SENIOR CLASS IN ONE SOUTHEAST VIRGINIA PUBLIC SCHOOL DIVISION

George Darryl Waller

Chairperson: Travis W. Twiford, Ed. D

(ABSTRACT)

For several decades music educators have proposed that the study of music has a significant impact on student academic achievement, attendance rates, and student conduct. In an era of higher student and teacher accountability, increasing budget cuts, the federal No Child Left Behind Act (NCLB), and stringent state standards of learning, a number of educators have argued that education in music can boost test scores, attendance, attitudes toward school, reduce discipline referrals, and increase overall academic achievement.

The purpose of this study was to quantify general education claims by examining high school academic achievement data, attendance rates, and student conduct of the 2006 graduating class in one Southeast Virginia school division.

In addition, this study briefly explores the impact that music education has on the human brain and on academic achievement at the elementary school and secondary school levels. Moreover, influences that integrating music has on academic achievement in general education courses, arts integration programs, and elements of an effective music education program are explored. Specific research studies provide evidence to support key concepts and the need for additional research.

The research design includes the independent variables: subject and number of years enrolled in formal music courses or no formal music courses, gender, ethnicity, and enrollment in formal music courses or no formal music courses in high school, grades nine through twelve. The dependent variables include: academic achievement as measured by grade twelve weighted cumulative grade point average (GPA), attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve.

Four research questions were used to explore academic achievement, attendance rate, and student conduct with regard to music or no music courses taken in grades nine through twelve. Ethnicity and gender were reported using the common dependent variables among participants in three populations – entire study population, music population, and non music population.

Conclusions were based upon sophisticated statistical tests including descriptive and inferential statistics, correlations, analysis of variance (ANOVA), and regression statistics. These tests confirmed the four research questions and null hypotheses that music students out perform their non music counterparts in academic achievement, attendance rate, and student conduct. Although the studied school division does not distinguish between excused and unexcused absences, music students had fewer days absent than non music students.

DEDICATION

This dissertation is dedicated to the memory of my father, George Alexander Waller, who died July 11, 2004 after a long and courageous battle against Amyotrophic Lateral Sclerosis (ALS) or Lou Gehrig's disease. It was through my father's example of unending strength and love that a promise to see this project to completion was ever possible.

Second, to my mother, Jean Faye Brickhouse Waller, who has provided me with countless examples of how to be the primary caregiver through good and tough times; and for the guidance, assurance, and words of wisdom that all things are possible.

Third, to my two younger brothers, Brian and Stephen, and the members of my extended family, I dedicate this work to you. Knowing that you all believed in me has made this journey all the more worthwhile.

Most importantly, I dedicate this dissertation to the glory of God who has opened and will continue to open many doors for growth and opportunity throughout my education and professional career.

Finally, I dedicate this dissertation to the individuals and families that have or are experiencing the devastation of ALS. We must search for strength within one another to sustain the ideals on which our afflicted loved ones stood so that the lessons they taught us will remain constant in our daily lives. Reach for the cure!

ACKNOWLEDGEMENT

When a person begins the arduous task of taking on a study of this magnitude, it is difficult to project the number of people that influence the journey. So many people shape your person and your work. Therefore, let me mention only a few.

First, let me thank my chairperson Dr. Travis W. Twiford and his secretary Linda Jones for your undying partnership in this endeavor. Many times the journey seemed rocky but you both were always there to help smooth the pathway. Dr. Twiford, you are an incredible man and educator! Thank you!

To the members of my committee: Dr. James Craig, Dr. Christine Hill, and Dr. Rosalie Martin, words could never express the warmth and friendship you all have shared in making this study stronger, meaningful, and approachable. I agree, the study is long and takes more than just a few hours to read and comprehend, but I believe we have offered valuable information regarding the state of music education in the United States.

Second, I would like to thank the members of my 2003 Hampton Roads cohort for your encouragement, motivation, and constant perseverance during our four years together. You all are some of the most dedicated and talented individuals I have met along the journey.

Third, my highest gratitude is extended to the members of Hilton Christian Church. Your words of encouragement, prayers, and frequent banter were enough to sustain anyone undertaking this monumental task.

Finally, my heartfelt appreciation is given to my secretary, Shirley Barrow; my co-worker, Patricia Franklin, Supervisor of Art; and all my colleagues and teachers for vacations, shared presentations and more in order to complete this journey.

Thanks to you all!

TABLE OF CONTENTS

LIST OF TABLES

Music Population

Non Music Population

Dependent Variable – Number of Discipline Referrals in Grade Nine through Grade Twelve

Data Tables of Each Research Question

LIST OF FIGURES

CHAPTER 1

INTRODUCTION TO THE STUDY

Context for Inquiry

For several decades music educators have proposed that the study of music has a significant impact on student academic achievement in core subjects (Virginia Commission for the Arts, 1994; Music Educators National Conference, 1994a). In an era of higher student and teacher accountability, increasing budget cuts, the federal No Child Left Behind Act (NCLB), and stringent state standards of learning, a number of educators have argued that education in music can boost test scores, attendance, attitudes toward school, and overall academic achievement (Eisner, 1998; Virginia Commission for the Arts, 1994).

Moreover, educators contend music education is a means for self expression that allows students to connect with themselves and others, transform the environment of learning through arts integration products, provide learning opportunities for the adults in the lives of students, provide new challenges for students already considered successful, and connect learning experiences to the world of real work. Most importantly, educators maintain that music education can reach a number of students who are not being reached and in ways that students are not otherwise being reached (Fiske, 2002).

The Virginia Commission for the Arts (VCA) and the Music Educators National Conference (MENC) are a few state and national organizations that have presented literature in support of music’s impact on academic achievement with claims that music students demonstrate performance skills in academic subject areas that are 30 percent higher than performance skills of students who did not study music. Morrison (1994) reported that high school sophomores who participated in music reported higher grades in English, math, history, and science than those who did not participate in music. Other publications such as *Arts Education Means Business* (Virginia Commission for the Arts, 1994) states there is strong evidence that the study of music affects brain development…giving… children musical training stimulates neural activity and expands their ability to think. Slogans similar to Study Music, Score High infiltrate a wide variety of publications in support of music and music education (Virginia Commission for the Arts, 1994; Music Educators National Conference, 2002).

In opposition, many general subject educators challenge that music is just a frill and should be eliminated from public education (BBC News, 2005). Some educators claim that "music courses hamper achievement in other domains;" (Gouzouasis, Guhn, & Kishor, n.d., p. 9) or music requires too much time and therefore wastes or slows down student progress in core instructional time (Gouzouasis et al.). A demand for a return to basics - reading, writing, and arithmetic – has been published in news articles, magazines, and has been the focus of research across the nation (LaRussa, 2006).

As a result, countless debates of whether to include or exclude music education from academic curricula in public education have been generated (Von Zastrow, 2004; Virginia Commission for the Arts, 1994; Vaughn, 2000; Steele, Bass, & Crook, 1999; Rauscher, 2003b; Rauscher, 2000; Music Educators National Conference, 1994a; Quinn, 2003). Columnist Jann Flury (2002) writes, "The public wants a demonstrably sound basic academic education for public school students: the 'progressives' want to educate the 'whole child,' resulting in intangible results that cannot be measured" (p. 1).

Similarly, arguments regarding whether to include music education or return to basics have attained international attention. In response to remarks that music builds a child's self esteem, Chris Woodhead, the ex-chief inspector of schools in the United Kingdom told the BBC

Radio Today program, “The best way to develop self esteem is to teach children to read and write, to add up and to know something about the world” (BBC News, 2005, p. 1). In addition, under the guise of educational reform, Canada and the United States have run a parallel course. Flury (2002) writes, “History clearly indicates that there is an undeclared war in progress between the demigods of education and the unassuming taxpaying public. What is less clear, to the uninitiated, is why the modern ’progressive’ educators’ aims are so different from that of society” (p. 1).

As a means to comply with pleas for increased rigor, strict budget constraints, a return to basics, and the music is a *frill* mentality, school divisions across the nation have severely cut or eliminated music and other programs. A case in point occurred during the mid 1980s in Oklahoma’s Empire School District where the school board’s decisions about the budget weakened the community’s confidence. In December 1985, the board decided to eliminate a significant number of positions and programs, among them, the music/band program. Other school districts, such as Portland, Oregon, have been forced to consider layoffs, increased class sizes, a shortened school year, and school closings. Many school divisions, similar to Oklahoma’s Empire School District, have led to litigation and community outcry against school boards (Quinn, 2003).

Nonetheless, it is difficult to determine the state of music education in the United States given that obtaining reliable data regarding music courses is limited. According to Robert B. Morrison, Chairman and C.E.O. for the Music for All Foundation, in many larger school districts, there is a lack of an agreed upon definition for calculating and reporting music education data. Therefore, it is challenging to determine basic information regarding student enrollment in music courses and music offerings on a school-to-school basis or any comparable data. However, the Board of Trustees of the organization has embarked on a multi-year effort to find quantifiable data regarding access and participation in music education programs in public schools (Music for All Foundation, 2004).

In a 2004 report entitled *The Sound of Silence – The unprecedented decline of music education in California public schools: A statistical review,* published by the Music for All Foundation, data were collected during the 1999–2000 academic year through the 2003–2004 academic year. Key findings include that during the period when the total California public schools student population increased by 5.8%, the percentage of all California public school students involved in music education courses declined by 50%. This decline is the largest of any academic subject area (Music for All Foundation, 2004, p. 4).

Additional data indicate that actual student participation in music declined by 46.5% representing a loss of 512,366 students. This decline is the largest of any academic subject area by a factor of four. (Physical Education is second with a decline of 125,000 students representing a drop of 5.2% of the total PE enrollment). The number of music teachers declined by 26.7%. This represents an actual loss of 1,053 teachers (Music for All Foundation, 2004, p. 4).

Further key findings reveal that participation in general music courses (those courses designed to bring basic music knowledge and skills to young students) declined by 85.8% with the loss of 264,821 students. This represents over half of the total decline of participation in all music courses. This is followed by declines in other music courses (- 48.5%, -103,783 students), chorus (- 36.1%, - 57,905 students), band (- 20.5%, - 44,509 students), and instrumental lessons (- 41.4%, - 39,792 students) (Music for All Foundation, 2004, p. 5).

Finally, data indicate when student participation declines are compared to other academic subjects, music tops the list. The list in music participation (- 46.5%, -512,388 students) leads all other areas including physical education (-5.24%, - 125,156), health (-12%, - 31,660), humanities (-37.5%, - 25,622), safety (- 9.13%, -6,983), and computer education (- 0.7%, - 1,866). Art, drama, dance, foreign languages, social sciences, science, math, and English all posted gains during the study period (Music for All Foundation, 2004, p. 5).

While additional research needs to be conducted to determine the actual causes that have led to the decline in music programs, interviews conducted with educators and policy makers generated two recurring themes: (1) the implementation of the No Child Left Behind Act, in particular the act's emphasis on testing the limited areas of reading, math, and science; and (2) the well-documented budget crisis in California (Music for All Foundation, 2004, p. 5).

As additional music education statistics are collected throughout the nation, public school personnel will continue to argue well into the 21st century to maintain, downsize or eliminate effective, successful, and often expensive arts education programs (Akin, n.d.; BBC News, 2005; Campbell, 2000a). Debates stir the emotions of arts educators, students, and parents in board of education rooms across the country. Parents and arts advocates argue, "Arts education not only cultivates imagination, self-expression, and creativity, but also plays a vital role in the development of critical thinking and problem-solving skills" (PTA, 2005, p. 1).

To thwart difficult board of education decisions, arts organizations and music educators, as evidenced through literature, have attempted to make a case for the importance of music and music education. In 1994, the Virginia Commission for the Arts printed and distributed a document filled with testimonials, arts resources, statistical information, quotations, and test scores that demonstrated that an increase in arts funding, awareness, and community and business support would improve academic achievement. Copying newspaper articles, College Board and National Coalition for Music Education statistics, and university quotations from across the nation, *Arts Education Means Business* attempts to provide evidence in support of music education (Virginia Commission for the Arts, 1994).

In one reported statistic, the Virginia document (1994) states from the California School Boards (1990, September), “Students who [studied] the arts demonstrate performance skills in academic subject areas that [were] 30 percent higher than the performance skills of students who [did] not study the arts” (Virginia Commission for the Arts, p. 2). Furthermore, it asserts, “Test scores in reading, vocabulary and writing doubled at Anza High School in Los Angeles, California, following the school’s three-year participation in The Getty Center’s *Discipline-Based Arts Education Pilot Program.* The school now has the highest scores in the district” (Virginia Commission for the Arts, p. 2).

Are these claims simply a defense by music educators to maintain job security or does the study of music significantly impact student achievement? If the study of music does increase academic achievement in core subjects, is there a causal or correlational relationship between music education and academic success? Does music education have extensive possibilities that reach deep within the soul of public education?

According to statistical information reported by The College Board, music instruction has a significant impact on academic achievement. National reports on test-taking trends for college-bound seniors taking the Scholastic Achievement Tests I (SAT) have consistently shown that twelfth grade college-bound music students out perform non-music students on the verbal and math sections of the examination.

Likewise, state reports reveal similar results for music and non-music college-bound seniors throughout the country (The College Board, 1998a; The College Board, 2000b; and The College Board, 2005a).

Figure 1 illustrates national SAT I verbal mean score test-taking trends for twelfth grade college-bound music and non-music seniors in 1998, 2000, and 2005. Subsequent academic years indicate a consistent trend to support that music students out perform non-music students on the SAT.

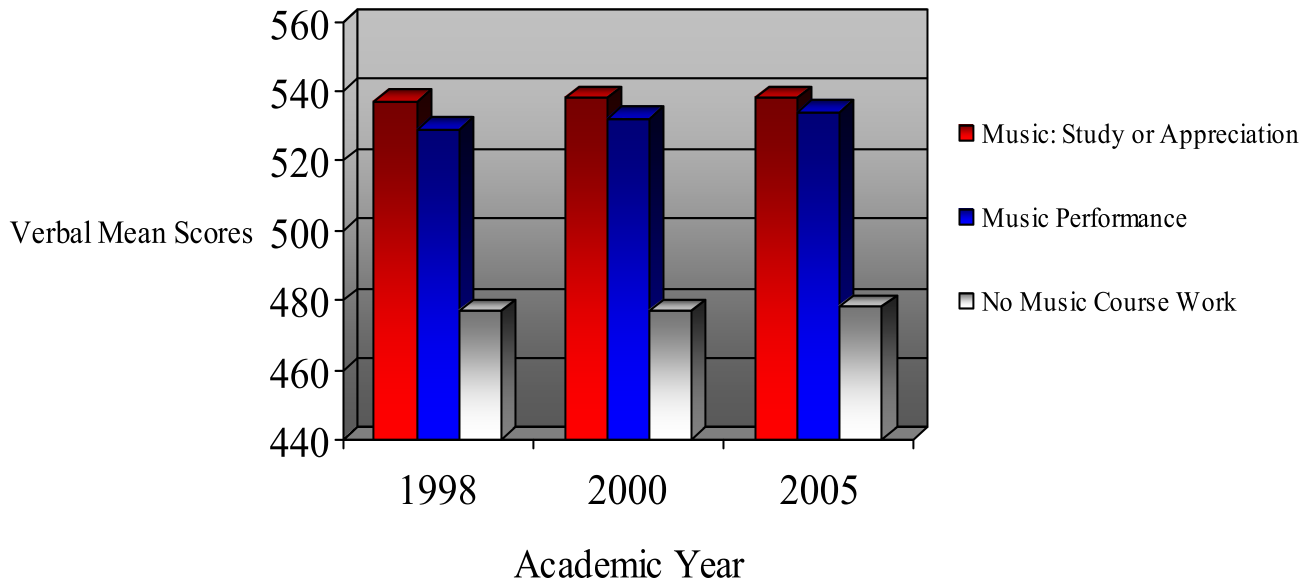


Figure 1. National Verbal Mean Score Test-Taking Trends for Twelfth Grade College-Bound Music and Non-Music Students.

Compiled from three different sources as cited below:

The College Board (1998b). *1998 College-Bound Seniors: Total Group Profile Report*. New York: College Board.

The College Board (2000a). *2000 College-Bound Seniors: Total Group Profile Report*. New York: College Board.

The College Board (2005b). *2005 College-Bound Seniors: Total Group Profile Report* (National Report ed.). New York: The College Board.

Similar to SAT I verbal mean scores for music and non-music college-bound seniors, SAT I mathematics mean scores for music and non-music college-bound seniors also show significant academic gains.

Figure 2 illustrates national SAT I math mean score test-taking trends for twelfth grade college-bound music and non-music students in 1998, 2000, and 2005. Again, twelfth grade college-bound music students consistently out perform non-music twelfth-grade college-bound students, including subsequent academic years.

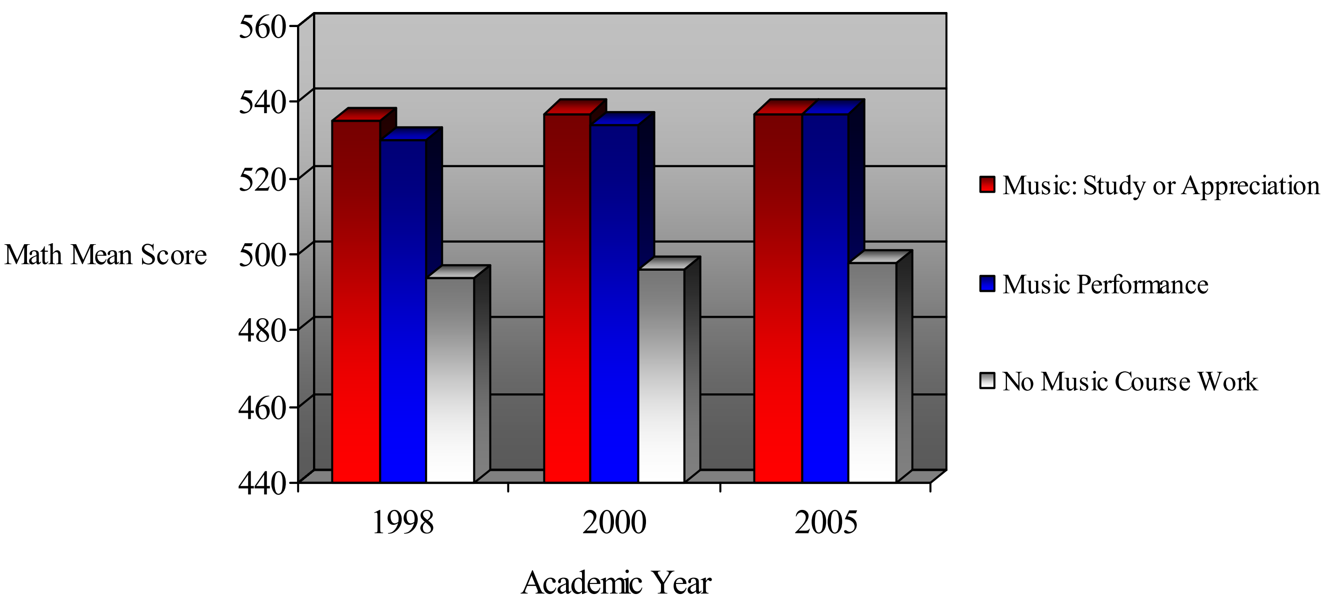


Figure 2. National Math Mean Score Test-Taking Trends for Twelfth Grade College-Bound Music and Non-Music Students.

Compiled from three different sources as cited below:

The College Board (1998b). *1998 College-Bound Seniors: Total Group Profile Report*. New York: College Board.

The College Board (2000a). *2000 College-Bound Seniors: Total Group Profile Report*. New York: College Board.

The College Board (2005b). *2005 College-Bound seniors: Total Group profile report* (National Report ed.). New York: The College Board.

In comparison to national test-taking trends for college-bound music and non-music seniors, Virginia also reports significant differences in SAT I verbal and math mean scores for college-bound senior music students. Again, findings in Virginia are consistent with those at the national level in the selected sample academic years and in subsequent academic years (The College Board, 1998a; The College Board, 2000b; and The College Board, 2005a). Figure 3 illustrates Virginia SAT I test-taking trends using verbal mean scores in 1998, 2000, and 2005 for college-bound twelfth grade music and non-music students.

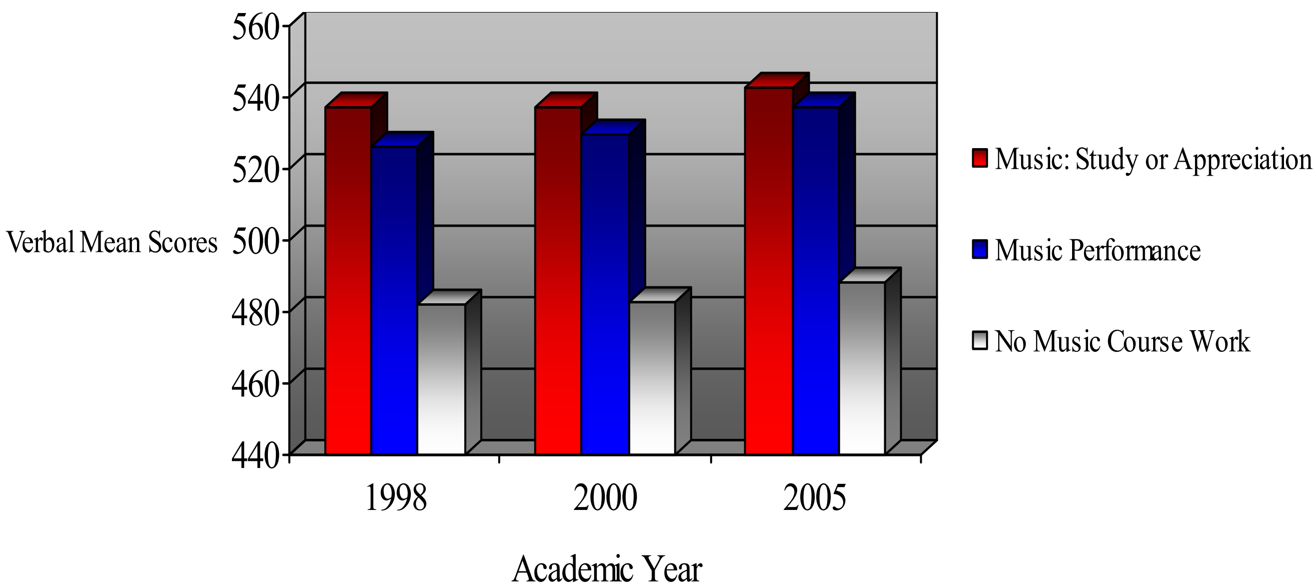


Figure 3. Virginia Verbal Mean Score Test-Taking Trends for Twelfth Grade College-Bound Music and Non-Music Students.

Compiled from three different sources as cited below:

The College Board (1998a). *1998 College-Bound seniors: State profile report* (Virginia ed.). New York: College Board SAT.

The College Board (2000b). *2000 College-Bound seniors: State profile report* (Virginia ed.). New York: College Board SAT.

The College Board (2005a). *2005 College-Bound seniors: State profile report* (Virginia ed.). New York: College Board SAT.

Consistent to national and Virginia verbal mean score test-taking trends for twelfth grade music and non-music college-bound seniors, Figure 4 illustrates Virginia SAT I test-taking trends using math mean scores in 1998, 2000, and 2005 for twelfth grade college-bound music and non-music students. Again, twelfth grade college-bound music students consistently out perform non-music twelfth-grade college-bound students. This trend is consistent in subsequent academic years in addition to the selected sample academic years.

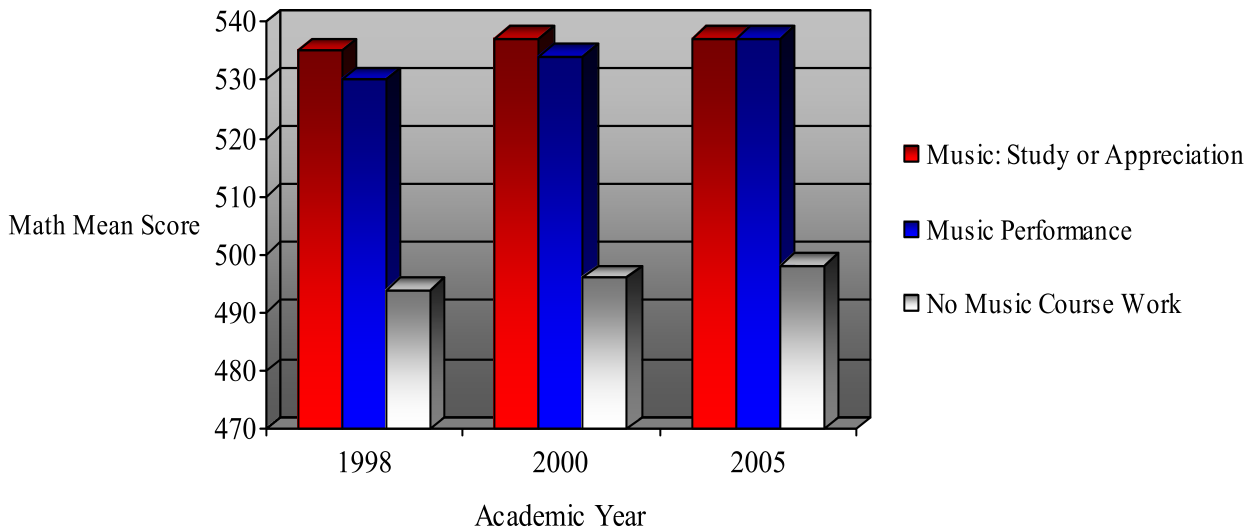


Figure 4. Virginia Math Mean Score Test-Taking Trends for Twelfth Grade College-Bound Music and Non-Music Students

---

Compiled from three different sources as cited below:

The College Board (1998b). *1998 College-Bound Seniors: Total Group Profile Report*. New York: College Board.

The College Board (2000a). *2000 College-Bound Seniors: Total Group Profile Report*. New York: College Board.

The College Board (2005b). *2005 College-Bound seniors: Total Group profile report* (National Report ed.). New York: The College Board.

Music Education in the United States

Music education in North America can be traced to the colonies of the seventeenth century. In the South, however, there existed no organized music education program. This tradition played a major role in the transmission of music. In other parts of the new world, music was already an important activity in the lives of the Northern colonists, namely the pilgrims. The Bay Psalm Book provided methods for using syllables to denote tones of the musical scale along with performance instruction. Thus Northern colonists could succeed in teaching themselves rudimentary music skills, as related to psalm singing (Wikipedia, n.d.).

According to the Music Educators National Conference (MENC), there are many personal benefits to participating in music education including confidence, self-esteem, and a sense of accomplishment (Music Educators National Conference, 2002). It shapes and molds character with self-assurance and stability; and has the added bonus of public performance which helps to conquer the fear of getting up in front of people. Furthermore, learning a musical instrument fosters good habits such as focus, mental discipline, staying with a task until its completion and it allows for the expression of emotions (Music Educators National Conference, 1994a).

Music instruction comprises the application of educational methods in teaching music. Specifically, the inclusion of music education encompasses many areas of instruction, including music history, music theory, and proficiency in a musical instrument, singing skills, and general music skills.

From preschool to postsecondary education, music education is common in North America and Europe. Distinctively, involvement in music is thought to teach basic skills such as concentration, counting, listening, self-discipline and cooperation. In addition, music education is thought to promote understanding of language, improve the ability to recall information, foster creativity, and create an environment more conducive to learning in other areas (Music Educators National Conference, 1994b).

For much of its existence, standards for teaching music in the United States were determined locally or by individual teachers. In the late 20th century, there was a significant move toward regional and national standards. The Music Educators National Conference

(MENC), the national association for music education, created nine content standards called the *National Standards for Music Education.* This document, adopted in 1994, includes the following music standards:

1. Singing: alone and with others, a varied repertoire of music.
2. Performing on instruments, alone and with others, a varied repertoire of music.
3. Improvising melodies, variations, and accompaniments.
4. Composing and arranging music within specified guidelines.
5. Reading and notating music.
6. Listening to, analyzing, and describing music.
7. Evaluating music and music performances.
8. Understanding relationships between music, the other arts, and disciplines outside the arts.
9. Understanding music in relation to history and culture.

(Music Educators National Conference, 1994a)

Many states and school districts have adopted their own standards for music education. Frequently, local standards are developed in some form from the National Standards. For instance, the state of Florida has adapted the National Standards to form the Sunshine State Standards. In either case, the document sets grade-level expectations for music students from pre-kindergarten through twelfth grade (Music Educators National Conference, 1994a).

In elementary schools, children often learn to play instruments such as the recorder, sing in small choirs, and learn about the history of Western art and music. In primary and secondary schools, students may have the opportunity to perform in some type of musical ensemble, including choir, concert band, marching band, jazz band, or orchestra (Music Educators National Conference, 1994b).

At the university level, students in most arts and humanities courses can receive credit for enrolling in music classes. Typically, these courses take the form of a historical overview of music or a music appreciation course that focuses on listening to and learning about different musical styles. Most North American and European universities have some type of music ensemble in which non-music students are able to participate. Performance based courses including choir, concert band, marching band, or orchestra serve not only an instructional purpose, but as a positive community and public relations tool for sponsoring organizations (Music Educators National Conference, 1994a).

The study of Western music is increasingly common in music education outside the United States and Europe. The Asian nations of South Korea, Japan, and China are consistently breaching the history of Western civilization to expand existing music programs. At the same time, Western universities and colleges are widening their curricula to include music of non-Western cultures, including the music of Africa, Eastern Asia, and countries in the Southern hemisphere (Music Educators National Conference, 1994b).

Some schools and organizations encourage the integration of arts classes such as music with other content areas. Using music as a prism for increased learning, students discover and explore other subjects such as English, mathematics, social studies, and science. It is thought that by combining different curricula, students are able to connect content areas and important concepts, thus, enhancing the quality of education (Music Educators National Conference, 1994a).

Some examples of arts integration programs are the Kennedy Center's *Changing Education Through the Arts* program (CETA), The GRAMMY Foundation's Leonard Bernstein Center for Learning – Artful Learning: A School Reform Model, the Children's Music Workshop *Swap With Arts Program,* and others. CETA defines arts integration as finding a natural connection between one or more art forms. Therefore, infusing dance, theatre arts, music, visual arts, storytelling, puppetry, or creative writing with other curricular areas is a means to teach and assess objectives in both the art form and other subject areas. This allows a simultaneous focus on creating, performing, and responding to the arts while addressing content in other subject areas (Music Educators National Conference, 1994a).

Statement of the Problem

In 1971, the average elementary school student received two hours of music instruction a week. However, over the last several decades governmental agencies, through No Child Left Behind (NCLB) and stringent local and state standards in addition to limited budgets, have demanded increased standardized test scores, stricter student and teacher accountability, greater academic rigor, improved literacy, an increase in teacher quality, and better math and science instruction in public education. As a result, thirty-one years later, the average elementary school student in Chicago received 45 minutes of weekly instruction in music (Rabkin & Redmond, 2004).

As boards of education across the United States struggle to abide by mandated guidelines or risk the loss of appropriated funding, music education programs continue to be closely monitored for their role, effectiveness, and monetary value in public schools (NCLB n.d.; LaRussa, 2006; Music Educators National Conference, 1994; and National Arts Education Consortium, n.d.). Consequently, music education has been comprehensively eroded in low-income districts, but is better established in affluent districts. Rabkin and Redmond (2004) suggest this notion is an “enormous ‘arts gap’ in American education” (p. 12). Although the 1990s saw vigorous efforts to reverse the long-term decline of music education, some of those efforts were quite ambitious and sensitive to the broad currents of school reform (Rabkin & Redmond, 2004).

Music advocates are convinced that instruction in music can help children learn in school. Moreover, music advocates believe that music has increased value for academic achievement for all students. In order to bring about a statewide and national implementation of music education in the general curriculum, legislatures and other school policy makers must also be convinced of its value (Akin, n.d.).

Educational research demonstrates the positive effect of music curriculum in developing academic achievement skills (Akin, n.d.). Thus, music advocates, building on actual practices of contemporary music projects, are hopeful that music education can become available to more students, more schools, more districts, and more communities, even in the current climate of high stakes testing and accountability (Rabkin & Redmond, 2004). Consequently, the purpose of this study is to provide both music and non-music educators additional information regarding the impact of music education on academic achievement in public education.

Conceptual Model

In the Commonwealth of Virginia, comprehensive public school students are mandated by the Department of Education to enroll in and successfully complete subjects in certain courses including English, mathematics, science, and social studies. At the secondary school level, a variety of elective courses are available from which students may choose based upon individual interests. For instance, in the Commonwealth of Virginia, students may enroll in elective courses beginning at the sixth grade level. Students may continue the elective courses in one subject area through their secondary education or they may vary the focus of elective selections.

In music education, instrumental students in the sample school district may elect to enroll in band or orchestra beginning in grade six and continue participation through grade twelve. Vocal music students may enroll in a nine-week exploratory music program in grade six and start vocal music instruction in grade seven. Other students may elect to enroll in a sixth grade exploratory music program and start vocal or instrumental music in grade seven.

Still others may elect to enroll in vocal music or in instrumental music instruction in grade nine, although unlikely depending on past musical experience and instrumental music course objectives. Regardless of the individual student's interests, initial enrollment date, and the prescribed music course timeline, all music courses are academically sequential in which one concept builds upon another in consecutive years and culminate at the highest level of instruction in grade twelve (Virginia Department of Education, 2006a).

Band music consists of instruments in the brass, percussion, and woodwind families. Stringed instruments (violin, viola, cello, and string bass) are included in the orchestra. Other instruments such as guitar and piano are offered at a number of high schools across the Commonwealth (Virginia Department of Education, 2000). For the purpose of this study, all high school (grades nine through twelve) performance based and academic music courses such as music composition will be included in regards to their impact on academic achievement as measured by grade twelve weighted cumulative grade point average.

As students enter the high school setting, they bring with them variables related to their background. Background variables include gender, ethnicity, and middle school vocal music or instrumental music instruction, or no middle school music instruction. As students progress through four years of the high school curriculum toward graduation, all students are required to take four years of English in addition to Department of Education prescribed courses in mathematics, science, social studies, foreign language (optional), fine or practical arts, and a variety of electives (Virginia Department of Education, 2000). These background variables may impact academic achievement at varying levels of secondary school instruction.

In the Commonwealth of Virginia, grade 11 public high school students must take two semesters of course work and successfully pass end-of-course Standards of Learning (SOL) tests to include English: Reading/Literature and Research and English: Writing. In addition, in order to receive a high school diploma, end-of-course SOL tests in science, social studies, and mathematics must be successfully completed before the intended graduation date. In some cases, mathematics courses are available for students at the middle school level. These courses carry a high school credit and count toward academic units needed for graduation (Virginia Department of Education, 2000).

A conceptual model of a comprehensive high school student who elects to take vocal music, instrumental music, a combination of vocal and instrumental music, or no music instruction is presented in Figure 5. Music and non-music students are classified as follows: vocal music students with four or more years of vocal music instruction = VMusic-4; vocal music students with three to three and one-half years of vocal music instruction = VMusic-3; vocal music students with two to two and one-half years of vocal music instruction = VMusic-2; vocal music students with one to one and one-half years of vocal music instruction = VMusic-1; and students with one-half (one semester) or no vocal music instruction = VMusic-0.

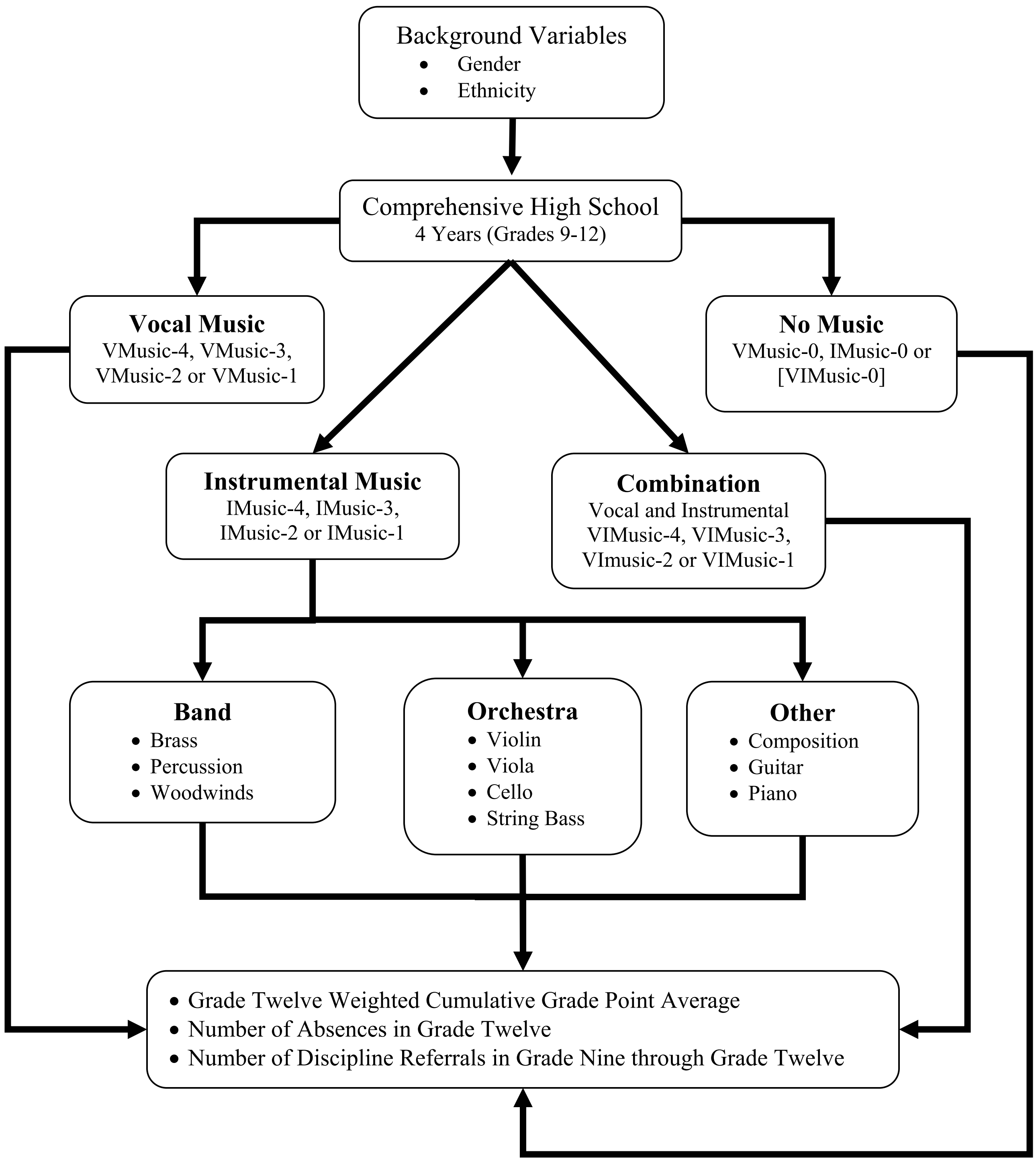


Figure 5. *Conceptual Model of Music and Non-Music Students Using Designated Academic Achievement Measures, Number of Absences, and Number of Discipline Referrals.*

Similarly, instrumental students are classified as follows: instrumental music students with four or more years of instrumental music instruction = IMusic-4; instrumental music students with three to three and one-half years of instrumental music instruction = IMusic-3; instrumental music students with two to two and one-half years of instrumental music instruction = IMusic-2; instrumental music students with one to one-half years of instrumental music instruction = IMusic-1; and instrumental music students with one-half year or no instrumental music instruction = IMusic-0. Students who may have taken a combination of vocal music and instrumental music in high school are represented by VIMusic-4, VIMusic-3, VIMusic-2, and VIMusic-1.

The model reflects the final element from which academic achievement is measured - weighted cumulative grade point average (GPA) at the end of grade twelve. Weighted cumulative grade point average (GPA) will be used to measure academic achievement regardless of a student's elective course choices (music or no music).

Significance of the Study

The impact of participation in music education on academic achievement has been the central focus of research for many years as evidenced in the review of literature. On the other hand, Hodges and O'Connell (n.d.) state that few studies have attempted to argue that education in music can boost test scores, attendance, attitudes toward school, and overall academic achievement and only five experimental studies have been identified that tested the effects of music instruction on academic achievement. Three of the five obtained results indicating that music instruction did have a positive effect on academic achievement (p. 2.5). However, a small number of studies have included variables such as gender or race, most have not.

Research literature is nearly evenly divided between studies in which a high degree of relationship was reported and those in which a low or negligent relationship was found (Hodges & O'Connell, n.d.).

Most recently, music education impact studies have been conducted due, in part, to higher student and teacher accountability, increasing budget cuts, the federal No Child Left Behind Act (NCLB), and stringent state standards of learning (Music for All Foundation, 2004). These studies have attracted considerable interest to many in both the music education community and the general education community (Music for All Foundation).

There is increasing interest in determining whether music instruction would impact reading skills as evidence in research by Rabkin and Redmond (2004), Mavrogenes & Bezrucko (1994), Koppelman & Imig (1995), Jensen (2001), Ingram & Reidel (2003), and Hood-Mincey (2005). However, most literature has focused on elementary school children (Hodges & O'Connell, n.d.). Additionally, it is possible that participating in music education can improve students' understanding of mathematics which, in turn, results in improved mathematics achievement scores (Hodges & O'Connell, n.d.).

Hodges and O'Connell (n.d.) report the subject of mathematics is generally taught in isolation from other subjects and often lacks any creative or artistic flair (p. 2.11). Students often become bored and do not pay attention in class, resulting in lower test scores. However, there is a connection between music and mathematics; both subject areas use numbers, repeating patterns and ratios (Vaughn, 2000). However, as in reading, most research literature has focused on elementary school students.

Data have indicated that students who had studied an instrument prior to fourth grade had higher scores in mathematics achievement than did students in other groups (Hodges &

O'Connell, n.d.; Rauscher, 1999). More importantly, a review of the literature will reveal significance in the integration of the arts, specifically music.

Eisner (1998) states what is needed more than correlations or statistically significant differences between groups are a theory that links experience in the arts with academic achievement (p. 56). Integration is felt to be critical for the development of a whole person.

Eisner has outlined a number of ways this can be done, including:

1. Students should acquire a feel of what it means to transform their idea, images, and feelings into an art form.
2. Arts education should refine the student's awareness of the aesthetic qualities in art and life.
3. Arts education should enable students to understand that there is a connection between the content and form that the arts display and the culture and time in which the work was created (p. 57 - 59).

Finally, Eisner (1998) identifies a particularly important set of outcomes for arts education. "This one pertains to dispositions that are difficult to assess, let alone measure, but they are dispositional that *appear* to be cultivated through programs that engage students in the process of artistic creation" (p. 58). Eisner speaks of dispositional outcomes such as the following:

1. A willingness to imagine possibilities that are not now, but which might become.
2. A desire to explore ambiguity, to be willing to forestall premature closure in pursuing resolutions.
3. The ability to recognize and accept the multiple perspectives and resolutions that work in the arts celebrate (p. 58 – 59).

Purpose of the Study

The purpose of this study is to investigate the impact of music participation on academic achievement, specifically on grade twelve weighted cumulative grade point average. This investigation includes students with 4 or more years, 3 to 3.5 years, 2 to 2.5 years, and 1 to 1.5 years of vocal or instrumental music instruction; students not participating in instrumental or vocal music instruction; and students that may have been enrolled in a combination of vocal and instrumental music courses in grades nine through twelve. In addition, this study examines the impact of participation in music on the number of absences in grade twelve and the number of discipline referrals in grades nine through twelve.

Conclusions were drawn based on the analysis of data to determine the long-term impact that music, specifically the number of years enrolled in music instruction, has on grade twelve attendance rates as determined by the number of absences in grade twelve; on student conduct as determined by the number of discipline referrals in grade nine through grade twelve; and on academic achievement as determined by grade twelve weighted cumulative grade point average.

Research Questions

The research questions for this study are:

1. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to subject and number of years in which a student participates in formal music courses or in no formal music courses?

2. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to gender and participation in formal music courses or in no formal music courses?
3. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to ethnicity and participation in formal music courses or in no formal music courses?
4. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect participation in formal music courses or in no formal music courses?

Definition of Terms

An understanding of the following terminology is essential to readers of this study. The terms are defined as they relate to the topic of this paper.

1. Formal music education: the practice of teaching music in public school using established criteria and curricula; usually teacher directed (Jaffers, 2006).

2. Mozart Effect: A challenged set of research results that indicate that listening to certain kinds of complex music may induce a short-lived (fifteen minutes) improvement on the performance of certain kinds of mental tasks known as spatial-temporal reasoning. Popularized versions of the theory, which suggest that listening to Mozart makes you smarter, or that early childhood exposure to classical music has a beneficial effect on mental development (Rauscher & Shaw, 1998).
3. Core Subjects: English/language arts, mathematics, science, and social studies/history courses taught in K – 12 public schools (NCLB, n.d.).
4. Cumulative Grade Point Average: A weighted numerical average (on a 4-point scale) of grades students receive from all high school credit bearing courses. The cumulative grade point average is computed by dividing the aggregate total of quality points by the total number of courses attempted (Sampled School District, 2001a).
5. Number of Absences: The total number of days a student is absent from school in grade twelve including excused, unexcused absences, and field trips (Sampled School District, 2001b).
6. Number of Discipline Referrals: The total number of times a student is sent to an administrator by the classroom teacher or designated school personnel due to an infringement of school rules or regulations in grade nine through grade twelve (Sampled School District, 2001c).
7. Standards of Learning – SOL Tests: Statewide tests administered to students in Virginia upon completion of designated course work. Students are required to

take End-of-course *English: Reading/Literature and Research* and End-of-course *English: Writing* SOL tests; and Mathematics: End-of-course *Algebra I* at the conclusion of the designated course (Virginia Department of Education, n.d.b).

8. Secondary School: A school classified as secondary by state practice and composed of any span of Grades 7-12. Junior high schools, middle schools and senior high schools are included. Generally refers to the years of formal education preceding entry into a college or University. A school for students intermediate between elementary school and college; usually grades 9 to12 (Virginia Department of Education, n.d.a).
9. Music Education: comprises the application of education methods in teaching music (Virginia Department of Education, n.d.b).
10. Instrumental Music: comprised of music composed for or performed on a musical instrument. Instrumental music is intended to be performed by a musical instrument or group of instruments. Instrumental music is music produced by playing a musical instrument (Virginia Department of Education, n.d.b).
11. Vocal Music: comprised of music composed or arranged for or sung by the human voice. Vocal music is intended to be performed by one or more singers, usually with instrumental accompaniment. A vocal selection is a music selection that is vocalized (as contrasted with instrumental music). A vocal selection is music intended for performance mainly by singers or other vocalists. Other musical instruments may be involved, but the choir is the main focus of the piece. Examples of vocal music include choral music, yodeling, Sacred Harp, and Barbershop (Virginia Department of Education, n.d.b).

12. IMusic-4: Students enrolled in instrumental music (band, guitar, piano, orchestra or composition) for four or more years and in the same school district from grade 9 through grade 12.
13. IMusic-3: Students enrolled in instrumental (band, guitar, piano, orchestra or composition) for three to three and one-half years and in the same school district from grade 9 through grade 12.
14. IMusic-2: Students enrolled in instrumental music (band, guitar, piano, orchestra or composition) for two to two and one-half years and in the same school district from grade 9 through grade 12.
15. IMusic-1: Students enrolled in instrumental music (band, guitar, piano, orchestra or composition) for one to one and one-half years and in the same school district from grade 9 through grade 12.
16. IMusic-0: Students enrolled in instrumental music one-half year or are non-music participants in the same school district from grade 9 through grade 12. These students graduated from high school in 2006.
17. VMusic-4: Students enrolled in vocal music for four or more years and in the same school district from grade 9 through grade 12.
18. VMusic-3: Students enrolled in vocal music for three to three and one-half years and in the same school district from grade 9 through grade 12.
19. VMusic-2: Students enrolled in vocal music for two to two and one-half years and in the same school district from grade 9 through grade 12.
20. VMusic-1: Students enrolled in vocal music for one to one and one-half years and in the same school district in grade 9 through grade 12.

21. VMusic-0: Students enrolled in vocal music for one-half year or are non-music participants in the same school district from grade 9 through grade 12. These students graduated from high school in 2006.
22. VIMusic-4: Students enrolled in a combination of vocal and instrumental music for four or more years and in the same school district in grade 9 through grade 12.
23. VIMusic-3: Students enrolled in a combination of vocal and instrumental music for three years and in the same school district in grade 9 through grade 12.
24. VIMusic-2: Students enrolled in a combination of vocal and instrumental music for two years and in the same school district in grade 9 through grade 12.
25. VIMusic-1: Students enrolled in a combination of vocal and instrumental music for one year and in the same school district in grade 9 through grade 12.

Limitations and Delimitations of the Study

This study is limited to high school music students in one urban school district in Southeastern Virginia. Several limitations within the research design reduce the ability to generalize the results to a population other than the one studied.

First, it is important to note that music students are self selected. Although research variables are confined to instrumental music (band, guitar, piano, orchestra, and composition) and vocal music, the researcher has no control over which music course or instrument the subject may choose. However, other instruments other than those listed are not included in this study.

Similarly, the researcher has no control over student course selection (music or core areas) other than the state prescribed courses or over content teacher assignments. Further research is required to determine the individual affects a particular teacher may have on the academic success of a given student.

Second, the studied school district has an open access policy for all its courses. If a student has an interest in a course, enrollment in that course is not denied. Since there are minimal costs for participation in music courses such as instrument and uniform rental fees, no student is refused membership due to financial hardship. Therefore, poverty is not an issue.

Third, the impact of music on academic achievement are restricted to present day available data such as grade twelve weighted cumulative Grade Point Average, regardless of whether it is specifically music instruction, music integrated in the curriculum or the use of background music in general education classrooms.

Most importantly, the impact of individual music teachers has been completely neglected. Hodges and O'Connell (n.d.) state that simply testing the affects of a given form of music instruction without taking into account the characteristics of the teacher is short sighted. There is the possibility that excellent teachers who are enthusiastic and who relate well to students may make a greater difference in educational outcomes than the particular methodology used (p. 2.21). However, the reverse is also true.

Furthermore, the researcher acknowledges the influence of outside sources such as private music lessons, church affiliations, and other variables. These variables may be prevalent in determining academic achievement in core subjects. However, for the purpose of this study, literature was contained to the impact of music education on academic achievement in core subjects as it relates to public schools.

Fourth, although weighted courses (i.e. Honors, International Baccalaureate) are accounted for in the study, cumulative grade point averages may affect outcomes. However, differences in weighted courses or non-weighted courses and participation or non-participation in music courses is not the focus of this study.

Finally, the researcher's past experiences as a high school choral director and music administrator are prevalent. To control for bias, the researcher purposefully chose a quantitative study to gather existing data for analysis. Reported data are a result of sophisticated statistical equations and analysis.

Organization of the Study

A five-chapter dissertation format is used to organize the study. Chapter One establishes the context for the study. In addition, the chapter includes a brief history of music education in the United States; the statement of the problem; the conceptual model; the significance of the study; the research questions, and definitions for terms used in the study.

Chapter Two contains an extensive review of literature that is relevant to the study. Chapter Two is divided into five domains: *The Impact of Music on the Brain – The Mozart Effect; Music Education and Elementary School Academic Achievement; Music Education and Secondary School Academic Achievement; Integrating Music Education in Core Subjects and Academic Achievement;* and *Elements of an Effective Music Education Program that Impact Academic Achievement*.

Chapter Three outlines the methodology applied in the investigation including population, instrumentation issues, and procedures used to collect and analyze data.

Chapter Four reports the results of the study. The first section includes: background information related to the study; the four research questions and null hypotheses; information on data collection procedures; a review of utilized instrumentation; and techniques employed in data analysis. The second section includes descriptive statistics, correlations, analysis of variance (ANOVA), and regression for the entire study population, the music population, and the non music population using the three dependent variables: (1) grade twelve weighted cumulative grade point average; (2) number of absences in grade twelve; and (3) number of discipline referrals in grade nine through grade twelve. Utilizing the four independent variables: (1) number of years enrolled in formal music or no formal music courses; (2) gender; (3) ethnicity; and (4) formal music courses or no formal music courses, the three dependent variables are presented to address the research questions and null hypotheses. Data tables are presented.

The final section of Chapter Four includes data tables for each research question and null hypotheses. For the reason that there is a significant amount of data, each research question and corresponding data tables are presented.

In conclusion, Chapter Five consists of a discussion of Chapter Four results and their implication for future practice and research. In addition, recommendations for practice and future studies are presented.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Review of the Literature

The review of literature in this chapter contains information regarding the impact of music education on academic achievement in core subjects and related topics which resulted in the selected domains. A number of databases, including Wilson Web, ERIC, and Electronic Thesis and Dissertations were utilized to collect information for the analysis of literature. Studies, articles, and other publications were limited to significant and relevant material that started with the Rauscher, Shaw, and Ky experiment which resulted in The *Mozart Effect.*

The review of literature revealed five self-selected domains: (1) The Impact of Music on the Brain – The *Mozart Effect*; (2) Music Education and Elementary School Academic Achievement; (3) Music Education and Secondary School Academic Achievement; (4) Integrating Music Education in Core Subjects and Academic Achievement; and (5) Elements of an Effective Music Education Program that Impact Academic Achievement.

For the purpose of this review, the first domain will consist of literature relating to music education and brain research. The second domain will reveal studies from preschool through grade five. Studies related to grades six through twelve and post high school education frame the third domain. The final two domains will encompass a wide range of grade levels and related materials.

Please note that the researcher in the current study acknowledges the influence of outside sources such as private music lessons, church affiliations, and other variables. These variables may be prevalent in determining academic achievement in core subjects. However, for the purpose of this study, literature will be contained to the impact of music education on academic achievement in core subjects as it relates to public schools.

The Impact of Music on the Brain – The Mozart Effect

Historical Perspective

A number of studies have been completed regarding the brain and the effects of music on brain stimulation and brain development. However, the impact and importance of music education contention was fueled in 1991 when the concept *Mozart Effect* was described by Dr. Alfred Tomatis, a French physician who has devoted his life over the past fifty years to the physiological effects of sound (Campbell, 2000b), in his book *Pourquoi Mozart?* Dr. Tomatis explored the "broad applicability of Mozart in particular in achieving results" (Wikipedia.org. n.d., p. 1) during his work with primarily learning disabled children.

The phrase, *Mozart Effect*, came to the United States in 1993 and gained wide media attention when a paper entitled *Music and spatial task performance* by researchers Frances Rauscher, Gordon Shaw, and Katherine Ky at the University of California at Irvine was published in *Nature*, Volume 365 (Rauscher, Shaw, & Ky, 1993). In 1992, Dr. Rauscher and her fellow researchers began experimentation on the effect of music on the brain.

Rauscher et al. found in simulations that the way nerve cells were connected to one another predisposed groups of cells to adopt certain specific firing patterns and rhythms. They hypothesized: "If brain activity can sound like music, might it be possible to begin to understand the neural activity by working in reverse and observing how the brain responds to music? Might patterns in music somehow stimulate the brain by activating similar firing patterns of nerve clusters?" (Anderson, 2000, p. 3; Rauscher & Shaw, 1998).

Rauscher, Shaw, and Ky turned the output of their investigations into sounds instead of a conventional printout. To their astonishment, the rhythmic patterns sounded somewhat familiar, with some of the same characteristics found in baroque, new age, or Eastern music (Anderson, 2000; Rauscher & Shaw, 1998). As they continued their investigation, Rauscher et al. assigned 36 college students to one of three groups and offered the same pretest to each of the students. One group listened to the Mozart *Sonata in D Major for Two Pianos, K488*; a second group listened to what was called a relaxation tape; and the third group was subjected to ten minutes of silence (Rauscher et al., 1993; Rauscher & Shaw).

Immediately after receiving all three forms of treatment, the 36 students were administered the same Stanford-Binet intelligence scale which was designed to measure spatial reasoning. The music condition yielded a mean standard age score (SAS) of 57.56; the mean SAS for the relaxation condition was 54.61; and the mean score for the silent condition was 54.00 (Rauscher et al., 1993). To assess the impact of these scores, "we 'translated' them to spatial IQ scores of 119, 111, and 110, respectively" (Rauscher et al., p. 611). Therefore, students who listened to the Mozart sonata averaged an eight to nine point increase in their IQ score as compared to the average score received by students who had listened to the relaxation tape or who had experienced silence (Rauscher et al.).

Although the increase in IQ of the Mozart group was brief - it lasted only about the time it took to take the test (from ten to fifteen minutes) – Tomatis' term "Mozart Effect" was adopted (Anderson, 2000, p. 3-4). In his work, the French physician concludes, "of all types and composers of music, Mozart created the greatest healing effect on the human body" (Campbell, 2000b, p. 1). This healing effect has been attributed to "the rhythms, melodies, symmetry and high frequencies of Mozart's music, its purity and simplicity" (Campbell, p. 1).

Nevertheless, through a series of events, the term *Mozart Effect* became generalized and popularized to refer to the beneficial effects of any type of music (Campbell), including music of Wolfgang Amadeus Mozart (1756–1791). However, will any style of music produce the *Mozart Effect?* "Understanding how it does so and determining which among different types of music will also produce the Mozart effect are of great general and scientific interest in helping us understand the brain" (Shaw, 2004, p. xxi).

Promoting Music and the Mozart Effect

Since the results of the 1993 Rauscher, Shaw, and Ky research, mainstream media has exaggerated the *Mozart Effect*. Claims that music can make children smarter have spawned a *Mozart Effect* industry that include books, CDs, and internet sites (Coff, 1998–2002; Rauscher, 2003b). As a result, "many people read about this experiment in popular magazines and newspapers and thought that listening to classical music would be a good way to improve memory and increase intelligence" (University of Washington, n.d., p. 3).

Almost immediately, music educators and entrepreneurs seized an opportunity to justify music in public schools along with the prospects of earning a quick dollar. Educational documents including *Transforming Education Through the Arts Challenge: Final Project Report,* (National Arts Education Consortium, n.d.), *Arts Education Means Business* (Virginia Commission for the Arts, 1994), *Profiles of SAT and Achievement Test Taken*, and *How Music Can Dramatically Affect Your Child's Development and Life-Time Success: A Summary of the Current Scientific Literature Concerning Music and the Mind* (Foundation for Music Literacy, 2003) were readily available across the nation.

Don Campbell, author, musician, and capitalist, describes himself simply as a man who has "listened to the world" (Campbell, 2005, p. 1). He has "produced numerous sets of recordings of Mozart's music to help parents interested in taking advantage of the Mozart Effect in their homes" (Campbell, p. 274). His compiled works target audiences from pregnancy to adulthood including volumes that claim to: *Strengthen the Mind: Music for Intelligence and Learning; Heal the Body: Music for Rest and Relaxation; Unlock the Creative Spirit: Music for Creativity and Imagination; Music for Stress Reduction,* and *Music for Study* (Campbell, 2000a).

Campbell prefaces his recorded literature as follows:

> All music has an effect on us. But, somehow, almost indescribably, Mozart has a simple and remarkable way of speaking to us. He is clear, organized, efficient, and not overly emotional. His music goes into our psyche in ways that are subtle and powerful. Even if Mozart is not your favorite composer from an aesthetic perspective, his music provides a positive environment where you can learn, relax, and create at your best. And that, quite simply, is The Mozart Effect.
> (Campbell, 1997).

Mainstream media and music educators jumped on the *Mozart Effect* notion. With assistance from the entertainment industry, music educators from across the nation created a firestorm of arts advocacy materials that showed the importance of music education in public schools (Foundation for Music Literacy, 2003; Music Educators National Conference, 2002; and Virginia Commission for the Arts, 1994).

Even politicians joined the fight. William J. Bennett, former Secretary of Education during the Reagan administration, supported music education's fundamental effect as:

> All creative souls do not express themselves in the written word; some paint, some sculpt, some build, and some challenge the depths of human understanding through the sounds of music.
>
> No education is complete without awareness of music; music is an essential expression of the character of a society.
> (Potosky & Gridley, 1986, p. 15)

As a psychological tool, Don Campbell characterized music:

1. as a carrier: using the melody or beat to help encode the content.
2. for arousal: using music to manage states, to calm down or to energize.
3. as a primer: using music (e.g. Mozart) to prime/prepare (excite and arouse) specific neural pathways for learning content or processing.

(Campbell, 2000b, p. 1)

On the other hand, a number of educational investigative attempts have tried to use Mozart's music to improve memory but have failed (University of Washington, n.d.).

The Controversy Begins

As the *Mozart Effect* swept the country, one group of scientists investigated its premise by having students listen to Mozart, a list of numbers, and then repeat the numbers backwards (this is called a backwards digit span test). Results indicated no effect. Investigators concluded, "apparently the Mozart Effect depends on what kind of test is used" (University of Washington, p. 3). Steele, Bass, and Crook (1999) at Appalachian State University, who meticulously replicated the original Rauscher et al. experiment also concluded "there is little evidence to support basing intellectual enhancement programs on the existence of the causal relationship termed the Mozart Effect" (Steele et al., p. 368).

Similar to the Rauscher et al. (1993) investigation, the Appalachian State University experiment involved 125 college student-participants (42 male and 83 female) that came from introductory psychology courses and received credit for participation. Participants were distributed among the three conditions (Steele et al.). However, results established in Rauscher et al. (1993) were unfounded.

In the years after the initial experiment, Rauscher and Shaw themselves admit that other investigators have had difficulties in producing a *Mozart Effect* because "the investigators have not distinguished between spatial-temporal tasks (like the PF&C task) and spatial pattern-recognition tasks (like the Raven Progressive Matrices task)" (Steele et al., p. 368; Rauscher & Shaw, 1998; and Rauscher, 2000). The letters PF&C task refer to the Stanford-Binet paper folding and cutting test that measures spatial-reasoning scores.

Scientifically, the Rauscher neuroscience/music studies have "caused quite an impact on related fields and some controversy" (Coff, 1998-2002, p. 1), as evidenced in the University of Washington (n.d.) and Appalachian State University (Steele et al.) studies. Yet other researchers, including further Rauscher studies, continue to attest to the power of music and the *Mozart Effect* in improving intelligence (Hetland, 2000; Rauscher et al. (1994); and Rauscher, 2003b).

Rauscher and Shaw claim that their work has been misrepresented. As a result, Rauscher has counteracted with a number of additional studies, articles, and conference speeches (Rauscher, 2000; Rauscher, 2003b; Rauscher & Shaw, 1998; & Rauscher et al., 1994).

One notable declaration entitled, *Is the Mozart Effect "debunked"?* (Rauscher, 2000) was presented at the bi-annual meeting of the International Conference on Music Perception and Cognition at Keele University in Keele, United Kingdom. In this presentation, Rauscher admits, "unfortunately, affirmations of scientific discoveries are not as newsworthy as their purported refutations" (Rauscher, p. 1). Additionally, she testifies that "two independent meta-analyses report that the Mozart effect has been replicated 29 times in 13 independent laboratories" (Rauscher, p. 1). "It is a moderate effect, and it is robust" (Rauscher, p. 1).

Much later, Rauscher acknowledges the excitement that has been generated by media claims that "Mozart makes you smarter" (Rauscher, 2000, p. 1) and that attempts to replicate the effect have been inconsistent. Moreover, she admits that additional research is needed and suggests that "the presence of five experimental factors may have contributed to negative findings" (Rauscher, p. 1). Experimental factors include *Task Validity, Expectancy Effects, Instructions to Participants, Item Difficulty,* and *Practice Effects* (Rauscher).

In regards to *Task Validity*, Rauscher illustrates the importance of task choice. Researchers using other types of visuospatial tasks report failure to replicate (Steele et al., 1999). She stresses the importance of using the "animated spatial-temporal task only" (Rauscher, 2000, p. 2). When Rauscher et al. repeated the experiment using only the animated spatial-temporal task, results "revealed a 'Mozart effect'…an effect that was not substantially weakened by the pretest" (Rauscher, p. 2).

The second experimental factor that may have contributed to negative findings is *Expectancy Effects.* This term refers to the outcome of a study that can affect its actual outcome (Rauscher, 2000). "Researchers exploiting the Mozart effect have rarely employed designs in which the experimenter is blind to the study's hypothesis and condition assignment" (Rauscher, 2000, p. 2). However, studies that controlled for the expectancy factor all found a Mozart effect (Nantais & Schellenberg, 1999; Rauscher et al., 1993; Rauscher, 2000).

Rauscher used an expectancy control design to directly test the contribution of experimenter expectancies to the *Mozart Effect* (Rauscher, 2000). Manipulating the beliefs of 79 undergraduate freshman subjects that served as both experimenters and participants, she assigned them to one of three expectancy conditions: High Expectancy, Low Expectancy, and Blind (Rauscher, 2000).

Under the pretext of informed consent, experimenter-subjects in High Expectancy conditions were asked to read a newspaper article supporting the *Mozart Effect.* Subjects were told that their partners were expected to perform better after listening to music than following silence. Participants in Low Expectancy conditions read an article regarding findings relating to the poor exposure of the *Mozart Effect*. They were told that researchers expected “to find no difference between their partners’ scores in the two listening conditions” (Rauscher, 2000, p. 2). Subjects in Blind conditions read an article concerning research methods and were told nothing pertaining to possible outcomes of the study. Experimental-subjects were provided identical instructions and scripts (Rauscher).

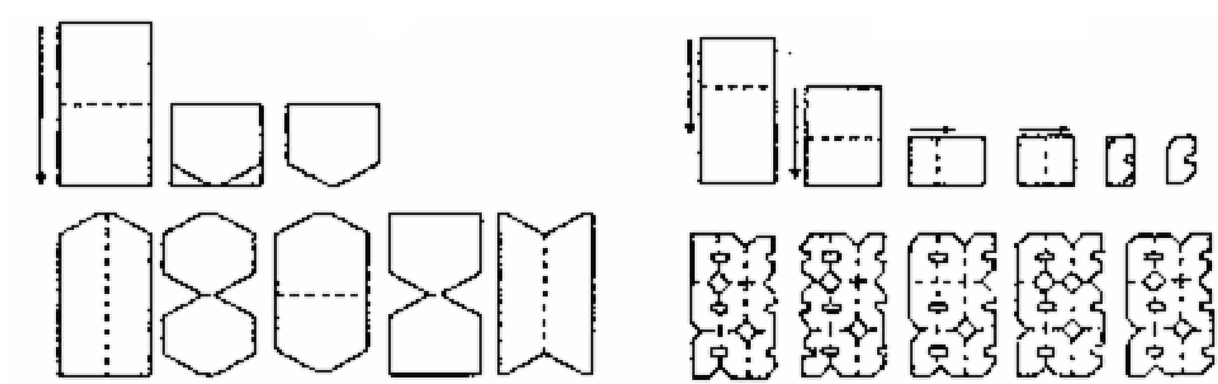
Two listening conditions, Mozart and silence, were administered to each participant. After each condition, subjects answered 16 Paper Folding and Cutting items. All groups evidenced a *Mozart Effect.* However, the scores of participants tested by the high expectancy and blind experimenter-subjects were “significantly higher than the scores of participants tested by the low-expectancy experimenters” (Rauscher, 2000, p. 2). Further findings revealed participants in high-expectancy groups scored significantly higher than those in low-expectancy groups. Therefore, data indicate that “experimenter expectancies probably contribute to the outcome of Mozart Effect experiments, even when experimenters are provided with identical instructions and scripts” (Rauscher, p. 2).

A third factor that may have contributed to negative findings may exist in the *Instructions to Participants* (Rauscher, 2000). In meta-analysis, researchers who instruct participants to listen carefully to the auditory selections (instead of playing them without instructing subjects) find larger effects, perhaps due to attention or lack thereof (Hetland, 2000; Rauscher, 2000). Rauscher cautions that “attention may either permit a more complete neural activation of the networks involved in processing musical and spatial information, or it may increase arousal” (Rauscher, p. 3).

She speculates, in either case, “it seems unlikely that a Mozart effect would be found for participants who did not actively process the music” (Rauscher, p. 3). Moreover, Rauscher acknowledges that research directly assessing the effects of informing subjects to listen to the music is needed. However, she suggests that researchers must consider the instructions to participants in future research (Rauscher, 2000).

The fourth element Rauscher suggests may be a factor in negative findings is *Item Difficulty.* She explains if the spatial-temporal measure is too easy, participants may depend on comparatively automatic processes that are not made possible by listening to music (Rauscher, 2000). For example, the easy Paper Folding and Cutting item depicted in Figure 6 can be solved without mentally unfolding the object, whereas the more difficult item requires processes of imagery and rotation (Rauscher, 2000). Researchers "found a positive relationship between effect size and item difficulty. The size of the Mozart effect was larger in experiments that used more difficult tasks" (Rauscher, p. 3).

Easy Difficult



A B C D E A B C D E

Figure 6. Easy and Difficult Paper Folding and Cutting Items.

Note: From Rauscher, F. H. (2000, August). Is the Mozart effect "debunked"? *Poster presented at the bi-annual meeting of the International Conference on Music Perception and Cognition, Keele University, Keele, UK.* (p. 3).

The final factor Rauscher points out that may have contributed to negative findings is *Practice Effects.* "In studies using pretest posttest design, it is important to control for practice effects. Some tasks, such as the Paper Folding and Cutting task, are highly susceptible to practice effects" (Rauscher, 2000, p. 3). Rauscher explains there can be a ceiling effect which may make it difficult to observe any posttest differences that could be present when subjects are pretested and then posttested (Rauscher). A meta-analysis by Block and Grosfield (Rauscher, 2000) supports this concept. "Stronger Mozart effects were found in studies in which task performance was furthest from the ceiling" (Rauscher, p. 3).

Using Mozart or Not Using Mozart

In comments, Rauscher admits that since the original article, "our understanding of the Mozart effect has evolved" (Rauscher, 2000, p. 3). At first, the term *Mozart Effect* referred to the transitory increase of certain visuospatial task scores following listening to a particular Mozart sonata. However, the phrase has been generalized to include the effects of music instruction on spatial-temporal task performance (Rauscher).

In spite of Rauscher' remarks, controversies regarding the *Mozart Effect* and the use of various music styles or conditions continue. At the University of Windsor and University of Toronto, both in Canada, two experiments replicated and extended the *Mozart Effect*. Recruited participants included 84 undergraduates: 56 for Experiment 1 and 28 for Experiment 2 (Nantais & Schellenberg, 1999). In Experiment 1: "Performance on a spatial-temporal task was better after participants listened to a piece composed by Mozart or by Schubert than after they sat in silence" (Nantais & Schellenberg, p. 370). In Experiment 2, "the advantage for the music condition disappeared when the control condition consisted of a narrated story instead of silence" (Nantais & Schellenberg, p. 370).

Nantais and Schellenberg found “although both pieces of music are relatively ‘easy listening’ examples from the common-practice period, our finding makes it clear that the Mozart effect has nothing to do with Mozart in particular” (Nantais & Schellenberg, p. 372). In fact, they generalize the effect to a wide variety of enjoyable pieces of music composed in the classical or romantic styles (Nantais & Schellenberg).

Another self-described skeptic and psychologist, Eric Seigel at Elmhurst College in Illinois, set out to invalidate the *Mozart Effect*. He chose a different spatial reasoning test (a factor that Rauscher warns against) (Rauscher, 2000); one that involves the participant’s ability to differentiate between shifted positions of the letter *E* as various rotations were given. The brief time that it takes to judge whether the letter is the same or different competently measures spatial reasoning. In this experiment, Seigel found that subjects in the Mozart listening group did significantly better (Anderson, 2000). He remarks, “it was as though they had practiced the test…we have another way to measure the Mozart Effect” (Anderson, p. 6).

The Mozart Effect and Preschool Children

Previous investigations have attempted to replicate the Rauscher et al. 1988 and Rauscher et al. 1994 experiments involving the *Mozart Effect* (Davidson & Powell, 1986; and Dryden, 1992). In November 2004, Ken Hui, a researcher at Yale University, challenged the Rauscher et al. results. Knowing that experiments, up until that time, had been completed only on college age students, Hui wanted to examine the relationship of the *Mozart Effect* on preschool children (Hui, 2004). Parental consent for all volunteer participants was obtained at the beginning of the study which included 41 preschool children (16 females and 25 males) at a childcare center in a large Midwestern city (Hui). “The center had no special provisions for either gifted learning or special education, and it was a fully private institution with no form of financial aid” (Hui, p.

413). The ages of children ranged from three years, two months to six years, three months with a mean of 4.69 years and one missing observation (Hui).

The conditions for music were created and consisted of two audiotapes of approximately 8 minutes, 20 seconds. One tape included the first movement of Mozart's *Piano Concerto in A Major (K488)*, the selection used in the original Rauscher et al. experiment. The second tape contained three pieces of typical popular children's music excerpted from *Songs for the Road* (Hui, 2004). To encourage the participant's active listening, they were told that a brief discussion of the music would be held at the conclusion of the test (Hui).

Hui conquered potential internal and external experimental design flaws such as behavioral characteristics of the participants, balances in learning effects, and variance by controlling for each condition. After random assignments were made, each student was given a pen and portable lap desk that had a hard flat surface and a cushioned underside.

At the end of the listening condition, tests were distributed to each subject. Test materials consisted of a series of pencil-and-paper mazes, which were based upon a recently expired version of the *Wechsler Preschool and Primary Scale of Intelligence – Revised* (WPPSI-R). The test was chosen because it comprised both the necessary spatial and temporal components, as specified in the original Rauscher and Shaw experiment, in addition to its practical use in administering the test in a group setting (Hui, 2004). Each test contained a series of eleven unique mazes, as prescribed by Rauscher and Shaw, and were presented in booklet form, in increasing order of difficulty. The tests took place over a period of three days. Each child was compensated with Oreo cookies for their participation after each session (Hui).

To ensure anonymity, Ken Hui, the investigator, graded each performed test. The participant and condition received was unknown to Hui. Grading took place over a one-week period following the conclusion of data collection. Mazes were scored according to guidelines of the WPPSI-R. Completed mazes were assigned point values based on difficulty and points were deducted for wrong turns and U-turns. The maximum score was 26 and the minimum was zero (Hui, 2004).

The results of the experiment revealed 41 children and 17 missing observations. Missing observations were due to absenteeism or the participant did not wish to participate on a given day. Thirty-nine children participated on at least two of the three days and could be included in the analysis of individual score differences. The mean score and standard deviation of these children in each condition are presented in Table 1 (Hui, 2004).

Table 1

Mean Scores of Males by Condition.

Condition	Mozart	Popular music	Silence
Mean	14.50	14.35	15.32
Standard deviation	4.64	4.73	5.24
N	36	34	34

Note: From Hui, 2004, p. 415.

The mean scores were tested using a repeated-measures analysis of variance. This found no significant effect of the conditions on the test scores ($F_{2,63} = 1.51$, $p > .05$) (Hui, 2004, p. 414). Hui controlled for children's age which had a significant positive effect on score. However, it did not change the conclusion that there was no overall difference across conditions (Hui).

Paired *t*-tests were conducted on score difference between conditions within individual participants. This analysis indicated a significant decrease in scores in the classical music condition compared to the silence control ($t = -2.21$, $p = .035$, $n = 31$). The average loss was

1.13 points. Differences between popular music and silence ($t = -1.06$, $p > .05$) and between the two music conditions ($t = 0.06$, $p > .05$) were not significant (Hui, 2004, p. 415).

Hui discovered “there was no improvement in the spatial-temporal ability of preschool children after listening to Mozart’s or popular music compared with after silence” (Hui, 2004, p. 415). His hypothesis that listening to music increases spatial temporal ability in children was not supported by data. Hui acknowledges previous studies have suggested a stronger *Mozart Effect* for women (Gilleta, Vrbancic, Elias, & Saucier, 2003; Hui). However, “no such correlation between gender and spatiotemporal enhancement was detected in this study” (Hui, p. 415).

The Mozart Effect and Background Music in Public Schools

A study involving fifth grade students examines the effects of easy-listening background music on the on-task-performance (OTP) of children. An experiment conducted by Charles W. Davidson and Lou Anne Powell investigated 26 fifth grade science students. The students were observed for 42 class sessions with data recorded every three minutes (10 times) per session over a four-month period (Davidson & Powell, 1986).

The treatment, in the form of easy-listening music, was “delivered in between two control observations (i.e. 15 sessions without background music, 15 with, and 12 without, in that order)” (Levy, n.d., p. 4). Davidson and Powell discovered a significant increase in OTP for males in the classroom and for the class as a whole. However, there was also an increase in OTP for females, although this effect “was inhibited by the ceiling effect (the mean pretreatment OTP for females was 99%)” (Davidson & Powell, 1986, p. 29).

Davidson and Powell admit concerns about their data gathering and statistical methods. They note, “It was not feasible to randomly assign the students to an experimental group and a control group” (Davidson & Powell, 1986, p. 30). They also state, “there were no anticipated external events that would coincide with the treatment" (Davidson & Powell, p. 30). This last statement is a critical element, "since external events, anticipated or not, can certainly influence the results of a study conducted outside the laboratory" (Levy, n.d., p. 4). Yiftach Levy, in the Department of Educational Technology at San Diego State University, gives an unfortunate illustration of such an external occurrence when she cites the results of a 1995 study by Koppelman and Imig on the effects of music on children's writing where "the unexpected death of the student's teacher" occurred (Levy, p. 4; Koppelman & Imig, 1995, p. 21).

In spite of the experiment's no anticipated external events and the lack of random assignment, Davidson and Powell indicate, "The use of easy-listening background music was effective in increasing on-task-performance of children in an elementary science classroom… [and may be generalized to] other subjects in the middle grades" (Davidson & Powell, 1986, p. 32). Therefore, replications of the Davidson and Powell study may be viable for further research at the middle school and high school levels.

During an informal study completed in 27 public school classrooms, over two-thirds of teachers found students to be more *on-task* when classroom environments were structured around background classical music (Patten, 1999). However, Christopher Chabris, a graduate student at Harvard University, questioned a number of studies that played different styles of background music, in particular, classical music in classrooms.

He examined 16 studies and analyzed their conclusions (Cromie, 1999; Cromie, 2000; Anderson, 2000). Chabris maintains:

> The results do not show any real change in IQ or reasoning ability. There's a very small enhancement in learning a specific task, such as visualizing the result of folding and cutting paper, but even that is not statistically significant. The improvement is smaller than the average variation of a single person's IQ test performance.
> (Cromie, 1999; Anderson, 2000, p. 5)

Chabris further concludes, “there’s nothing wrong with having young people listen to classical music, but it’s not going to make them smarter” (Cromie, 1999; Anderson, 2000, p. 5).

Even music education cynics have thwarted the *Mozart Effect*. Michael Linton, head of the Division of Music Theory and Composition at Middle Tennessee State University, writes, “the very best thing that could be said of their [Rauscher and Shaw] experiment — were it completely uncontested — would be that listening to bad Mozart enhances short–term IQ” (Linton, 1999, p. 12). Still other educational skeptics have been swayed to accept the *Mozart Effect* does exist (Cromie; Anderson).

A case in point is Lois Hetland’s work at the Harvard Graduate School of Education. Hetland attempted to replicate earlier *Mozart Effect* studies in broader depth, including a total of 1,014 participants (Hetland, 2000; Anderson, 2000). Dr. Hetland presents the results from two meta-analyses of *Mozart Effect* studies. She examined the 16 Christopher Chabris studies with subjects $N = 714$ and 12 studies with subjects $N = 522$ in addition to her own meta-analyses of 36 studies with subjects $N = 2{,}465$ and 31 studies with subjects $N = 2{,}089$ (Hetland, 2000).

The Hetland (2000) meta-analyses revealed that the Mozart listening group outperformed other groups by a higher margin than could be explained by chance, although “factors such as the subject’s gender, musical tastes and training, innate spatial ability, and cultural background made a difference in the degree to which the Mozart would increase test scores” (Anderson, 2000, p. 6; Hetland, 2000; Cromie, 2000).

In contrast, Hetland did not find the *Mozart Effect* to be as strong as the Rauscher et al. (1993) experiment. Then again, she believes “that even these small effects are impressive because so many other factors could obscure them” (Anderson, p. 6).

Hetland (2000) explains, “in the early stages of research in a field, we would expect the measured effect to be small until we learn to separate the signal from the noise in the research method” (Anderson, 2000, p. 6). She observed that Chabris “had only studied the experiments that compared listening to Mozart to silence, and which had not included listening to other compositions” (Anderson, p. 6).

Comparable to Rauscher et al. (1993), studies that resulted in the *Mozart Effect* have examined the effect of background music on mathematics test anxiety of college algebra students. Haynes (2003) at West Virginia University proposed two research questions: (1) Does the use of background music played while students studied for 10 minutes prior to an exam reduce the level of mathematics test anxiety as opposed to students who had no background music while studying?; and (2) Is there a significant difference in the achievement scores of students exposed to background music while studying as opposed to students who had no background music while studying (Haynes, 2003).

All subject-participants, 160 West Virginia University students, completed a revised version of the Mathematics Assessment Resource Service (MARS) test and the first college algebra exam for the semester in the course. Data analysis indicates that studying to background music reduced math anxiety levels of participants. However, the second hypothesis was not supported. Researchers found that achievement scores were not affected by background music for either high anxiety students or low anxiety students (Haynes, 2003). This set of results is contrary to results in other studies involving music and the mind.

Expanding the Mozart Effect – A Summary

What is so special about Mozart’s music? Why are his tunes hailed as possibly making children smarter? How can listening to Mozart increase academic achievement for students?

According to Associate Professor Sukree Charoensuk, Dean of the College of Music at Mahidol University in Thailand, “Mozart’s works are not too complicated. In fact, they were considered a kind of pop music in his time” (Siribhakdi, 2006, p. 1). It is with this quality that Mozart’s music along with its quick tempo is believed to stimulate the brain (Siribhakdi). Sukree Charoensuk goes on to state, “a tempo that is faster than the rate of the heartbeat naturally excites listeners” (Siribhakdi, p. 1).

Can music other than compositions by Mozart stimulate the brain? Several investigators have attempted to prove this theory. In 1999, Bodner, Muftuler, Nalcioglu, and Shaw report results of Mozart’s music during a functional MRI (*f*MRI) significantly increased active brain areas of Alzheimer’s patients as compared to a Beethoven composition or popular 1930s music (Rauscher, 2000). Beethoven compositions “differently activated the prefrontal, occipital, and cerebellar regions – all regions associated with spatial-temporal reasoning (Rauscher, pp. 3 - 4).

Similarly, Dr. Lawrence Parsons at the University of Sheffield in the United Kingdom has found that it was Mozart’s energetic rhythms rather than its melodies or harmonies that created the performance enhancing effect (Lichtenstein Creative Media, 2002). Dr. William Thompson of York University has found comparable results. “Energetic music by Schubert produces the same effect; a slower, sadder piece by Albioni does not” (Lichtenstein Creative Media, p. 1).

In spite of evidenced research, limitations to Rauscher et al. (1993) did occur, specifically, a small sample size. Moreover, little or no demographic information is provided other than participants are college students.

Unlike the Rauscher et al. (1993) study, the sample size in Haynes (2003) is significant and can be generalized to a larger population. Dependent variables, test anxiety and academic achievement, appear to be easily observable by examining MARS achievement data. Independent variables, listening to background music for 10 minutes as opposed to 10 minutes of silence, are easily controlled to provide adequate and measurable outcomes, similar to those in the initial experiment. However, in comparing the two studies, Rauscher et al. (1993) to Haynes (2003), the level of confidence that like results would be attained should the experiment be repeated is quite low, as evidenced in the second hypothesis and data collection in Haynes (2003). Why is this so? Several recurring questions come to mind.

If the study of music does increase academic achievement, is there a causal or correlational relationship between music education and academic success? Is a participant's age a factor in brain development in regards to music education and academic achievement? Both Rauscher et al. (1993) and Haynes (2003) include only college students. How would the results differ if the age of participants were changed? Will different types of music, i.e. relaxation, classical, heavy metal, hip-hop, or even silence, affect academic outcomes? How or does educational background and instrument choice have an impact on academic success? Each of these questions is worthy of further investigation.

Frances Rauscher and Gordon Shaw as well as other researchers have ventured to answer these questions. Shaw comments that the human brain is one of the most complicated entities in our solar system. In his quest to understand how we think, reason, and create, Shaw and his fellow researchers found that they could use "music as a window into high brain function" (Shaw, 2004, p. xxi) through the *Mozart Effect*. Is this a means to establish higher standards for public education?

According to Eric Jensen (2001), "flying in the face of these hopes is an educational juggernaut unlike any we've seen in recent history" (p. v). Jensen suggests that there is no evidence that higher standards “actually produce better human beings – unless accompanied by better quality teaching, more targeted resources, greater opportunities for underserved populations, stronger role models, high expectations, and a dozen other key variables” (Jensen, p. vi).

Perhaps the answer in attaining consistent high standards is contained, as predicted by researchers, in music listening and training of infants and young children (when their brains are developing the most) (Shaw, 2004).This would enhance their ability to do spatial-temporal reasoning, which is important in doing math and science.

Consequently, “an increasing amount of research supports the theory that the brain is specialized for the building blocks of music, and that these building blocks include separate spatial (melodic) and temporal (rhythmic) components” (Rauscher, 1997, p. 34). Understanding how it does so and determining which types of music will also create the *Mozart Effect* are of immense general and scientific interest in helping us know the brain (Shaw).

As evidenced in cited studies by a number of researchers, including Frances Rauscher, Gordon Shaw, Lois Hetland, those in the business and education communities, the public, and yes, even skeptics, have a clearer understanding how music can impact the brain.

As future researchers uncover data that making music helps young people develop mental capacity, perform better in a variety of academic areas, and promotes wellness in older people (Christensen, 2005), music educators should be “aware of the controversy, and neither focus music curricula around certain types of music for maximum intelligence building” (Anderson, 2000, p. 11). On the other hand, with a clear and thorough understanding of the brain and the impact that music has upon it, educators, regardless of content specialty, cannot exclude the possibility that there may be a link between listening to music, instruction in music, and increased academic achievement (Jensen, 2001).

Music Education and Elementary School Academic Achievement

After findings of the *Mozart Effect* and the initial outcry for educational reform had waned, additional research, some replicating the original study, others of a more conventional nature, have taken place to challenge the Rauscher, Shaw, and Ky findings. As in all good research, Rauscher attempts to prove her own theories through a variety of additional studies (Rauscher, 1997; Rauscher, 1999; Rauscher, 2003a; Rauscher, 2003b; Rauscher & Shaw, 1998; and Rauscher & Zupan, 2000).

Many Rauscher studies involve public school preschool, kindergarten, and second-grade subjects who receive music instruction. Studies, especially those regarding piano instruction, have revealed higher results on spatial-temporal tasks than control groups who received other types of instruction (i.e. computers) or no training (Rauscher, 1999; Hetland, 2000; Rauscher & Zupan, 2000; Rauscher, 2003b). "These effects appear to last only if the instruction begins before age seven, and if it continues for two or more years. The effect of music instruction has been replicated in several laboratories and may last at least three years" (Rauscher, p. 3).

Classroom keyboard instruction improves kindergarten children's spatial-temporal performance: A field experiment (Rauscher & Zupan, 2000); *Effects of piano, singing, and rhythm instruction on the spatial reasoning of at-risk children* (Rauscher, 2003a); *Music exposure and the spatial intelligence in children* (Rauscher, 1999); and *Can music instruction affect children's cognitive development?* (Rauscher, 2003b) reveal significant results in regard to music education and academic achievement in elementary school. Elements of their research design and analysis will be revealed in this domain.

Using Piano Instruction for Increased Academic Achievement

Rauscher (2003a) notes that research studies have found musicians who begin piano instruction before age 7 have larger cross-sections of the anterior corpus callosum. A follow-up MEG study found auditory cortex dipole moments for piano tones that were enlarged by about 25% in musicians relative to non-musicians (Rauscher, 2003a). Rauscher reminds future investigators, "there was a positive correlation between effect size and when participants initiated instruction: musicians who began instruction before age 9 showed the largest effects" (Rauscher, 2003a, p. 1).

Rauscher and Zupan (2000) hypothesize the impact of piano instruction and elementary school academic achievement. *Classroom keyboard instruction improves kindergarten children's spatial-temporal performance: A field experiment* (Rauscher & Zupan, 2000) is perhaps a precursor to Rauscher's future and more extensive work *Effects of piano, singing, and rhythm instruction on the spatial reasoning of at-risk children* (Rauscher, 2003a).

In Rauscher and Zupan (2000) participants include 62 middle-income kindergarten children (36 boys and 26 girls) of mixed ethnicity attending four kindergarten classes at two Midwestern public elementary schools. Children range in age from 5 years, 1 month to 6 years, 1 month at the start of the study (Rauscher & Zupan, 2000).

Children were assigned to one of two groups, keyboard ($N = 34$) or no music ($N = 28$). Random assignment was not possible due to logistics and school administrators' need to keep classes intact. A music specialist visited each classroom to administer 20 minute piano lessons to the keyboard group two times per week. Ten Kawai XG130 keyboards (Rauscher & Zupan, 2000) were arranged in a row against one wall of the classroom. Children assigned to the no music group were engaged in journaling by their kindergarten teacher in a separate area of the classroom during lesson time (Rauscher & Zupan).

Children in the keyboard group participated in groups of approximately ten students. In typical lessons, participants are seated in a semicircle, prompted by the music specialist, on the floor away from the keyboards to sing and move to previously learned keyboard compositions. Afterward, singing and movement to compositions of current and subsequent weeks ensued. A brief discussion of keyboard hand position led by the music specialist followed (Rauscher & Zupan, 2000).

Next, children were seated individually at keyboards to play the previous week's selection alone and in ensembles. This was followed by an introduction to a new composition accompanied by rhythmic clapping and *solfege* (a way of assigning syllables to degrees or steps of the diatonic scale. For example: Do, Re, Mi, Fa, So, La, Ti, and Do for the eight ascending notes of a musical scale or octave). This activity culminated in keyboard performances (Rauscher & Zupan, 2000).

Activities were interspersed with ear training, notation, rhythm, improvisation, interval, and dynamic exercises. Lessons ended with a review of the day's activities and repertoire. Children assigned to the keyboard group were encouraged to play the keyboard throughout the day and, if possible, at home. Children in the no music group were not permitted access to keyboards in school (Rauscher & Zupan, 2000).

Prior to exposure to conditions, all children were pretested using a series of tasks. Each task contains the elements required for spatial-temporal reasoning. Procedures for completing each task were provided by test publishers.

The first task - *Puzzle Solving and Pictorial Memory*, taken from *McCarthy Scales of Children's Abilities* (Rauscher & Zupan, 2000), consists of four items of increasing difficulty. To successfully complete each item, the child was required to arrange cardboard pieces of a puzzle to create a familiar object (Rauscher & Zupan, 2000).

The second task - *Block Building*, taken from *Learning Accomplishment Profile Standardized Assessment* test (LAP-D) (Rauscher & Zupan, 2000), an object assembly test, has been used in previous studies (Rauscher et al., 1994; Rauscher & Zupan, 2000). The child's task in this test was to join puzzle pieces together in particular orders to match a mental image (Rauscher & Zupan).

For the third task, the child was required to reproduce from memory a simple stair-step structure previously created by the test administrator from ten one-inch blocks. The *Pictorial Memory* task (a six item test of visual memory) required the child to recall and identify previously viewed picture objects. However, this task requires neither mental image formation nor temporal ordering (Rauscher & Zupan).

Tests were administered by M. A. Zupan and a colleague blind to the experimental hypotheses and condition assignment. Specific tests were chosen to develop a baseline for each participating child to measure academic improvement over time. Procedures specified by McCarthy (1972) and the *Learning Accomplishment Profile Standardized Assessment* (1992) (Rauscher and Zupan, 2000) test manuals were followed. Children were tested individually at their regularly assigned schools (Rauscher & Zupan, 2000).

Testing sessions lasted approximately 15 minutes and were administered before lessons and again at two subsequent 4-month intervals, totaling three testing sessions (Rauscher &

Zupan, 2000). Keyboard lessons began immediately following pretesting. Therefore, the final testing session occurred 8 months after the keyboard group's first lesson (Rauscher & Zupan).

Means and standard deviations for all variables are presented in Table 2. An alpha level of .05 was used for all statistical tests.

Table 2

Mean Task Scores and Standard Deviations for Keyboard (N = 34) and No Music (N = 28) Groups.

	Task					
	Puzzle Solving*		Block Building**		Pictorial Memory*	
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*
Keyboard						
Pretest	4.52	3.05	77.68	48.76	3.32	1.09
4 months	9.17	4.97	39.74	38.46	4.26	0.86
8 months	11.97	6.02	27.72	29.67	4.82	1.24
No Music						
Pretest	3.93	2.26	77.66	44.70	3.79	1.20
4 months	5.75	3.26	74.54	48.29	3.50	1.35
8 months	6.87	3.63	58.70	45.49	4.36	1.06

Notes: * The higher the score is, the better the performance.
** The lower the score is, the better the performance.

From Rauscher, F. H., & Zupan, M. A. (2000). Classroom keyboard instruction improves kindergarten children's spatial-temporal performance: A field experiment. *Early Childhood Research Quarterly, 15* (2), p. 221.

In an attempt to understand data collection, it is important to review three Rauscher and Zupan scoring mechanisms:

Puzzle Solving – the number of correctly joined puzzle pieces was divided by the number of minutes taken to complete each puzzle within a specified time limit for a dependent measure of joins per minute.

> *Block Building* – the total number of seconds taken to complete the structure was recorded. A maximum of 120 seconds was permitted. Children who did not complete the structure received a score of 120.
>
> *Pictorial Memory* – the total number of pictured items recalled out of a total of six items was recorded.
>
> (Rauscher & Zupan, 2000, p. 220)

The first set of analysis focused on group factors that may have predicted the skills enhancement found (Rauscher & Zupan, 2000). Since the children's scores on the *Puzzle Solving* and *Block Building* tasks were significantly correlated (pretest: $r = -0.25$, $p \leq .015$; 4 months: $r = -0.54$, $p < .01$; 8 months: $r = -0.49$, $p < .01$), a multivariate analysis of variance (MANOVA) with gender and group (keyboard, no music), between-subject factors and time (pretest, 4 months, 8 months), and within-subject factor was performed on the three dependent measures (Rauscher & Zupan).

Results indicate significant multivariate main effects for group ($\eta^2_{(3,56)} = 0.20$, $p < .005$) and time ($\eta^2_{(6,53)} = 0.86$, $p < .001$) and a significant interaction between group and time ($\eta^2_{(6,53)} = 0.27$, $p < .009$). There was no significant main effect for gender ($\eta^2_{(3,56)} = 0.03$, $p < .05$), and no other significant interactions were found (Rauscher & Zupan, 2000).

The ANOVA performed on *Puzzle Solving* tasks showed significant main effects for both group and time and a significant interaction between group and time. Similar effects were found for *Block Building* tasks. The ANOVA performed on *Pictorial Memory* yielded a main effect for time only and an interaction between group and time (Rauscher & Zupan, 2000).

Since random assignment was not possible, a two-factor (gender, group) MANOVA on pretest scores for *Puzzle Solving, Block Building*, and *Pictorial Memory* tasks were conducted to assure children's scores prior to treatment were equivalent across group and gender. No significant main effects for group ($\eta^2_{(3,56)} = 0.01$, $p < .05$) or gender ($\eta^2_{(3,56)} = 0.01$, $p < .05$)

were found. In addition, there was no significant interaction between group and gender ($\eta^2_{(3,56)}$ = 0.05, $p < .05$) (Rauscher & Zupan).

Subsequent analysis includes, separate two-factor group (keyboard, no music) multiplied by time (pretest, 4 months, 8 months), and mixed analyses of variance (ANOVAs) with time as the repeated measure on each task. Results for this analysis are reported in Table 3.

Table 3

Two-Factor (Group, Time) Analyses of Variance for Puzzle Solving, Block Building and Pictorial Tasks.

			F	
Source	*df*	Puzzle Solving	Block Building	Memory
Group (G)	1	11.63*	7.13*	1.28
Time (T)	2	61.45**	17.16**	24.53**
G x T	2	10.55**	4.71*	8.3**
S within-group error	120	(7.51)	(1190.07)	(0.76)

Notes: Values enclosed in parentheses represent mean square errors.
S = subjects.
*$p \leq .001$; $p < .0001$.

From Rauscher, F. H., & Zupan, M. A. (2000). Classroom keyboard instruction improves kindergarten children's spatial-temporal performance: A field experiment. *Early Childhood Research Quarterly, 15* (2), p. 222.

Scheffe *t* tests further reveal that pretest of keyboard and no music groups did not differ significantly for any variable (*Puzzle Solving*: $t = 0.15$, $p > .05$; *Block Building*: t = 0.1.98, $p < .05$; *Pictorial Memory*: t = 0.1.43, $p < .05$) (Rauscher & Zupan, 2000). However, children in the keyboard group scored significantly higher on *Puzzle Solving* and *Block Building* tasks after 4 months of lessons than did children in the no music group (*Puzzle Solving*: $t = 4.90$, $p \leq .05$; *Block Building*: $t = 5.99$, $p \leq .001$) (Rauscher & Zupan).

After 8 months of lessons, differences in spatial-temporal task scores between the keyboard and no music groups had further increased (*Puzzle Solving*: $t = 10.9$, $p \leq .001$; *Block Building*: $t = 4.7$, $p \leq .001$) (Rauscher & Zupan, 2000). No significant differences between groups were found for *Pictorial Memory* task (4 months: $t = 3.74$, N.S.; 8 months: $t = 1.37$, N.S.) (Rauscher & Zupan).

Rauscher explains, "An additional method for assessing learning over time is to calculate and analyze gain scores (posttest minus pretest). This method, however, fails to control for the common observation that children who score the lowest on cognitive pretests tend to improve the most over time" (Rauscher & Zupan, 2000, p. 222). Therefore, a covariance approach to factor out pretest scores' effect on outcome measures was employed. Using posttest scores as an outcome measure with pretest scores as a predictor, Rauscher and Zupan performed a one-factor (group) multivariate analysis of covariance (MANCOVA) by using pretest scores as the covariate and gain scores (8 months – pretest) as the dependent measure (Rauscher & Zupan). Results for this analysis are presented in Table 4.

Table 4

Mean Gain Scores (Pretest – 8 Months) for Keyboard (N = 34) and No Music (N = 28) Groups.

	Task					
	Puzzle Solving [a]		Block Building [b]		Pictorial Memory [a]	
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*
Keyboard	7.43	4.94	-49.97	51.17	1.5	1.46
No Music	2.94	3.05	-18.95	52.44	.57	1.29

Notes: a. The higher the score is, the greater the improvement.
b. The lower the score is, the greater the improvement.

From Rauscher, F. H., & Zupan, M. A. (2000). Classroom keyboard instruction improves kindergarten children's spatial-temporal performance: A field experiment. *Early Childhood Research Quarterly, 15* (2), p. 223.

Rauscher and Zupan indicate, "This analysis yielded a significant main effect for group ($\eta^2_{(3,53)} = 0.35$, $p < .001$), indicating that the effect for group revealed by the MANOVA performed earlier was not an artifact of the children's pretest scores" (Rauscher & Zupan, 2000, p. 222). Furthermore, MANCOVA tests revealed the effect for gender ($\eta^2_{(3,56)} = 0.04$, $p > .05$) were not significant (Rauscher & Zupan).

The primary purpose of this study was to demonstrate the effects of music instruction on spatial-temporal reasoning of kindergarten children in the "chaotic setting of the public school classroom" (Rauscher & Zupan, 2000, p. 223). Regardless of the hectic classroom environment, results revealed that children exposed to keyboard instruction improved significantly on two spatial-temporal tasks. Enhancements found were similar in magnitude to studies in other research (Rauscher et al., 1994, 1997) in spite of vast differences in setting in which older children received music instruction.

Although no differences in pretest scores were found between keyboard and no music groups, keyboard participants scored significantly higher than no music groups after 4 months of instruction. Moreover, this difference was greater in magnitude after 8 months. As hypothesized, pictorial memory did not differ for the two groups following music instruction (Rauscher & Zupan, 2000). However, the MANOVA revealed significant interaction between group and time as a function of music instruction (Rauscher & Zupan).

Music Instruction and At-Risk Preschool Children

As an extension of previous research, Rauscher investigates the *Effects of piano, singing, and rhythm instruction on the spatial reasoning of at-risk children* (Rauscher, 2003a). This study reports the product of three closely related studies involving economically disadvantaged preschool children. All children in this study were enrolled in Head Start, a federally funded preschool program designed to prepare economically disadvantaged children for public school. Household incomes ranged between $10,400 and $15,600 (Rauscher, 2003a).

Conducted over a period of two years, this extensive study attempted to replicate and expand findings that piano instruction provided to preschool children improved spatial-temporal scores compared to children who received computer instruction or no special training (Rauscher, 2003a).

The study's design examines at-risk three- and four- year old children's spatial and temporal skills before (T1) and after (T2) two academic years of weekly individual piano instruction. Two other groups were included in the design to control for the Hawthorne Effect - an increase in subject productivity produced by the psychological stimulus of being singled out and made to feel important. One group received computer instruction which matched in frequency and duration to that of the piano instruction. The third group received no special training (Rauscher).

Five standardized tests were administered to measure specific cognitive processes that improve through exposure to music training. Specific predictions were made regarding the children's performance on each test. Rauscher predicted, "children who received the piano instruction would improve more and score significantly higher than the children in the comparison and control groups on tasks classified as having spatial and/or temporal content" (Rauscher, 2003a, p. 2). Further predictions that tasks do not tap spatial or temporal abilities would not be affected by music instruction were included (Rauscher).

Study 1 randomly assigned 87 children (mean age 3 years, 3 months at T1 - 45 girls, 42 boys) to three groups: Piano ($N = 33$), computer ($N = 28$), and control ($N = 26$) (Rauscher). Students were pre- and post- tested using subtests of the *Kaufman Assessment Battery for*

Children (K-ABC), the *Developmental Test of Visual Perception* (DTVP-2), the *Test of Auditory Perceptual Skills – Revised* (TAPS-R), and the *Wechsler Preschool and Primary Scale of Intelligence – Revised* (WPSSI-R) (Rauscher). “These tests measure different aspects of spatial-temporal, visual-spatial, and auditory skills” (Rauscher, p. 2). Overall, 26 subtests were administered by research assistants blind to experimental conditions and hypotheses (Rauscher).

An *alpha* level of .05 was used for all statistical tests. As hypothesized, children who received music instruction scored significantly higher than those who received computer or no special instruction on tasks requiring spatial and temporal skills (Rauscher, 2003a).

Researchers ask that consideration be given to the WPPSI-R’s Object Assembly task:

> A two-factor (condition, testing) mixed analysis of variance (ANOVA) found a main effect for condition ($F_{(2,84)} = 8.99$, $p < .000$), a main effect for condition ($F_{(1,84)} = 97.58$, $p < .000$), and an interaction between condition and testing ($F_{(2,84)} = 49.10$, $p < .000$). Although the three groups’ scores did not differ in T1, the piano group scored significantly higher than computer or control groups ($p < .000$ both) in T2.
> (Rauscher, 2003a, p. 3)

Following piano instruction, four tasks from the K-ABC improved significantly (Hand Movements, Magic Window, Gestalt Closure, and Arithmetic); five tasks from the DTVP (Eye-Hand Coordination, Spatial Relations, Form Constancy, Visual Closure, and Figure-Ground) improved significantly; and two tasks from the TAPS [Auditory Sentence Memory (Sequencing) and Auditory Processing (Thinking and Reasoning)] (Rauscher, 2003a). In précis, Rauscher reveals, “that spatial and temporal tasks were improved following piano instruction, whereas verbal tasks, matching tasks, copying tasks, and memory tasks were not significantly affected” (Rauscher, p. 3). Nevertheless, none of these tasks were improved by computer instruction, although children who received computer lessons did score significantly higher on the K-ABC’s Expressive Vocabulary and Faces and Places tasks than children in the piano and control groups (Rauscher).

The purpose of Study 2 was "to determine if the type of music instruction children received had measurably different effects on cognition" (Rauscher, p. 2). Similar to Study 1, Study 2 was a two-year study. Rauscher hypothesized Study 2 as "early music instruction emphasizing different musical skills would produce correspondingly differential effects on cognitive performance" (Rauscher, p. 2).

To support this concept, Rauscher proposes results of a recent study revealing "several years of string and percussion instruction selectively improved auditory frequency and duration discrimination thresholds compared to no instruction" (Rauscher, 2003a, p. 2). Therefore, Study 2 compared "the effects of three types of music training – piano, singing, and rhythm – each of which highlights a partially non-overlapping set of musical properties" (Rauscher, p. 2).

Once again, at-risk preschool children received individual piano instruction for two years. However, unlike Study 1, the elements of singing, rhythm, or no instruction conditions were added. All children were pre- and post- tested using the same standardized tests as in Study 1. For Study 2, Rauscher hypothesized "improvement in spatial-temporal tasks following all types of music instruction, improvement in mental imagery tasks following singing instruction (due to singing's strong reliance on auditory imagery), and improvement in temporal tasks following rhythm instruction (due to rhythm training's emphasis on the temporal qualities of music)" (Rauscher, 2003a, p. 3).

Participants included 123 male and female Head Start preschool children of mixed races randomly assigned to four conditions: Piano ($N = 34$); singing ($N = 28$); rhythm ($N = 35$); and control ($N = 26$) (Rauscher, 2003a).

Similar to Study 1, children in music groups received weekly individual instruction for a period of 48 weeks over two years. Children in the control group received no special training. All children were administered the same 26 subtests (pre- and post- tests) as in Study 1: K-ABC; DTVP-2; TAPS-R; and WPSSI-R (Rauscher, 2003a).

Due to the large number of administered subtests, data from one spatial-temporal tasks (Object Assembly – OA), one mental imagery task (Form Constancy – FC), and one temporal task (Magic Window – MW) were presented to demonstrate the veracity of researcher predictions (Rauscher, 2003a). Rauscher states, "data represent typical results for these task categories" (Rauscher, p. 3).

An alpha level of .05 was used for all statistical tests. A two-factor (condition, testing) mixed analysis of variance (ANOVA), with condition as the between-subjects factor and testing as the within-subjects factor, was performed on the pre- and post- test scores of the OA (spatial-temporal) task (Rauscher, 2003a).

Study 2 researchers found a main effect for testing ($F_{(3,119)} = 129.44$, $p < .001$) and an interaction between testing and condition ($F_{(1,119)} = 14.52$, $p < .001$). The main effect for condition was not significant ($F_{(3,119)} = 2.50$, $p = .06$). Pretests scores for the four groups did not differ. However, LSD tests revealed that posttest scores for piano, singing, and music groups were significantly higher than those of the control group ($p < .001$, all). Standard scores of the three music groups improved significantly from pretest to posttest ($p < .001$). Posttest scores for music groups did not differ (Rauscher).

To illustrate effects of music instruction on mental imagery, researchers present data for the Form Constancy (FC) task. Rauscher performed a two-factor (condition, testing) mixed ANOVA on pre- and post- test raw scores. Standard scores rather than raw scores were used since FC task is standardized for children 4 to 11 years of age. Main effects for condition revealed ($F_{(3,119)} = 3.05$, $p < .04$) and testing ($F_{(1,119)} = 175.56$, $p < .001$). Interaction between condition and testing did not reach significance ($F_{(3,119)} = 2.57$, $p = .06$). Pretest scores of the four groups did not differ from each other (Rauscher, 2003a).

Since raw scores were used rather than scaled scores, LSD tests found significant differences between pre- and post- test scores for all groups (p < .001, all). Rauscher speculates, "the improvement for the control group was presumably due to maturation" (Rauscher, 2003a, p. 4.). Nevertheless, posttest scores of three music groups were significantly different from posttest scores of the control group (piano vs. control: p < .01). Posttest scores of the three music groups did not differ significantly (Rauscher).

The final step in Study 2 included a two-factor (condition, timing) mixed ANOVA on scaled pre- and post- test scores of the Magic Window (temporal, task). Analysis revealed main effects for condition ($F_{(3,119)} = 6.63$, $p < .001$) and testing ($F_{(1,119)} = 138.97$, $p < .001$), and an interaction between condition and testing ($F_{(3,119)} = 14.83$, $p < .001$). Four groups' pretest scores did not differ. However, all music groups scored significantly higher in posttests than in pretests ($p < .001$, all). Results of the control groups' pre- and post- test scores did not differ significantly ($p < .15$). Posttest scores of three music groups were significantly higher than those of the control group (singing vs. control and rhythm vs. control: $p < .001$; piano vs. control: $p < .03$) (Rauscher, 2003a).

Although posttest scores of the piano and singing groups did not differ significantly (p < .13), posttest scores of the rhythm group were higher than both the piano and singing groups (p < .001, both). Rauscher compares this trend found in other temporal tasks administered – Number Recall, Magic Window, and Arithmetic tasks of the K-ABC; Figure Ground task of the DTVP; and Auditory Number Memory Forward, Auditory Number Memory Backward, and Auditory Sentence Memory (Sequencing) tasks of the TAPS (Rauscher, 2003a).

Study 3 in Rauscher's *Effects of piano, singing, and rhythm instruction on the spatial reasoning of at-risk children* (2003a) was designed to investigate effects found in the first and second studies. Specifically, Study 3 compared scores of children who received music lessons to three groups of grade matched children: (1) Head Start children who did not receive music instruction; (2) at-risk children who were not enrolled in Head Start; and (3) middle income children (Rauscher, 2003a).

In addition, Rauscher's query tests the sustention of effects well into elementary school. Therefore, Study 3 is an extension of Study 1 and Study 2 to further examine previously-initiated instruction and the affects on academic achievement that may extend further into elementary school (Rauscher, 2003a).

Study 3 re-tested children who participated in the control ($N = 24$) and piano ($N = 31$) groups in Study 1. At the time of Study 3, participating subjects, previously investigated in preschool, were now in second grade. Music children who participated in Study 2 and currently enrolled in kindergarten were also included. Rauscher was able to track 76 of the 97 music students from Study 2 (piano, $N = 27$; singing, $N = 20$; and rhythm, $N = 29$). All children were tested individually in their homes or schools (Rauscher, 2003a).

Children in Studies 1 and 2 received the K-ABC and *Wechsler Individual Achievement Test* (WIAT), a test that measures basic reading, mathematics reasoning, spelling, reading comprehension, numerical operations, listening comprehension, and oral expression. Tests were administered to 27 at-risk kindergartners, 24 at-risk second-graders, 32 middle-income kindergartners, and 28 middle-income second graders (Rauscher, 2003a).

Results of Study 3 indicate children who received music instruction in Study 1 (currently second graders) continue to score higher on three of the four K-ABC tasks that were previously enhanced by music instruction (Hand Movements, Gestalt Closure, and Arithmetic). The fourth task, Magic Window (MW), was not standardized for children older than age 5. Therefore, MW was not administered. Regardless, these children scored significantly higher on tasks compared to second grade Head Start children who did not receive music instruction (Rauscher, 2003a).

When compared to grade-matched at-risk children not enrolled in Head Start, the music group also scored significantly higher on Expressive Vocabulary and Faces and Places tasks. Children enrolled in Head Start but did not receive music instruction scored significantly higher than at-risk children who were not enrolled in Head Start programs on Arithmetic, Expressive Vocabulary, and Faces and Places tasks. Rauscher suggests, "although Head Start has little effect on spatial-temporal reasoning, it does influence children's abilities on other non-spatial tasks (and arithmetic)" (Rauscher, 2003a, p. 5).

As a final point, although no groups scored significantly higher than middle income children on any of the administered tasks, scores for children in the music group were roughly the same as those of middle-income children on spatial-temporal and arithmetic tasks. Other groups scored significantly lower than middle-income children on all tasks (Rauscher, 2003a).

For WIAT, researchers found the music group scored significantly higher than Head Start and at-risk children on reading, spelling, reading comprehension, mathematical reasoning, numerical operations, and listening tasks. Head Start children scored higher than at-risk children on reading, spelling, and reading comprehension tasks but not on mathematical reasoning or numerical operations tasks (Rauscher, 2003a).

Children in Study 2 (currently enrolled in kindergarten) scored higher on the K-ABC's Arithmetic, Expressive Vocabulary, Faces and Places, Hand Movements, and Gestalt Closure tasks than did Head Start and at-risk children. Study 2 group participants received singing, piano, and rhythm instruction during the initial study as preschoolers. However, children in the rhythm instruction group scored higher on arithmetic subtests than did singing and piano groups (Rauscher, 2003a).

Rauscher suggests that “rhythm instruction has the strongest impact on mathematical reasoning” (Rauscher, 2003a, p. 5). Similar to the second grade children in this study, kindergarten Head Start children scored higher than at-risk children on Arithmetic, Expressive Vocabulary, and Faces and Places tasks (Rauscher).

Researchers were astonished that although piano and singing groups scored equal to middle-income children on spatial-temporal and arithmetic tasks, the rhythm group actually scored significantly higher than middle-income children on arithmetic tests. Children in the rhythm group also scored higher than middle-income children on mathematical reasoning and numeracy tests of WIAT (Rauscher, 2003a).

What do the results of this study suggest? Rauscher claims, “learning music is an important developmental activity that may help at-risk children compete academically on a more equal basis with their middle-income peers” (Rauscher, 2003a, p. 5). Moreover, programs similar to Head Start did improve performance on several tasks administered. However, improvement on spatial-temporal tasks was confined to children who received music instruction. Presence of the Hawthorne Effect was ruled out by control groups employed in Study 1. Effects of music instruction were found to continue for at least two years after interventions concluded (Rauscher).

Elementary School Instrumental Music Instruction and Academic Achievement

Many school instrumental music programs remove students from regular classrooms for individual or small-group instrumental instruction. Often, “this practice causes tension among teachers and administrators" (Children's Music Workshop, n.d.a, p.1). Many opposed to pull-out lessons are concerned that students will fall behind in academic performance by missing classroom instruction time.

A 1995 Ohio study reveals test scores of students who leave their classrooms for 30-minute string lessons twice each week score significantly higher than students who remain in traditional classroom settings (Children's Music Workshop, n.d.a). To make comparisons between string and non-string students as fair as possible, researchers examine student scores on previous standardized test – the *Cognitive Abilities Test* or COGAT.

Participants include 148 fourth-grade Hamilton, Ohio string students matched to a non-string student who achieved the same verbal score on the COGAT. This revealed the analysis of 296 student scores on the Ohio Proficiency Test (OPT). The academic abilities of selected non-string students matched the academic abilities of the string students as closely as possible (Children's Music Workshop, n.d.a). Table 5 consists of mean Ohio Proficiency Test scores for students in this study.

Table 5

Mean Ohio Proficiency Test Scores for String and Non-string Students.

	Writing	Reading	Citizenship	At Standard on All Sections of the Test
Mean scores				
String Students	5.05	229.5	93%	68%
Non-String Students	4.85	223.2	87%	58%

Note: Adapted from (Children's Music Workshop, n.d.a, pp. 1 - 2).

Researchers conclude that string students did not suffer negative effects when compared to students of similar academic capability who remained in the classroom. In addition, researchers conclude “the overall Ohio Proficiency Test performance of the students who participate in string pull-out lessons was better than the performance of the students of similar ability who did not participate in the string program” (Children's Music Workshop, n.d.a, p. 2). Results indicate that students who study instruments in a small group or individual setting actually improve their academic abilities, however, this study was not designed to document improvement. Further study is needed before drawing such conclusions (Children's Music Workshop).

The author of the Ohio report offers this analysis of what takes place during pull-out string instruction:

> When string students are excused from their classrooms for string class, they are not leaving instruction. They are moving to another classroom in a different area of the building. The concepts taught in string [lessons] go far beyond pitch and rhythm. For example, a student must understand fractions and their relationships to each other in order to manipulate rhythm. The student who has trouble understanding the abstract concept that a half is twice one quarter may comprehend the concrete example of his or her bow moving twice as far on half notes as quarter notes. The musician reads abstract concepts from the page and then translates them into concrete phenomena that involve time and space.
> (Children's Music Workshop, n.d.a, p. 2)

Another study investigating elementary school instrumental music was completed in 1992 by Susannah Dryden. This study linked instrumental music education and fifth grade academic achievement. The study examined 270 fifth grade students (135 boys and 135 girls) located in a southwestern Kansas school district with an enrollment of approximately 4,500 students. Located in a city of approximately 20,000 people, the school district consists of eight elementary schools (Dryden, 1992).

The sample size incorporated 164 subjects that self-selected participation in instrumental music instruction (band or orchestra) or nonparticipation in instrumental music instruction during the 1991-92 school year. Those who chose instrumental music instruction included 69 males and 95 females for a total of 164 students. Demographic information was obtained from the school district's permanent records (Dryden, 1992).

A single factor pre- and post- test design was employed for the composite null hypothesis. The following independent variables were investigated: participation status in instrumental music, gender, race, socioeconomic status, family structure, mother's level of formal education, and length of time in the school system. The dependent variable includes *The Comprehensive Tests of Basic Skills* (CTBS), *Fourth Edition Levels 14 and 15*. Subscale scores for Reading Vocabulary, Reading Comprehension, Mathematics Computation, Mathematics Concepts and Applications, Reading Total, Mathematics Total, and Total Test scores were used for data collection. Seven composite null hypotheses were tested (Dryden, 1992).

Data collection procedures were simplified since the covariate measure had been collected as part of the district's annual standardized testing in April 1991. A year later, the posttest was administered and demographic information gathered. During data analysis, Dryden applied appropriate descriptive statistics, single-factor analysis of covariance, and least sum of squares tests of means (Dryden, 1992).

Results of the study indicate significant findings that band participants had statistically higher reading vocabulary and reading total achievement; males receiving instrumental instruction scored higher statistically in reading vocabulary; and instrumental students whose mothers had a post high school education showed statistically higher achievement in total score. Of the 49 comparisons for main effects, 10 were significant at the .05 level (Dryden, 1992).

Further research regarding elementary school aged children was conducted in a 2005 causal-comparative study entitled *The Impact of Instrumental Music on Student Academic Achievement* by Martha McLelland. It examines possible impacts that an instrumental music program may have on student achievement in reading and mathematics in one school district in the State of Delaware. Standardized testing data for 2001, 2002, 2003, and 2004 cohorts of fifth grade students were analyzed to determine if a statistically significant difference exists in music students as opposed to those who did not study music (McLelland, 2005).

The sample size includes 356 ($N = 356$) participants. The number of participants in music education was 159 with 78 females and 81 males. Non-participants in music education include 197 ($N = 197$) with 82 females and 115 males (McLelland, 2005).

Third grade test scores in reading and mathematics from the fifth grade population were used as a covariate to control for existing differences before enrollment in the music program. Researchers also examine test scores in reading and mathematics from an eighth grade cohort that began instrumental music in the fifth grade to provide a longitudinal assessment of instrumental music on academic achievement (McLelland, 2005).

Results of *t*-tests for fifth grade scores in reading and mathematics between participants and non-participants in an instrumental music program show a statistically significant difference in mean values for participants in an instrumental music program in both reading and mathematics achievement as measured by the *Delaware Student Testing Program* (DSTP) scores. However, differences were mitigated by race and gender. Statistically significant differences in academic achievement are found between gender and race but differences were not related to participation in instrumental music (McLelland, 2005).

If music educators argue that students participating in instrumental music programs achieve academically higher than those not involved in instrumental music programs, the analysis conducted in this study neither substantiates nor disconfirms their claim. Findings, however, do legitimize further research.

Music, Academic Achievement, and Gender Control

Studies have sought to determine interaction affects between gender and participation in music classes and academic achievement. As extensions of a Gilleta, Vrbancic, Elias, and Saucier (2003) study that explored the affects of Mozart's music on women, further research has examined the relationship between participation in music classes and academic achievement. *An analysis of the influence of music on academic achievement in urban education* by Hollie Hood-Mincey (2005), examines the effects between gender in addition to investigating the impact that music has on reading and mathematics (Hood-Mincey, 2005).

This experiment utilized four research hypotheses that were formulated and tested at the .05 alpha level. Two hypotheses specified that when third grade reading or mathematics achievement is controlled, "the reading or mathematics achievement of fifth grade students who participate in music classes is higher than that of students who do not participate in music classes" (Hood-Mincey, 2005, p. 1). The second set of hypothesis concerned interaction hypotheses. Hood-Mincey hypothesized that when third grade reading or mathematics achievement is controlled, the effect of participation in music classes on fifth grade reading or mathematics achievement is moderated by gender (Hood-Mincey).

The study population consisted of a random sample of 801 fifth grade students attending 112 schools in an urban school district in the state of Maryland. The sample was limited to those students who had available third grade scores on the *Comprehensive Test of Basic Skills* (Hood-Mincey, 2005).

Generated data was analyzed using the analysis of covariance (ANCOVA). Data for the first two hypotheses were rejected ($p < 0.05$). However, in examining two interaction hypotheses, each of the null hypotheses were sustained ($p > 0.05$). Therefore, it may be concluded that participation in music classes has a positive affect on reading and mathematics achievement for this research sample (Hood-Mincey, 2005). However, Hood-Mincey's data indicate that "gender does not moderate the effect of participation in music classes on the reading and mathematics achievement of fifth grade students" (Hood-Mincey, p. 1).

In examining data in experiments concerning music education, gender, and academic achievement in elementary school students, Hui (2004), Hood-Mincey (2005), and Gilleta et al. (2003) surmise that successful academic achievement is not affected when controlling for gender (Gilleta et al., 2003; Hui, 2004; Hood-Mincey, 2005).

Background Music and Academic Achievement in Writing

Researchers have attempted to examine the affects of background music or the actual instruction in music and its impact on academic achievement. A study by David Koppelman and Scott Imig at The University of Virginia examined *The Effect of Music on Children's Writing Content.* The study sample consists of 19 students from a second grade class in the Charlottesville City School System and examines writing examples on ten separate occasions. The students range in age from seven to nine years old. Eleven students are male; eight are female (Koppelman & Imig, 1995).

The intellectual abilities of the students range from those who are on grade level to those who are at the ability for a first grader. No student in the class is identified as gifted. One child has been retained from the previous year (Koppelman & Imig, 1995).

All students in the class are from low socioeconomic backgrounds. Seventeen students receive full aid from the school's free lunch program. Two students receive partial aid (Koppelman & Imig, 1995). Many students are domiciled in single parent families. However, family structure cannot be definitively stated since "family situations are continually changing" (Koppelman & Imig, p. 11).

The study consists of ten individual sessions spanning a five week period in which a variety of background music is played during writing periods. Baseline conditions were established using no music (pretest). Data collection sessions were held on the same two days each week and at the same time during the day (Koppelman & Imig, 1995).

Writing sessions consists of two distinct components for each session, physical exercises and writing. Physical exercise served two purposes: (1) as a buffer between routine class activities and actual writing sessions; and (2) verified research has found that "moving or exercising has a positive impact on mental functioning by sparking a feeling of excitement and increases concept development" (Koppelman & Imig, p. 5). Writing sessions were mitigated by a series of instructions:

1. Each student is expected to write for the entire 15 minute period.
2. No communication between students is permissible during the writing period.
3. Raise your hand if you need another sheet of paper.
4. All writing that is produced will be kept completely confidential and no one, except the researchers, will ever see the finished product.

(Koppelman & Imig, 1995, pp. 12 -13).

During each 15 minute writing session, students were exposed to one type of music (classical, jazz, popular or country) or wrote in silence. The initial session was completed in silence to determine a baseline for future writings. Sessions two through five involved classical, popular, jazz, and country music, respectively. Sessions six through nine were repeated sessions of background music played in experiments two through five, and session ten provided a second baseline with no music being played. Volume intensities of background music for each session involving music were kept at a constant level (Koppelman & Imig, 1995).

At the conclusion of each writing session, students were given a 5-minute opportunity to participate in a quick draw activity to demonstrate their writings. Students who chose not to participate were instructed to read silently for 5 minutes. Writing examples were collected and filed after each session without scoring (Koppelman & Imig, 1995).

Since second graders “have a tendency to write ‘I love’ and ‘I like’ statements” (Koppelman & Imig, p. 16), each writing example was examined for tone, consistency, and number of words. Tone is defined on three levels: “positive, negative, or ambivalent” (Koppelman & Imig, 1995, p. 13) - a self-created measure utilized during the data collection process. Negative and ambivalent writings indicate “a trend away from these type statements” (Koppelman & Imig, p. 16). Moreover, ambivalent writings indicate a wide range of topics used by second graders which demonstrate “some variety in the children’s writings” (Koppelman & Imig, p. 16).

Consistency is defined as “of or pertaining to the same general theme or topic” (Koppelman & Imig, pp. 13 -14) as defined by Donlan (1975) in analyzing student’s writing. Writing examples had to contain three or more sentences on the same general topic to be identified as consistent. If writing examples contained less than three sentences, all sentences had to acquiesce to be considered as consistent. The more consistent students were in their writings, the more they remained on task (Koppelman & Imig).

The number of words was analyzed using an assessment tool in a study by Mavrogenes and Bezrucko (Mavrogenes & Bezrucko, 1994). Results were tabulated, recorded, and analyzed for significant differences (Koppelman & Imig).

A one-tailed *t*-test was utilized for all statistical measures. Each measure was examined at the .95 confidence interval. For all *t*-test, the degrees of freedom was 20 and the *t*-score at the .95 confidence interval for $v = 29$ is ± 1.699 (Koppelman & Imig, 1995). Results indicate areas of statistical significance for each of the defined areas - tone, consistency, and number of words (Koppelman & Imig).

Under the no music condition, a total of three student writings out of a sample of 31 were considered as ambivalent for tone. Jazz proved to be statistically significant. The second graders wrote a total of eight ambivalent writings under the jazz background music condition. The *t*-score for jazz music is 2.193 which falls outside the .95 confidence interval *t*-score of ± 1.699 (Koppelman & Imig, 1995). There are no other statistically significant findings regarding ambivalent stories for other music types (Koppelman & Imig).

Negative student writings were examined using investigator created tone assessment tools. Under the no music condition, negative writings were greater in number for all music types (Koppelman & Imig, 1995). This may be attributed to extraneous variables. However, differences were not large enough to be statistically significant (Koppelman & Imig).

Under the no music condition, a total of 31 writings were received. Eight were defined as inconsistent. A total of four writings proved to be statistically insignificant under the jazz music condition. (Koppelman & Imig, 1995). However, once again, jazz in addition to top 40 (popular) music proved to be the most statistically significant. The *t*-score for jazz music is -2.00 which is outside the .95 confidence interval of ± 1.699. Of 32 collected writings, 12 were identified as inconsistent under the top 40 music condition. The *t*-score for top 40 music is 2.00 which is outside the .95 confidence interval. Country and classical music did not provide significant findings in terms of consistency (Koppelman & Imig).

Students wrote a mean of 36.5 words when no music was played. However, a mean of 45.6 words were written when classical music played in the background. This score proved to be statistically significant since the *t*-test score is 1.791, acceptably outside the .95 confidence interval of ± 1.699. There are no other statistically significant findings for other types of music (jazz, popular or country) regarding word count (Koppelman & Imig, 1995).

Of particular interest is an extraneous event that occurred during data collection. The second grade subject's teacher unexpectedly died. Although such occurrences are never planned, the researchers indicate that the event "most likely affected the students' writing selections" (Koppelman & Imig, 1995, p. 20). However, five writing sessions were conducted prior to the event. The final five writings, those that began with the second classical music session, were conducted after the teacher's death. Other than the student's lack of motivation as "students were experiencing a difficult time," (Koppelman & Imig, p. 20) statistical differences were not large enough to be statistically significant (Koppelman & Imig).

During the final writing set which included no background music, subjects called out, "Where's the music?" (Koppelman & Imig, 1995, p. 20). Investigators surmised not only did "the children genuinely like listening to the music" (Koppelman & Imig, p. 20), students proved to be more productive workers when classical and jazz music was played in the background (Koppelman & Imig).

Additional research to validate this study is warranted. As evidenced, elementary teachers may consider musical devices which children enjoy and prove to be productive for academic achievement (Koppelman & Imig, 1995). Classical and jazz music prove to be those devices.

Summary

As research literature reveals, under the guise of domain two, *Music Education and Elementary School Academic Achievement*, there are several inferences for further study. One important aspect to consider must include age in regards to brain development and stimulation as well as instrument choice (piano, violin, trumpet, etc.). Music instruction in early human development and subsequent years may have an impact on academic achievement.

Possible limitations could include researcher bias. As a musician and researcher, Rauscher and many musician-researchers have unique connections to selected subject matter unlike traditional researchers. In replicating or developing similar research models, music educators should use extreme caution to avoid this pitfall.

Additional limitations include subjects as volunteers and not random selection (Dryden, 1992). Moreover, in experimental studies, sample selection should include a variety of participants. Subjects in the Dryden (1992) study are part of a single, yet small, school district. Additionally, activities of the control groups, during times the experimental group received instrumental instruction, were determined by individual classroom teachers. Finally, levels of each independent variable were predetermined by available school district data (Dryden, 1992).

To validate the Dryden (1992) study, additional research and testing should have been completed on the educational background and musical experiences of both parents and the family/home structure (single parent home verses a two-parent home). The researcher attempted to make correlations between the parent’s highest level of education and their child’s success in instrumental music. Although findings related to the educational background of the participant's mother was found to be significant (Dryden, 1992), there was no mention of other family member backgrounds.

The magnitude of the Dryden (1992) study clearly examines the impact of music education on academic achievement for fifth grade students. Additionally, it provides information that connects learning music to academic achievement and reveals variables not found to be significant, such as socioeconomic status (Dryden, 1992). Dryden's research methodology, although not thorough, is precise, easy to understand, and replicable. Further investigation is recommended.

In regards to McLelland (2005), there appears to be an ethical dilemma. Instead of studying the same students over the course of time, McLelland studies different sets of students with similar characteristics and makes comparisons. Internal validity is at stake. The research design would have been more meaningful and accurate had McLelland followed the same group of students from fifth grade to eighth grade or examined high school student's middle school academic records to make comparisons. This would have attempted to establish causal and correlational effects in regards to music instruction and academic achievement.

As the development of additional research is considered, the elements and factors found in research studies that are pertinent and applicable to the impact of music education on elementary school academic achievement must be calculated.

Music Education and Secondary School Academic Achievement

Participation in Music and Athletic Activities

According to a report from the National Center for Education Statistics, 94% of public secondary schools offer separate instruction in music (Music Educators National Conference, 1994).

However, what impact does music education play in regards to academic achievement in core subjects?

A study completed by Timothy Schneider and Jack Klotz attempted to answer this question. Schneider and Klotz (2000) investigated the impact of music education and athletic participation on academic achievement. Expanding sample size and age of participants, this study sought to determine if participation as a musician or an athlete had an affect on academic achievement as measured by standardized test scores.

Similar to Rauscher and Zupan (2000) and Rauscher (2003a) preschool and elementary studies, Schneider and Klotz hypothesized that secondary students who received training as musicians would score higher on core battery composites of reading, language, and mathematics sections of the California Achievement Test than their athletic and non-musician peers, and that the amount of time spent (years of music study or athletic participation) would have a significant affect on test scores (Schneider & Klotz, 2000).

Participants in this study include 346 students who perform in the band or choir, are athletes, or are non-participants in either – music or athletics – in a large suburban/urban school district in the southeast United States. The schools represented in this study reflect a cross section of different types of music programs (Schneider & Klotz, 2000).

All data are collected from the core battery reading, language, and mathematics scores of the California Achievement Test from 1991 through 1995 in grades 5 through 9. A multiple analysis of variance is employed to test for significant relationships between the dependent variables of reading, language, and mathematics and the independent variables of musician, athlete, and non-musician/non-athlete for each year of the study. Pairwise comparisons are accomplished using Tukey's HSD post hoc tests (Schneider & Klotz, 2000).

Results of statistical procedures reveal that all groups are statistically equivalent in grades 5 and 6. In the seventh, eighth, and ninth grades, musicians achieve significantly higher mathematics and language scores than athletes. Although musicians do not significantly outperform non-musicians/non-athletes, by ninth grade, musicians' standardized test scores tend to stabilize while athletes and non-musician/non-athletes show a downward trend (Schneider & Klotz, 2000).

Additional findings show that although mean scores for musicians are higher than non-musicians/non-athletics, participation in music is not a conclusive factor in predicting statistically higher academic scores than those of non-musicians and non-athletics. However, musicians do score higher than athletes, and over time this gap widens. Findings indicate that factors other than enrollment in a performing music class are affecting outcomes. Results also indicate an overall drop in standardized test scores in ninth grade that is not seen for student musicians (Schneider & Klotz, 2000).

Instrumental Music and Academic Achievement

Another study examined the impact that a formal public school instrumental music instruction program has on middle school student's reading and mathematics achievement. The purpose of the study, completed by Gerald Babo in 2001, set out to determine if participation in a formal public school instrumental music program has a positive impact on grade eight middle school student's academic achievement and if a possible causal relationship exists. The conceptual premise for this research is based on previous findings of Rauscher (1999) and others who determine that instrumental and vocal music instruction with preschool students has a direct impact on neural development in the area of the brain that controls spatial reasoning. Spatial reasoning ability has been directly linked to success in mathematics (Babo, 2001).

The research design analyzes testing data from the California Achievement Test and the New Jersey Grade Eight Proficiency Assessment in reading and language arts and mathematics for 93 students enrolled in an instrumental music program and 85 students not enrolled in an instrumental music program during the 1998 and 1999 academic years. The study is conducted to determine if differences exists between the two groups and the impact, if any, participation in an instrumental music program has on academic achievement. The studies of D. Zanutto and J. Anello, both of whom look at significant differences in academic achievement between instrumental music students and non-instrumental music students, led Babo (2001) to propose a similar study of data using multiple regression analysis to determine the impact participation in an instrumental music program has on academic achievement while controlling for variables of intelligence quotient, socioeconomic status, and gender (Babo, 2001).

Twelve null hypotheses are examined with eight being rejected, two accepted, and two demonstrating mixed results that determine participation in a formal instrumental music instruction program does have an impact on reading and language arts achievement of an eighth grade student, and that the effect is between 10% and 16% contributing the strongest impact on reading and language arts achievement. Research also determines that intelligence quotient and socioeconomic status has the greatest impact on reading and language arts and mathematics achievement and the existence of a possible causal relationship between participation in instrumental music and superior academics may be proposed (Babo, 2001).

Music Participation and Grade 12 Core Academic Subjects

An extensive study recently completed in Canada examines *The Relationship Between Achievement and Participation in Music and Achievement in Core Grade Twelve Academic Subjects.* This investigation by Peter Gouzouasis, Martin Guhn, and Nand Kishor at The

University of British Columbia in Vancouver examines the extent to which academic achievement of Grade 12 students is related to achievement and participation in music courses for three consecutive cohorts of different students (Gouzouasis, Guhn, & Kishor, n.d.).

The purpose of this study is to investigate the extent to which achievement in music courses is predictive of academic achievement in three most commonly taken British Columbia provincially examinable subjects (English, mathematics, and biology). In addition, it examines if there are group mean differences in academic achievement between students participating in music and students that are not participating in music (Gouzouasis et al., n.d.).

Participating subjects include grade 11 and 12 students for three consecutive cohorts in the academic years 2000 - 2001 (*N* = 54, 348), 2001–2002 (*N* = 69, 475), and 2002–2003 (*N* = 60, 742). Examination data is pulled from student's Ministry of Education's annual Student Level Data Collection (SLDC) (Gouzouasis et al., n.d.).

Additionally, student performance scores on provincial tests are collected from the *Transcript and Examination* (TRAX) files and matched with the *Personal Education Number* (PEN) which are codes that uniquely identify all K-12 students. Resulting data files are merged with Ministry of Education data which contain academic marks for Grade 11 music courses. Merged files are transposed to yield one row of data consisting of Grade 11 music scores and provincial exam scores for each student (Gouzouasis et al., n.d.).

In British Columbia, provincial examinations may be taken up to three times. Since students select the best score for university applications, for investigation purposes, the "best examination percent score" (Gouzouasis et al., n.d., p. 2) is selected as the indicator of academic achievement in the subject. Provincial examination scores only are used since they stem from standardized tests and allow for comparisons across schools (Gouzouasis et al.).

In order to assess the validity of provincial examination scores, correlations between provincial examination scores and school grades in the same subject are calculated. Results indicate correlations consistently in the range from .90 to .97 (Gouzouasis et al., n.d.). These high correlations justify the researchers approach to use standardized provincial examination scores as “ecologically valid indictors of academic achievement” (Gouzouasis et al., p. 6).

Two types of analyses are conducted for the 2001, 2002, and 2003 cohorts. First, simple linear regressions are utilized to examine the extent to which grades in Grade 11 music courses predict academic achievement in Grade12. Researchers individually examine relationships between (a) band, (b) strings, (c) choir, and (d) music composition as well as relationships between (i) mathematics, (ii) English, and (iii) biology. Analysis is completed to examine “if there was a relationship between music achievement and general academic achievement; in other words, if the degree of musical training and excellence as assessed via the music course grades was associated with the degree to which these students also excelled in other general academic courses” (Gouzouasis et al., n.d., p. 6).

Analysis of data reports a consistent pattern of results across all three cohorts. All results indicate a positive correlation between achievement in music courses and achievement in core subjects. Table 6 presents data for Grade 12 music predictors in mathematics for the 2001, 2002, and 2003 cohorts. Correlation coefficients are attained using simple regression in SPSS for each core subject (Gouzouasis et al., n.d.).

Music subjects as predictors of achievement in Grade 12 English are presented in Table 7. As in mathematics, analyses of data indicate a consistent pattern of results across all three cohorts.

Table 6

Music Subjects as Predictors of Achievement in Grade 12 Mathematics.

	Mathematics								
	Correlation			*N* (sample size)			*p*-value		
Year	2001	2002	2003	2001	2002	2003	2001	2002	2003
Band 11	0.18	0.16	0.15	316	426	380	<.001	<.001	.002
String 11	0.28	0.29	0.27	101	103	176	.003	.002	<.001
Choir 11	0.16	0.27	0.25	215	306	273	.010	<.001	<.001
Comp. 11	0.48	0.36	0.53	23	43	59	NA	NA	NA

Note: From Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf, p. 18.

Table 7

Music Subjects as Predictors of Achievement in Grade 12 English.

	English								
	Correlation			*N* (sample size)			*p*-value		
Year	2001	2002	2003	2001	2002	2003	2001	2002	2003
Band 11	0.21	0.12	0.26	132	161	155	.003	.065	<.001
String 11	0.24	0.08	0.08	138	187	244	.002	.138	.106
Choir 11	0.25	0.10	0.15	263	314	241	<.001	.038	.010
Comp. 11	0.47	0.23	-.17	32	65	59	NA	NA	NA

Note: From Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf, p. 19.

Average correlations between music course achievement and math and biology ($r = .22$ and $r = .26$, respectively) are equal to medium effect sizes. In addition, correlations between music and English are equal to a small effect size ($r = .16$) (Gouzouasis et al., n.d.). Fisher z-Transformation as described in Bortz (Gouzouasis et. al.) is used to calculate average correlations.

Finally, Table 8 presents Grade 12 biology achievement using music courses as predictors. As in mathematics and Grade 12 English, analysis of data shows a consistent pattern of results across all three cohorts.

Table 8

Music Subjects as Predictors of Achievement in Grade 12 Biology.

	Biology								
	Correlation			*N* (sample size)			*p*-value		
Year	2001	2002	2003	2001	2002	2003	2001	2002	2003
Band 11	0.26	0.27	0.17	119	165	161	.002	<.001	.016
String 11	0.44	0.37	0.36	56	87	112	<.001	<.001	<.001
Choir 11	0.11	0.28	0.25	141	178	163	.097	<.001	<.001
Comp. 11	0.44	0.27	0.25	12	15	38	NA	NA	NA

Note: From Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf, p. 20.

In their second analysis, Gouzouasis et al. conduct t-tests for independent samples, as measured by provincial exam scores, to examine group differences in mean academic achievement between Grade 11 students who participate in music courses and those who did not. A consistent pattern of differences in academic achievement is found between music students and the group that do not. Moreover, group differences are consistent across cohorts (Gouzouasis et al., n.d.).

Most notably, eleventh grade band students have higher achievement in all three examined core subjects. For math, the difference is consistently more than ten percentage points with substantial effect sizes (d = .38 to .61). Biology group differences are equally large (11 to 13 percentage points) and even larger effect sizes (d = .53 to .65) due to smaller variation of scores measured in standard deviation. Differences are less pronounced in English which range from 2 to 9 percentage points and effect sizes from d = .10 to .75, respectively (Gouzouasis et al., n.d.).

Due to large sample sizes, all independent sample t-tests are significant (p < .0001) except effect sizes close to zero (i.e., d < .02). Statistical power to detect small effect sizes (d = .2) in all cases is greater than .99 (Gouzouasis et al., n.d.).

Similar to eleventh grade band students, students participating in eleventh grade string, choir and music composition courses show consistently higher achievement in mathematics and biology. Two t-tests are not conducted since "data contained fewer than 20 cases which had participated in that Grade 11 course and had taken the provincial exam in Grade 12" (Gouzouasis et al., n.d., p. 8). Effect sizes, however, are not as large as participants in eleventh grade band (d = .06 to .53). Systematic relationships for English do not appear since effect sizes are zero or nearly below or above zero (Gouzouasis et al.). Mean percentage scores of the 2001 cohort in core subjects (mathematics, English, and Biology) in Grade 12 achievement, and effect sizes in Cohen's d (group mean differences in standard deviations), and r (correlation coefficients) for all groups (all students, band, string, choir, and composition) are presented in Table 9.

Effect sizes in comparison to "all students" mean scores using Cohen's d (group mean differences in standard deviations) and as correlation coefficients r are presented in Table 10.

Table 9

Mean percentage scores of Achievement in Grade 12 Mathematics, English, and Biology, for the 2001 cohort, for four groups: All students; Participants of Band Grade 11; Participants of String Grade 11; Participants of Choir Grade 11; Participants of Composition Grade11.

		All students	Band	String	Choir	Composition
Mean Scores						
	Math	68.3	78.5	73.3	74.0	76.3
2001	Biology	64.6	75.5	68.1	68.3	NA
	English	69.8	78.9	69.0	71.5	74.5

Note: From Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf, p. 21.

Table 10

Effect sizes in comparison to "all students" mean scores using Cohen's d (group mean differences in standard deviations) and as correlation coefficients r.
All group comparisons are with the "all students" mean scores.

Effect sizes in comparison to		Band		String		Choir		Composition	
"All students" mean scores		*d*	*r*	*d*	*r*	*d*	*r*	*d*	*r*
	Mathematics	.61	.29	.29	.14	.33	.17	.48	.23
2001	Biology	.62	.30	.20	.10	.21	.10	NA	NA
	English	.75	.35	-.07	-.03	.14	.07	.37	.18

Note: From Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf, p. 21.

Data regarding the 2002 cohort mean percentage scores of achievement in Grade 12 mathematics, English, and biology for four groups: all students; Grade 11 band participants; Grade 11 string participants; Grade 11 choir participants; and Grade 11 composition participants is presented in Table 11.

Table 11

Mean percentage scores of Achievement in Grade 12 Mathematics, English, and Biology for the 2002 cohort, for four groups: All student; Participants of Band Grade 11; Participants of String Grade 11; Participants of Choir Grade 11; Participants of Composition Grade 11.

		All student:	Band	String	Choir	Composition
Mean Scores						
	Math	68.6	77.2	71.4	72.7	75.6
2002	Biology	64.5	74.3	66.9	68.0	NA
	English	64.8	66.8	63.0	64.7	62.5

Note: From Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf, p. 22.

Data regarding effect sizes in Cohen's *d* (group mean differences divided by standard deviation) and as correlation coefficients *r* are presented in Table 12. All group comparisons are with the "all students" mean scores.

Mathematics, English, and biology mean percentage scores for all groups (all students, Grade 11 band, Grade 11 string, Grade 11 choir, and Grade 11 composition) for the 2003 Grade 12 cohort are presented in Table 13.

Table 12

Effect sizes in Cohen's d (group mean differences divided by standard deviation) and as correlation coefficients r. All group comparisons are with the All students mean scores.

Effect sizes in comparison to		Band		String		Choir		Composition	
Overall mean scores		*d*	*r*	*d*	*r*	*d*	*r*	*d*	*r*
	Mathematics	.38	.19	.12	.06	.19	.10	.31	.15
2002	Biology	.53	.26	.12	.06	.17	.08	.13	.06
	English	.10	.05	-.09	-.05	.00	.00	-.12	-.06

Note: From Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf, p. 22.

Table 13

Mean percentage scores of Achievement in Grade 12 Mathematics, English, and Biology for the 2003 cohort, for four groups: All students, Participants of Band Grade11; Participants of String Grade 11; Participants of Choir Grade 11; Participants of Composition Grade 11

		All students	Band	String	Choir	Composition
Mean scores						
	Math	69.3	79.2	73.0	72.3	75.1
2003	Biology	63.4	77.2	64.7	67.6	67.5
	English	64.6	68.0	64.8	65.0	59.1

Note: From Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf, p. 23.

Data for effect sizes in using Cohen's *d* (group mean differences in standard deviations) and as correlation coefficients *r* is presented in Table 14. All group comparisons are with the "all students" mean scores.

Table 14

Effect sizes in Cohen's d (group mean differences in standard deviations) and as correlation coefficients r: All group comparisons are with the All students mean scores.

Effect sizes in comparison to		Band		String		Choir		Composition	
Overall mean scores		*d*	*r*	*d*	*r*	*d*	*r*	*d*	*r*
	Mathematics	.43	.21	.16	.08	.13	.06	.24	.12
2003	Biology	.65	.30	.06	.03	.20	.10	.17	.08
	English	.15	.08	.01	.00	.02	.01	-.25	-.12

Note: From Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf, p. 23.

Gouzouasis et al. illustrate patterns of consistency across three consecutive cohorts. Of particular importance is strong evidence to support statistically significant relationships between music participation and academic achievement in addition to correlations between music achievement and achievement in core subjects (Gouzouasis et al., n.d.). However, perhaps even more compelling data supporting the relationship between music participation/achievement and mathematics and biology is consistently greater than between music participation/achievement and English. "These results support previous empirical findings and theoretical treatises of the link between music-related skills and mathematical abilities specifically and between music-related capacities and intellectual capacities" (Gouzouasis et al., p. 9).

Gouzouasis, Guhn, and Kishor attest that music courses do not "hamper achievement in other domains" (Gouzouasis et al., n.d., p. 9). Claims that music courses require too much time and therefore wastes or slows down student progress in core instructional time is unfounded (Gouzouasis et al.). As evidenced in the Gouzouasis et al. study, "results imply that music participation benefits students in ways that are directly or indirectly linked to higher academic achievement…and specifically in regard to mathematics and biology" (Gouzouasis et al., p. 10).

However, based on current data analysis, Gouzouasis et al. caution that claims of causality cannot be made since students have not been randomly assigned to music courses and data collection regarding previous musical and academic histories has not been completed (Gouzouasis et al., n.d.). On the other hand, Gouzouasis et al. argue a plausible explanation for the strong relationship between music participation and academic achievement and it is "in line with a number of emerging insights in music education research" (Gouzouasis et al., p. 10).

Music Participation, Acquisition of Complex Academic and Social Skills, and Academic Transfer

In British Columbia, band programs in schools have had a long tradition of excellence. Thus, tradition implies that Grade 11 band students have learned to play a musical instrument over the course of several years (Gouzouasis et al., n.d.). In other words, "students in Band 11 typically have acquired the complex skills that are required to play an instrument in a band, as well as the social emotional skills that are necessary to be a contributing member of a band" (Gouzouasis et al., p. 10).

Researchers infer that discipline, collaboration, patience, and motivation (Gouzouasis et al., n.d.) contribute to lasting traditions and high academic achievement for music students.

> The relationships that we found between music courses and academic achievement are similar to other empirical studies (Gouzouasis et al., n.d.) that found a correlation between music involvement and academic achievement. Our findings also support the conclusion of Catterall, Chapleau, and Iwanaga (1999) that students involved in music are "doing better than those who are not – for whatever constellation of reasons."
> (Gouzouasis et al., n.d., p. 11)

Skeptics argue that students who possess better academic skills have more time on their hands to participate in music. Therefore, music attracts high achievers (Gouzouasis et al., n.d.).

In opposition, the attraction of non-musical, extra-curricular subjects, and activities is high for every student. Gouzouasis et al. contend:

> All students do spend much of their time on some extra-curricular activities…Our findings, other studies, and common sense clearly support the notion that the type of extra-curricular activities (e.g., playing an instrument versus playing video games) has differential effects on the person's skill acquisition and personality development.
> (Gouzouasis et al., n.d., p. 11).

In a sense, "students who participate in music may gain a more positive attitude toward school and toward learning (Gouzouasis et al., p. 11). In other words, as is reflected in provincial examination scores, "students who feel they are achieving positively in music may have more positive attitudes toward learning while their non-music participation peers are more negative toward learning" (Gouzouasis et al., pp. 11 - 12).

A small number of randomized control group design studies have attempted to investigate established causal relationships between music and general academic achievement and between music and social skills or personal traits. For example, cited researchers have conjectured: Does music instruction provided to experimental groups lead to academic gains in comparison to control groups not receiving music instruction? (Gouzouasis et al., n.d.).

More recent studies (Rauscher, 2003b) conclude that, depending on the type of music instruction, some skills learned in a music context are transferable to other contexts. For instance, spatial-temporal skills acquired in music instruction apparently benefit spatial-temporal tasks in mathematics (Babo, 2001; Eady & Wilson, 2004; Gouzouasis et al., n.d.; Haynes, 2003; Hetland, 2000; and Hood-Mincey, 2005).

In regard to social skills and personality traits, longitudinal studies have found personal, social, and motivational effects of involvement in music. *Effects of three years of piano instruction on children's academic achievement, school performance and self-esteem* (Costa-

Giomi, 2004) reveals evidence that involvement in musical competencies (piano instruction) have specific benefits in the development of self-esteem including reduction in aggressive and anti-social behaviors.

Further studies reveal an increase in pro-social behavior (Gouzouasis et al., n.d.).What is significant in these studies is the use of multi-year longitudinal designs that find musical effects steadily increase pro-social behavior and such effects persist over time (Gouzouasis et al.).

Summary

In comparing results of the Dryden (1992), Babo (2001), Schneider and Klotz (2000), and Gouzouasis, Guhn, and Kishor (n.d.) studies, only Babo (2001) and Gouzouasis et al.(n.d.) investigations reveal or attempt to reveal a more causal relationship between music instruction and academic achievement. Babo examines factors (IQ and socioeconomic status) not considered in earlier studies and Gouzouasis et al. expand upon those variables. There in of itself justifies the need for further research if not for validation purposes.

Specifically, valid information revealing musical elements of a causal nature are needed. Excluding the Babo (2001) and Gouzouasis et al. (n.d.) studies, there appears to be few examples that investigate the impact of music education on academic achievement in core subjects in regards to contributory relationships. However, a number of studies are correlational or qualitative in design which limits their ability to establish causal relationships between the arts and other areas of academic development (Horowitz, 2005).

Horowitz (2005) suggests that complexities in designing successful transfer studies in the arts may be contingent upon traditional, linear ideas of transfer and cognitive development. Contemporary theorists propose a dynamic interaction of learning with and across multiple domains of learning and thinking (Horowitz, 2005).

As evidenced by research at the University of Washington and a number of Frances Rauscher studies (University of Washington, n.d.; Rauscher et al., 1993; Rauscher, 1997; Rauscher & Shaw, 1998; Rauscher, 1999; and Rauscher, 2003b), neuroscientists and educational researchers recommend a variety of conceptual models that transfer hypotheses of multi-dimensional designs and interactive learning that reach within and across subjects and philosophical thought (Horowitz, 2005).

Furthermore, unlike Dryden (1992), additional research comparable to Schneider and Klotz (2000) are needed to show both causal and correlational relationships between music education and academic achievement in core subjects. Schneider and Klotz (2000) validate their study by evaluating participants over the course of several years where as Dryden (1992) evaluates subjects over a period of several months. Furthermore, Schneider and Klotz (2000) include musicians and athletes in addition to a larger sample size. In contrast, the Dryden (1992) study has fewer participants and focuses only on student musicians.

Integrating Music Education in Core Subjects and Academic Achievement

There is a growing body of evidence that music instruction can significantly strengthen students' academic performance (LaRussa, 2006). However, the integration of the arts, specifically music into core subjects, has gained equal attention over the last several years (Mason, Steedly, & Thormann, n.d.). As music education is weaved in core subjects lesson plans, educators "enable students to be active, to experience things directly, and to express themselves in ways best suited to the students" (Corbett, Wilson, & Morse, 2002, p. 17).

One goal of arts integration is to use music as a tool to allow students to have direct experiences, be involved in making decisions about their learning, and be engaged in lessons that are motivating (Mason et al.). Encouraging teachers to use a "project based" approach to instruction provides students opportunities to use the arts to demonstrate their understanding of specific content often with themes that span a number of academic disciplines.

With a project-based approach, students might “draw pictures, develop collages, or multi-media productions, or even perform skits to demonstrate their knowledge of a particular theme in science, math, social studies, or the language arts” (Mason et al., p. 3) – all the while demonstrating a deeper understanding of the subject matter before them.

In direct contrast to the return to basics continuum, recent data indicate that the arts can be instrumental in increasing literacy. Ingram and Reidel in 2003 found “for students in grades three, four, and five, arts integration is significantly related to gain scores in reading” and that “arts integration is more effective for third grade ELL [English Language Learners] students and third grade students from low socioeconomic homes [than for students in general]” (Ingram & Reidel, 2003, p. 26).

Start With Arts Program (SWAP)

The latest research involves a two year study in two phases of first and second graders at two Pawtucket, Rhode Island elementary schools. The study reveals “strong evidence that sequential, skill building, instruction in art and music, integrated with the rest of the curriculum, can greatly improve children’s performance in reading and math” (Children's Music Workshop, n.d.b, p. 2).

The study consists of a “test arts” program (called the “Start With Arts Program”) developed by music teacher Donna Jeffreys and her colleagues. This collaborative project includes The Music School (in Providence, Rhode Island), arts specialists in the Pawtucket school division, and the Kodaly Center of America. The collaborative team believes that “the keys to the improvements in math and reading are the sequential skill building arts curricula and the integration with the rest of the curriculum" (Children's Music Workshop, n.d.b, p. 2).

The study was designed to integrate the areas of art and music with classroom subjects such as reading and math, while maintaining the integrity of the arts curricula (Children's Music Workshop, n.d.b). It included 96 students that range in age from 5 to 7 years of age in eight first-grade classrooms (Children's Music Workshop, n.d.b).

Martin Gardiner, a biophysicist and research director at The Music School, and his colleagues theorize that "learning arts skills forces mental 'stretching' useful to other areas of learning" (Children's Music Workshop, n.d.b, p. 2). For example, the *math's* learning advantage (found in this study) could reflect the development of mental skills such as ordering and other elements of thinking on which mathematical learning at this age also depends (Children's Music Workshop).

For the first phase of this study, participating classes were divided into four "test arts" groups (Children's Music Workshop, n.d.b). Two "test arts" groups were established in each of the two schools. Students in these classrooms participated in music and visual arts programs that emphasized sequential skill development and an integration of music and visual art with other curricula (Children's Music Workshop, n.d.b). "Test arts" classrooms received one hour of music and one hour of visual art per week. The four control classrooms (two in each school) received the school system's standard visual arts and music sessions (one hour of visual arts and forty-five minutes of music in alternating weeks) (Children's Music Workshop).

After seven months, all students were administered standardized first-grade Metropolitan Achievement Tests. Gardiner compared the results of this test with kindergarten achievement test scores of 83% of students for whom kindergarten scores were available. Results indicate, although students in the test arts classes had started behind the control students in regard to percentage of students at or above the national average of other kindergarten students on Metropolitan Achievement Test scores, they had caught up to statistical equality in reading, and had pulled ahead in mathematics (Children's Music Workshop, n.d.b). Moreover, 77% of those in “test arts” classes were now at or above grade level in mathematics as compared to 55% of students in control groups (Children's Music Workshop).

The following year, the second phase of the experiment was continued in four “test arts” and five control classrooms. Participating students had been promoted to second grade and were attending the same schools as in the previous year. Achievement tests were again given at the seven month interval. As in the first year, test and control groups were equal on reading and, once again, “test arts” students were ahead in math. The percentage of students at or above grade level in second-grade math was highest in students with two years of the “test arts” program, lower in those with one year of the “test arts” program, and lowest in students who had no “test arts” participation (Children's Music Workshop, n.d.b).

Artful Learning: A School Reform Model

Leonard Bernstein envisioned that “music and all the artistic disciplines could be used to improve any student’s academic achievement by instilling a love of learning while engaging them in the process” (The GRAMMY Foundation: Leonard Bernstein Center for Learning, 2004, p. 8). The GRAMMY Foundation’s Leonard Bernstein Artful Learning: A School Reform Model places the arts at the center of learning.

Artful Learning provides educators the needed structure to infuse their curriculum with arts-based skills and strategies that have lasting and practical applications to academic rigor. The Foundation assists schools and communities achieve educational excellence by allowing students to make interdisciplinary connections through total engagement, thus, promoting "our rich cultural legacy as a catalyst for lifelong learning" (The GRAMMY Foundation: Leonard Bernstein Center for Learning, 2004, p. 7).

The Leonard Bernstein Center (LBC) firmly believes the "expert in the classroom is the teacher" (The GRAMMY Foundation: Leonard Bernstein Center for Learning, 2004, p. 5). Therefore, artful learning empowers educators with confidence to use the arts daily in their classroom without supplanting the expertise and necessity of the resident arts specialists. This is accomplished through professional development opportunities which empower educators to design engaging, content-rich, interdisciplinary Bernstein Units of Study that will actively engage students (The GRAMMY Foundation: Leonard Bernstein Center for Learning).

Teachers, administration, and support staff participate in 116 hours of professional development for implementation of the Artful Learning model. In addition, the Principal Leadership Institute: Artful Leadership is held annually to support the leadership component of successfully managing a Bernstein School (The GRAMMY Foundation: Leonard Bernstein Center for Learning, 2004).

Artful Learning professional development provides practical training to develop and implement Bernstein Units of Study (BUS) that are grounded in academic standards and evaluated with comprehensive and authentic assessment measures. Use of the intuitive and groundbreaking BUS Authoring Tool will allow educators the ability to "write a Unit of Study using the arts-infused Artful Learning School Reform methodology linking national, state, and local standards into the document, automatically, without ever leaving artfullearning.com" (The GRAMMY Foundation: Leonard Bernstein Center for Learning, 2004, p. 8). This BUS document can be modified, printed, and then archived for other Bernstein teachers to browse, adapt, or use.

The GRAMMY Foundation is dedicated to engaging students of all ages through music and arts-based education programs. With initiatives that include mentoring, preservation programs, and the Leonard Bernstein Center's Artful Learning™ School Reform Model, the Foundation strives to cultivate understanding, appreciation and advancement of the arts across the country (The GRAMMY Foundation: Leonard Bernstein Center for Learning, 2004).

Many school districts utilize a variety of programs that target specific academic deficiencies. While many of these mandated programs are beneficial, some can be restrictive to the innovative educator. Artful Learning is flexible enough to recognize the value of these initiatives and utilize them in unit development without sacrificing the integrity of the Bernstein Model or the intent of the mandated programs (The GRAMMY Foundation: Leonard Bernstein Center for Learning, 2004, p. 5).

With this positive reformation of thought toward teaching, educators nationwide have come to realize that the Bernstein Model is their curriculum, not an "add-on" program. Guided by content standards infused with arts-based skills and strategies, this revolutionary approach provides the scaffolding to develop student and teacher growth and sustainability (The GRAMMY Foundation: Leonard Bernstein Center for Learning, 2004, p. 5).

Why does Artful Learning work? The GRAMMY Foundation is committed to developing each school in the Leonard Bernstein Center consortium with the capacity to use and understand student achievement data. Initial data from early Bernstein schools report a trend towards significant student achievement growth compared to the academic growth of other schools in the district not implementing the Artful Learning methodology. (The GRAMMY Foundation:

Leonard Bernstein Center for Learning, 2004, p. 5) Exemplars of this trend are presented in Figures 7, 8, and 9.

Figure 7 presents a 20% growth of LBC students meeting or exceeding Grade 4 reading and language arts achievement on criterion-based assessments in 2000 to 2001 as compared to an 8% growth for schools as a whole in surrounding districts.

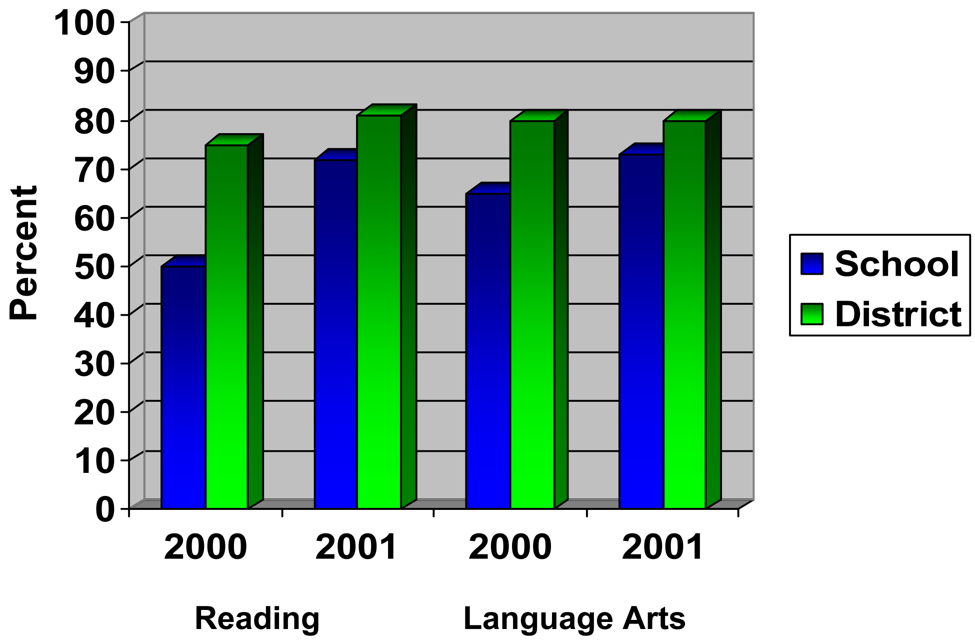


Figure 7. *Grade 4 Reading and Language Arts Criterion-Based Assessments. Percent of Students Meeting or Exceeding Standards.*

Note: From the GRAMMY Foundation: Leonard Bernstein Center for Learning (2004). *Artful learning: A school Reform model.* Retrieved May 27, 2006, from http://artfullearning.com/index.html, (p. 5).

Figure 8 shows the same trend for reading achievement in another Leonard Bernstein Center for Learning school (LBC) with twice the growth in student achievement at the LBC school compared to schools as a whole in the surrounding district.

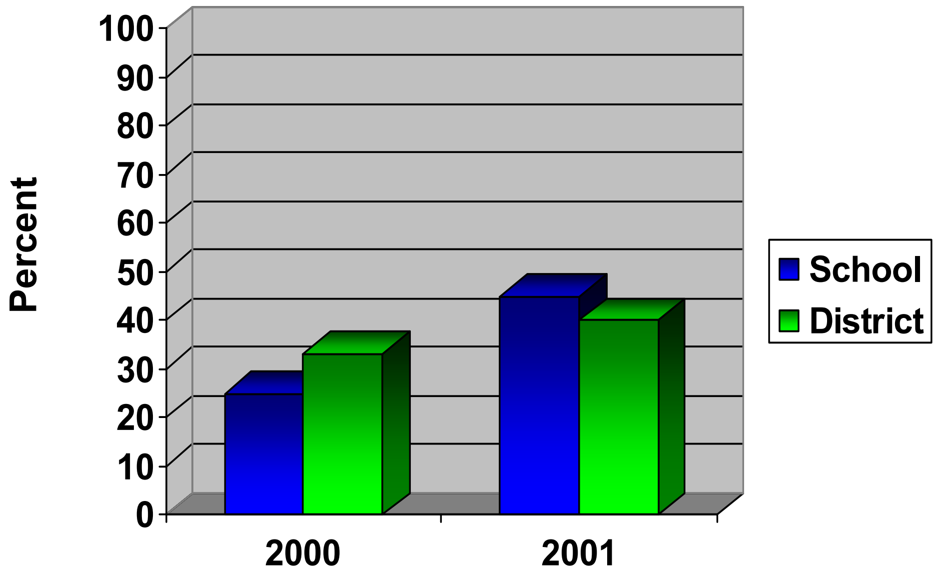


Figure 8. *Grade 5 Statewide Reading Assessment.*
Percent of Students Meeting or Exceeding Standards.

Note: From the GRAMMY Foundation: Leonard Bernstein Center for Learning (2004). *Artful learning; A school reform model.* Retrieved May 27, 2006, from http://artfullearning.com/index.html, (p. 6).

Figure 9 presents a similar example of student writing achievement with Leonard Bernstein Center for Learning students exhibiting 20% growth in writing scores compared to less than 10% of growth for schools in the surrounding district. Evidence of change are evident in results of significant measurable gains in: visual transformation of the school-site through art creations in all academic disciplines; reduced behavior problems; increased student enthusiasm for learning through an arts-infused curriculum; teacher leadership; and collaborative team building for differentiated instruction of various student populations eventually leading to a culture of continuous learning through the arts and best school practices (The GRAMMY Foundation: Leonard Bernstein Center for Learning, 2004, p. 9).

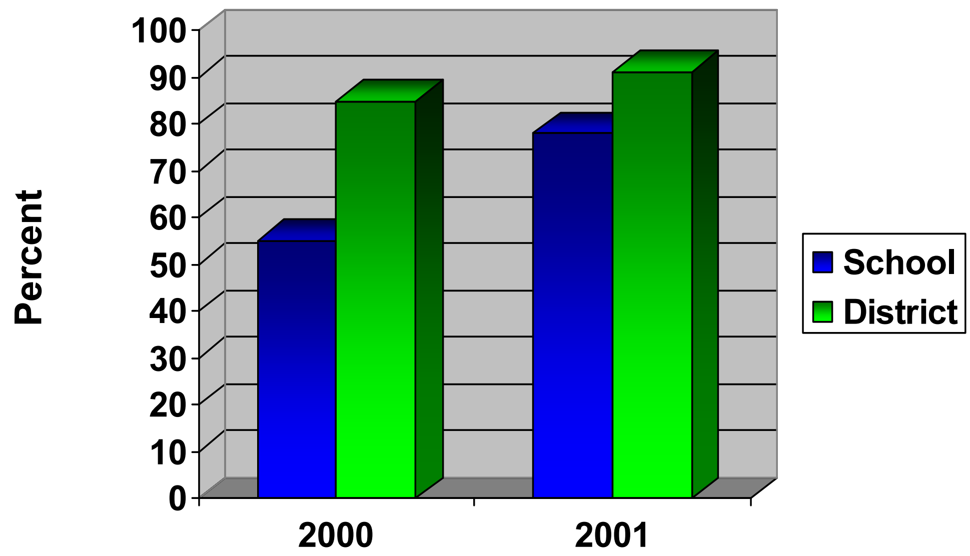


Figure 9. Grade 8 Writing Assessment.

Percent of Students Meeting or Exceeding Standards.

Note: From the GRAMMY Foundation: Leonard Bernstein Center for Learning (2004). *Artful learning; A school reform model.* Retrieved May 27, 2006, from http://artfullearning.com/index.html, (p. 6).

Integrating Music into Social Studies

Integrating Music into Social Studies

As education reform moved into the 21st century, additional research studies are found to support music education. In 2003, Cheryl Brogla-Krupke completed an inquiry entitled *Improving Student Achievement Through the Use of Music Strategies*. This study investigates the implementation of music strategies to improve student achievement. Participants include fifth grade students in a small Midwestern community located in Iowa. The absence of music integration in social studies curricula was observed through data, which indicated the lack of motivation and in-depth learning experienced by students (Brogla-Krupke, 2003).

To validate the study, Brogla-Krupke utilizes three major categories of treatment: (1) accommodate students with various styles of learning; (2) implement cross-curricular thematic instruction; and (3) use of aesthetic education. Varied instruction is implemented to allow students to learn in different ways. Students experience music that encourages them to become fully aware of characteristics of the historical period they study. The aesthetics of music help make history become more personal and realistic than merely reading the chapter in the social studies text (Brogla-Krupke, 2003).

At the conclusion of the experiment, data indicate an increase in student motivation, an increase in understanding relationships between disciplines, and more in-depth learning. Students show a greater understanding of the era of the time of slavery and the Civil War through the use of African American Spirituals, Blues, and Jazz music. Furthermore, students' reactions, their test results, and the teachers' comments regarding the study indicate that it is a positive experience (Brogla-Krupke, 2003).

The Impact of Music on Social, Cognitive, and Academic Skills of Disabled Students

Understanding the role of music education in social, cognitive, and academic learning is a means to improve academic achievement of disabled students. For those interested in the topic, questions abound about whether time spent in music supports learning efficiencies and cognitive development for students with and without disabilities (Mason et al., n.d.).

One research study that addresses this theme is a qualitative investigation entitled, Arts integration: How do the arts impact social cognitive, and academic skills? (Mason et al.). Researchers conducted 34 focus groups and interviews with teachers and resident artists in 16 states over a two year period.

According to research subjects, through music and arts activities, disabled students gained and demonstrated additional skills in problem solving, sequencing, following directions, teaming, communicating, planning and organizing, and self-assessment (Mason et al.). Across a wide compilation of circumstances, teachers and artists alike depict the arts as giving students "choices and opportunities to display both their talents and their knowledge" (Mason et al., p. 2).

In *Critical links: Learning in the arts and student academic and social development* (2002), a meta-analysis of 64 studies published by the Arts Education Partnership, Deasy alleges that the influence of the arts may be greater on the academic learning for students with disabilities and special learning needs, students living in poverty, and students learning English as a second language, than for the general population.

Deasy (2002) outlines two purposes for his compendium: (1) to recommend to researchers and funders of research promising lines of inquiry and study suggested by recent, strong studies of the academic and social effects of learning in the arts; and (2) to provide designers of arts education curriculum and instruction with insights found in the research that suggest strategies for deepening the arts learning experiences and are required to achieve the academic and social effects (Deasy, 2002, p. 1).

Table 15 highlights four studies relating to the impact of music education on emotionally disturbed students, juvenile delinquents and disadvantaged students, English language learners, and the effects of music as reinforcement for education/therapy objectives as featured in Deasy's (2002) *Critical links: Learning in the arts and student academic and social development*.

Summary

An article recently printed in the Pittsburgh Tribune-Review recognized a national call "to turn out better educated children" (LaRussa, 2006, p. 1). Specific documents have resulted in significant curriculum changes in local school districts (LaRussa). One document to make significant advancements in music education that impacts academic achievement is *The Influence of Music on Core Learning* by Israel Eady and Janell Wilson (Eady & Wilson, 2004).

Table 15

Results of Four Research Studies Relating to Emotionally Disturbed Students, Juvenile Delinquents and Disadvantaged Students, English Language Learners, and the Effects of Music as Reinforcement for Education/Therapy Objectives as Featured in Deasy (2002) Critical Links: Learning in the Arts and Student Academic and Social Development.

Researchers	Title	Results
Kariuki and Honeycutt (1998)	*An Investigation of the Effects of Music on Two Emotionally Disturbed Students' Writing Motivations and Writing Skills*	Both students improved their writing skill by two letter grades, wrote more words, felt more positive about writing, and were observed to be more focused when listening to music. Students reported that music made writing exciting and helped them stay focused.
Kennedy (1998)	*The Effects of Musical Performance, Rational Emotive Therapy and Vicarious Experience on the Self-Efficacy and Self-Esteem of Juvenile Delinquents and Disadvantaged Children*	Scores in the Performance and Performance/Cognitive groups improved significantly, but scores in the other groups did not improve.

Lowe (1995)	*The Effect of the Incorporation of Music Learning Into the Second-Language Classroom on the Mutual Reinforcement of Music and Language*	Reliabilities of French tests were adequate as were all but the tonal-rhythmic pattern written test. Private piano lessons did correlate with higher scores on tonal-rhythm pattern reading. Academic achievement did covary with all tests except tonal-rhythm. Main analysis suggest this music program enhanced general French and music skills and, in particular, oral grammar, reading comprehension, tonal-rhythmic pattern/performance and form/described (written) concepts.
Standley (1996)	*A Meta-Analysis on the Effects of Music as Reinforcement for Education/Therapy Objectives*	The general result is that contingent music is more effective in promoting education and therapy objectives (all types combined) than other reinforcement techniques.

Note: Compiled from Deasy, R. J. (2002). *Critical links: Learning in the arts and student academic and social development*. Washington, DC: Arts Education Partnership.

This paper presents a review of recent literature that reports the benefits of integrating music across the curriculum (Eady & Wilson, 2004). Perhaps integration of the arts is the catalyst for increased academic achievement. However, as stated by the Music Educators National Conference, the integrity of each arts discipline must not be compromised (Music Educators National Conference, 2002). Music standards, as with all standards, must be continually reviewed and assessed for their significance in what some may describe as a dying art form. Nevertheless, additional research must be completed to solidify the impact of music education and the integration of music on academic achievement.

Specifically, arts integration programs that incorporate music into daily instruction may have the greatest impact for increased achievement, as evidenced in the Brogla-Krupe (Brogla-Krupe, 2003) study that takes theory and puts it into practice – application. If we know that music education can have correlational affects on academic achievement, how are educators going to apply the use of music to increase achievement? The Brogla-Krupke study demonstrates such applications.

Students deserve choice in completing academic assignments. Music education can facilitate that choice and meet different learning styles. Moreover, as the call for additional research is mandated by legislatures and arts educators in a quest for educational reform, position papers and additional research will be required.

Elements of an Effective Music Education Program that Impact Academic Achievement

Parental Involvement

A number of fundamental elements comprise effective music education programs. Many have a significant impact on academic achievement. However, no element has the greatest impact than parent involvement, as evidenced in a 1996 research study concerning parental involvement, selected student attributes, and learning outcomes in instrumental music by Stephen F. Zdzinski.

Educators have known that parental involvement is an important aspect of any child's education. Decades of research have demonstrated that "parent/family involvement significantly contributes, in a variety of ways, to improved outcomes related to learning and school success" (Carter, 2002, p. 1).

Zdzinski (1996) surveyed 406 volunteer instrumental music students from five intact public school band programs in grades 4 – 12 in New York and Pennsylvania. He investigates if a significant relationship between parental involvement and various outcomes of instrumental music at different age levels exists. Of the 406 subjects, nine students do not provide demographic information and are eliminated from analysis leaving 396 subjects completing the study. Approximately 45% of the subjects are senior high students (N = 165); 31% (N = 124) from junior high grades; and 27% (N = 171) from elementary grades. One-hundred and eight students were not able to participate in the performance measurement portion of the data collection or data analysis. Woodwind students (N = 166) account for 57% of the sample; brass (N = 88) account for 30%; and percussion (N = 35) 12% (Zdzinski, 1996).

Three dependent measures: affective outcomes, cognitive musical achievement, and performance achievement; and two independent measures: parental involvement and music aptitude and other variables, are examined. The first dependent measure, affective outcomes, is measured using three instruments: The Zorn Music Attitude Inventory (MAI), the Asmus Motivational Factors measure (AMF), and the Asmus Magnitude of Motivation (AMM) measure. MAI are designed to measure attitudes toward music and musical participation. It includes 35 items with a possible range of scores from 35 to 175 points. AMF assesses five factors which students may attribute their degree of success in music, such as effort, background, classroom environment, and affect for music. The scale contains 32 items and has a range of 32 to 160 points. AMM assesses the magnitude of student motivation on three areas: personal commitment, school music, and music compared to other activities. The scale contains 23 items and has a range of 23 to 92 possible points (Zdzinski, 1996).

The second dependent measure, cognitive musical achievement, is measured by selected subtests of the Music Achievement Test (MAT) and the Iowa Test of Music Literacy (ITML). MAT subtests were selected to measure pitch discrimination, interval discrimination, instrument recognition, music reading, and choral recognition. In the ITML, subtests of pitch, rhythm reading and recognition were selected (Zdzinski, 1996).

The third dependent measure, performance achievement, is measured using the Watkins-Farnum Performance Scale (WFPS) and the Performance Rating Scale Supplement (PRSS). This measure assesses aspects of performance on the WFPS not addressed by the published scoring system (i.e. musicality, intonation/tone quality, and technique). Rating-scale items developed using a facet-factorial approach to scale construction to evaluate brass and woodwind performances was adapted to create the PRSS. Items in PRSS (N = 30) are paired with 5-point Likert scales to evaluate musicality, tone quality and intonation, and technique (Zdzinski, 1996).

The independent measure of parental involvement is measured by the Parental Involvement Measure (PIM) designed for use in a study of middle school instrumental students. Five-point Likert-scale items (N =30) examine frequency (PI-F) with which parents are engaged in selected parental involvement activities and the degree (PI-D) of parental involvement (father only, mother only, or both parents) of those who are engaged in these activities. The composite PIM has a total possible range of 15 to 105 points. Nine categorical items are contained in the PIM to obtain additional parental involvement information about ownership of musical materials and non-behavioral parental involvement activity (Zdzinski, 1996).

The second independent measure, music aptitude and other variables, is measured by The Tonal Rhythmic subtests of the Musical Aptitude Profile (MAP). The composite score of the two sections serve as the measure of music aptitude. The independent variable of grade level is defined as elementary, junior high, or senior high. Gender also serves as an independent variable (Zdzinski, 1996).

Procedures of the investigation include the WFPS administered to subjects by their band directors at each school according to the directions used in a previous study. Performances are tape-recorded and later scored by the researcher. The MAT and ITML subtests are administered by the researcher, followed by administration of the MAP, the attitude measures and the PIM. The administration takes place during four class periods (Zdzinski, 1996).

Descriptive statistics for affective, cognitive, and performance measures are gathered for each subtests. Cronbach's alpha reliability coefficients are obtained for the AMM, AMF, MAI, and the PIM. All reliability coefficients are acceptable with coefficients varying from .82 (Music Attitude Inventory) to .98 (Watkins-Farnum Performance Scale). For each of the domain areas, subtests are combined using *z*-score transformations to create composite measures (Zdzinski, 1996).

Parental involvement is found to be significantly related to affective, cognitive, and performance outcomes in music. The strongest items are concert attendance, taping performances, providing materials, and parent group participation. The strongest parental involvement correlation is obtained for the affective composite, followed by the cognitive musical composite, and the musical performance composite. PIM accounts for over 8.6% of the variance in the affective composite (Zdzinski, 1996).

Significant correlations are also found between the specific cognitive musical subtests. Correlations are slightly lower in strength than are those for the affective measures. Weakest relationships are found between PIM scores and the musical performance measures, accounting for only 5% shared variance among the entire sample. Parental involvement is significantly related to WFPS scores beyond the .01 level and composite music performance scores beyond the .05 level. Overall, parental involvement is not found to be significantly related to the PRSS (Zdzinski, 1996).

Significant relationships among individual PIM items and the independent variables of cognitive musical achievement, the affective composite, and the performance achievement are moderately low to low in all cases. Twenty-seven individual PIM items are significantly correlated with cognitive musical composites, whereas the affective and performance composites obtain 20 and 18 significant item correlations, respectively. All composite measures are positively related to PIM items dealing with concert attendance, taping performances, providing materials, and parent group participation. Cognitive and performance composites are significantly related to PIM items concerning musical siblings and parental musical ensemble participation. Two PIM items dealing with practicing are negatively related to cognitive and performance scores. Significantly related PIM items common to both cognitive and affective composites are in the areas of talking about and listening to music in addition to providing transportation to musical activities (Zdzinski, 1996).

Although findings are statistically significant, overall relationships are moderately low suggesting modest practical significance. According to the Zdzinski study, parental involvement is related to musical learning outcomes and can benefit from increased parental involvement activities that may prove valuable to increased student success. Grade-level differences in parental involvement relationships are found among the various outcome measures and the affective outcome relationships increased in strength as the subjects' age increased. Conversely, for affective outcomes, the only significant parental involvement relationships are found at the secondary levels and are related most strongly at the senior high level. (Zdzinski, 1996).

The Zdzinski (1996) findings correlate with his 1987 investigation in which parental involvement accounts for approximately 4% shared variance with cognitive achievement. Earlier research studies and investigations since the 1996 findings also support correlations between parental involvement and academic success in music. However, further research is needed to identify those areas that may interact with parental involvement. It is important to point out that parental involvement relationships may obscure specific findings in future research. For instance, variables such as socioeconomic status, race, and previous musical experience may impact academic achievement. In addition, parental involvement research should be expanded to include not only music instruction but other content areas.

For example, in examining parental involvement research with and in other disciplines, a 1996 study by Tillmann and Ford regarding African American family involvement in early childhood special education programs emerges. The Tillmann and Ford research is significant because there appears to be a number of similarities between level of parental involvement of special education students and parental involvement of music students. As parents become involved in music education programs, it will be important to investigate musical experiences, educational background, level of involvement, and other elements that may impact academic achievement.

Tillmann and Ford investigate the role of parents in their children's education programs. The following objectives guide the study: to gain a better understanding of African American families' perceptions of their child's early childhood special education programs; to gain a better understanding of the unique issues faced by African American families with children in early childhood special education programs; and to better understand the role of African American culture in family interpretations of their children's education and the nature of their interactions with school professionals (Tillmann & Ford, 1996). In future research, these same objectives will provide insight into the role parental involvement plays in academic achievement.

Tillmann and Ford involve 12 families in focus groups composed of African American family members with children in early childhood special education programs. Ten parents are fulfilling the mother role for their children - two are fathers (1 biological, 1 foster father); nine parents are married, three are single mothers. All children are currently enrolled in an early intervention or preschool program with the exception of two. Ages range from 3 to 9 years. The mean age of the children is 5.2 years. Focus groups consist of 1 to 4 family members with a preschool child (3 to 5 years of age) with a disability. A moderator is responsible for facilitating the discussion. Data is analyzed using the constant comparative method developed by Glaser and Strauss in 1967 (Tillmann & Ford, 1996).

Parents report that they genuinely keep abreast of school activities through phone calls and progress notes. Family involvement depends on the type and degree of communication and contact with school personnel. A parent's main source of communication is the classroom teacher. It is important to note that meetings and home visits do exist. However, according to Tillmann and Ford, home visits appear to be much less influential. Communication issues are viewed very positively among most parents. Then again, when communication is lacking, parents report that they would appreciate "more information on what things they could do at home to better help their children" (Tillmann & Ford, 1996, p. 16).

Moreover, Tillmann and Ford report family involvement depends on the type and degree of communication and contact with school personnel. The initial discovery and knowledge of a child's disability can be devastating for parents. Parents must work through the special education system starting out with little information. Social support, collaboration with school personnel, and availability of community agencies are necessary to help parents in order to enhance and ease the difficulty of raising a child with special needs (Tillmann & Ford, 1996).

Five major themes evolve from the Tillmann and Ford focus groups. Parents begin with processing variables. These variables include: (1) the discovery and knowledge that a problem exists; (2) the child going through testing, getting diagnosed, reaction to this knowledge, quest for a reason behind the disability, and how the family is affected; (3) placing the child in a special needs program at a time when families are finding out about the special education process and learning what things need to be done in order for their children to be successful in school; (4) families must deal with the results of placement and the effect the placement has on the child, the treatment of the child by others (other children, school, public), and learning to cope with and modify for the child's problem; and (5) families must define what expectations they have for their child and what they can expect from others in the future (Tillmann & Ford, 1996, p. 13).

The majority of responses reveal positive effects of the placement and most report that they saw progress in their children since attending a special education program. The second but most frequently identified theme was type and degree of involvement. When communication is lacking, parents report that they would appreciate more information on what things they could do at home to better help their children. Home activities include what parents saw as their role in their child's education, what type of activities they participated in outside of school that relate to their child's education and how they and their children react to that involvement (Tillmann & Ford, 1996).

At the preschool level, parents see as their primary role to provide their children with knowledge and skills that would meet their basic needs so they will be able to function more independently in the future. Preschool parents feel that they are advocates for their children and it is their job to ensure that their children receive the best education possible (Tillmann & Ford, 1996).

Parents also report participation in activities at the school. Activities include Individual Education Program (IEP) meetings, visiting the classroom, attending after school programs or field days, and connecting with community resources. To be actively involved in the school setting, parents need to volunteer their services. Parents are generally satisfied with their involvement. However, they feel responsible for initiating involvement in many cases (Tillmann & Ford, 1996).

In descriptions of home and school, themes revolve around basic descriptions of school and family make up and a child's behavior and characteristics. Three categories emerge: child descriptions, family descriptions, and school descriptions (Tillmann & Ford, 1996).

The most frequently mentioned category includes child descriptions which consist of the child's behavior at school and at home, academic descriptions, and descriptions of the child's general characteristics and personality traits. The second most frequent subcategory includes description of the subject's family and fell under the category of family issues which include describing members of the family and living situations. The final category includes descriptions regarding the make up of various aspects at school consisting of what personnel work with the child, make up of the IEP meetings, and classroom characteristics of the child's education program (Tillmann & Ford, 1996).

Individual perceptions of others are comprised of themes in three categories: parent's perceptions, child's perceptions, and school's perceptions. These themes focus on how the parent, school, and child view the other aspects of the system in which they are working (Tillmann & Ford, 1996).

Parents seem to have positive views of the school and its personnel. Much respect is given to those teachers and schools which care about the children. It is extremely important to parents for their child to get good teachers. Parents report that when their child has a good teacher, positive results are seen throughout the year (Tillmann & Ford, 1996).

Children are perceived by their parents to enjoy the programs in which they are enrolled. Parents understand what is going on around them and appreciate what other parents and teachers do to help them and their children (Tillmann & Ford, 1996).

Schools are seen as wanting parents to volunteer their help in the classroom and appreciate the close contact with the parents. However, low levels of trust and comfort are felt by parents within the school (Tillmann & Ford, 1996).

Another theme brought forth in the Tillmann and Ford research is support. The content of this theme deals with the help that parents and children receive from various agents. Support is seen as a need which facilitates parents who are working through the special education process and learning to cope. Then again, parents report a lack of availability of support for many families (e.g. support groups). Families who do report receiving support seem to be getting this from other family members and concerned personnel at school and other community agencies.

Finally, parents report that support from others help them in dealing with the many obstacles that they face every day (Tillmann & Ford, 1996).

If parental involvement is an element that affects academic achievement, it will be important to analyze issues of communication, level of involvement, and educational background of parents in future studies, especially as it relates to music education and academic achievement. The level parents choose to participate may be of particular interest.

In most effective school divisions it is expected that educators nurture the home-school relationship. Research involving parental involvement, as evidenced in the Zdzinski study, confirms that music education lends itself to foster this type of positive communication and parental association.

> Parents play a vital role in the survival of sufficient arts education in schools. Collaboration among parent, teacher, and arts leaders can create a powerful constituency advocating for arts programs in schools. Parent involvement is an integral part of not only influencing decision makers to include arts education as part of the basic curriculum, but also guaranteeing the best possible education for all students.
>
> (PTA, 2005, p. 1)

The results of the Zdzinski study support his hypothesis that parental involvement is related to instrumental music outcomes. Specifically, this research study demonstrates that an effective public high school music program can boost family awareness, familial interaction, and increased school attendance and academic success (Zdzinski, 1996).

Barriers to Family Involvement

According to Tillmann and Ford (1996), the level of parental involvement is a function of lack of trust or comfort, lack of transportation, life situations, or financial difficulties. Parents, who are dealing with children with challenging behaviors, especially for the first time, may need suggestions on behavior intervention techniques and parenting skills. Moreover, Tillmann and Ford stress that it is important to enhance involvement and effective communication.

The findings in the Tillmann and Ford study can be generalized to other populations, including parents new to music education. Some parents may not have a musical background and depend upon the assigned music teacher to make recommendations for instrument choice. However, parental involvement in music education or lack thereof, as illustrated by Tillmann and Ford, may be due to lack of trust or comfort, life situations, or financial difficulties in renting uniforms, instruments, and other musical equipment. Similarly, since most high school music programs are performance based, parents that have children without a driver's license may have difficulty in transporting their children to and from events.

As schools struggle to increase family involvement, it may serve them well to provide at least general music instruction for all students (PTA, 2005).

> The very students NCLB is most aimed at helping – those who are low-income, minority, and academically vulnerable – are the ones studies consistently show stand the most to gain from regular arts instruction.
>
> (PTA, 2005, p. 2)

Raymond Bartlett, president of the Council on Basic Education, notes, "In our effort to close the achievement gap in literacy and math, we risk substituting one form of educational inequity for another, denying our most vulnerable students the kind of curriculum available to the wealthy" (PTA, 2005, p. 2). In other words, parents play a vital role in the survival of sufficient arts education in schools.

In a recent study of opportunities for and barriers to family involvement in education sponsored by the Partnership for Family Involvement in Education, the U.S. Department of Education, and the GTE Foundation, parents of elementary and middle school students are asked about many aspects of their involvement in their children's education and about how their school keeps parents involved. Key survey findings include:

> Parents think schools see them as important partners in helping their children learn, and there is plenty of good news about family involvement. 88% of parents report that their children's schools treat them as important partners in encouraging their children to learn, 86% say teachers generally listen to what parents have to say, 66% say teachers give their child homework assignments that are designed for the family to do together at least once a month, 62% of parents say teachers regularly communicate them [*sic*] about their children's progress (The Partnership for Family Involvement in Education, the U.S. Department of Education, and the GTE Foundation, n.d., p. 2).

Although the U.S. Department of Education’s figures may appear to be significant in that 88% of parents report that their children’s schools treat them as important partners in encouraging their children to learn, what about parents on the opposite end of the spectrum? How do educators attempt to reach those parents?

Carter (2002) reports research in music education that supports involving parents through musical activities such as booster organizations, chaperoning trips, and attending concerts and performances, students can improve academic success. Through the music education process, parents often see their children mature and gain independence to perform in front of large groups. Moreover, as evidenced through reviewed literature, partnerships between home and school are strengthened.

Family/home and school relationship research literature also reveals three distinct categories: communication issues, home activities, and school activities. Communication issues emerge as the main focus area of involvement for families. Copious researchers have found that family involvement increases when consistent communication lines remain open employing a variety of means (personal contact, phone calls, newsletters, concerts, etc.). When communication between the school and family increases, the child’s academic performance improves. Evidence to support this statement is found in the Zdzinski (1996) study. Therefore, the most frequently identified research themes consist of activities in which there was contact between home and school and home, school, and community agencies.

Research has much to suggest in identifying parental involvement activities in addition to barriers that families suggest may validate increased student success. Administrators and music teachers need to enlighten parents about such parental involvement strategies. In this way, the home and school can work together for maximum student benefit (Zdzinski, 1996).

Peer Influence and Success in Life

Although the Zdzinski (1996) research was thorough and examined many facets of academic success in instrumental music, the study did not address specific variables in regards to race, socioeconomic status, previous musical experience, and peer influence. Additional research literature shows that students gain self-confidence and find a common niche among like peers (Music Educators National Conference, 2002). Furthermore, peer influence among student musicians has effects far beyond the academic realm. “The basic message is that music programs in the schools help our kids and communities in real and substantial ways” (Music Educators National Conference, p. 1).

Daniel A. Carp, the Chairman and CEO for the Eastman Kodak Company, states:

> Music is one way for young people to connect with themselves, but it is also a bridge for connecting with others. Through music, we can introduce children to the richness and diversity of the human family and to the myriad rhythms of life. (Music Educators National Conference, 2002, p. 6)

Introducing children to a wide variety of diverse cultures is, perhaps, the basic reason that every child must have an education in music.

“Music is a part of the fabric of our society” (Music Educators National Conference, 2002, p.1). Unfortunately, peer influences, both good and bad, are woven into that fabric. Every day, on average, 11,318 American youth (12 to 20 years of age) try alcohol for the first time, compare with 6,488 for marijuana; 2,786 for cocaine; and 386 for heroin (Schmidtlein, 1997). However, according to the Texas Commission on Drug and Alcohol Abuse (1998), secondary students who participated in band or orchestra reported the lowest lifetime and current use of all substances (alcohol, tobacco, illicit drugs).

"Let's not forget that the arts are a compelling solution to teen violence, certainly not the cause of it!" says Michael Greene, Recording Academy President and CEO at the 42nd Annual Grammy Awards in February 2000 (Music Educators National Conference, 2002). According to statistics compiled by the National Data Resource Center, students who can be classified as *disruptive* [italics added] (based on factors such as frequent skipping of classes, times in trouble, in-school suspensions, disciplinary reasons given, arrests, and dropouts) total 12.14 percent of the total school population. In contrast, only 8.08 percent of students involved in music classes meet the same criteria as disruptive (National Data Resource Center, 1992).

Music education also has benefits that make children successful in life. Michael E. DeBakey, M.D., a leading heart surgeon at Baylor College of Music says:

> Studying music encourages self-discipline and diligence, traits that carry over into intellectual pursuits and that lead to effective study and work habits. An association of music and math has, in fact, long been noted. Creating and performing music promotes self-expression and provides self-gratification while giving pleasure to others. In medicine, increasing published reports demonstrate that music has a healing effect on patients. For all these reasons, it deserves strong support in our educational system, along with the other arts, the sciences, and athletics (Music Educators National Conference, 2002, p. 6).

The nation's top business executives agree that music education, in addition to the other arts, can help repair weaknesses in American education and better prepare workers for the 21st century (Business Week, 1996). Ted Turner, Turner Broadcasting System, says "Music has a great power for bringing people together. With so many forces in this world acting to drive wedges between people, it's important to preserve those things that help us experience our common humanity" (Music Educators National Conference, 2002, p. 6).

Finally, former United States presidents have commented on the power of music education. President Gerald Ford said, "Music education opens doors that help children pass from school into a world of work, culture, intellectual activity, and human involvement. The future of our nation depends on providing our children with a complete education that includes music" (Music Educators National Conference, 2002, p. 6-7). "Music is about communication, creativity, and cooperation, and by studying music in school, students have the opportunity to build on these skills, enrich their lives, and experience the world from a new perspective," former President Bill Clinton (Music Educators National Conference, p. 7).

Summary

There are many elements of an effective music education program that impact academic achievement. Research literature, books, and news articles reveal only a few. Among them are parental involvement, lack of parent involvement, peer influence, and music education's impact on being successful in life and work. The Tillmann and Ford (1996) study provides evidence into a particular population – specifically the African American special education parent. Nonetheless, the study provides insight into obstacles that influence the level of parental involvement which in turn can affect academic achievement. The manner in which data is collected was unique but yielded important facts. Further investigation into obstacles that families face in music education is needed. In particular, the contributions of and at what level fathers are involved may be of interest. It may be beneficial to investigate the impact of music education on the academic success of special education students and how fathers view their experiences as unique to the special education process at the early childhood level.

Moreover, the Tillmann and Ford study provides valuable information for music educators and parents whose students may be learning music for the very first time. Understanding the level of parental involvement and the reasons why a parent does or does not become involved can be significant information for any educator, especially if the parent has no musical experience. Aspects of the Tillmann and Ford study can be replicated so that additional information is gained in regards to parental involvement, peer influence, and academic achievement through the use of music education.

Chapter Summary

Research literature has shown that music and music education has an impact on many aspects of human development. Beginning with experiments by Rauscher, Shaw, and Ky and the *Mozart Effect*, music education has been shown to impact brain stimulation and brain development. However, findings have not been without controversy. Some researchers have not been able to replicate results of the initial experiment. Others have reached similar results but not at a statistically significant level. Still others have shown that music does impact academic achievement, however, significant results rely on the type of music utilized in the experiment.

Music has been shown to be effective at all levels of the educational system. From preschool to high school and at the university level, investigations involving the study of music or studying to music have been shown to impact academic achievement. The work of Gouzouasis et al. , Dryden, and McLelland have divulged useful information for educators. Some experiments have shown marginal results, others have shown significant findings.

Nonetheless, researchers have discovered that music education may impact the lives of children not only academically, but through complex social infrastructures that have yet to be discovered.

When music is integrated into general education courses, dramatic results have been shown. Brogla-Krupke has discovered this by integrating music into social studies. Through music, elementary children have learned valuable lessons in our nation's history that have long-lasting effects. Arts integration programs like *Start With Arts Program* and *Artful Learning Centers* are just beginning to appear and make an impact in public education. Perhaps the greatest impact of music education has been seen in the social, cognitive, and academic skills of disabled students.

Finally, there are many elements of a music education program that impact academic achievement. Some of the elements revealed in this review of literature include parental involvement, positive peer influences, and social conscientiousness. Music education has been shown to bring communities together and has been described as the fabric of our society. Researchers, medical professionals, and former United States Presidents have shown that music is seen as a positive influence to academia, intellectual advancement, building human relations, effective work environments, and overall human growth and development. As school divisions investigate ways to slash budgets, increase academic performance, and build community relations, the impact of music education must be taken into consideration.

CHAPTER THREE

METHODOLOGY

This study investigates the impact of music participation on grade twelve weighted cumulative grade point average, attendance rate in grade twelve, and student conduct in grade nine through grade twelve. The purpose of this study is to determine whether participation or non-participation in music courses or the number of years a student participates in vocal or instrumental music has an impact on academic achievement as measured by grade twelve weighted cumulative grade point average; attendance rate as measured by the number of absences in grade twelve; and on student conduct as measured by the number of discipline referrals in grade nine through grade twelve. One Southeast Virginia school division's 2006 graduating class serves as the sample population.

The investigation includes students with 4 or more years, 3 to 3.5 years, 2 to 2.5 years, and 1 to 1.5 years of vocal or instrumental music instruction; students not participating in instrumental or vocal music instruction; and students that may have been enrolled in a combination of vocal and instrumental music courses in grades nine through twelve.

The investigation attempts to determine the long-term impact that music education, specifically the number of years enrolled in music instruction or no music instruction, has on academic achievement, using grade twelve weighted cumulative grade point average (GPA). In addition, the study attempts to determine the affect that music education has on attendance rate in grade twelve and on student conduct in grade nine through grade twelve. Data are analyzed for highest GPA, the least number of absences, and the least number of discipline referrals among subject and number of years enrolled in formal music courses or no formal music courses, gender, ethnicity, and formal music courses or no formal music courses.

Setting

The study takes place in a large urban school district located in the Southeast section of Virginia. During the 2005–2006 school year, the school district had 48 individual schools: 5 early childhood centers; 28 elementary schools; 8 middle schools; 2 alternative secondary schools; and 5 high schools. Approximately 33,200 students in grades pre-kindergarten through 12 were enrolled in the school district. Fall membership 2005 data collection (September 30) reports 7,281 middle school and 9,437 high school students comprising approximately 52% of the total student population. The total number of elementary school students, as indicated on the fall membership report, was 15,924 for pre-kindergarten through grade 5. Alternative programs report 525 total student enrollment.

The 2005–2006 Virginia Department of Education free and reduced price lunch program eligibility report presents that on October 31, 2005 this school division had a total of 15,828 students or 49.68% of the total membership on free and reduced lunch. Of that 49.68%, 12,721 or 39.92% receive free lunch services and 3,107 or 9.75% receive reduced priced lunches.

A diverse group of students were enrolled in the school district. Student nationalities comprise the following cultural groups: Native American/Alaskan Native, Asian Pacific Islander, African American, Hispanic, White, and unspecified. African American students represent the largest group (57.4%) followed by White (32.8%), Hispanic (5.5%), Asian/Pacific Islander (2.6%), unspecified (1%), and Native American/Alaskan Native (0.7%). Additional demographic information includes 12.4% special education students, 4.5% talented and gifted students, 46.5% economically disadvantaged students, and 1.48% English Speakers of Other Languages (ESOL). Race/Ethnicity membership totals and percentages are presented in Table 16.

Table 16

Student Enrollment by Ethnicity for the Sampled School Division.

Race/Ethnicity	*N*	%
Native American/Alaskan Native	208	0.7%
Asian Pacific Islander	855	2.6%
African American	19,026	57.4%
Hispanic	1,825	5.5%
White	10,888	32.8%
Unspecified	337	1.0%
Total	33,139	100.0%

Note: Data collected from Virginia Department of Education (2006c, January 23). *Virginia Department of Education September 30, 2005, Student Membership.* Retrieved July 19, 2006, from http://www.pen.k12.va.us/VDOE/dbpubs/Fall_Membership/2005/fm_div_grade.xls

For the purpose of this study, it was important to examine demographic information in regards to music education and academic achievement for the 2005-2006 twelfth grade class. Research literature indicates gender does not indicate significant academic differences in music instruction. However, gender totals are reported in this study to confirm or challenge previous research. As a result, gender distributions for the investigative population (the sampled school division's 2006 graduating class) are as follows: 999 total males and 1,055 total females for a grand total of 2,054 seniors.

Race/Ethnicity and gender distributions are as follows: 18 Native American/Alaskan Native; 71 Asian Pacific Islander; 1,082 African American; 94 Hispanic; 785 White; and 4 did not specify race/ethnicity. Table 17 presents race/ethnicity, gender, and total distributions for the 2006 graduating class in this school division as of September 30, 2005.

Table 17

Ethnicity and Gender for the 2006 Senior Class in the Sampled School Division.

Race/Ethnicity	Male	Female	Percentage	Totals
Native American/Alaskan Native	13	5	.8%	18
Asian Pacific Islander	37	34	3.7%	71
African American	509	573	52.9%	1,082
Hispanic	51	43	4.5%	94
White	386	399	37.8%	785
Unspecified	3	1	.3%	4
Totals	999	1,055	100.0%	2,054

Compiled from Virginia Department of Education (2006b, February 7). *Virginia Department of Education September 30, 2005 Student Membership PK-12.* Retrieved July 19, 2006, from http://www.doe.virginia.gov/VDOE/dbpubs/Fall_Membership/2005/fm_sch_sum.xls

Population

The ethnic structure in the studied school division is similar to that of the population among the 2006 graduates in the investigation. Table 18 presents the ethnic composition, as reported in May 2006, for all students in grade nine through grade twelve in the studied school division.

For the purpose of this study, the sample population was divided into four sets. Set one contains the following groups: VMusic-4, VMusic-3, VMusic-2, and VMusic-1, representing music students enrolled in vocal music in the same school district for the number of years indicated.

Table 18

Ethnic Structure for the Sampled School Division (Grade Nine through Grade Twelve).

Native American/Alaskan Native	.6%
Asian/Pacific Islander	2.6%
African American	57.4%
Hispanic	5.5%
White	32.8%
Unspecified	1.0%

Collected from Sampled School District (2006). *Demographics and student achievement profiles at a glance 2005-2006*: Sampled School District.

Set two contains the following: IMusic-4, IMusic-3, IMusic-2, and IMusic-1 representing music students enrolled in instrumental music (band, orchestra, guitar, piano, or composition) in the same school district for the number of years indicated.

Set three contains the following groups: VMusic-0 and IMusic-0 representing students enrolled in a music course (vocal or instrumental) for one-half year or no music courses in the same school district.

The final group, VIMusic-4, VIMusic-3, VIMusic-2, and VIMusic-1, represents students that may have been enrolled in a combination of high school vocal and instrumental music in the same school district in grade nine through grade twelve.

Table 19 illustrates the four population sets and the years students could have been enrolled in vocal or instrumental music instruction or no music instruction within the same school district. However, music instruction could have occurred during grades nine through twelve in a number of grade level combinations.

Table 19

Four Population Sets and the Possible Years Students Enrolled in Vocal Music, Instrumental Music, No Music Instruction or a Combination of Vocal and Instrumental Music within the Same School District.

		Possible Grade Level Enrolled			
		9	10	11	12
Set 1	VMusic-4	X	X	X	X
	VMusic-3	X	X	X	
	VMusic-2	X	X		
	VMusic-1	X			
Set 2	IMusic-4	X	X	X	X
	IMusic-3	X	X	X	
	IMusic-2	X	X		
	IMusic-1	X			
Set 3	VMusic-0				
	IMusic-0				
Set 4	VIMusic-4	X	X	X	X
	VIMusic-3	X	X	X	
	VIMusic-2	X	X		
	VIMusic-1	X			

Note: Music instruction could have occurred during grades nine through twelve in a number of grade level combinations.

In the fall of 1999, the study population's sixth grade year, there were a total of 2,302 sixth grade students enrolled in the school division (Virginia Department of Education, 1999). All sixth grade students are enrolled in some aspect of the music program including band, orchestra or a nine-week exploratory music program encompassing the fundamentals of music education. There are no requirements for initial participation in a music program other than student interest.

According to the 2006 Virginia Department of Education Membership Report, on September 30, 2005, the beginning of the study group's twelfth grade year, student enrollment had dropped to 2,054 from 2,302 as reported in the September 30, 1999 membership report in which study participants were in the sixth grade. The enrollment drop is due to attrition in this school division. Since specific data on music student enrollment is not collected, no further information is presented.

Research Design

The research design used in this study includes the independent variable group membership in fourteen levels: VMusic-4, VMusic-3, VMusic-2, VMusic-1, VMusic-0, IMusic-4, IMusic-3, IMusic-2, IMusic-1, IMusic-0 and students with a combination of vocal music, instrumental music or composition courses, VIMusic-4, VIMusic-3, VIMusic-2, and VIMusic-1.

The first dependent variable is grade twelve weighted cumulative grade point average. Weighted cumulative grade point average is a numerical average based on the course taken, the grade received, and the rigor or weight assigned to the course.

The second dependent variable is the number of absences in grade twelve. Attendance rates are calculated based upon the number of days a student is absent from school. Absences may be excused or unexcused. Excused absences occur on days in which the student is out of school sick, has a medical appointment, a death in the family, is enrolled in school suspension (ISS), etc. Similarly, field trips and other school related activities in which the student is not in class are considered by the school division as excused absences. On the other hand, unexcused absences occur when the student is truant, suspended, or has been expelled.

The third and final dependent variable is the number of discipline referrals in grade nine through grade twelve. Discipline referrals occur when a student repeatedly does not follow specific guidelines set forth by the school division or classroom teacher. Minor occurrences may include infractions of the dress code, talking in class or a number of other student conduct trepidations. These infractions may result in counseling, in school suspension, or out of school suspension depending on the severity and number of referrals for the same offense.

Occurrences of a more serious nature include a violation of the honor code, fighting, endangering the lives of others, threats to teachers and staff, striking teachers and staff, stealing, etc. These infractions would result in out of school suspension from one to ten days or more, expulsion, or a recommendation for placement at an alternative school.

Using the four independent variables and the three dependent variables, the following research questions and null hypotheses are addressed in the study:

1. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to subject and number of years in which a student participates in formal music courses or in no formal music courses?

Null Hypothesis:

There is no statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to subject and number of years in which a student participates in formal music courses or in no formal music courses.

2. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to gender and participation in formal music courses or in no formal music courses?

   Null Hypothesis:

   There is no statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to gender and participation in formal music courses or in no formal music courses.

3. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to ethnicity and participation in formal music courses or in no formal music courses?

   Null Hypothesis:

   There is no statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to ethnicity and participation in formal music courses or in no formal music courses.

4. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to participation in formal music courses or in no formal music courses?

   Null Hypothesis:

   There is no statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to participation in formal music courses or in no formal music courses.

The purpose of this study is to determine whether participation, non-participation, and degree of participation in vocal or instrumental music or a combination of the two have an impact on grade twelve weighted cumulative grade point average, the number of absences in grade twelve, and the number of discipline referrals in grade nine through grade twelve. In this study, it was necessary to distinguish which variable (subject and number of years enrolled in formal music instruction or no formal music instruction, gender, ethnicity, and formal music courses or no formal music courses) revealed the highest mean twelfth grade weighted cumulative grade point average; the lowest number of days absent in grade twelve; and the lowest number of discipline referrals in grade nine through grade twelve.

For each group in the study, scores were computed and statistical measures were used to determine differences in the mean performance between and within the groups.

Data Collection Procedures

After completion of training in human subjects protection (see Appendix A), permission was requested and approved from the Virginia Polytechnic Institute and State University's Institutional Review Board (see Appendixes B and C). Upon university approval (see Appendix D), a request to conduct the study was submitted and approved by the Research Committee and the Superintendent of the sampled school district (see Appendixes E and F). Essential to data collection was the identification of music and non-music participants, demographic identifiers, final grade point averages in grade twelve, the number of absences in grade twelve, and the number of discipline referrals in grade nine through grade twelve for the 2006 graduation class in the sampled school district. The school district's student information database was used to collect pertinent information.

To further delineate study groups, the school district's electronic student information system database was used to determine 2006 graduates enrolled in the sampled school district in grades nine through twelve and met the study requirements. A request was made to the technology services department of the sampled school district (see Appendix G). Further differentiation distinguished between music students and non-music students and the type of music course or courses enrolled. The entire population of grade twelve music students in the sampled school division was utilized in data collection and analysis. Students who attended more than one high school in the same school district and remained in the vocal or instrumental music program were included in the study.

A similar process was employed to determine non-music participants. All non-music participants were included in data collection and analysis. Students included in this group must have been enrolled in the same school division for four years (grades 9 – 12) and not enrolled in formal public school music education courses for more than one-half year (1 semester). Students attending more than one high school in the same school district and not enrolled in formal public school music education courses for more than one-half year (1 semester) were also included in the study.

Finally, students not meeting requirements specified in this study were eliminated. Names for selected students were coded to provide maximum anonymity. Coded information was entered into a database using SPSS 13. At no time are students identified by name, school, or by the school division's student identification numbering system. Likewise, the school division is not identified. There were no more than minimal risks involved for participation.

Instrumentation

The following instrumentation was employed in the research design: grade twelve weighted cumulative grade point average to measure academic achievement; the number of absences in grade twelve to measure attendance rate; and the number of discipline referrals in grade nine through grade twelve to measure behavior. Critical to data collection was the total number of years and type of formal music education courses or no formal music courses each 2006 graduate was enrolled over a four-year span in grade nine through grade twelve in the sampled school division. In addition, demographic information was necessary to data collection. These data were retrieved from the sampled school division's electronic student information system with assistance from the technology department.

Grade Twelve Weighted Cumulative Grade Point Average

A cumulative grade point average is an overall weighted average of the marks/grades which a student earns to date at a particular institution. The school division in this study offers a variety of courses for which students receive credit toward high school graduation. At the completion of the first semester of the senior year, the grade point average is used to determine honor graduates. A student with a 3.0 average or above is considered an honor graduate.

To determine honor graduate status, the school division offers courses with varying levels of rigor and weighted credits. Additionally, course weighting is assigned upon recommendation of the school district's curriculum committee and the approval of the School Board. Courses identified for advanced placement/standing contain a mandated external evaluation component. Students who do not participate in external evaluations receive honors weighted credit. International Baccalaureate courses and Advanced Placement courses are weighted with advanced standing; Honors and Pre-International Baccalaureate courses receive honors weight.

Weighted cumulative grade point averages are computed at the end of each semester and reported on the student's report card (Whitaker, 2005). The final grade twelve weighted cumulative grade point average at the end of the second semester was collected in this study. Table 20 presents the scale used by this school division for determining grade point averages. Weighting is adjusted to reflect the academic rigor of the course content.

Weighted cumulative grade point averages are provided to students in grades 9 through 12. This grade point average is based upon the grades individual students earn in courses for which high school credit is awarded (including failing grades, repeated courses, summer school, night school, and credit courses taken prior to grade nine) (Whitaker, 2005).

Table 20

Scale for Determining Grade Point Average.

Grade	Advanced Standing	Honors	Standard
A	5	4.5	4
B	4	3.5	3
C	3	2.5	2
D	2	1.5	1
F	0	0	0

Note: Information taken from the Study Groups Policies and Procedures Manual 2005-2006.

The school district offers a wide variety of courses to middle school and high school students. High school credit courses available to middle school students are foreign language (Spanish, French, German, and Latin), Algebra I, Honors Geometry, and Summer Institute for the Arts. Of these courses, only Honors Geometry and Summer Institute for the Arts are weighted.

This school division includes 26 Advanced Placement courses and 22 honors courses throughout the comprehensive high school curricula (Whitaker, 2005).

Students begin their high school planning in grade eight. Counselors meet with students and parents individually and in groups to develop a program of study for grades 9 – 12. Students and parents have opportunities to attend three district-wide meetings that focus on the academic transition from middle school to high school. A course offerings booklet with descriptions of all courses and district-wide programs is provided to all eighth grade families (Whitaker, 2005).

The school district offers open access to all courses at the high school level. Open access allows students, with the permission of their parents, to enroll in any course offered in the high school curriculum with the exception of courses that are sequential in nature. For example, Algebra II is a sequential course to Algebra I and Geometry. Therefore students must successfully complete Algebra I and Geometry before enrolling in Algebra II. Open access enables students to take honors and Advanced Placement (AP) courses without prerequisites or teacher approval (Whitaker, 2005).

Number of Absences in Grade Twelve

Attendance rates are calculated based upon the number of days a student is absent from school. Absences may be excused or unexcused. Excused absences occur on days in which the student is out of school sick, has a medical appointment, a death in the family, is enrolled in in-school suspension (ISS), etc. Similarly, field trips and other school related activities in which the student is not in class are considered by the studied school division as excused absences. On the other hand, unexcused absences occur when the student is truant, suspended, has been expelled or fails to provide a note from the parent or guardian excusing an absence.

The studied school division has not distinguished between excused and unexcused absences in available data. Therefore, all absences in grade twelve have been included in data collection (Sampled School District, 2001b).

Number of Discipline Referrals in Grade Nine through Grade Twelve

Discipline referrals occur when a student repeatedly and consciously does not follow specific guidelines set forth by the school division or classroom teacher. Minor occurrences may be infractions of the dress code, talking in class, smoking or a number of other student conduct trepidations. These infractions may result in counseling, enrollment in the in-school suspension program (ISS) or a student may be assigned out of school suspension for up to ten days depending on the severity of the offense and the number of referrals. Occurrences of a more serious nature include violation of the honor code, fighting, possession of a weapon, endangering the lives of others, threats to teachers and staff, striking teachers and staff, etc. These infractions would result in out of school suspension from one to ten days or more, expulsion, or recommendation for placement at an alternative school (Sampled School District, 2001c).

Threats to Internal and External Validity

Internal validity, as defined by Campbell and Stanley (1963), refers specifically to whether an experimental treatment or condition makes a difference or not, and whether there is sufficient evidence to support the claim. External validity refers to the generalizibility of the treatment or condition outcomes.

In this research design, there were several factors which jeopardized internal validity. First, maturation or the processes within participants which act as a function of the passage of time (i.e. if the project lasts a few years, most participants may improve their performance regardless of treatment received). This study evaluates a participant's academic performance over a period of time (from one to four years). Therefore, maturation could threaten internal validity.

A second factor to threaten internal validity is instrumentation. Instrumentation refers to the changes in the instrument, observers, or scorers which may produce changes in outcomes. In this study, there are three basic instrumentation issues that affect internal validity: 1) Teachers are assigned to teach courses based on student enrollment and their particular certification/licensure; 2) Study participants/students choose a variety of general education and elective courses; and 3) Students are mandated by the Department of Education to take specific courses and a specified number of those courses. Given this information, it is inevitable that the dependent variable chosen to measure academic achievement (GPA) threatened internal validity. The researcher has no control over grades that study participants may earn from any given teacher, music or non-music.

The final factor threatening internal validity, selection-maturation interaction, refers to the selection of comparison groups and maturation interacting which may lead to confounding outcomes and erroneous interpretation that the treatment caused the effect. In opposition to instrumentation, participants in comparison groups are randomly assigned to classes made during their course choices. Consequently, students may have been assigned to the same general education teacher or the same elective course teacher at different times of the academic day or year. Moreover, there is a possibility that participants may have been randomly assigned to the same teacher and class period over a four year period of high school. In the case of music students, often the same music teacher will instruct all music courses within the same school building (i.e. vocal director, band director, orchestra director, etc.). Therefore, selection-maturation interaction may threaten internal validity.

One factor that may have jeopardized external validity is multiple treatment interference. As multiple treatments are given to the same subjects, it is difficult to control for the affects of prior treatments. This may occur as school personnel changes are made or subjects are assigned to the same general education teacher or the same elective course teacher for multiple years as is the case in most music education courses. Interaction affects of selection biases and the experimental variable in addition to reactive affects of experimental arrangements will jeopardize external validity. It is difficult to generalize to non-experimental settings if the affect is attributable to the experimental arrangement of the research (Campbell & Stanley, 1963).

Data Analysis

In analyzing data for this quantitative study, several actions occurred. The first step included the recoding of the variable subject and number of years enrolled in formal music courses or no formal music courses. This was necessary to determine the fourth independent variable formal music courses or no formal music courses. Students participating in formal music courses were coded as one and students participating in no formal music courses were coded as two.

The next stage of analysis included computing descriptive statistics (means and standard deviations) for each of the independent variables. Likewise, demographic analysis was computed to provide a clear understanding of the research participants. In addition, correlations were conducted to determine the existence of any relationships between independent variables and dependent variables.

After descriptive and demographic statistics were reported, inferential statistics were used to test each null hypothesis. The overall null hypothesis states that there is no statistically significant difference among group membership (music and non-music participants) with respect to grade twelve weighted cumulative grade point average, the number of absences in grade twelve, and the number of discipline referrals in grade nine through grade twelve. Because subjects are randomly assigned to classes, the research design is *Treatment-Control Postmeasure.* In the case of both groups (music and non-music), one group received the treatment (music instruction), the other did not (non-music). Both groups received the same post measures – grade twelve weighted cumulative grade point average, the number of absences in grade twelve, and the number of discipline referrals in grade nine through grade twelve.

There are several inferential statistical procedures that were employed in this study. One employed procedure was a factorial Analysis of Variance (ANOVA), sometimes called an *F* test. Closely related to the *t* test where differences are measured between means of two groups, the ANOVA (*F* test) tests the difference between the means of two or more groups. Therefore, a factorial ANOVA examined data that was classified on multiple independent variables. Furthermore, a factorial ANOVA will show whether there is a significant main effect of the independent variables and whether there are significant interaction effects within and between independent variables in a set of data. Interaction effects occur when the impact of one independent variable depends on the level of the second independent variable (Creswell, 2003).

One potential drawback to an ANOVA is the loss of specificity. The *F* test will distinguish that there is a significant difference between groups, not which groups are significantly different from each other. To determine this statistical significance, if any, a post-hoc comparison was conducted to reveal where specific differences occur. In other words, which groups are significantly different from each other and which are not. Common post-hoc comparisons include Scheffe and Tukey (Solso, Johnson, & Beal, 1998).

Finally, regression statistics were conducted. An extension of an ANOVA, regression is a statistical technique used to predict the value of a dependent variable using one or more independent variables (University of Newcastle upon Tyne, 2002). It is used to account for or predict variance in an interval dependent, based on linear combinations of interval, dichotomous, or dummy independent variables. Since there are a number of independent variables and one dependent variable in this study, a multiple regression was employed. Multiple regression can establish that a set of independent variables explains a proportion of the variance in a dependent variable at a significant level (through a significance test of R^2) and can establish the relative predictive importance of the independent variables by comparing beta weights (Garson, 2006).

Chapter Summary

The purpose of this study was to determine the impact that participation in formal public school music education (vocal and instrumental music) or non-participation in music education has academic achievement as measured by grade twelve weighted cumulative grade point average; on attendance rate as measured by the number of absences in grade twelve; and on behavior as measured by the number of discipline referrals in grade nine through grade twelve. Setting and population descriptives were established.

The research design included the identification of four independent and three dependent variables. Data analysis resulted following descriptive statistics (mean and standard deviation), correlations, and inferential statistical procedures to test hypotheses and null hypotheses using analysis of variance (ANOVA). The research questions consist of four hypotheses and four null hypotheses. Since F tests will not determine which groups are significantly different from each other, Scheffe and Tukey post hoc comparisons were applied. In addition, multiple regression procedures were employed to predict the value of the dependent variables using one or more of the independent variables.

Included in the steps for data collection were procedures for training in human subjects protection by Virginia Polytechnic Institute and State University; and requesting to conduct the study that consisted of submitting to and approval of the school division's Research Committee and the division Superintendent as well as the Virginia Polytechnic Institute and State University's Institutional Review Board. A description of the dependent variables has been revealed in addition to reliability and validity procedures. Furthermore, threats to internal and external validity have also been explored.

Finally, data analysis has been explained. Descriptive, ANOVA, tests for homogeneity, post-hoc inferential statistical procedures, and multiple regression were employed in various combinations to determine the impact that formal public school music education or no music education has on academic achievement, as measured by grade twelve weighted cumulative grade point average; attendance rate, as measured by the number of absences in grade twelve; and on behavior as measured by the number of discipline referrals in grade nine through grade twelve.

CHAPTER FOUR

FINDINGS AND RESULTS

Introduction

In this chapter, the results of the study are presented. The first section includes: background information related to the study; the four research questions and four null hypotheses; information on data collection procedures; a review of utilized instrumentation; and techniques employed in data analysis.

The second section includes descriptive statistics, correlations, and regression for the three dependent variables: (1) grade twelve weighted cumulative grade point average; (2) number of absences in grade twelve; and (3) number of discipline referrals in grade nine through grade twelve for each of the study populations: (1) the entire study population; (2) the music population; and (3) the non music population. Utilizing the four independent variables, (1) subject and number of years enrolled in formal music or no formal music courses; (2) gender; (3) ethnicity; and (4) formal music courses or no formal music courses, the three dependent variables are presented to address the research questions and null hypotheses. Relevant data tables are presented.

Finally, the last section includes data tables for each research question.

Background Information

The purpose of this study was to investigate the impact of music participation or non-music participation on academic achievement, as measured by grade twelve weighted cumulative grade point average; on attendance rate, as measured by the number of absences in grade twelve; and on student conduct, as measured by the number of discipline referrals in grade nine through grade twelve.

This investigation included students with 4 or more years, 3 to 3.5 years, 2 to 2.5 years, and 1 to 1.5 years in vocal or instrumental music instruction; students not participating in instrumental or vocal music instruction; and students that may have been enrolled in a combination of vocal and instrumental music courses in grades nine through twelve in one Southeast Virginia school division.

Research Questions

This study has been guided by four research questions. The research questions are:

1. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to subject and number of years in which a student participates in formal music courses or in no formal music courses?
2. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to gender and participation in formal music courses or in no formal music courses?
3. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve

among the population with respect to ethnicity and participation in formal music courses or in no formal music courses?

4. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to participation in formal music courses or in no formal music courses?

Data Collection Procedures

Using the school district database, the following demographic information was collected for the 2006 graduation class:

1. identification of music and non-music participants
2. type of music enrollment (vocal or instrumental)
3. final grade twelve cumulative weighted grade point averages
4. number of absences in grade twelve
5. number of discipline referrals in grades nine through twelve.

The entire population of grade twelve music students in the sampled school division was utilized in data collection and analysis. Students who attended more than one high school in the same school district and remained in the vocal or instrumental music program were included in the study.

A similar process was employed to determine non-music participants. All non-music participants were included in data collection and analysis. Students included in this group must have been enrolled in the same school division for four years (grades 9 – 12) and not enrolled in formal public school music education courses for more than one-half year (1 semester). Students attending more than one high school in the same school district and not enrolled in formal public school music education courses for more than one-half year (1 semester) were also included in the study.

Finally, students not meeting requirements specified in this study were eliminated. Names for selected students were coded to provide maximum anonymity. Coded information was entered into a database using SPSS 13. At no time were students identified by name, school, or by the school division's student identification numbering system. Likewise, the school division was not identified. There were no more than minimal risks involved for participation.

Instrumentation

The following instrumentation was employed in the research design: grade twelve weighted cumulative grade point average to measure academic achievement; the number of absences in grade twelve to measure attendance rate; and the number of discipline referrals in grade nine through grade twelve to measure student conduct. Critical to data collection was the total number of years and type of formal music education courses or no formal music courses each 2006 graduate was enrolled over a four-year span in grade nine through grade twelve in the sampled school division. In addition, demographic information was necessary to data collection. These data were retrieved from the sampled school division's electronic student information system with assistance from the technology department.

Data Analysis Techniques

Upon completion, using SPSS, descriptive and inferential statistics for the independent variables and the dependent variables, correlation and regression analysis were conducted to reveal significant correlations, analysis of variance (ANOVA) and residual statistics. A number of charts and figures were requested through SPSS to indicate relevant information regarding correlations and significance, if any.

Descriptive Statistics, Correlations, Analysis of Variance (ANOVA), and Regression

The total number of subjects for the study population, music and non music, is 1,741 (*N* = 1,741) or 100%. There are 454 (*N* = 454) music students or 27% of the total population. On the other hand, there are 1,287 (*N* = 1,287) non music students or 73% of the total population. Table 21 presents frequencies (*N*) and percentages for each study population.

Table 21

Frequencies (N) and Percentages for Each Study Population.

Population	*N*	Percentage
Music Population	454	27%
Non Music Population	1,287	73%
Total Population	1,741	100%

Among the 1,741 total subjects (*N* = 1,741), the largest group for the independent variable subject and number of years enrolled in formal music courses or no formal music courses is reported in the category no formal music courses (VMusic-0; IMusic-0) or no vocal or instrumental music courses with 1,287 (*N* = 1,287) or 73.0% among the entire study population. The smallest groups in the study are found in the music categories VMusic-4 (four years of vocal music instruction) and VIMusic-1 (a combination of vocal and instrumental music instruction for one year) with two (*N* = 2) subjects in each category or .1% of the entire study population. Although these categories yielded a small number of participants, they were included in data analysis for future reference and are indicated within the text.

Among the 1,741 total subjects (*N* = 1,741), there are 927 (*N* = 927) females or 53.2% and 814 (*N* = 814) males or 46.8% of the entire study population. These numbers are a reflection of the total sampled school division's population in regard to gender.

In comparison to the total population (*N* = 1,741), the music population (*N* = 454) consists of 275 (*N* = 275) females or 60.6% of the music population and 179 (*N* = 179) males or 39.4% of the music population. Therefore, more senior class females are enrolled in the sampled school division's music education program than are males. This data is not a reflection of the total study population.

Among the non music population (*N* = 1,287), there are 652 (*N* = 652) females or 50.7% of the non music population and 635 (*N* = 635) males or 49.3% of the non music population. This data indicate a reflection of the total population of the sampled school division.

Table 22 presents the gender structure for all populations within the research study.

Table 22

Gender Structure for All Populations.

	Entire Population		Music Population		Non Music Population	
Gender	*N*	%	*N*	%	*N*	%
Female	927	53.2%	275	60.6%	652	50.7%
Male	814	46.8%	179	39.4%	635	49.3%
Total	1,741	100.0%	454	100.0%	1,287	100.0%

Among the total study population (*N* = 1,741), African Americans comprise the largest ethnic group. There are 916 (*N* = 916) African Americans or 52.6% of the total study population. The second largest ethnic group is White with 662 (*N* = 662) or 38.0% of the entire study population. The unspecified category comprises the smallest ethnic group among the entire study population with five ($N = 5$) participants or .3% of the entire study population. For the entire study population, data indicate that ethnicity is a reflection of the total population of the sampled school division.

Similar to the entire population, African Americans comprise the largest ethnic group among the music population. For the music population, there are 213 ($N = 213$) African Americans or 46.9% of the music population. Comparable to the entire study population, the second largest ethnic group among the music population are Whites with 205 ($N = 205$) participants or 45.2% of the music population. In the same way, the unspecified ethnic group is the smallest ethnic group among the music population with one ($N = 1$) participant or .2% of the music population.

The ethnic structure of the non music population yields similar data as the total study population and the music population. The largest ethnic group among the non music population is African Americans with 703 ($N = 703$) participants or 54.6% of the non music population. The second largest ethnic group is Whites with 457 ($N = 457$) participants or 35.5% of the non music population. Once again, the unspecified ethnic group comprises the smallest ethnic group with four ($N = 4$) or .3% of the non music population.

Table 23 presents frequency (N) and percentage (%) for the ethnic structure of all study populations.

For the entire study population, data indicate the mean for the dependent variable grade twelve weighted cumulative grade point average is 2.6203 and the standard deviation is .72876; the mean for the dependent variable number of absences in grade twelve is 16.17 and the

Table 23

Frequency (N) and Percentage (%) for the Ethnic Structure Among All Study Populations.

Ethnicity	Entire Population		Music Population		Non Music Population	
	N	*%*	*N*	*%*	*N*	*%*
African American	916	52.6%	213	46.9%	703	54.6%
Asian/Pacific Islander	65	3.7%	16	3.5%	49	3.8%
Hispanic	79	4.5%	17	3.7%	62	4.8%
Native American/Alaskan Native	14	.8%	2	.4%	12	.9%
White	662	38.0%	205	45.2%	457	35.5%
Unspecified	5	.3%	1	.2%	4	.3%
Total	1,741	100.0%	454	100.0%	1,287	100.0%

standard deviation is 13.790; and the mean for the dependent variable number of discipline referrals in grade nine through grade twelve is 3.46 and the standard deviation is 6.537.

In contrast, data indicate the mean grade twelve weighted cumulative grade point average for the music population (*N* = 454) is 2.8181 and the standard deviation is .74536. Data indicate the mean number of absences in grade twelve among the music population is 14.44 with a 12.511 standard deviation. Finally, data indicate the mean number of discipline referrals in grade nine through grade twelve is 2.00 and a 4.143 standard deviation.

Divergent of the music population, data indicate the mean grade twelve weighted cumulative grade point average for the non music population (*N* = 1,287) is 2.5505 with a .71007 standard deviation. The mean number of absences in grade twelve for the non music population is 16.78 with a 14.168 standard deviation. Lastly, the mean number of discipline referrals in grade nine through grade twelve for the non music population is 3.98 with a 7.124 standard deviation.

Table 24 presents frequency (*N*), mean (*M*), and standard deviation (*SD*) for each of the dependent variables, grade twelve weighted cumulative grade point average (GPA), number of absences in grade twelve, and number of discipline referrals in grade nine through grade twelve for all populations (entire study population, the music population, and the non music population).

Table 24

Frequency (N), Mean (M), and Standard Deviation (SD) for Each Dependent Variable for All Populations.

Research	Entire Study Population			Music Population			Non Music Population		
Variable	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
GPA (9-12)	1,741	2.6203	.72876	454	2.8181	.74536	1,287	2.5505	.71007
Absences (12)	1,741	16.17	13.790	454	14.44	12.511	1,287	16.78	14.168
Discipline Referrals (9-12)	1,741	3.46	6.537	454	2.00	4.143	1,287	3.98	7.124

Grade Twelve Weighted Cumulative Grade Point Average

As indicated, the mean grade twelve weighted cumulative grade point average for the entire study population is 2.6203 and the standard deviation is .72876; the mean grade twelve weighted cumulative grade point average for the music population is 2.8181 with a .74536 standard deviation; and the mean grade twelve weighted cumulative grade point average for the non music population is 2.5505 with a .71007 standard deviation.

Entire Study Population

The highest mean grade twelve weighted cumulative grade point average among the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the entire study population is reported in the category VIMusic-1 or a combination of vocal and instrumental music for one year with a mean grade twelve weighted cumulative grade point average of 3.31 and a .34648 standard deviation.

In opposition, the lowest mean grade twelve weighted cumulative grade point average among the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the entire study population is reported in the category VMusic-4 or four years of vocal music courses with a mean grade twelve weighted cumulative grade point average of 2.46 and a .28284 standard deviation.

Figure 10 presents a line graph of the estimated marginal mean grade twelve weighted cumulative grade point average for all study participants who have participated in formal music courses from one to four years or no formal music courses.

Table 25 presents mean, standard deviation, and frequency (*N*) for the dependent variable grade twelve weighted cumulative grade point average among the independent variable subject and number of years enrolled in formal music courses or no formal music courses in grade nine through twelve for the entire study population.

The highest mean grade twelve weighted cumulative grade point average among the independent variable gender for the entire study population is reported among females with a mean grade twelve weighted cumulative grade point average of 2.7155 and a .72571 standard deviation.

Therefore, the lowest mean grade twelve weighted cumulative grade point average among the independent variable gender for the entire study population is reported among males

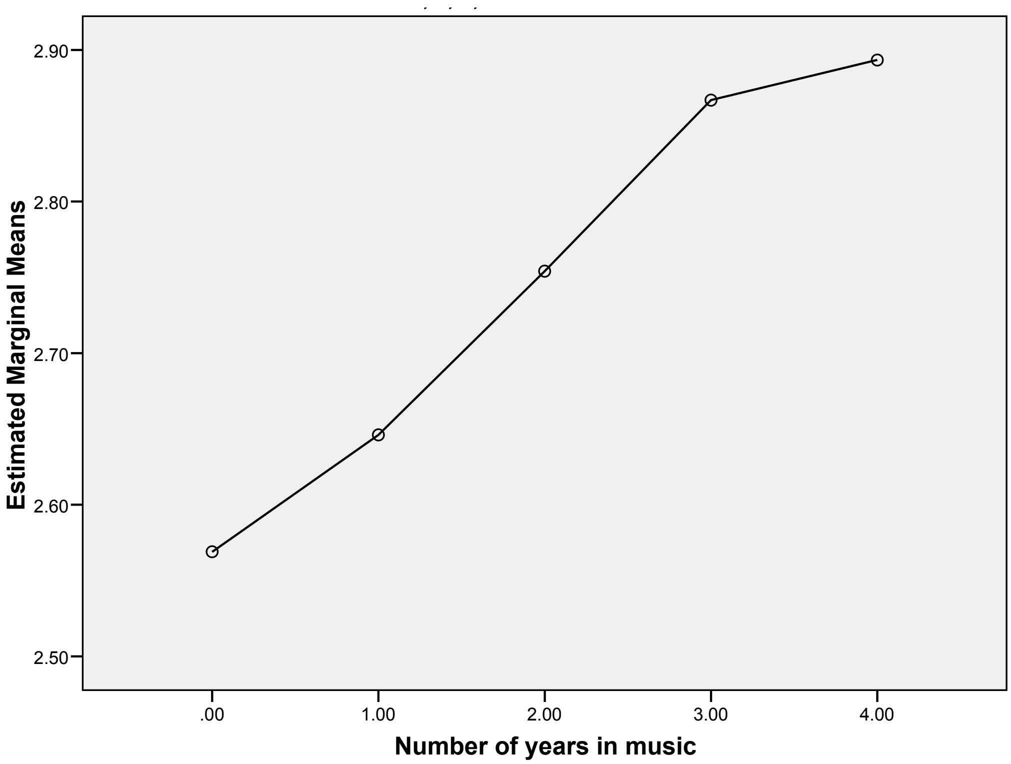


Figure 10. Estimated Marginal Mean Grade Twelve Cumulative Weighted Grade Point Average by Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Entire Study Population.

---

with a mean grade twelve weighted cumulative grade point average of 2.5120 and a .71745 standard deviation.

Table 26 presents mean, standard deviation, and frequency (*N*) for the dependent variable grade twelve weighted cumulative grade point average for the independent variable gender among the entire study population.

Table 25

Mean(a), Standard Deviation, and Frequency (N) by Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Entire Study Population.

Subject and Number of Years Enrolled in Music or No Music		Grade Twelve Weighted Cumulative Grade Point Average
VMusic-1	Mean	2.6227
	Std. Deviation	.73610
	N	78
VMusic-2	Mean	2.6890
	Std. Deviation	.68095
	N	30
VMusic-3	Mean	2.8910
	Std. Deviation	.76034
	N	42
VMusic-4	Mean	2.4600
	Std. Deviation	.28284
	N	2

IMusic-1	Mean	2.7569
	Std. Deviation	.74420
	N	88
IMusic-2	Mean	2.8700
	Std. Deviation	.69056
	N	51
IMusic-3	Mean	3.0120
	Std. Deviation	.80533
	N	83
IMusic-4	Mean	2.8976
	Std. Deviation	.71073
	N	29
VIMusic-1	Mean	3.3150
	Std. Deviation	.34648
	N	2

VIMusic-2	Mean	2.4850
	Std. Deviation	.65024
	N	10
VIMusic-3	Mean	2.6727
	Std. Deviation	.74405
	N	15
VIMusic-4	Mean	3.0533
	Std. Deviation	.68251
	N	24
VMusic-0; IMusic-0	Mean	2.5505
	Std. Deviation	.71007
	N	1,287
Total	Mean	2.6203
	Std. Deviation	.72876
	N	1,741

a. Grade Twelve Weighted Cumulative Grade Point Average

Table 26

Mean(a), Standard Deviation, and Frequency (N) by Gender for the Entire Study Population.

Gender		Grade Twelve Weighted Cumulative Grade Point Average
Female	Mean	2.7155
	Std. Deviation	.72571
	N	927
Male	Mean	2.5120
	Std. Deviation	.71745
	N	814
Total	Mean	2.6203
	Std. Deviation	.72876
	N	1,741

a. Grade Twelve Weighted Cumulative Grade Point Average

The highest mean grade twelve weighted cumulative grade point average among the independent variable ethnicity for the entire study population is reported among Asian/Pacific Islanders with a mean grade twelve weighted cumulative grade point average of 2.9868 and a .79171 standard deviation.

In opposition, the lowest mean grade twelve weighted cumulative grade point average among the independent variable ethnicity for the entire study population is reported among African Americans with a mean grade twelve weighted cumulative grade point average of 2.3673 and a .63150 standard deviation.

Table 27 presents mean, standard deviation, and frequency (*N*) for the dependent variable grade twelve weighted cumulative grade point average and the independent variable ethnicity for the entire study population.

The highest mean grade twelve weighted cumulative grade point average among the independent variable formal music courses or no formal music courses for the entire study population is reported in the independent variable formal music courses with a mean grade twelve weighted cumulative grade point average of 2.82 and a standard deviation of .74536.

Therefore, the lowest mean grade twelve weighted cumulative grade point average among the independent variable formal music courses or no formal music courses for the entire study population is reported in the no formal music courses category with a mean grade twelve weighted cumulative grade point average of 2.55 and a .71001 standard deviation

Table 28 presents mean, standard deviation, and frequency (*N*) for the dependent variable grade twelve weighted cumulative grade point average among the independent variable formal music courses or no formal music courses for the entire study population.

Figure 11 presents a line graph of the estimated marginal mean grade twelve weighted cumulative grade point average for all study participants who have participated in formal music courses or no formal music courses.

There are several statistically significant correlations among the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, ethnicity, and formal music courses or no formal music courses and the dependent variable grade twelve weighted cumulative grade point average for the entire study population.

Table 27

Mean(a), Standard Deviation, and Frequency (N) by Ethnicity for the Entire Study Population.

Ethnicity		Grade Twelve GPA
African American	Mean	2.3673
	Std. Deviation	.63150
	N	916
Asian/Pacific Islander	Mean	2.9868
	Std. Deviation	.79171
	N	65
Hispanic	Mean	2.6199
	Std. Deviation	.66806
	N	79
Native American/Alaskan Native	Mean	2.4236
	Std. Deviation	.60727
	N	14

White	Mean	2.9390
	Std. Deviation	.71762
	N	662
Unspecified	Mean	2.5660
	Std. Deviation	.99077
	N	5
Total	Mean	2.6203
	Std. Deviation	.72876
	N	1,741

a. Grade Twelve Weighted Cumulative Grade Point Average

Table 28

Mean(a), Standard Deviation, and Frequency (N) by Formal Music Courses or No Formal Music Courses for the Entire Study Population.

Formal Music Courses or No Formal Music Courses		Grade Twelve Weighted Cumulative Grade Point Average
Formal Music Courses	Mean	2.8181
	Standard Deviation	.74536
	N	454
No Formal Music Courses	Mean	2.5505
	Standard Deviation	.71007
	N	1,287
Total	Mean	2.6203
	Standard Deviation	.72876
	N	1,741

a. Grade Twelve Weighted Cumulative Grade Point Average

Table 29 presents correlations for all independent variables and the dependent variable grade twelve weighted cumulative grade point average for the entire study population. Statistical significance at the 0.05 level is indicated with one asterisk (*) and statistical significance at the 0.01 level is indicated with two asterisks (**).

Table 30 presents univariate analysis of variance tests of between-subjects effects for the dependent variable grade twelve weighted cumulative grade point average for the entire study population.

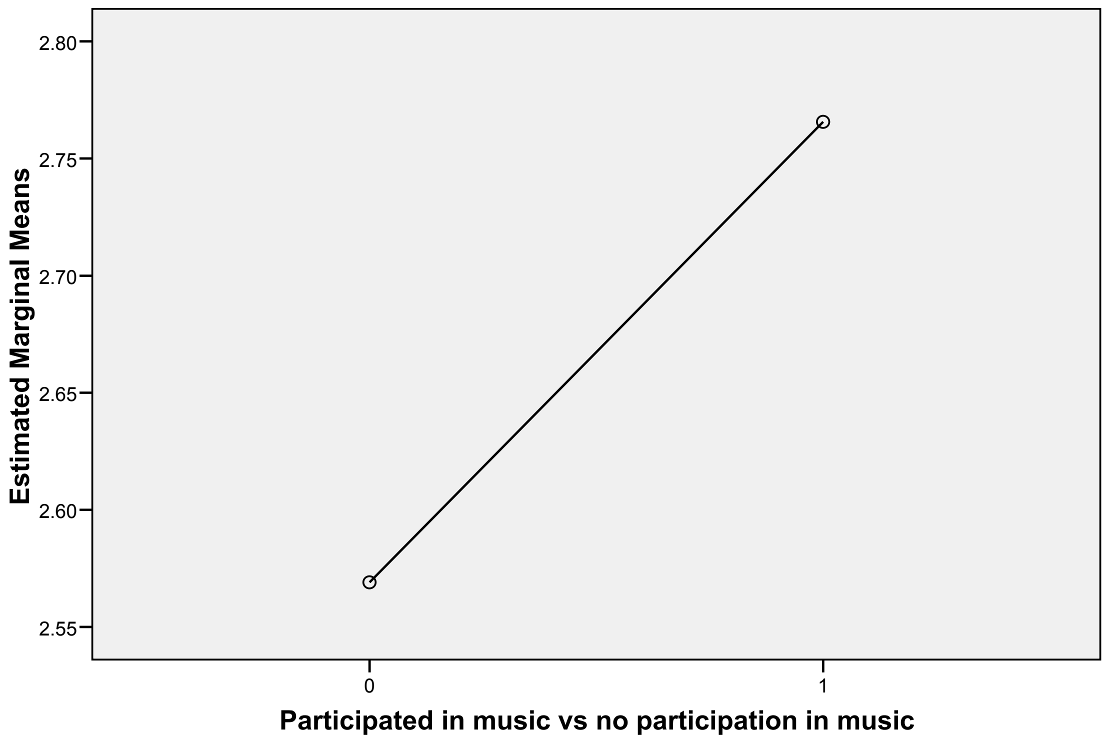


Figure 11. Estimated Marginal Mean Grade Twelve Cumulative Weighted Grade Point Average by Formal Music Courses or No Formal Music Courses for the Entire Study Population.

Table 31 presents the model summary for all independent variables and the dependent variable grade twelve weighted cumulative grade point average after controlling for gender and ethnicity for the entire study population.

Table 32 presents the analysis of variance (ANOVA) for the independent variables and the dependent variable grade twelve weighted cumulative grade point average after controlling for gender and ethnicity for the entire study population.

Table 29

Correlations(a) for the Entire Study Population.

		Subject and Number of Years	Gender	Ethnicity	Formal Music or No Formal Music	Grade 12 GPA
Subject and Number of Years	Pearson Correlation	1	.108**	-.056*	907**	-.120**
	Sig. (2-tailed)		.000	.019	.000	.000
	N	1,741	1,741	1,741	1,741	1,741
Gender	Pearson Correlation	108**	1	.051*	. 087**	-.139**
	Sig. (2-tailed)	.000		.035	.000	.000
	N	1,741	1,741	1,741	1,741	1,741
Ethnicity	Pearson Correlation	-.056*	.051*	1	-.079**	.357**
	Sig. (2-tailed)	.019	.035		.001	.000
	N	1,741	1,741	1,741	1,741	1,741
Formal Music or No Formal Music	Pearson Correlation	.907**	.087**	-.079**	1	-.161**
	Sig. (2-tailed)	.000	.000	.001		.000
	N	1,741	1,741	1,741	1,741	1,741
Grade 12 GPA	Pearson Correlation	-.120**	-.139**	.357**	-.161**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	1,741	1,741	1,741	1,741	1,741

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
a. Grade 12 Cumulative Weighted Grade Point Average.

Table 30

Univariate Analysis of Variance Tests of Between-Subjects Effects(b) for the Entire Study Population.

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.
Corrected Model	167.953a	6	27.92	64.919	.000
Intercept	856.383	1	856.383	1963.839	.000
Gender 2	19.865	1	19.865	45.553	.000
Ethnicity 2	123.893	1	123.893	284.109	.000
Subject and Number of Years in Music	17.527	4	4.382	10.048	.000
Error	756.156	1,734	.436		
Total	12878.037	1,741			
Corrected Total	924.108	1,740			

a. R Squared = .182 (Adjusted R Squared = .179)
b. Grade 12 Weighted Cumulative Grade Point Average

Table 31

Model Summary(c) for the Entire Study Population.

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	.403a	.163	.162	.66720	.163	168.958	2	1,738	.000
2	.426b	.182	.179	.66036	.019	10.048	4	1,734	.000

a. Predictors: (Constant), Recoded Ethnicity. Recoded Gender
b. Predictors: (Constant), Recoded Ethnicity, Recoded Gender, Recoded music versus no music2, Recoded music versus no music4, Recoded music versus no music3, Recoded music versus no music1
c. Grade 12 Weighed Cumulative Grade Point Average.

Table 32

Analysis of Variance (ANOVA)[c] for the Entire Study Population.

Model		Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	150.426	2	75.213	168.958	.000a
	Residual	773.682	1,736	.445		
	Total	924.108	1,740			
2	Regression	167.953	6	27.992	64.191	.000b
	Residual	756.156	1,734	.436		
	Total	924.108	1,740			

a. Predictors: (Constant), Recoded Ethnicity, Recoded Gender

b. Predictors: (Constant), Recoded Ethnicity, Recoded Gender, Recoded music versus no music2, Recoded music versus no music4, Recoded music versus music3, Recoded music versus no music1

c. Dependent Variable: Grade 12 Cumulative Weighted Cumulative Grade Point Average.

Table 33 presents coefficients for each of the independent variables and the dependent variable grade twelve weighted cumulative grade point average after controlling for gender and ethnicity for the entire study population.

Table 34 presents a model summary of excluded variables for the dependent variable grade twelve weighted cumulative grade point average after controlling for gender and ethnicity.

Subsequent regression statistics are presented for the dependent variable grade twelve weighted cumulative grade point average for the entire study population (N = 1,741).
The mean predicted value is 2.6203 and the standard deviation is .30026. The mean standardized predicted value is .000 and the standard deviation is 1.000. The mean standard error of the predicted value is .034 and the standard deviation is .010. The mean adjusted predicted value is 2.6204 and the standard deviation is .30036. The mean residual is .00000 and the standard deviation is .66403. The mean standard residual is .000 and the standard deviation is .999. The mean studentized residual is .000 and the standard deviation is .000. The mean deleted residual is -.00004 and the standard deviation is .66603. Finally, the mean studentized deleted residual is .000 and the standard deviation is 1.001.

Table 35 presents residual statistics for the dependent variable grade twelve weighted cumulative grade point average for the entire study population (N = 1,741).

Regression scatter plots for the dependent variable grade twelve weighted cumulative grade point average for the entire study population are presented in Appendix H.

Table 33

Coefficients(a) for the Entire Study Population.

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	*Beta*	*t*	Sig.
1	(Constant)	1.953	.040		48.838	.000
	Recoded Gender	.232	.032	.159	7.222	.000
	Recoded Ethnicity	.294	.017	.379	17.251	.000
2	(Constant)	1.926	.040		48.217	.000
	Recoded Gender	.215	.032	.148	6.749	.000
	Recoded Ethnicity	.285	.017	.368	16.856	.000
	Recoded Music versus No Music1	.007	.054	.031	1.417	157
	Recoded Music versus No Music2	.185	.072	.057	2.583	.010
	Recoded Music versus No Music3	.298	.059	.111	5.049	.000
	Recoded Music versus No Music4	.324	.091	.078	3.560	.000

a. Dependent Variable: Grade Twelve weighted Cumulative Grade Point Average.

Table 34

Excluded Variables (b).

Model		*Beta* In	*t*	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	Recoded music versus no music1	.010a	.477	.634	.011	.995
	Recoded music versus no music2	.043a	1.958	.050	.047	1.000
	Recoded music versus no music3	.100a	4.547	.000	.108	.944
	Recoded music versus no music4	.067a	3.061	.002	.073	.997

a. Predictors in the Model (Constant), Recoded Ethnicity, Recoded Gender
Dependent Variable: Grade 12 Cumulative Weighted Grade Point Average

Table 35

Residual Statistics for the Entire Study Population.

	Minimum	Maximum	Mean	Std. Deviation	*N*
Predicted Value	2.2226	3.3681	2.6203	.30026	1,741
Std. Predicted Value	-1.325	2.490	.000	1.000	1,741
Standard Error of Predicted Value	.025	.079	.034	.010	1,741
Adjusted Predicted Value	2.2187	3.3839	2.6204	.30036	1,741
Residual	-1.62340	2.09740	.00000	.66403	1,741
Std. Residual	-2.442	3.155	.000	.999	1,741
Stud. Residual	-2.449	3.158	.000	1.000	1,741
Deleted Residual	-1.63287	2.10128	-.00004	.66603	1,741
Stud. Deleted Residual	-2.453	3.166	.000	1.001	1,741

a. Dependent Variable: Grade Twelve Weighted Cumulative Grade Point Average.

Music Population

In comparison to the entire study population of 1,741 (*N* = 1,741), the music population consists of 454 (*N* = 454) students. As indicated, the mean grade twelve weighted cumulative grade point average for the entire study population is 2.6203 with a .72876 standard deviation. However, the mean grade twelve weighted cumulative grade point average for the music population is 2.8181 with a .74536 standard deviation.

The highest mean grade twelve weighted cumulative grade point average among the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the music population is reported in the category VIMusic-1 or a combination of vocal and instrumental music for one year with a mean grade twelve weighted cumulative grade point average of 3.31 and a .34648 standard deviation.

In opposition, the lowest mean grade twelve weighted cumulative grade point average among the independent variable subject and number of years enrolled in formal music courses or no formal music courses for music population is reported in the category VMusic-4 or four years of vocal music courses with a mean grade twelve weighted cumulative grade point average of 2.46 and a .28284 standard deviation.

Table 36 presents mean, standard deviation, and frequency (*N*) for the dependent variable grade twelve weighted cumulative grade point average and the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the music population.

The highest mean grade twelve weighted cumulative grade point average among the independent variable gender for the music population is reported among females with a mean grade twelve weighted cumulative grade point average of 2.9087 and a .73536 standard

Table 36

Mean(a), Standard Deviation, and Frequency (N) by Subject and Number of Years Enrolled in Formal Music Courses for the Music Population.

Subject and Number of Years Enrolled in Music or No Music		Mean Grade Twelve Weighted Cumulative Grade Point Average
VMusic-1	Mean	2.6227
	Std. Deviation	.73610
	N	78
VMusic-2	Mean	2.6890
	Std. Deviation	.68095
	N	30
VMusic-3	Mean	2.8910
	Std. Deviation	.76034
	N	42
VMusic-4	Mean	2.4600
	Std. Deviation	.28284
	N	2

IMusic-1	Mean	2.7569
	Std. Deviation	.74420
	N	88
IMusic-2	Mean	2.8700
	Std. Deviation	.69056
	N	51
IMusic-3	Mean	3.0120
	Std. Deviation	.80533
	N	83
IMusic-4	Mean	2.8976
	Std. Deviation	.71073
	N	29
VIMusic-1	Mean	3.3150
	Std. Deviation	.34648
	N	2

VIMusic-2	Mean	2.4850
	Std. Deviation	.65024
	N	10
VIMusic-3	Mean	2.6727
	Std. Deviation	.74405
	N	15
VIMusic-4	Mean	3.0533
	Std. Deviation	.68251
	N	24
Total	Mean	2.8181
	Std. Deviation	.74536
	N	454

a. Grade Twelve Weighted Cumulative Grade Point Average.

deviation. Therefore, male music students have the lowest mean grade twelve weighted cumulative grade point with a mean grade twelve weighted cumulative grade point average of 2.6791 and a .74120 standard deviation.

Table 37 presents mean, standard deviation, and frequency (*N*) for the dependent variable grade twelve weighted cumulative grade point average and the independent variable gender for the music population.

The highest mean grade twelve weighted cumulative grade point average among the independent variable ethnicity for the music population is reported among Asian/Pacific Islanders with a mean grade twelve weighted cumulative grade point average of 3.4119 and a .74074 standard deviation.

In opposition, the lowest mean grade twelve weighted cumulative grade point average among the independent variable ethnicity for the music population is reported among the unspecified ethnic group with a mean grade twelve weighted cumulative grade point average of 1.7600. Since there is only one student in this ethnic group, the standard deviation is not reported.

Table 38 presents mean, standard deviation, and frequency (*N*) for the dependent variable grade twelve weighted cumulative grade point average and the independent variable ethnicity for the music population.

There are several statistically significant correlations among the independent variables and the dependent variable grade twelve weighted cumulative grade point average at the 0.05 (2-tailed) and 0.01 (2-tailed) levels for the music population.

Table 39 presents correlations for all independent variables and the dependent variable grade twelve weighted cumulative grade point average for the music population. Statistical

Table 37

Mean(a), Standard Deviation, and Frequency (N) by Gender for the Music Population.

Gender		Grade Twelve Weighted Cumulative Grade Point Average
Female	Mean	2.9087
	Std. Deviation	.73536
	N	275
Male	Mean	2.6791
	Std. Deviation	.74120
	N	179
Total	Mean	2.8181
	Std. Deviation	.74536
	N	454

a. Grade Twelve Weighted Cumulative Grade Point Average

Table 38

Mean(a), Standard Deviation, and Frequency (N) by Ethnicity for the Music Population.

Ethnicity		Grade Twelve Weighted Cumulative Grade Point Average
African American	Mean	2.5947
	Std. Deviation	.68002
	N	213
Asian/Pacific Islander	Mean	3.1449
	Std. Deviation	.74074
	N	16
Hispanic	Mean	2.7329
	Std. Deviation	.73651
	N	17
Native American/Alaskan Native	Mean	2.0850
	Std. Deviation	.04950
	N	2

White	Mean	3.0233
	Std. Deviation	.73267
	N	205
Unspecified	Mean	1.7600
	Std. Deviation	-
	N	1
Total	Mean	2.8181
	Std. Deviation	.74536
	N	454

a. Grade Twelve Weighted Cumulative Grade Point Average

significance at the 0.05 level is indicated with one asterisk (*) and statistical significance at the 0.01 level is indicated with two asterisks (**).

Table 40 presents the model summary for the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, and ethnicity and the dependent variable grade twelve weighted cumulative grade point average for the music population. Since the independent variable formal music courses or no formal music courses has missing correlations, it has been deleted from the analysis.

Table 41 presents the analysis of variance (ANOVA) for the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, and ethnicity and the dependent variable grade twelve weighted cumulative grade point average among the music population. Again, since the independent variable formal music courses or no formal music courses has missing correlations, it has been deleted from the analysis.

Table 42 presents coefficients for each of the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, and ethnicity and the dependent variable grade twelve weighted cumulative grade point average for the music population. Once again, since the independent variable formal music courses or no formal music courses has missing correlations, it has been deleted from the analysis.

Subsequent regression statistics are presented for the dependent variable grade twelve weighted cumulative grade point average for the music population ($N = 454$).

Table 39

Grade Twelve Weighted Cumulative Grade Point Average Correlations for the Music Population.

		Subject and Number of Years	Gender	Ethnicity	Formal Music or No Formal Music	GPA
Subject and Number of Years	Pearson Correlation	1	.139**	.070	.a	.118*
	Sig. (2-tailed)		.003	.135	-	.012
	N	454	454	454	454	454
Gender	Pearson Correlation	.139**	1	.067	.a	-.151**
	Sig. (2-tailed)	.003	-	.155	-	.001
	N	454	454	454	454	454
Ethnicity	Pearson Correlation	.070	.067	1	.a	.253**
	Sig. (2-tailed)	.135	.155		-	.000
	N	454	454	454	454	454
Formal Music or No Formal Music	Pearson Correlation	.a	.a	.a	.a	.a
	Sig. (2-tailed)	-	-	-	-	-
	N	454	454	454	454	454
GPA	Pearson Correlation	.118*	-.151**	.253**	.a	1
	Sig. (2-tailed)	.012	.001	.000	-	-
	N	454	454	454	454	454

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
a. Cannot be computed because at least one of the variables is constant.

Table 40

Model Summary(b) for Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses, Gender, and Ethnicity for the Music Population.

				Change Statistics				
R	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	*R* Square Change	*F* Change	*df*1	*df*2	Sig. *F* Change
.328a	.108	.102	.70650	.108	18.069	3	450	.000

a. Predictors: (Constant), Subject and Number of Years Enrolled in Music or No Music (Grades 9-12), Gender, and Ethnicity.
b. Dependent Variable: Grade Twelve Weighted Cumulative Grade Point Average.

Table 41

Analysis of Variance (ANOVA)[b] for Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses, Gender, and Ethnicity for the Music Population.

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	27.056	3	9.019	18.069	.000a
Residual	224.615	450	.499		
Total	251.671	453			

a. Predictors: (Constant), Subject and Number of Years Enrolled in Music or No Music (Grades 9-12), Gender, and Ethnicity.
b. Dependent Variable: Grade Twelve Weighted Cumulative Grade Point Average.

Table 42

Coefficients for Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses, Gender, and Ethnicity for the Music Population.

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for *B*	
	B	Std. Error	*Beta*	*t*	Sig.	Lower Bound	Upper Bound
(Constant)	2.760	.117		23.550	.000	2.530	2.991
Subject and Number of Years Enrolled in Music or No Music	.030	.011	.126	2.792	.005	.009	.052
Gender	-.282	.069	-.185	-4.113	.000	-.417	-.147
Ethnicity	.099	.017	.256	5.729	.000	.065	.132

a. Dependent Variable: Grade Twelve Weighted Cumulative Grade Point Average.

Table 43 presents residual statistics for the dependent variable grade twelve weighted cumulative grade point average for the music population (*N* = 454).

Table 43

Residual Statistics for the Music Population.

	Minimum	Maximum	Mean	Std. Deviation	*N*
Predicted Value	2.3250	3.3370	2.8181	.24439	454
Std. Predicted Value	-2.018	2.123	.000	1.000	454
Standard Error of Predicted Value	.043	.095	.066	.010	454
Adjusted Predicted Value	2.3220	3.3565	2.8184	.24451	454
Residual	-1.57780	1.81314	.00000	.70416	454
Std. Residual	-2.233	2.566	.000	.997	454
Stud. Residual	-2.243	2.577	.000	1.001	454
Deleted Residual	-1.59157	1.82829	-.0024	.71032	454
Stud. Deleted Residual	-2.253	2.593	.000	1.003	454

a. Dependent Variable: Grade Twelve Cumulative Grade Point Average.

Regression scatter plots for the dependent variable grade twelve weighted cumulative grade point average for the music population are presented in Appendix I.

Non Music Population

In comparison to the entire study population of 1,741 (*N* = 1,741) and the music population of 454 (*N* = 454), there are 1,287 non music students or 73.9% of the total population. As indicated, the mean grade twelve weighted cumulative grade point average for the entire study population is 2.6203 and the standard deviation is .72876. However, the mean grade twelve weighted cumulative grade point average for the non music population is 2.5505 with a .71007 standard deviation.

Since all participants in the non music population are not enrolled in a music course, the independent variable subject and number of years enrolled in formal music courses or no formal music courses is moot. Therefore, the independent variable subject and number of years enrolled in formal music courses or no formal music courses is restricted to one category within the independent variable, VMusic-0; IMusic-0 or no vocal or instrumental music courses, and has been omitted from analysis.

Nonetheless, Table 44 presents frequency (*N*), mean grade twelve weighted cumulative grade point average, and standard deviation for the category VMusic-0; IMusic-0 for the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the non music population.

Table 44

Frequency (N), Mean(a), and Standard Deviation by Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Non Music Population.

Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses		Grade Twelve Weighted Cumulative Grade Point Average
VMusic-0; IMusic-0	Mean	2.5505
	Standard Deviation	.71007
	N	1,287
Total Population	Mean	2.6203
	Standard Deviation	.72876
	N	1,741

a. Grade Twelve Weighted Cumulative Grade Point Average

Similar to the total study population and the music population, the highest mean grade twelve weighted cumulative grade point average among the independent variable gender for the non music population is reported among females with a mean grade twelve weighted cumulative grade point average of 2.6340 and a .70648 standard deviation. Therefore, male music students have the lowest mean grade twelve weighted cumulative grade point with a mean grade twelve weighted cumulative grade point average of 2.4649 and a .70407 standard deviation.

Table 45 presents mean, standard deviation, and frequency (*N*) for the dependent variable grade twelve weighted cumulative grade point average and the independent variable gender for the non music population.

Table 45

Mean(a), Standard Deviation, and Frequency (N) for by Gender for the Non Music Population.

Gender		Grade 12 Weighted Cumulative Grade Point Average
Female	Mean	2.6340
	Std. Deviation	.70648
	N	652
Male	Mean	2.4649
	Std. Deviation	.70407
	N	635
Total	Mean	2.5505
	Std. Deviation	.71007
	N	1,287

a. Grade Twelve Weighted Cumulative Grade Point Average

The highest mean grade twelve weighted cumulative grade point average among the independent variable ethnicity for the non music population is reported among Whites with a mean grade twelve weighted cumulative grade point average of 2.9012 and a .70832 standard deviation. In opposition, the lowest mean grade twelve weighted cumulative grade point average among the independent variable ethnicity for the non music population is reported among African Americans with a mean grade twelve weighted cumulative grade point average of 2.2984 and a .59975 standard deviation.

Table 46 presents mean, standard deviation, and frequency (*N*) for the dependent variable grade twelve weighted cumulative grade point average and the independent variable ethnicity for the non music population. In view of the fact that all participants in the non music population are not enrolled in a music course, the independent variable formal music courses or no formal music courses is moot and has been omitted from analysis.

There are several statistically significant correlations among the independent variables and the dependent variable grade twelve weighed cumulative grade point average at the 0.05 (2-tailed) and the 0.01 (2-tailed) levels for the non music population. Table 47 presents correlations for all independent variables and the dependent variable grade twelve weighted cumulative grade point average for the non music population. Statistical significance at the 0.05 level is indicated with one asterisk (*) and statistical significance at the 0.01 level is indicated with two asterisks (**).

Since all students in this population are not enrolled in a music course, the independent variable subject and number of years enrolled in a formal music course or no formal music course and the independent variable formal music courses or no formal music courses are constant. Therefore, several correlations cannot be computed and are indicated accordingly.

Table 46

Mean(a), Standard Deviation, and Frequency (N) by Ethnicity for the Non Music Population.

Ethnicity		Grade 12 Weighted Cumulative Grade Point Average
African American	Mean	2.2984
	Std. Deviation	.59975
	N	703
Asian/Pacific Islander	Mean	2.8480
	Std. Deviation	.76444
	N	49
Hispanic	Mean	2.5889
	Std. Deviation	.65105
	N	65
Native American/Alaskan Native	Mean	2.4800
	Std. Deviation	.64132
	N	12

White	Mean	2.9012
	Std. Deviation	.70832
	N	457
Unspecified	Mean	2.7675
	Std. Deviation	1.01890
	N	4
Total	Mean	2.5505
	Std. Deviation	.71007
	N	1,287

a. Grade Twelve Weighted Cumulative Grade Point Average

Table 47

Grade Twelve Weighted Cumulative Grade Point Average Correlations for the Non Music Population

		Subject and Number of Years	Gender	Ethnicity	Formal Music or No Formal Music	Grade 12 GPA
Subject and Number of Years	Pearson Correlation	a.	a.	a.	a.	a.
	Sig. (2-tailed)					
	N	1,287	1,287	1,287	1,287	1,287
Gender	Pearson Correlation	a.	1	.055a	a.	-.119**
	Sig. (2-tailed)			.050		.000
	N	1,287	1,287	1,287	1,287	1,287
Ethnicity	Pearson Correlation	a.	.055*	1	a.	.386**
	Sig. (2-tailed)		.050			.000
	N	1,287	1,287	1,287	1,287	1,287
Formal Music or No Formal Music	Pearson Correlation	a.	a.	a.	a.	a.
	Sig. (2-tailed)					
	N	1,287	1,287	1,287	1,287	1,287
Grade 12 GPA	Pearson Correlation	a.	-.119**	.386**	a.	1
	Sig. (2-tailed)		.000	.000		
	N	1,287	1,287	1,287	1,287	1,287

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
a. Cannot be computed because at least one of the variables is constant.

Table 48 presents the model summary for the independent variables gender and ethnicity and the dependent variable grade twelve weighted cumulative grade point average for the non music population. The independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music courses are constants or have missing correlations. Therefore, they have been deleted from analysis.

Table 48

Model Summary (b) for Gender and Ethnicity for the Non Music Population.

		Adjusted	Std. Error	Change Statistics				
	R	*R*	of the	*R* Square	*F*			Sig. *F*
R	Square	Square	Estimate	Change	Change	*df*1	*df*2	Change
.411a	.169	.168	.64778	.169	130.608	2	1,284	.000

a. Predictors: (Constant), Gender and Ethnicity
b. Dependent Variable: Grade Twelve Weighted Cumulative Grade Point Average

Table 49 presents the analysis of variance (ANOVA) for the independent variables gender and ethnicity and the dependent variable grade twelve weighted cumulative grade point average for the non music population. Again, since the independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music courses are constants or have missing correlations, they are deleted from analysis.

Table 49

Analysis of Variance (ANOVA)[b] for Gender and Ethnicity for the Non Music Population.

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	109.612	2	54.806	130.608	.000a
Residual	538.792	1,284	.420		
Total	648.403	1,286			

a. Predictors: (Constant), Gender and Ethnicity.
b. Dependent Variable: Grade Twelve Weighted Cumulative Grade Point Average.

Table 50 presents coefficients for the independent variables gender and ethnicity and the dependent variable grade twelve weighted cumulative grade point average for the non music population. Once again, since the independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music courses are constants or have missing correlations, they are deleted from analysis.

For the non music population's independent variables and the dependent variable grade twelve weighted cumulative grade point average, the mean predicted value is 2.5505 and the standard deviation is .29195. The mean standardized predicted value is .000 and the standard deviation is 1.000. The mean standard error of the predicted value is .031 and the standard deviation is .003. The mean adjusted predicted value is 2.5506 and the standard deviation is .29196. The mean residual is .00000 and the standard deviation is .64728. The mean standard residual is .000 and the standard deviation is .999. The mean studentized residual is .000 and the standard deviation is .000. The mean deleted residual is -.00001 and the standard deviation is .64882. Finally, the mean studentized deleted residual is .000 and the standard deviation is 1.001.

Table 50

Coefficients(a) for Gender and Ethnicity for the Non Music Population.

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for *B*	
	B	Std. Error	*Beta*	*t*	Sig.	Lower Bound	Upper Bound
(Constant)	2.461	.061		40.339	.000	2.342	2.581
Gender	-.200	.036	-.141	-5.522	.000	-.271	-.129
Ethnicity	.149	.010	.394	15.469	.000	.130	.168

a. Dependent Variable: Grade Twelve Weighted Cumulative Grade Point Average.

Table 51 presents residual statistics for the dependent variable grade twelve weighted cumulative grade point average for the non music population (N = 1,287).

Regression scatter plots for the dependent variable grade twelve weighted cumulative grade point average for the non music population are presented in Appendix J.

Number of Absences in Grade Twelve

As indicated, the mean number of absences in grade twelve for the entire study population is 16.17 and the standard deviation is 13.790. Data indicate the mean number of absences in grade twelve for the music population is 14.44 with a 12.511 standard deviation. Conversely, the mean number of absences in grade twelve for the non music population is 16.78 with a 14.168 standard deviation.

Table 52 presents frequency (N), mean number of absences in grade twelve, and standard deviation for the entire population, the music population, and the non music population.

Table 51

Residual Statistics(a) for the Non Music Population.

	Minimum	Maximum	Mean	SD	*N*
Predicted Value	2.2110	3.1564	2.5505	.29195	1,287
Std. Predicted Value	-1.163	2.075	.000	1.000	1,287
Standard Error of Predicted Value	.026	.042	.031	.003	1,287
Adjusted Predicted Value	2.2063	3.1616	2.5506	.29196	1,287
Residual	-1.52750	2.10897	.00000	.64728	1,287
Std. Residual	-2.358	3.256	.000	.999	1,287
Stud. Residual	-2.361	3.259	.000	1.000	1,287
Deleted Residual	-1.53170	2.11366	-.00001	.64882	1,287
Stud. Deleted Residual	-2.366	3.272	.000	1.001	1,287

a. Dependent Variable: Grade Twelve Cumulative Grade Point Average.

Table 52

Frequency (N), Mean(a), and Standard Deviation for All Populations.

Population	Frequency (*N*)	Mean Number of Absences in Grade 12	Standard Deviation
Music Population	454	14.44	12.511
Non Music Population	1,287	16.78	14.168
Total Population	1,741	16.17	13.790

a. Number of Absences in Grade Twelve

Entire Study Population

The lowest mean number of absences in grade twelve among the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the entire study population is reported in the category VIMusic-1 or a combination of vocal and instrumental music for one year with a mean number of absences in grade twelve of 9.00 and a 8.485 standard deviation.

In opposition, the highest mean number of absences in grade twelve among the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the entire study population is reported in the category VMusic-1 or vocal music for one year with a mean number of absences in grade twelve of 18.22 and a 14.027 standard deviation.

Figure 12 presents a line graph of the estimated marginal mean number of absences in grade twelve for all study participants who have participated in formal music courses from one to four years or no formal music courses.

Table 53 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve among the independent variable subject and number of years enrolled in formal music courses or no formal music courses in grade nine through twelve for the entire study population.

The lowest mean number of absences in grade twelve among the independent variable gender for the entire study population is reported among males with a mean number of absences in grade twelve of 15.25 and a 13.243 standard deviation. Therefore, the highest mean number of absences in grade twelve among the independent variable gender for the entire study population is reported among females with a mean number of absences in grade twelve of 16.98 and a 14.211 standard deviation.

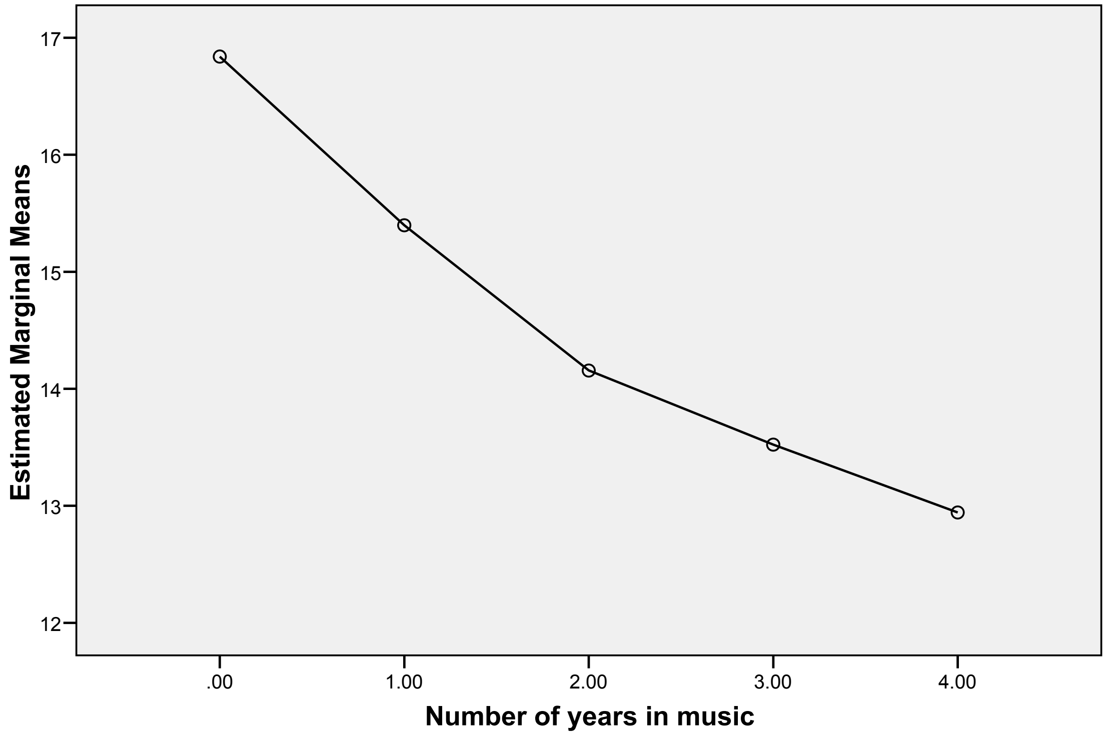


Figure 12. *Estimated Marginal Mean Number of Absences in Grade Twelve by Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Entire Study Population.*

Table 54 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve for the independent variable gender among the entire study population.

The lowest mean number of absences in grade twelve among the independent variable ethnicity for the entire study population is reported among Whites with a mean number of absences in grade twelve of 16.14 and a 13.439 standard deviation.

In opposition, the highest mean number of absences in grade twelve among the independent variable ethnicity for the entire study population is reported in the unspecified ethnic group with a mean number of absences in grade twelve of 26.40 and a 20.756 standard deviation.

Table 53

Mean(a), Standard Deviation, and Frequency (N) by Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Entire Study Population.

Subject and Number of Years Enrolled in Music or No Music		Number of Absences in Grade 12
VMusic-1	Mean	18.22
	Std. Deviation	14.027
	N	78
VMusic-2	Mean	16.23
	Std. Deviation	11.437
	N	30
VMusic-3	Mean	15.29
	Std. Deviation	14.118
	N	42
VMusic-4	Mean	14.00
	Std. Deviation	1.414
	N	2

IMusic-1	Mean	13.42
	Std. Deviation	10.573
	N	88
IMusic-2	Mean	12.33
	Std. Deviation	9.995
	N	51
IMusic-3	Mean	12.81
	Std. Deviation	13.720
	N	83
IMusic-4	Mean	16.03
	Std. Deviation	15.098
	N	29
VIMusic-1	Mean	9.00
	Std. Deviation	8.485
	N	2

VIMusic-2	Mean	17.60
	Std. Deviation	10.690
	N	10
VIMusic-3	Mean	14.20
	Std. Deviation	13.001
	N	15
VIMusic-4	Mean	9.79
	Std. Deviation	7.390
	N	24
VMusic-0; IMusic-0	Mean	16.78
	Std. Deviation	14.168
	N	1,287
Total	Mean	16.17
	Std. Deviation	13.790
	N	1,741

a. Number of Absences in Grade Twelve

Table 54

Mean(a), Standard Deviation, and Frequency (N) by Gender for the Entire Study Population.

Gender		Number of Absences in Grade 12
Female	Mean	16.98
	Std. Deviation	14.211
	N	927
Male	Mean	15.25
	Std. Deviation	13.243
	N	814
Total	Mean	16.17
	Std. Deviation	13.790
	N	1,741

a. Number of Absences in Grade Twelve

Table 55 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve and the independent variable ethnicity among the entire study population.

The lowest mean number of absences in grade twelve among the independent variable formal music courses or no formal music courses for the entire study population is reported in formal music courses with a mean number of absences in grade twelve of 14.44 and a 12.511 standard deviation. Therefore, the highest mean number of absences in grade twelve among the independent variable formal music courses or no formal music courses for the entire study

Table 55

Mean(a), Standard Deviation, and Frequency (N) by Ethnicity for the Entire Study Population.

Ethnicity		Number of Absences in Grade 12
African American	Mean	16.03
	Std. Deviation	13.925
	N	916
Asian/Pacific Islander	Mean	15.91
	Std. Deviation	15.535
	N	65
Hispanic	Mean	16.44
	Std. Deviation	12.293
	N	79
Native American/Alaskan Native	Mean	22.79
	Std. Deviation	17.485
	N	14

White	Mean	16.14
	Std. Deviation	13.439
	N	662
Unspecified	Mean	26.40
	Std. Deviation	20.756
	N	5
Total	Mean	16.17
	Std. Deviation	13.790
	N	1,741

a. Number of Absences in Grade Twelve

population is reported in the independent variable no formal music courses with a mean number of absences in grade twelve of 16.78 and a standard deviation of 14.168.

Table 56 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve among the independent variable formal music courses or no formal music courses for the entire study population.

Table 56

Mean(a), Standard Deviation, and Frequency (N) by Formal Music Courses or No Formal Music Courses for the Entire Study Population.

Formal Music Courses or No Formal Music Courses		Number of Absences in Grade 12
Formal Music Courses	Mean	14.44
	Standard Deviation	12.511
	N	454
No Formal Music Courses	Mean	16.78
	Standard Deviation	14.168
	N	1,287
Total	Mean	16.17
	Standard Deviation	13.790
	N	1,741

a. Number of Absences in Grade Twelve

Figure 13 presents a line graph of the estimated mean number of absences in grade twelve by formal music courses or no formal music courses for the entire study population.

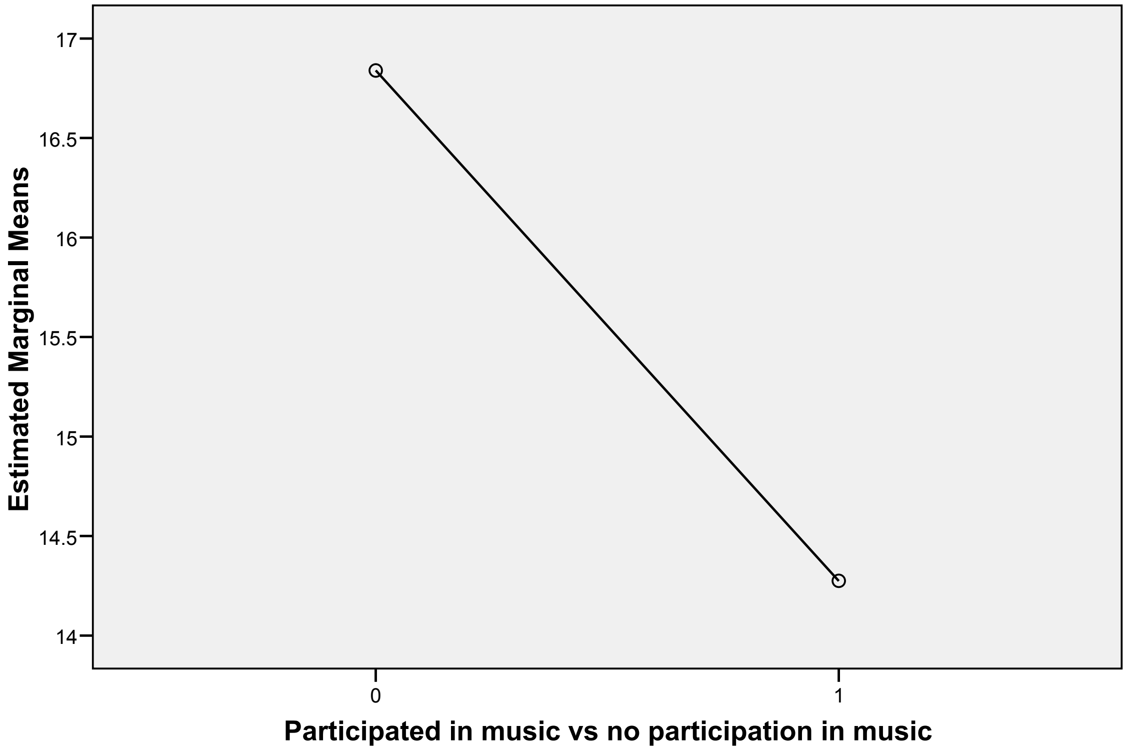


Figure 13. Estimated Marginal Mean Number of Absences in Grade Twelve by Formal Music Courses or No Formal Music Courses for the Entire Study Population.

There are several statistically significant correlations among the independent variables and the dependent variable number of absences in grade twelve at the 0.05 (2-tailed) and the 0.01 (2-tailed) levels for the entire study population.

Table 57 presents correlations for all independent variables and the dependent variable number of absences in grade twelve for the entire study population. Statistical significance at the 0.05 level is indicated with one asterisk (*) and statistical significance at the 0.01 level is indicated with two asterisks (**).

Table 57

Number of Absences in Grade Twelve Correlations for the Entire Study Population.

		Subject and Number of Years	Gender	Ethnicity	Formal Music or No Formal Music	Number of Absences in Grade 12
Subject and Number of Years	Pearson Correlation	1	.108**	-.056*	.907**	.041
	Sig. (2-tailed)		.000	.019	.000	.085
	N	1,741	1,741	1,741	1,741	1,741
Gender	Pearson Correlation	.108**	1	.051*	.087**	-.062**
	Sig. (2-tailed)	.000		.035	.000	.009
	N	1,741	1,741	1,741	1,741	1,741
Ethnicity	Pearson Correlation	-.056*	.051*	1	-.079**	.010
	Sig. (2-tailed)	.019	.035		.001	.663
	N	1,741	1,741	1,741	1,741	1,741
Formal Music or No Formal Music	Pearson Correlation	.907**	.087**	-.079**	1	.074**
	Sig. (2-tailed)	.000	.000	.001		.002
	N	1,741	1,741	1,741	1,741	1,741
Number of Absences in Grade 12	Pearson Correlation	.041	-.062**	.010	.074**	1
	Sig. (2-tailed)	.085	.009	.663	.002	
	N	1,741	1,741	1,741	1,741	1,741

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 58 presents the results of univariate analysis of variance tests of between-subjects effects for the dependent variable number of absences in grade twelve for the entire study population.

Table 59 presents the model summary for all independent variables and the dependent variable number of absences in grade twelve after controlling for gender and ethnicity for the entire study population.

Table 60 presents the analysis of variance (ANOVA) for the independent variables and the dependent variable number of absences in grade twelve after controlling for gender and ethnicity for the entire study population.

Table 61 presents coefficients for each of the independent variables and the dependent variable number of absences in grade twelve after controlling for gender and ethnicity for the entire study population.

Table 62 presents a model summary of excluded variables for the dependent variable number of absences in grade twelve after controlling for gender and ethnicity.

Subsequent regression statistics are presented for the dependent variable number of absences in grade twelve for the entire study population (N = 1,741).

The mean predicted value is 16.17 and the standard deviation is 1.638. The mean standardized predicted value is .000 and the standard deviation is 1.000. The mean standard error of the predicted value is .703 and the standard deviation is .212. The mean adjusted predicted value is 16.17 and the standard deviation is 1.639. The mean residual is .000 and the standard deviation is 13.692. The mean standardized residual is .000 and the standard deviation is .999. The mean studentized residual is .000 and the standard deviation is 1.000. The mean deleted residual is .000 and the standard deviation is 13.729. Finally, the mean studentized deleted residual is .000 and the standard deviation is 1.002.

Table 58

Univariate Analysis of Variance Tests of Between-Subjects Effects for Number of Absences in Grade Twelve for the Entire Study Population.

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.
Corrected Model	3876.058[a]	6	646.010	3.426	.002
Intercept	33373.390	1	33373.390	176.969	.000
Gender 2	1621.856	1	1621.856	8.600	.003
Ethnicity 2	74.731	1	74.731	.396	.529
Subject and Number of Years in Music	2564.917	4	641.229	3.400	.009
Error	327004.276	1,734	188.584		
Total	786131.000	1,741			
Corrected Total	330880.334	1,740			

a. R Squared = .012 (Adjusted R Squared = .008)

Table 59

Model Summary(c) for the Entire Study Population.

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	.063[a]	.004	.003	13.770	.004	3.457	2	1,738	.032
2	.108[b]	.012	.008	13.733	.008	3.400	4	1,734	.009

a. Predictors: (Constant), Recoded Ethnicity. Recoded Gender
b. Predictors: (Constant), Recoded Ethnicity, Recoded Gender, Recoded music versus no music2, Recoded music versus no music4, Recoded music versus no music3, Recoded music versus no music1
c. Number of Absences in Grade 12

Table 60

Analysis of Variance (ANOVA)[c] for the Entire Study Population.

Model		Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	1311.142	2	855.571	3.457	.032[a]
	Residual	329569.19	1,738	189.626		
	Total	330880.33	1,740			
2	Regression	3876.058	5	646.010	3.426	.002[b]
	Residual	327004328	1,734	188.584		
	Total	330880.33	1,740			

a. Predictors: (Constant), Recoded Ethnicity, Recoded Gender
b. Predictors: (Constant), Recoded Ethnicity, Recoded Gender, Recoded music versus no music2, Recoded music versus no music4, Recoded music versus music3, Recoded music versus no music1
c. Dependent Variable: Number of Absences in Grade 12

Table 63 presents residual statistics for the dependent variable number of absences in grade twelve among the entire study population (N = 1,741).

Regression scatter plots for the dependent variable number of absences in grade twelve for the entire study population are presented in Appendix K.

Table 61

Coefficients for the Entire Study Population.

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	*t*	Sig.
1	(Constant)	15.031	.825		18.215	.000
	Recoded Gender	1.737	.662	.063	2.622	.009
	Recoded Ethnicity	.116	.351	.008	.330	.741
2	(Constant)	15.393	.831		18.534	.000
	Recoded Gender	1.947	.664	.070	2.933	.003
	Recoded Ethnicity	.221	.352	.015	.630	.529
	Recoded Music versus No Music1	-1.441	1.131	-.031	-1.275	.203
	Recoded Music versus No Music2	-2.683	1.490	-.043	-1.800	.072
	Recoded Music versus No Music3	-3.316	1.227	-.065	-2.702	.007
	Recoded Music versus No Music4	-3.897	1.895	-.049	-2.056	.040

a. Dependent Variable: Number of Absences in Grade 12.

Table 62

Excluded Variables(b).

Model		*Beta* In	*t*	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	Recoded music versus no music1	-.018a	-.735	.462	-.018	.995
	Recoded music versus no music2	-.034a	-1.428	.153	-.034	1.000
	Recoded music versus no music3	-.056a	-2.350	.019	-.053	.994
	Recoded music versus no music4	-.042a	-1.749	.081	-.042	.997

a. Predictors in the Model (Constant), Recoded Ethnicity, Recoded Gender
b. Dependent Variable: Number of Absences in Grade 12

Table 63

Residual Statistics for the Entire Study Population.

	Minimum	Maximum	Mean	Std. Deviation	*N*
Predicted Value	9.58	18.24	16.17	1.638	1,741
Std. Predicted Value	-4.023	1.265	.000	1.000	1,741
Standard Error of Predicted Value	.510	1.628	.703	.212	1,741
Adjusted Predicted Value	9.43	18.17	16.17	1.639	1,741
Residual	-18.080	72.415	.000	13.692	1,741
Std. Residual	-1.319	5.283	.000	.999	1,741
Stud. Residual	-1.320	5.288	.000	1.000	1,741
Deleted Residual	-18.123	72.549	.000	13.729	1,741
Stud. Deleted Residual	-1.321	5.329	.000	1.002	1,741

a. Dependent Variable: Number of Absences in Grade Twelve.

Music Population

In comparison to the entire study population's (*N* = 1,741) mean number of absences in grade twelve of 16.17 and 13.790 standard deviation, the music population's (*N* = 454) mean number of absences in grade twelve is 14.44 with a 12.511 standard deviation.

The lowest mean number of absences in grade twelve among the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the music population is reported in the category VIMusic-4 or a combination of vocal and instrumental music courses for four years with a mean number of absences in grade twelve of 9.79 and a 7.390 standard deviation.

In opposition, the highest mean number of absences in grade twelve among the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the music population is reported in the category VMusic-1 or one year of vocal music with a mean number of absences in grade twelve of 18.22 and a 14.027 standard deviation.

Table 64 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve and the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the music population.

The lowest number of absences in grade twelve among the independent variable gender for the music population is reported among males with a mean number of absences in grade twelve of 14.22 and a 12.911 standard deviation. Therefore, female music students have the highest mean number of absences in grade twelve with a mean number of absences in grade twelve of 14.59 and a 12.266 standard deviation.

Table 65 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve and the independent gender for the music population.

Table 64

Mean[a], Standard Deviation, and Frequency (N) for by Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Music Population.

Subject and Number of Years Enrolled in Music or No Music		Mean Number of Absences in Grade 12
VMusic-1	Mean	18.22
	Std. Deviation	14.027
	N	78
VMusic-2	Mean	16.23
	Std. Deviation	11.437
	N	30
VMusic-3	Mean	15.29
	Std. Deviation	14.118
	N	42

VMusic-4	Mean	14.00
	Std. Deviation	1.414
	N	2
IMusic-1	Mean	13.42
	Std. Deviation	10.573
	N	88
IMusic-2	Mean	12.33
	Std. Deviation	9.995
	N	51
IMusic-3	Mean	12.81
	Std. Deviation	13.720
	N	83
IMusic-4	Mean	16.03
	Std. Deviation	15.098
	N	29

VIMusic-1	Mean	9.00
	Std. Deviation	8.485
	N	2
VIMusic-2	Mean	17.60
	Std. Deviation	10.690
	N	10
VIMusic-3	Mean	14.20
	Std. Deviation	13.001
	N	15
VIMusic-4	Mean	9.79
	Std. Deviation	7.390
	N	24
Total	Mean	14.44
	Std. Deviation	12.511
	N	454

a. Number of Absences in Grade 12

Table 65

Mean(a), Standard Deviation, and Frequency (N) by Gender for the Music Population.

Gender		Number of Absences in Grade 12
Female	Mean	14.59
	Std. Deviation	12.266
	N	275
Male	Mean	14.22
	Std. Deviation	12.911
	N	179
Total	Mean	14.44
	Std. Deviation	12.511
	N	454

a. Number of Absences in Grade 12

The lowest mean number of absences in grade twelve among the independent variable ethnicity for the music population is reported among Asian/Pacific Islanders with a mean number of absences in grade twelve of 10.69 and a 19.527 standard deviation.

In opposition, the highest mean number of absences in grade twelve among the independent variable ethnicity for the music population is reported among the unspecified ethnic group with a mean number of absences in grade twelve of 38.00. Once again, since there is only one student in this ethnic group, the standard deviation is not reported.

Table 66 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve and the independent variable ethnicity among the music population.

In view of the fact that all participants in the music population are enrolled in a music course, the independent variable formal music courses or no formal music courses is moot and has been omitted from analysis. Nonetheless, Table 67 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve and the independent variable formal music courses for the music population and the entire study population.

There are several statistically significant correlations among the independent variables and the dependent variable number of absences in grade twelve at the 0.05 (2-tailed) and 0.01 (2-tailed) levels for the non music population.

Table 68 presents correlations for all independent variables and the dependent variable number of absences in grade twelve for the music population. Statistical significance at the 0.05 level is indicated with one asterisk (*) and statistical significance at the 0.01 level is indicated with two asterisks (**).

All students are enrolled in a music course. Therefore, the independent variable formal music courses or no formal music courses is moot and analysis is omitted.

Table 69 presents the model summary for the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, and ethnicity and the dependent variable number of absences in grade twelve for the music population. Again, since the independent variable formal music courses or no formal music courses has missing correlations, it has been deleted from the analysis.

Table 66

Mean(a), Standard Deviation, and Frequency (N) by Ethnicity for the Music Population.

Ethnicity		Number of Absences in Grade 12
African American	Mean	14.36
	Std. Deviation	12.409
	N	213
Asian/Pacific Islander	Mean	10.69
	Std. Deviation	9.527
	N	16
Hispanic	Mean	12.88
	Std. Deviation	7.541
	N	17
Native American/Alaskan Native	Mean	16.00
	Std. Deviation	4.243
	N	2

White	Mean	14.82
	Std. Deviation	13.121
	N	205
Unspecified	Mean	38.00
	Std. Deviation	-
	N	1
Total	Mean	14.44
	Std. Deviation	12.511
	N	454

a. Number of Absences in Grade 12

Table 67

Mean(a), Standard Deviation, and Frequency (N) by Formal Music Courses or No Formal Music Courses for the Music Population and the Entire Study Population.

Formal Music Courses or No Formal Music Courses		Mean Number of Absences in Grade 12
Formal Music Courses	Mean	14.44
	Standard Deviation	12.511
	N	454
Total	Mean	16.17
	Standard Deviation	13.790
	N	1,741

a. Number of Absences in Grade Twelve

Table 68

Number of Absences in Grade Twelve Correlations for the Music Population.

		Subject and Number of Years	Gender	Ethnicity	Formal Music or No Formal Music	Number of Absences in Grade 12
Subject and Number of Years	Pearson Correlation	1	.139**	.070	.a	-.134**
	Sig. (2-tailed)		.003	.135	-	.004
	N	454	454	454	454	454
Gender	Pearson Correlation	.139**	1	.067	.a	-.015
	Sig. (2-tailed)	.003		.155	-	.755
	N	454	454	454	454	454
Ethnicity	Pearson Correlation	.070	.067	1	.a	.030
	Sig. (2-tailed)	.135	.155		-	.529
	N	454	454	454	454	454
Formal Music or No Formal Music	Pearson Correlation	.a	.a	.a	.a	.a
	Sig. (2-tailed)	-	-	-	-	-
	N	454	454	454	454	454
Number of Absences in Grade 12	Pearson Correlation	-.134**	-.015	.030	.a	1
	Sig. (2-tailed)	.004	.755	.529	-	
	N	454	454	454	454	454

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
a. Cannot be computed because at least one of the variables is constant.

Table 69

Model Summary(b) for the Music Population.

		Adjusted	Std. Error	Change Statistics				
	R	*R*	of the	*R* Square	*F*			Sig. *F*
R	Square	Square	Estimate	Change	Change	*df*1	*df*2	Change
.104a	.020	.013	12.430	.020	2.985	3	450	.031

a. Predictors: (Constant), Subject and Number of Years Enrolled in Music or No Music (Grades 9-12), Gender, and Ethnicity.
b. Dependent Variable: Number of Absences in Grade Twelve.

Table 70 presents the analysis of variance (ANOVA) for the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, and ethnicity and the dependent variable number of absences in grade twelve for the music population. Once more, since the independent variable formal music courses or no formal music courses has missing correlations, it has been deleted from the analysis.

Table 71 presents coefficients for the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, and ethnicity and the dependent variable number of absences in grade twelve for the music population. Since the independent variable formal music courses or no formal music courses has missing correlations, it has been deleted from the analysis.

Subsequent regression statistics are presented for the dependent variable number of absences in grade twelve for the music population ($N = 454$).

Table 70

Analysis of Variance (ANOVA)[b] for the Music Population.

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	1383.422	3	461.141	2.985	.031a
Residual	69526.701	450	154.504		
Total	70910.123	453			

a. Predictors: (Constant), Subject and Number of Years Enrolled in Music or No Music (Grades 9-12), Gender, and Ethnicity.
b. Dependent Variable: Number of Absences in Grade Twelve.

Table 71

Coefficients for the Music Population.

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for *B*	
	B	Std. Error	*Beta*	*t*	Sig.	Lower Bound	Upper Bound
(Constant)	16.584	2.062		8.042	.000	12.531	20.637
Subject and Number of Years Enrolled in Music or No Music	-.557	.192	-.137	-2.902	.004	-.934	-.180
Gender	.046	1.207	.002	.038	.969	-2.327	2.419
Ethnicity	.253	.303	.039	.835	.404	-.342	.848

a. Dependent Variable: Number of Absences in Grade Twelve.

The mean predicted value is 14.44 and the standard deviation is 1.748. The mean standardized predicted value is .000 and the standard deviation is 1.000. The mean standard error of the predicted value is 1.153 and the standard deviation is .177. The mean adjusted predicted value is 14.44 and the standard deviation is 1.751. The mean residual is .000 and the standard deviation is 12.389. The mean standardized residual is .000 and the standard deviation is .997. The mean studentized residual is .000 and the standard deviation is 1.001. The mean deleted residual is .002 and the standard deviation is 12.497. Finally, the mean studentized deleted residual is .002 and the standard deviation is 1.007.

Table 72 presents residual statistics for the dependent variable number of absences in grade twelve for the music population ($N = 454$).

Table 72

Residual Statistics for the Music Population.

	Minimum	Maximum	Mean	Std. Deviation	*N*
Predicted Value	10.20	17.64	14.44	1.748	454
Std. Predicted Value	-2.431	1.827	.000	1.000	454
Standard Error of Predicted Value	.751	1.673	1.153	.177	454
Adjusted Predicted Value	10.07	17.50	14.44	1.751	454
Residual	-16.270	69.958	.000	12.389	454
Std. Residual	-1.309	5.628	.000	.997	454
Stud. Residual	-1.315	5.651	.000	1.001	454
Deleted Residual	-16.433	70.519	.002	12.497	454
Stud. Deleted Residual	-1.317	5.856	.002	1.007	454

a. Dependent Variable: Number of Absences in Grade Twelve.

Regression scatter plots for the dependent variable number of absences in grade twelve for the music population are presented in Appendix L.

Non Music Population

In comparison to the entire study population of 1,741 ($N = 1{,}741$) and the music population of 454 ($N = 454$), there are 1,287 non music students or 73.9% of the total population. As indicated, the mean number of absences in grade twelve for the entire study population is 16.17 with a 13.790 standard deviation. However, the mean number of absences in grade twelve for the non music population ($N = 1{,}287$) is 16.78 with a 14.168 standard deviation.

Since all participants in the non music population are not enrolled in a music course, the independent variable subject and number of years enrolled in formal music courses or no formal music courses is moot. Therefore, the categories within the independent variable subject and number of years enrolled in formal music courses or no formal music courses are restricted to the category VMusic-0; IMusic-0 or no vocal or instrumental music courses and have been omitted from analysis.

Nonetheless, Table 73 presents frequency (*N*), mean number of absences in grade twelve, and standard deviation for the category VMusic-0; IMusic-0 for the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the non music population.

In contrast to the total study population and the music population, the lowest number of absences in grade twelve among the independent variable gender for the non music population is reported among males with a mean number of absences in grade twelve of 15.54 and a 13.331 standard deviation. Therefore, female music students have the highest mean number of absences in grade twelve with a mean number of absences in grade twelve of 17.98 and a 14.850 standard deviation.

Table 73

Frequency (N), Mean(a) and Standard Deviation by Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Non Music Population.

Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses		Number of Absences in Grade 12
VMusic-0; IMusic-0	Mean	16.78
	Standard Deviation	14.168
	N	1,287
Total Population	Mean	16.17
	Standard Deviation	13.790
	N	1,741

a. Number of Absences in Grade 12

Table 74 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve and the independent variable gender for the non music population.

The lowest mean number of absences in grade twelve among the independent variable ethnicity for the non music population is reported among African Americans with a mean number of absences in grade twelve of 16.54 and a 14.322 standard deviation.

In opposition, the highest mean number of absences in grade twelve among the independent variable ethnicity for the non music population is reported among Native Americans/Alaskan Natives with a mean number of absences in grade twelve of 23.92 and a 13.551 standard deviation.

Table 74

Mean(a), Standard Deviation, and Frequency (N) by Gender for the Non Music Population.

Gender		Number of Absences in Grade 12
Female	Mean	17.98
	Std. Deviation	14.850
	N	652
Male	Mean	15.54
	Std. Deviation	13.331
	N	635
Total	Mean	16.78
	Std. Deviation	14.168
	N	1,287

a. Number of Absences in Grade 12

Table 75 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve and the independent variable ethnicity for the non music population.

In view of the fact that all participants in the non music population are not enrolled in a music course, the independent variable formal music courses or no formal music courses is moot and has been omitted from analysis.

Nonetheless, Table 76 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of absences in grade twelve and the independent variable formal music courses or no formal music courses for the non music population and the entire study population.

Table 75

Mean(a), Standard Deviation, and Frequency (N) by Ethnicity for the Non Music Population.

Ethnicity		Number of Absences in Grade 12
African American	Mean	16.54
	Std. Deviation	14.322
	N	703
Asian/Pacific Islander	Mean	17.61
	Std. Deviation	16.774
	N	49
Hispanic	Mean	17.42
	Std. Deviation	13.184
	N	65
Native American/Alaskan Native	Mean	23.92
	Std. Deviation	18.706
	N	12

White	Mean	16.73
	Std. Deviation	13.51
	N	457
Unspecified	Mean	23.50
	Std. Deviation	22.767
	N	4
Total	Mean	16.78
	Std. Deviation	14.168
	N	1,287

a. Number of Absences in Grade 12

Table 76

Mean[a], Standard Deviation, and Frequency (N) by Formal Music Courses or No Formal Music Courses for the Non Music Population and the Entire Study Population.

Formal Music Courses or No Formal Music Courses		Number of Absences in Grade 12
No Formal Music Courses	Mean	16.78
	Standard Deviation	14.168
	N	1,287
Total Population	Mean	16.17
	Standard Deviation	13.790
	N	1,741

a. Number of Absences in Grade 12

There are several statistically significant correlations among the independent variables and the dependent variable number of absences in grade twelve at the 0.05 (2-tailed) and the 0.01 (2-tailed) levels for the non music population.

Table 77 presents correlations for all independent variables and the dependent variable number of absences in grade twelve for the non music population. Statistical significance at the 0.05 level is indicated with one asterisk (*) and statistical significance at the 0.01 level is indicated with two asterisks (**).

Since all students in this population are not enrolled in a music course, the independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music courses are constant. Therefore, several correlations cannot be computed and are indicated accordingly.

Table 77

Number of Absences in Grade Twelve Correlations for the Non Music Population

		Subject and Number of Years	Gender	Ethnicity	Formal Music or No Formal Music	Number of Absences in Grade 12
Subject and Number of Years	Pearson Correlation	a.	a.	a.	a.	a.
	Sig. (2-tailed)					
	N	1,287	1,287	1,287	1,287	1,287
Gender	Pearson Correlation	a.	1	.055a	a.	-.086**
	Sig. (2-tailed)			.050		.002
	N	1,287	1,287	1,287	1,287	1,287
Ethnicity	Pearson Correlation	a.	.055*	1	a.	.012
	Sig. (2-tailed)		.050			.661
	N	1,287	1,287	1,287	1,287	1,287
Formal Music or No Formal Music	Pearson Correlation	a.	a.	a.	a.	a.
	Sig. (2-tailed)					
	N	1,287	1,287	1,287	1,287	1,287
Number of Absences in Grade 12	Pearson Correlation	a.	-.086**	.012	a.	1
	Sig. (2-tailed)		.002	.661		
	N	1,287	1,287	1,287	1,287	1,287

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
a. Cannot be computed because at least one of the variables is constant.

Table 78 presents the model summary for the independent variables gender and ethnicity and the dependent variable grade twelve weighted cumulative grade point average for the non music population. The independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music courses are constants or have missing correlations. Therefore, they have been deleted from analysis.

Table 78

Model Summary (b) for the Non Music Population.

		Adjusted	Std. Error	Change Statistics				
	R	*R*	of the	*R* Square	*F*			Sig.
R	Square	Square	Estimate	Change	Change	*df*1	*df*2	*F* Change
.088a	.008	.006	14.124	.008	4.986	2	1,284	.007

a. Predictors: (Constant), Gender and Ethnicity.
b. Dependent Variable: Number of Absences in Grade Twelve.

Table 79 presents the analysis of variance (ANOVA) for the independent variables gender and ethnicity and the dependent variable number of absences in grade twelve for the non music population. Again, since the independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music courses are constants or have missing correlations, they are deleted from analysis.

Table 79

Analysis of Variance (ANOVA)[b] for the Non Music Population.

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	1989.491	2	994.745	4.986	.007a
Residual	256151.84	1,284	199.495		
Total	258141.33	1,286			

a. Predictors: (Constant), Gender and Ethnicity.
b. Dependent Variable: Number of Absences in Grade Twelve.

Table 80 presents coefficients for the independent variables gender and ethnicity and the dependent variable number of absences in grade twelve for the non music population. Once again, since the independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music courses are constants or have missing correlations, they are deleted from analysis.

For the non music population's independent variables and the dependent variable number of absences in grade twelve, the mean predicted value is 16.78 and the standard deviation is 1.244. The mean standardized predicted value is .000 and the standard deviation is 1.000. The mean standard error of the predicted value is .679 and the standard deviation is .061. The mean adjusted predicted value is 16.78 and the standard deviation is 1.244. The mean residual is .00000 and the standard deviation is .64728. The mean standard residual is .000 and the standard deviation is 14.113. The mean studentized residual is .000 and the standard deviation is .999. The mean deleted residual is .000 and the standard deviation is 1.000. Finally, the mean studentized deleted residual is .000 and the standard deviation is 14.146.

Table 80

Coefficients for the Non Music Population.

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for *B*	
	B	Std. Error	*Beta*	*t*	Sig.	Lower Bound	Upper Bound
(Constant)	20.129	1.330		15.129	.000	17.519	22.739
Gender	-2.466	.789	-.087	-3.127	.002	-4.013	-.919
Ethnicity	.128	.210	.017	.611	.541	-.284	.541

a. Dependent Variable: Number of Absences in Grade Twelve.

Table 81 presents residual statistics for the dependent variable number of absences in grade twelve for the non music population (N = 1,287).

Regression scatter plots for the dependent variable number of absences in grade twelve for the non music population are presented in Appendix M.

Number of Discipline Referrals in Grade Nine through Grade Twelve

As indicated, the mean number of discipline referrals in grade nine through grade twelve for the entire study population is 3.46 and the standard deviation is 6.537. Data indicate the mean number of discipline referrals in grade nine through grade twelve for the music population is 2.00 with a 4.143 standard deviation. Conversely, the mean number of discipline referrals in grade nine through grade twelve for the non music population is 3.98 with a 7.124 standard deviation.

Table 81

Residual Statistics(a) for the Non Music Population.

	Minimum	Maximum	Mean	Std. Deviation	*N*
Predicted Value	15.32	18.43	16.78	1.244	1,287
Std. Predicted Value	-1.170	1.330	.000	1.000	1,287
Standard Error of Predicted Value	.563	.921	.679	.061	1,287
Adjusted Predicted Value	15.16	18.36	16.78	1.244	1,287
Residual	-18.305	72.675	.000	14.113	1,287
Std. Residual	-1.296	5.145	.000	.999	1,287
Stud. Residual	-1.298	5.151	.000	1.000	1,287
Deleted Residual	-18.358	72.837	.000	14.146	1,287
Stud. Deleted Residual	-1.298	5.203	.001	1.002	1,287

a. Dependent Variable: Number of Absences in Grade Twelve.

Table 82 presents frequency (*N*), mean number of discipline referrals in grade nine through grade twelve, and standard deviation for the entire population, the music population, and the non music population.

Entire Study Population

As indicated, the mean number of discipline referrals in grade nine through grade twelve for the entire population is 3.46 and the standard deviation is 6.537. However, the lowest mean number of discipline referrals in grade nine through grade twelve among the entire study population for the independent variable subject and number of years enrolled in formal music

Table 82

Frequency (N), Mean(a) and Standard Deviation for All Populations.

Population	Frequency (*N*)	Mean	Standard Deviation
Music Population	454	2.00	4.143
Non Music Population	1,287	3.98	7.124
Total Population	1,741	3.46	6.537

a. Number of Discipline Referrals in Grade 9 – 12.

courses or no formal music courses is reported in the category VIMusic-4 or a combination of vocal and instrumental music for four years with a mean number of discipline referrals in grade nine through grade twelve of .71 and the standard deviation is 1.160.

In opposition, the highest mean number of discipline referrals in grade nine through grade twelve among the entire study population for the independent variable subject and number of years enrolled in formal music courses or no formal music courses is reported in the category VIMusic-2 or a combination of vocal and instrumental music for two years with a mean number of discipline referrals in grade nine through grade twelve of 4.90 and a 9.362 standard deviation.

Figure 14 presents a line graph of the estimated marginal mean number of discipline referrals in grade nine through grade twelve for all study participants who have participated in formal music courses from one to four years or no formal music courses.

Table 83 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve among the

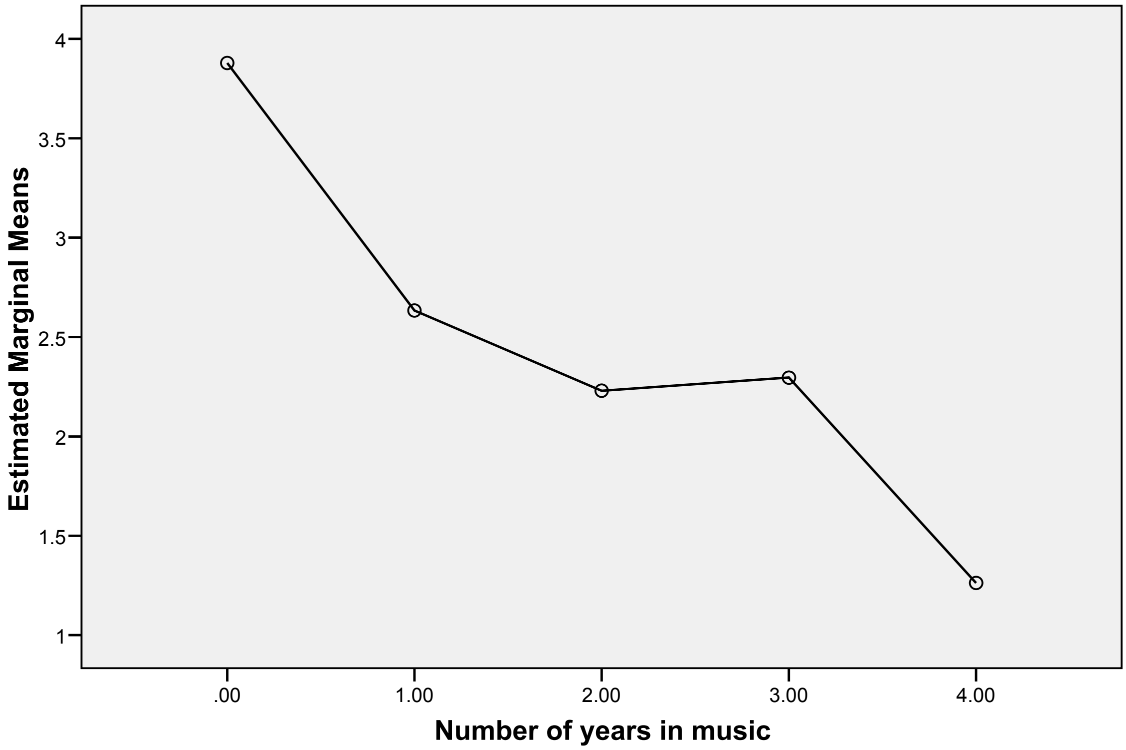


Figure 14. Estimated Marginal Mean Number of Discipline Referrals in Grade Nine through Grade Twelve by Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Entire Study Population.

---

independent variable subject and number of years enrolled in formal music courses or no formal music courses in grade nine through grade twelve for the entire study population.

Among both males and females in the entire study population, the mean number of discipline referrals is 3.46 and the standard deviation is 6.537. However, the lowest mean number of discipline referrals in grade nine through grade twelve among the independent variable gender for the entire study population is reported among females with a mean number of discipline referrals in grade nine through grade twelve of 3.06 and a 6.097 standard deviation. Therefore, the highest mean number of discipline referrals in grade nine through grade twelve

Table 83

Mean(a), Standard Deviation, and Frequency (N) by Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Entire Study Population.

Subject and Number of Years Enrolled in Music or No Music		Discipline Referrals in Grade 9 through Grade 12
VMusic-1	Mean	2.19
	Std. Deviation	4.896
	N	78
VMusic-2	Mean	2.03
	Std. Deviation	3.908
	N	30
VMusic-3	Mean	2.86
	Std. Deviation	4.872
	N	42
VMusic-4	Mean	1.50
	Std. Deviation	.707
	N	2

IMusic-1	Mean	2.50
	Std. Deviation	4.705
	N	88
IMusic-2	Mean	1.69
	Std. Deviation	3.766
	N	51
IMusic-3	Mean	1.13
	Std. Deviation	1.879
	N	83
IMusic-4	Mean	1.17
	Std. Deviation	1.965
	N	29
VIMusic-1	Mean	1.00
	Std. Deviation	1.414
	N	2

VIMusic-2	Mean	4.90
	Std. Deviation	9.362
	N	10
VIMusic-3	Mean	3.40
	Std. Deviation	5.068
	N	15
VIMusic-4	Mean	.71
	Std. Deviation	1.160
	N	24
VMusic-0; IMusic-0	Mean	3.98
	Std. Deviation	7.124
	N	1,287
Total	Mean	3.46
	Std. Deviation	6.537
	N	1,741

a. Number of Discipline Referrals in Grade 9 - 12

among the independent variable gender for the entire study population is reported among males with a mean number of discipline referrals in grade nine through grade twelve of 3.93 and a 6.980 standard deviation.

Table 84 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve for the independent variable gender among the entire study population.

Table 84

Mean(a), Standard Deviation, and Frequency (N) by Gender for the Entire Study Population.

Gender		Discipline Referrals in Grade 9 through Grade 12
Female	Mean	3.06
	Std. Deviation	6.097
	N	927
Male	Mean	3.93
	Std. Deviation	6.980
	N	814
Total	Mean	3.46
	Std. Deviation	6.537
	N	1,741

a. Number of Discipline Referrals in Grade 9 - 12

The lowest mean number of discipline referrals in grade nine through grade twelve among the independent variable ethnicity for the entire study population is reported among the unspecified ethnic group with a mean number of discipline referrals in grade nine through grade twelve of 1.40 and a 1.673 standard deviation.

In opposition, the highest mean number of discipline referrals in grade nine through grade twelve among the independent variable ethnicity for the entire study population is reported among African Americans with a mean number of discipline referrals in grade nine through grade twelve of 4.94 and a 7.970 standard deviation.

Table 85 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve and the independent variable ethnicity for the entire study population.

The lowest mean number of discipline referrals in grade nine through grade twelve for the independent variable formal music courses or no formal music courses for the entire study population is reported among students in formal music courses with a mean number of discipline referrals in grade nine through grade twelve of 2.00 and a 4.143 standard deviation.

Therefore, the highest mean number of discipline referrals in grade nine through grade twelve among the independent variable formal music courses or no formal music courses for the entire study population is reported among students in no formal music courses with a mean number of discipline referrals in grade nine through grade twelve with a mean number of discipline referrals in grade nine through grade twelve of 3.98 and a 7.124 standard deviation.

Table 86 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve among the independent variable formal music courses or no formal music courses for the entire study population.

Table 85

Mean(a), Standard Deviation, and Frequency (N) by Ethnicity for the Entire Study Population.

Ethnicity		Number of Discipline Referrals in Grade 9 through Grade 12
African American	Mean	4.94
	Std. Deviation	7.970
	N	916
Asian/Pacific Islander	Mean	2.32
	Std. Deviation	5.475
	N	65
Hispanic	Mean	3.68
	Std. Deviation	5.790
	N	79
Native American/Alaskan Native	Mean	4.07
	Std. Deviation	6.006
	N	14

White	Mean	1.51
	Std. Deviation	3.156
	N	662
Unspecified	Mean	1.40
	Std. Deviation	1.673
	N	5
Total	Mean	3.46
	Std. Deviation	6.537
	N	1,741

a. Number of Discipline Referrals in Grade 9 - 12

Table 86

Mean(a), Standard Deviation, and Frequency (N) by Formal Music Courses or No Formal Music Courses for the Entire Study Population.

Formal Music Courses or No Formal Music Courses		Discipline Referrals in Grade 9 through Grade 12
Formal Music Courses	Mean	2.00
	Standard Deviation	4.143
	N	454
No Formal Music Courses	Mean	3.98
	Standard Deviation	7.124
	N	1,287
Total	Mean	3.46
	Standard Deviation	6.537
	N	1,741

a. Number of Discipline Referrals in Grade 9 - 12

Figure 15 presents a line graph of the estimated marginal mean number of discipline referrals in grade nine through grade twelve for all study participants by formal music courses or no formal music courses.

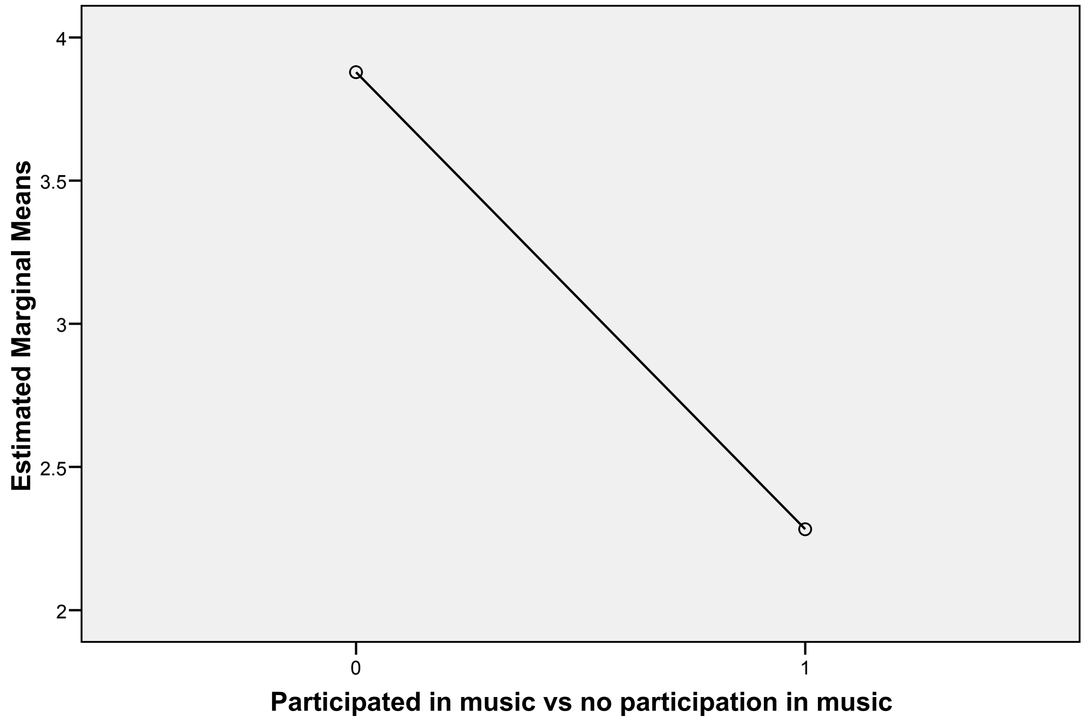


Figure 15. Estimated Marginal Mean Number of Discipline Referrals in Grade Nine through Grade Twelve by Formal Music Courses or No Formal Music Courses for the Entire Study Population.

There are several statistically significant correlations among the independent variables and the dependent variable number of discipline referrals in grade nine through grade twelve at the 0.05 (2-tailed) and the 0.01 (2-tailed) levels for the entire study population.

Table 87 presents correlations for all independent variables and the dependent variable number of discipline referrals in grade nine through grade twelve for the entire study population. Statistical significance at the 0.05 level is indicated with one asterisk (*) and statistical significance at the 0.01 level is indicated with two asterisks (**).

Table 87

Number of Discipline Referrals in Grade Nine through Grade Twelve Correlations for the Entire Study Population.

		Subject and Number of Years	Gender	Ethnicity	Formal Music or No Formal Music	Number Discipline Referrals
Subject and Number of Years	Pearson Correlation	1	.108**	-.056*	.907**	.113**
	Sig. (2-tailed)		.000	.019	.000	.000
	N	1,741	1,741	1,741	1,741	1,741
Gender	Pearson Correlation	.108**	1	.051*	.087**	.067**
	Sig. (2-tailed)	.000		.035	.000	.005
	N	1,741	1,741	1,741	1,741	1,741
Ethnicity	Pearson Correlation	-.056*	.051*	1	-.079**	-.243**
	Sig. (2-tailed)	.019	.035		.001	.000
	N	1,741	1,741	1,741	1,741	1,741
Formal Music or No Formal Music	Pearson Correlation	.907**	.087**	-.079**	1	.133**
	Sig. (2-tailed)	.000	.000	.001		.000
	N	1,741	1,741	1,741	1,741	1,741
Number of Discipline Referrals	Pearson Correlation	.113**	.067**	-.243**	.133**	1
	Sig. (2-tailed)	.000	.005	.000	.000	
	N	1,741	1,741	1,741	1,741	1,741

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

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

Table 88 presents the results of univariate analysis of variance tests of between-subjects effects for the dependent variable number of discipline referrals in grade nine through grade twelve for the entire study population.

Table 88

Univariate Analysis of Variance Tests of Between-Subjects Effects for Number of Discipline Referrals in Grade Nine through Grade Twelve for the Entire Study Population.

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.
Corrected Model	5932.890[a]	6	988.815	25.057	.000
Intercept	7120.942	1	7120.942	180.449	.000
Gender 2	350.323	1	350.323	8.877	.003
Ethnicity 2	4318.359	1	4318.359	109.430	.000
Subject and Number of Years in Music	920.383	4	230.096	5.831	.000
Error	68427.895	1,734	39.462		
Total	95232.000	1,741			
Corrected Total	74360.786	1,740			

a. R Squared = .080 (Adjusted R Squared = .077)

Table 89 presents the model summary for all independent variables and the dependent variable number of discipline referrals in grade nine through twelve after controlling for gender and ethnicity for the entire study population.

Table 90 presents the analysis of variance (ANOVA) for the independent variables and the dependent variable number of discipline referrals in grade nine through twelve after controlling for gender and ethnicity for the entire study population.

Table 89

Model Summary(c) for the Entire Study Population.

					Change Statistics				
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	*R* Square Change	*F* Change	*df*1	*df*2	Sig. *F* Change
1	.260a	.067	.066	6.317	.067	62.811	2	1,738	.000
2	.282b	.080	.077	6.282	.012	5.831	4	1,734	.000

a. Predictors: (Constant), Recoded Ethnicity. Recoded Gender
b. Predictors: (Constant), Recoded Ethnicity, Recoded Gender, Recoded music versus no music2, Recoded music versus no music4, Recoded music versus no music3, Recoded music versus no music1
c. Number of Discipline Referrals in Grade 9 through Grade 12

Table 90

Analysis of Variance (ANOVA)[c] for the Entire Study Population.

Model		Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	5012.508	2	2506.254	62.811	.000[a]
	Residual	69348.278	1,738	39.901		
	Total	74360.786	1,740			
2	Regression	5932.890	6	988.815	25.057	.000[b]
	Residual	68427.895	1,734	39.462		
	Total	74360.786	1,740			

a. Predictors: (Constant), Recoded Ethnicity, Recoded Gender
b. Predictors: (Constant), Recoded Ethnicity, Recoded Gender, Recoded music versus no music2, Recoded music versus no music4, Recoded music versus music3, Recoded music versus no music1
c. Dependent Variable: Number of Discipline Referrals in Grade 9 – 12.

Table 91 presents coefficients for each of the independent variables and the dependent variable number of discipline referrals in grade nine through twelve after controlling for gender and ethnicity for the entire study population.

Table 92 presents a model summary of excluded variables for the dependent variable number of discipline referrals in grade nine through grade twelve after controlling for gender and ethnicity.

Subsequent regression statistics are presented for the dependent variable number of discipline referrals in grade nine through grade twelve for the entire study population ($N = 1{,}741$).

Table 91

Coefficients for the Entire Study Population.

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	*t*	Sig.
1	(Constant)	7.252	.379		19.160	.000
	Recoded Gender	-1.039	.304	-.079	-3.421	.001
	Recoded Ethnicity	-1.746	.161	-.251	-10.834	.000
2	(Constant)	7.482	.380		19.693	.000
	Recoded Gender	-.905	.304	-.069	-2.979	.003
	Recoded Ethnicity	-1.683	.161	-.242	-10.461	.000
	Recoded Music versus No Music1	-1.246	.517	-.056	-2.408	.016
	Recoded Music versus No Music2	-1.649	.682	-.056	-2.419	.016
	Recoded Music versus No Music3	-1.583	.561	-.056	-2.820	.005
	Recoded Music versus No Music4	-2.616	.867	-.070	-3.018	.003

a. Dependent Variable: Number of Discipline Referrals in Grade 9 – 12.

The mean predicted value is 3.46 and the standard deviation is 1.813. The mean standardized predicted value is .000 and the standard deviation is 1.000. The mean standard error of the predicted value is .323 and the standard deviation is .097. The mean adjusted predicted value is 3.46 and the deviation is 6.295. Finally, the mean studentized deleted residual is .001 and the standard deviation is 1.005.

Table 92

Excluded Variables(b).

Model		*Beta* In	*t*	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	Recoded music versus no music1	-.041a	-1.753	.080	-.042	.995
	Recoded music versus no music2	-.044a	-1.907	.057	-.046	1.000
	Recoded music versus no music3	-.052a	-2.246	.025	-.054	.994
	Recoded music versus no music4	-.060a	-2.603	.009	-.062	.997

a. Predictors in the Model (Constant), Recoded Ethnicity, Recoded Gender
b. Dependent Variable: Number of Discipline Referrals in Grade 9 – 12.

Table 93 presents residual statistics for the dependent variable number of discipline referrals in grade nine through grade twelve for the entire study population (N = 1,741).

Regression scatter plots for the dependent variable number of discipline referrals in grade nine through grade twelve for the entire study population are presented in Appendix N.

Music Population

As indicated, the mean number of discipline referrals in grade nine through grade twelve for the music population is 2.00 and the standard deviation is 4.143. However, the lowest mean number of discipline referrals in grade nine through grade twelve among the music population for the independent variable subject and number of years enrolled in formal music courses or no formal music courses is reported in the category VIMusic-4 or a combination of vocal and instrumental music for four years with a mean number of discipline referrals in grade nine through grade twelve of .71 and a 1.160 standard deviation.

Table 93

Residual Statistics for the Entire Study Population.

	Minimum	Maximum	Mean	Std. Deviation	*N*
Predicted Value	-.44	5.75	3.46	1.813	1,741
Std. Predicted Value	-2.152	1.262	.000	1.000	1,741
Standard Error of Predicted Value	.234	.747	.323	.097	1,741
Adjusted Predicted Value	-.49	5.76	3.46	1.813	1,741
Residual	-5.750	58.250	.000	6.281	1,741
Std. Residual	-.914	9.263	.000	.999	1,741
Stud. Residual	-.915	9.272	.000	1.000	1,741
Deleted Residual	-5.760	58.358	.000	6.295	1,741
Stud. Deleted Residual	-.915	9.508	.001	1.005	1,741

a. Dependent Variable: Number of Discipline Referrals in Grade Nine through Grade Twelve.

In opposition, the highest mean number of discipline referrals in grade nine through grade twelve among the music population for the independent variable subject and number of years enrolled in formal music courses or no formal music courses is reported in the category VIMusic-2 or a combination of vocal and instrumental music for two years with a mean number of discipline referrals in grade nine through grade twelve of 4.90 and a 9.362 standard deviation.

Table 94 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve among the categories of the independent variable subject and number of years enrolled in formal music courses or no formal music courses in grade nine through twelve for the music population.

Table 94

Mean(a), Standard Deviation, and Frequency (N) by Subject and Number of Years Enrolled in Music or No Music for the Music Population.

Subject and Number of Years Enrolled in Music or No Music		Discipline Referrals in Grade Nine through Grade Twelve
VMusic-1	Mean	2.19
	Std. Deviation	4.896
	N	78
VMusic-2	Mean	2.03
	Std. Deviation	3.908
	N	30
VMusic-3	Mean	2.86
	Std. Deviation	4.872
	N	42

VMusic-4	Mean	1.50
	Std. Deviation	.707
	N	2
IMusic-1	Mean	2.50
	Std. Deviation	4.705
	N	88
IMusic-2	Mean	1.69
	Std. Deviation	3.766
	N	51
IMusic-3	Mean	1.13
	Std. Deviation	1.879
	N	83
IMusic-4	Mean	1.17
	Std. Deviation	1.965
	N	29

VIMusic-1	Mean	1.00
	Std. Deviation	1.414
	N	2
VIMusic-2	Mean	4.90
	Std. Deviation	9.362
	N	10
VIMusic-3	Mean	3.40
	Std. Deviation	5.068
	N	15
VIMusic-4	Mean	.71
	Std. Deviation	1.160
	N	24
Total	Mean	2.00
	Std. Deviation	4.143
	N	454

a. Number of Discipline Referrals in Grade 9 - 12

Among both males and females in the music population, the mean number of discipline referrals is 2.00 and the standard deviation is 4.143. However, the lowest mean number of discipline referrals in grade nine through grade twelve among the independent variable gender for the music population is reported among females with a mean number of discipline referrals in grade nine through grade twelve of 1.50 and a 3.113 standard deviation.

Therefore, the highest mean number of discipline referrals in grade nine through grade twelve among the independent variable gender for the music population is reported among males with a mean number of discipline referrals in grade nine through grade twelve of 2.77 and a 5.272 standard deviation.

Table 95 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve for the independent variable gender among the music population.

The lowest mean number of discipline referrals in grade nine through grade twelve among the independent variable ethnicity for the music population is reported among Asian/Pacific Islanders with a mean number of discipline referrals in grade nine through grade twelve of .63 and a 1.147 standard deviation.

In opposition, the highest mean number of discipline referrals in grade nine through grade twelve among the independent variable ethnicity for the music population is reported among two ethnic groups. Hispanics and Native Americans/Alaskan Natives share the highest mean number of discipline referrals in grade nine through grade twelve among the music population with a 3.00 mean number of discipline referrals in grade nine through grade twelve for each ethnic group. The standard deviation for the Hispanic population is 4.623 and the standard deviation for the Native American/Alaskan Native population is 4.243.

Table 95

Mean(a), Standard Deviation, and Frequency (N) by Gender for the Music Population.

Gender		Discipline Referrals in Grade Nine through Grade Twelve
Female	Mean	1.50
	Std. Deviation	3.113
	N	275
Male	Mean	2.77
	Std. Deviation	5.272
	N	179
Total	Mean	2.00
	Std. Deviation	4.143
	N	454

a. Number of Discipline Referrals in Grade 9 - 12

Table 96 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve and the independent variable ethnicity for the music population.

Since all participants in the music population are enrolled in a music course, the independent variable formal music courses or no formal music courses is moot and has been omitted from analysis.

Table 96

Mean(a), Standard Deviation, and Frequency (N) by Ethnicity for the Music Population.

Ethnicity		Discipline Referrals in Grade Nine through Grade Twelve
African American	Mean	2.97
	Std. Deviation	5.378
	N	213
Asian/Pacific Islander	Mean	.63
	Std. Deviation	1.147
	N	16
Hispanic	Mean	3.00
	Std. Deviation	4.623
	N	17
Native American/Alaskan Native	Mean	3.00
	Std. Deviation	4.243
	N	2

White	Mean	1.00
	Std. Deviation	1.990
	N	205
Unspecified	Mean	4.00
	Std. Deviation	-
	N	1
Total	Mean	2.00
	Std. Deviation	4.143
	N	454

a. Number of Discipline Referrals in Grade 9 - 12

Nonetheless, Table 97 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve and the independent variable formal music courses or no formal music courses for the music population and the entire study population.

Table 97

Mean(a), Standard Deviation, and Frequency (N) by Formal Music Courses or No Formal Music Courses for the Music Population and the Entire Study Population.

Formal Music Courses or No Formal Music Courses		Discipline Referrals
Formal Music Courses	Mean	2.00
	Standard Deviation	4.143
	N	454
Total Population	Mean	3.46
	Standard Deviation	6.537
	N	1,741

a. Number of Discipline Referrals in Grade 9 - 12

There are many statistically significant correlations among the independent variables and the dependent variable number of discipline referrals in grade nine through grade twelve at the 0.05 (2-tailed) and 0.01 (2-tailed) levels for the music population.

Table 98 presents correlations for all independent variables and the dependent variable number of discipline referrals in grade nine through grade twelve for the music population.

Statistical significance at the 0.05 level is indicated with one asterisk (*) and statistical significance at the 0.01 level is indicated with two asterisks (**).

Table 98

Correlations(b) for the Music Population

		Subject and Number of Years	Gender	Ethnicity	Formal Music or No Formal Music	Discipline Referrals
Subject and Number of Years	Pearson Correlation	1	.139**	.070	.a	-.055
	Sig. (2-tailed)		.003	.135	-	.239
	N	454	454	454	454	454
Gender	Pearson Correlation	.139**	1	.067	.a	.149**
	Sig. (2-tailed)	.003		.155	-	.001
	N	454	454	454	454	454
Ethnicity	Pearson Correlation	.070	.067	1	.a	-.218**
	Sig. (2-tailed)	.135	.155		-	.000
	N	454	454	454	454	454
Formal Music or No Formal Music	Pearson Correlation	.a	.a	.a	.a	.a
	Sig. (2-tailed)	-	-	-	-	-
	N	454	454	454	454	454
Number of Discipline Referrals	Pearson Correlation	-.055	.149**	-.218**	.a	1
	Sig. (2-tailed)	.239	.001	.000	-	
	N	454	454	454	454	454

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
a. Cannot be computed because at least one of the variables is constant.
b. Number of Discipline Referrals in Grade 9 - 12

Since all students in the music population are enrolled in a music course, the independent variable formal music courses or no formal music courses has missing correlations. Therefore, it has been deleted from analysis.

Table 99 presents the model summary for the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, and ethnicity and the dependent variable number of discipline referrals in grade nine through grade twelve for the music population. Once again, since the independent variable formal music courses or no formal music courses is missing correlations, it has been deleted from analysis.

Table 99

Model Summary(b) for Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses, Gender, and Ethnicity for the Music Population.

		Adjusted	Std. Error	Change Statistics				
	R	*R*	of the	*R* Square	*F*			Sig. *F*
R	Square	Square	Estimate	Change	Change	*df*1	*df*2	Change
.280a	.078	.072	3.991	.078	12.764	3	450	.000

a. Predictors: (Constant), Subject and Number of Years Enrolled in Music or No Music (Grades 9-12), Gender, and Ethnicity.
b. Dependent Variable: Number of Discipline Referrals in Grade Nine through Grade Twelve.

Table 100 presents the analysis of variance (ANOVA) for the independent variables subject and number of years enrolled in formal music or no formal music, gender, and ethnicity and the dependent variable number of discipline referrals in grade nine through grade twelve for the music population. As presented in previous data, the independent variable formal music courses or no formal music has been deleted from analysis.

Table 100

Analysis of Variance (ANOVA)[b] for Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses, Gender, and Ethnicity for the Music Population.

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	609.790	3	203.263	12.764	.000a
Residual	7166.210	450	15.925		
Total	7776.000	453			

a. Predictors: (Constant), Subject and Number of Years Enrolled in Music or No Music (Grades 9-12), Gender, and Ethnicity.
b. Dependent Variable: Number of Discipline Referrals in Grade Nine through Grade Twelve.

Table 101 presents coefficients for each of the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, and ethnicity and the dependent variable number of discipline referrals in grade nine through grade twelve for the music population.

Subsequent regression statistics are presented for the dependent variable number of discipline referrals in grade nine through grade twelve for the music population ($N = 454$).

The mean predicted value is 2.00 and the standard deviation is 1.160. The mean standardized predicted value is .000 and the standard deviation is 1.000. The mean standard error of the predicted value is .370 and the standard deviation is .057. The mean adjusted predicted value is 2.00 and the standard deviation is 1.161. The mean residual is .000 and the standard deviation is 3.977. The mean standardized residual is .000 and the standard deviation is .997. The mean studentized residual is .000 and the standard deviation is 1.002. The mean deleted residual is .001 and the standard deviation is 4.016. Finally, the mean studentized deleted residual is .004 and the standard deviation is 1.024.

Table 101

Coefficients for Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses, Gender, and Ethnicity for the Music Population.

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for *B*	
	B	Std. Error	*Beta*	*t*	Sig.	Lower Bound	Upper Bound
(Constant)	1.826	.662		2.758	.006	.525	3.127
Subject and Number of Years Enrolled in Music or No Music	-.086	.062	-.064	-1.390	.165	-.207	.035
Gender	1.466	.388	.173	3.781	.000	.704	2.228
Ethnicity	-.482	.097	-.225	-4.953	.000	-.673	-.291

a. Dependent Variable: Number of Discipline Referrals in Grade Nine through Grade Twelve.

Table 102 presents residual statistics for the dependent variable number of discipline referrals in grade nine through grade twelve for the music population ($N = 454$).

Table 102

Residual Statistics for the Music Population.

	Minimum	Maximum	Mean	Std. Deviation	*N*
Predicted Value	-.14	4.19	2.00	1.160	454
Std. Predicted Value	-1.849	1.888	.000	1.000	454
Standard Error of Predicted Value	.241	.537	.370	.057	454
Adjusted Predicted Value	-.20	4.25	2.00	1.161	454
Residual	-4.190	27.581	.000	3.977	454
Std. Residual	-1.050	6.911	.000	.997	454
Stud. Residual	-1.057	6.956	.000	1.002	454
Deleted Residual	-4.247	27.938	.001	4.016	454
Stud. Deleted Residual	-1.057	7.355	.004	1.024	454

a. Dependent Variable: Number of Discipline Referrals in Grade Nine through Grade Twelve.

Regression scatter plots for the dependent variable number of discipline referrals in grade nine through grade twelve for the music population are presented in Appendix O.

Non Music Population

As indicated, the mean number of discipline referrals in grade nine through grade twelve for the entire study population is 3.46 and the standard deviation is 6.537. However, the mean number of discipline referrals in grade nine through grade twelve for the non music population is 3.98 and the standard deviation is 7.124.

Again, since all participants in the non music population are not enrolled in a music course, the independent variable subject and number of years enrolled in formal music courses or no formal music courses is moot. Therefore, the categories within the independent variable subject and number of years enrolled in formal music courses or no formal music courses are restricted to the category VMusic-0; IMusic-0 or no vocal or instrumental music courses and have been omitted from analysis.

Nonetheless, Table 103 presents mean number of discipline referrals in grade nine through grade twelve, standard deviation, and frequency (*N*) for the category VMusic-0; IMusic-0 for the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the non music population.

Table 103

Mean(a), Standard Deviation, and Frequency (N) for the Non Music Population and the Entire Study Population.

Subject and Number of Years Enrolled in Music or No Music		Discipline Referrals
VMusic-0; IMusic-0	Mean	3.98
	Std. Deviation	7.124
	N	1,287
Total Population	Mean	3.46
	Std. Deviation	6.537
	N	1,741

a. Number of Discipline Referrals in Grade 9 - 12

For both males and females in the non music population, the mean number of discipline referrals is 3.98 and the standard deviation is 7.124. However, similar to the music population, the lowest mean number of discipline referrals in grade nine through grade twelve among the independent variable gender for the non music population is reported among females with a mean number of discipline referrals in grade nine through grade twelve of 3.71 and a 6.881 standard deviation.

Therefore, males have the highest mean number of discipline referrals in grade nine through grade twelve with a mean number of discipline referrals in grade nine through grade twelve of 4.25 and a 7.361 standard deviation.

Table 104 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve for the independent variable gender among the non music population.

Table 104

Mean(a), Standard Deviation, and Frequency (N) by Gender for the Non Music Population.

Gender		Discipline Referrals
Female	Mean	3.71
	Std. Deviation	6.881
	N	652
Male	Mean	4.25
	Std. Deviation	7.361
	N	635
Total	Mean	3.98
	Std. Deviation	7.124
	N	1,287

a. Number of Discipline Referrals in Grade 9 - 12

The lowest mean number of discipline referrals in grade nine through grade twelve among the independent variable ethnicity for the non music population is reported among the unspecified ethnic group with a mean number of discipline referrals in grade nine through grade twelve of .75 and a .957 standard deviation.

In opposition, the highest mean number of discipline referrals in grade nine through grade twelve among the independent variable ethnicity for the non music population is reported among African Americans with mean number of discipline referrals in grade nine through grade twelve of 5.54 and a 8.516 standard deviation.

Table 105 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve and the independent variable ethnicity for the non music population.

In view of the fact that all participants in the non music population are not enrolled in a music course, the independent variable formal music courses or no formal music courses is moot. Therefore it has been omitted from analysis.

Nonetheless, Table 106 presents mean, standard deviation, and frequency (*N*) for the dependent variable number of discipline referrals in grade nine through grade twelve and the independent variable formal music courses or no formal music courses for the non music population and the entire study population.

There are several statistically significant correlations among the independent variables and the dependent variable mean number of discipline referrals in grade nine through grade twelve at the 0.05 (2-tailed) and the 0.01 (2-tailed) levels for the non music population.

Table 105

Mean(a), Standard Deviation, and Frequency (N) by Ethnicity for the Non Music Population.

Ethnicity		Discipline Referrals
African American	Mean	5.54
	Std. Deviation	8.516
	N	703
Asian/Pacific Islander	Mean	2.88
	Std. Deviation	6.187
	N	49
Hispanic	Mean	3.87
	Std. Deviation	6.091
	N	62
Native American/Alaskan Native	Mean	4.25
	Std. Deviation	6.384
	N	12

White	Mean	1.74
	Std. Deviation	3.535
	N	457
Unspecified	Mean	.75
	Std. Deviation	.957
	N	4
Total	Mean	3.98
	Std. Deviation	7.124
	N	1,287

a. Number of Discipline Referrals in Grade 9 - 12

Table 106

Mean(a), Standard Deviation, and Frequency (N) by Formal Music Courses or No Formal Music Courses for the Non Music Population and the Entire Study Population.

Formal Music Courses or No Formal Music Courses		Discipline Referrals
No Formal Music Courses	Mean	3.98
	Standard Deviation	7.124
	N	1,287
Total Population	Mean	3.46
	Standard Deviation	6.537
	N	1,741

a. Number of Discipline Referrals in Grade 9 - 12

Table 107 presents correlations for the independent variables and the dependent variable for the non music population. Statistical significance at the 0.05 level is indicated with one asterisk (*) and statistical significance at the 0.01 level is indicated with two asterisks (**).

Since all students in the non music population are not enrolled in a music course, the independent variable subject and number of years enrolled in formal music courses or no formal music courses is restricted to the category VMusic-0; IMusic-0 within the independent variable. Similarly, the independent variable formal music courses or no formal music courses has missing correlations. Therefore, both variables have been deleted from analysis and are indicated accordingly.

Table 107

Correlations(b) for the Non Music Population.

		Subject and Number of Years	Gender	Ethnicity	Formal Music or No Formal Music	Discipline Referrals
Subject and Number of Years	Pearson Correlation	a.	a.	a.	a.	a.
	Sig. (2-tailed)					
	N	1,287	1,287	1,287	1,287	1,287
Gender	Pearson Correlation	a.	1	.055a	a.	.038
	Sig. (2-tailed)			.050		.171
	N	1,287	1,287	1,287	1,287	1,287
Ethnicity	Pearson Correlation	a.	.055*	1	a.	-.246**
	Sig. (2-tailed)		.050			.000
	N	1,287	1,287	1,287	1,287	1,287
Formal Music or No Formal Music	Pearson Correlation	a.	a.	a.	a.	a.
	Sig. (2-tailed)					
	N	1,287	1,287	1,287	1,287	1,287
Number of Discipline Referrals	Pearson Correlation	a.	.038	-.246**	a.	1
	Sig. (2-tailed)		.171	.000		
	N	1,287	1,287	1,287	1,287	1,287

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
a. Cannot be computed because at least one of the variables is constant.
b. Number of Discipline Referrals in Grade 9 – 12.

Table 108 presents the model summary for the independent variables gender and ethnicity and the dependent variable number of discipline referrals in grade nine through grade twelve for the non music population.

Table 108

Model Summary (b) for Gender and Ethnicity for the Non Music Population.

		Adjusted	Std. Error	Change Statistics				
	R	*R*	of the	*R* Square	*F*			Sig. *F*
R	Square	Square	Estimate	Change	Change	*df*1	*df*2	Change
.251a	.063	.062	6.902	.063	43.145	2	1,284	.000

a. Predictors: (Constant), Gender and Ethnicity.
b. Dependent Variable: Number of Discipline Referrals in Grade Nine through Grade Twelve.

Once again, since the independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music courses have missing correlations, they have been deleted from analysis.

Table 109 presents the analysis of variance (ANOVA) for the independent variables subject and number of years enrolled in formal music or no formal music, gender, and ethnicity and the dependent variable number of discipline referrals in grade nine through grade twelve for the non music population. As indicated, the independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music have been deleted from analysis.

Table 109

Analysis of Variance (ANOVA)[b] for Gender and Ethnicity for the Non Music Population.

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Regression	4110.270	2	2055.135	43.145	.000a
Residual	61161.120	1,284	47.633		
Total	65271.391	1,286			

a. Predictors: (Constant), Gender and Ethnicity.
b. Dependent Variable: Number of Discipline Referrals in Grade Nine through Grade Twelve.

Table 110 presents coefficients for the independent variables gender and ethnicity and the dependent variable number of discipline referrals in grade nine through grade twelve for the non music population. Once again, since the independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable formal music courses or no formal music courses are constants or have missing correlations, they are deleted from analysis.

For the non music population's independent variables and the dependent variable number of discipline referrals in grade nine through grade twelve, the mean predicted value is 3.98 and the standard deviation is 1.788. The mean standardized predicted value is .000 and the standard deviation is 1.000. The mean standard error of the predicted value is .332 and the standard deviation is .030. The mean adjusted predicted value is 3.98 and the standard deviation is 1.788. The mean residual is .000 and the standard deviation is 6.896. The mean standard residual is .000

Table 110

Coefficients(a) for Gender and Ethnicity for the Non Music Population.

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for *B*	
	B	Std. Error	*Beta*	*t*	Sig.	Lower Bound	Upper Bound
(Constant)	5.327	.650		8.195	.000	4.052	6.603
Gender	.737	.385	.052	1.913	.056	-.019	1.493
Ethnicity	-.943	.103	-.248	-9.181	.000	-1.144	-.741

a. Dependent Variable: Number of Discipline Referrals in Grade Nine through Grade Twelve.

and the standard deviation is .999. The mean studentized residual is .000 and the standard deviation is .999.

The mean deleted residual is .000 and the standard deviation is 1.000. Finally, the mean studentized deleted residual is .000 and the standard deviation is 6.911.

Table 111 presents residual statistics for the dependent variable number of discipline referrals in grade nine through grade twelve for the non music population (N = 1,287).

Regression scatter plots for the dependent variable number of discipline referrals in grade nine through grade twelve for the non music population are presented in Appendix P.

Table 111

Residual Statistics for the Non Music Population.

	Minimum	Maximum	Mean	Std. Deviation	*N*
Predicted Value	.41	5.86	3.98	1.788	1,287
Std. Predicted Value	-1.998	1.052	.000	1.000	1,287
Standard Error of Predicted Value	.275	.450	.332	.030	1,287
Adjusted Predicted Value	.40	5.87	3.98	1.788	1,287
Residual	-5.859	58.141	.000	6.896	1,287
Std. Residual	-.849	8.424	.000	.999	1,287
Stud. Residual	-.850	6.434	.000	1.000	1,287
Deleted Residual	-5.872	58.270	.000	6.911	1,287
Stud. Deleted Residual	-.850	8.674	.001	1.006	1,287

a. Dependent Variable: Number of Discipline Referrals in Grade Nine through Grade Twelve.

Data Tables for Each Research Question

In this section, each research question is presented in conjunction with relative data tables.

1. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to subject and number of years in which a student participates in formal music courses or in no formal music courses?

Table 112 presents frequencies (*N*) and mean scores for the dependent variables grade twelve weighted cumulative grade point average, number of absences in grade twelve, and number of discipline referrals in grade nine through grade twelve for the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the entire study population.

Table 112

Frequency (N) and Mean(a, b, and c) of Dependent Variables by Subject and Number of Years Enrolled in Formal Music Courses or No Formal Music Courses for the Entire Study Population.

Subject and Number of Years	Frequency	GPA	Absences	Discipline Referrals
VMusic-1	78	2.62	18.22	2.19
VMusic-2	30	2.69	16.23	2.03
VMusic-3	42	2.89	15.29	2.86
VMusic-4	2	2.46	14.00	1.50
IMusic-1	88	2.76	13.42	2.50
IMusic-2	51	2.87	12.33	1.69
IMusic-3	83	3.01	12.81	1.13
IMusic-4	29	2.90	16.03	1.17
VIMusic-1	2	3.32	9.00	1.00
VIMusic-2	10	2.49	17.60	4.90
VIMusic-3	15	2.67	14.20	3.40
VIMusic-4	24	3.05	9.79	.71
VMusic-0; IMusic-0	1,287	2.55	16.78	3.98
Total	1,741	2.62	16.17	3.46

a. Grade 12 Weighted Cumulative Grade Point Average
b. Number of Absences in Grade 12
c. Number of Discipline Referrals in Grade 9 - 12

2. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to gender and participation in formal music courses or in no formal music courses?

Table 113 presents frequencies (*N*) and mean scores for the dependent variables grade twelve weighted cumulative grade point average, number of absences in grade twelve, and number of discipline referrals in grade nine through grade twelve for the independent variable gender for all study populations.

3. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to ethnicity and participation in formal music courses or in no formal music courses?

Table 114 presents frequencies (*N*) and mean scores for the dependent variables grade twelve weighted cumulative grade point average, number of absences in grade twelve, and number of discipline referrals in grade nine through grade twelve for the independent variable ethnicity for all study populations.

Table 113

Frequency (N) and Mean(a, b, and c) of All Dependent Variables by Gender for All Study Populations.

Gender	Population	*N*	GPA	Absences	Discipline Referrals
Female	Entire Study Population	927	2.7155	16.98	3.06
	Music Population	275	2.9087	14.59	1.50
	Non Music Population	652	2.6340	17.98	3.71
Male	Entire Study Population	814	2.5120	15.25	3.93
	Music Population	179	2.6791	14.22	2.77
	Non Music Population	635	2.4649	15.54	4.25
Totals	Entire Study Population	1,741	2.6203	16.17	3.46
	Music Population	454	2.8181	14.44	2.00
	Non Music Population	1,287	2.5505	16.78	3.98

a. Grade 12 Weighted Cumulative Grade Point Average
b. Number of Absences in Grade 12
c. Number of Discipline Referrals in Grade 9 – 12

Table 114

Frequency (N) and Mean (a, b, and c) of All Dependent Variables by Ethnicity for All Study Populations.

Ethnicity	Population	*N*	GPA	Absences	Discipline Referrals
African American	Entire Study Population	916	2.3673	16.03	4.94
	Music Population	213	2.5947	14.36	2.97
	Non Music Population	703	2.2984	16.54	5.54
Asian/Pacific Islander	Entire Study Population	65	2.9868	15.91	2.32
	Music Population	16	3.1449	10.69	.63
	Non Music Population	49	2.8480	17.61	2.88
Hispanic	Entire Study Population	79	2.6199	16.44	3.68
	Music Population	17	2.7329	12.88	3.00
	Non Music Population	65	2.5889	17.42	3.87
Native American/Alaskan Native	Entire Study Population	14	2.4236	22.79	4.07
	Music Population	2	2.0850	16.00	3.00
	Non Music Population	12	2.4800	23.92	4.25

White	Entire Study Population	662	2.9390	16.14	1.51
	Music Population	205	3.0233	14.82	1.00
	Non Music Population	457	2.9012	16.73	1.74
Unspecified	Entire Study Population	5	2.5660	26.40	1.40
	Music Population	1	1.7600	38.00	4.00
	Non Music Population	4	2.7675	23.50	.75
Totals	Entire Study Population	1,741	2.6203	16.17	3.46
	Music Population	454	2.8181	14.44	2.00
	Non Music Population	1,287	2.5505	16.78	3.98

a. Grade 12 Weighted Cumulative Grade Point Average
b. Number of Absences in Grade 12
c. Number of Discipline Referrals in Grade 9 - 12

4. Is there a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the sample population with respect to participation in formal music courses or in no formal music courses?

Table 115 presents frequencies (*N*) and mean scores for the dependent variables grade twelve weighted cumulative grade point average, number of absences in grade twelve, and number of discipline referrals in grade nine through grade twelve for the independent variable formal music courses or no formal music courses for the study population.

Table 115

Frequency (N) and Mean (a, b, and c) of All Dependent Variables by Formal Music Courses or No Formal Music Courses for the Study Population.

Formal Music Courses or No Formal Music Courses	*N*	GPA	Absences	Discipline Referrals
Formal Music Courses	454	2.8181	14.44	2.00
No Formal Music Courses	1,287	2.5505	16.78	3.98
Total	1,741	2.6203	16.17	3.46

a. Grade 12 Weighted Cumulative Grade Point Average
b. Number of Absences in Grade 12
c. Number of Discipline Referrals in Grade 9 - 12

Chapter Summary

Chapter Four has presented the results of the study in three sections. Section one has presented background information for the study, research questions and null hypotheses, data collection procedures, utilized instrumentation - grade twelve weighted cumulative grade point average, number of absences in grade twelve, and number of discipline referrals in grade nine through grade twelve, and data analysis techniques.

Section two has presented descriptive statistics, analysis of variance (ANOVA), correlations, and regression data for the three populations – the entire study population, the music population, and the non music population.

In addition, Section two has presented scatter plots for each of the dependent variables by the three distinct populations – the entire study population, the music population, and the non music population.

Finally, Section three has presented data tables for each research question for all dependent variables - grade twelve weighted cumulative grade point average, number of absences in grade twelve, and number of discipline referrals in grade nine through grade twelve.

Pertinent information regarding background information for the study, research questions and null hypotheses, data collection procedures, and instrumentation devices has been specified. Furthermore, relevant data regarding descriptive statistics, analysis of variance (ANOVA), correlations, and regression for the dependent variables among three distinct populations have been presented.

In conclusion, due to the substantial amount of collected and analyzed data, data tables representing each of the study populations have been presented for all research questions.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

Introduction and Summary

For several decades music educators have proposed that the study of music has a significant impact on student academic achievement in core subjects, increases attendance rates, and decreases the number of discipline referrals in public education (Virginia Commission for the Arts, 1994; Music Educators National Conference, 1994a). In an era of higher student and teacher accountability, increasing budget cuts, the federal No Child Left Behind Act (NCLB), and stringent state standards of learning, a number of educators have argued that education in music can boost test scores, attendance, attitudes toward school, and overall academic achievement (Eisner, 1998; Virginia Commission for the Arts, 1994).

On the other hand, many general subject educators challenge that music is just a frill and should be eliminated from public education (BBC News, 2005). Some educators claim that "music courses hamper achievement in other domains;" (Gouzouasis, Guhn, & Kishor, n.d., p. 9) or music requires too much time and therefore wastes or slows down student progress in core instructional time (Gouzouasis et al.).

As a result, countless debates of whether to include or exclude music education from academic curricula in public education have been generated throughout the United States (Von Zastrow, 2004; Virginia Commission for the Arts, 1994; Vaughn, 2000; Steele, Bass, & Crook, 1999; Rauscher, 2003b; Rauscher, 2000; Music Educators National Conference, 1994a; Quinn, 2003). Similarly, arguments regarding whether to include music education or return to basics have attained international attention. Under the guise of educational reform, Canada and the

United States have run a parallel course in the fight to include or exclude music education in public schools.

In an effort to comply with pleas for increased rigor, strict budget constraints, a return to basics, and the music is a *frill* mentality, school divisions across the nation have severely cut or eliminated music and other arts programs. Nonetheless, it is difficult to determine the state of music education in the United States given that obtaining reliable data regarding music courses is limited. There is a lack of an agreed upon definition for calculating and reporting music education data therefore making it difficult to determine basic information regarding student enrollment in music courses and music offerings on a school-to-school basis or any comparable data (Music for All Foundation, 2004).

For these reasons, the purpose of this study was to confirm or dispel educational claims that instruction in music impacts academic achievement, attendance rates, and the number of discipline referrals at the secondary level. Specifically, this study set out to quantify both general and music education claims in examining high school academic achievement, attendance records, and discipline data for the 2006 graduating class in one Southeast Virginia school division.

Furthermore, this study is intended to be a catalyst to provide significant quantifiable data to public school divisions at critical decision making times such as budget development and program evaluation. Finally, this study should challenge general educators, music educators, and elected officials to develop and incorporate an approved and unified data collection procedure for all music programs across the country bringing the myth of such claims on both sides of the issue to a close.

In spite of the fact that participation in music education courses may be a significant factor in successfully increasing academic achievement as measured by grade twelve weighted cumulative grade point average; increasing attendance rates as measured by the number of days absent in grade twelve; or decreasing behavior problems as measured by the number of discipline referrals in grade nine through grade twelve, professional educators deserve a workable definition for calculating and reporting music education data to determine basic information regarding student enrollment in music courses and music offerings, if not on a school-to-school basis, then on a district-to-district and state-to-state basis. Consequently, a five-chapter dissertation was used to organize this study providing a channel for such data collection procedures.

Limitations and Delimitations

This study was limited to high school music and non music students in one urban school district in Southeastern Virginia. Several limitations within the research design reduce the ability to generalize the results to a population other than the one studied.

First, it is important to note that music students are self selected. Although research variables are confined to instrumental music (band, guitar, piano, orchestra, and composition) and vocal music, the researcher has no control over which music course or instrument the subject may choose. However, other instruments other than those listed were not included in this study.

Similarly, the researcher has no control over student course selection (music or core areas) other than the state prescribed courses or over content teacher assignments. Further research is required to determine the individual affects a particular teacher or teaching style may have on the academic success of a given student.

Second, the sampled school district has an open access policy for all its courses. If a student has an interest in a course, enrollment in that course is not denied, including to the special education population. However, there is no distinction between the general education and special education populations in this study. The impact that music education may have on academic achievement, attendance rate, and student conduct for the special education population is not the focus of this study. Furthermore, since there are minimal costs for participation in music courses such as instrument and uniform rental fees, no student is refused membership due to financial hardship. Therefore, poverty is not an issue.

Third, the impact of music on academic achievement are restricted to present day available data such as grade twelve weighted cumulative grade point average regardless of whether it is specifically music instruction, music integrated in the curriculum or the use of background music in general education classrooms; the number of days absent in grade twelve (excused and unexcused without any distinction between the two); and the number of discipline referrals in grade nine through grade twelve (including both severe and moderate student conduct and the consequences thereof). Equally important, the researcher has no control over individual administrators that handle discipline or the process in which discipline referrals are handled on a daily basis.

Fourth, several categories in the independent variable subject and number of years enrolled in formal music courses or no formal music courses and the independent variable ethnicity have ten participants or fewer. Therefore, the validity of collected data is cautiously reviewed when comparing like variables and making conclusions based on available data.

Fifth, the impact individual music teachers have on students has been completely neglected. Hodges and O’Connell (n.d.) state that simply testing the affects of a given form of music instruction without taking into account the characteristics of the teacher is short sighted. There is the possibility that excellent teachers who are enthusiastic and who relate well to students may make a greater difference in educational outcomes than the particular methodology used. However, the reverse is also true.

Furthermore, the researcher acknowledges the influence of outside sources such as private music lessons, church affiliations, and other variables that involve music. These variables may be prevalent in determining academic achievement in core subjects, attendance rates, and student conduct. However, for the purpose of this study, literature was contained to the impact of music education on academic achievement, attendance rate, and the number of discipline referrals in core subjects as it relates to public schools.

Although weighted courses (i.e. Honors, International Baccalaureate) are accounted for in the study, cumulative grade point averages may affect outcomes. However, differences in weighted courses or non-weighted courses and participation or non-participation in music courses is not the focus of this study.

Finally, the researcher's past experiences as a high school choral director and music administrator are prevalent. To control for bias, the researcher purposefully chose a quantitative study to gather existing data for analysis. Reported data are a result of sophisticated statistical equations and analysis.

Discussion of Findings

Conclusions were drawn based on the analysis of available data to determine the long-term impact that music, specifically the number of years enrolled in music instruction, has on academic achievement as determined by grade twelve weighted cumulative grade point average;

attendance rates as determined by the number of absences in grade twelve; and on student conduct as determined by the number of discipline referrals in grade nine through grade twelve.

The results of the research study are:

1. There are fewer students enrolled in formal music courses than there are in no formal music courses among the study population.

The music enrollment numbers among the senior class are disconcerting since one would reason that more students would remain in music courses throughout high school once they had enrolled in a music course in the lower grades. Among the study population, only 27% of the entire study population is enrolled in a formal music course.

Since students gain upper level musicianship skills as well as additional performance abilities and opportunities in the eleventh and twelfth grade years, the researcher would deem that after investing several semesters at a basic level of music instruction, students would remain in the music program during the upper grades. Furthermore, students would have invested a considerable amount of time and financial resources in their music courses and perhaps purchased their own instrument in previous academic years.

On the other hand, although it is encouraging to see a large number of students enrolled in a formal music course, it is discouraging that the largest numbers of participants in this study are seniors that have only one year of a musical experience. One would expect the total number of participants to increase in upper level music courses or the number of years enrolled in a music course to be larger for the twelfth grade year.

For example, the largest group among the categories in the independent variable subject and number of years enrolled in formal music courses or no formal music courses was VMusic-0; IMusic-0 or no vocal or instrumental music courses with 1,287 ($N = 1,287$) participants or

73% of the entire study population. Among the music population, the largest number of students was enrolled in the category IMusic-1 or one year of instrumental music with 88 ($N = 88$) or 5.1% of the entire study population. Data indicate a total of 454 ($N = 454$) twelfth grade music students and 1,287 ($N = 1,287$) twelfth grade non music students. These numbers equate to 27% and 73% of the entire study population, respectively.

2. Among the study population, there are more females enrolled in a formal music course than there are males enrolled in a formal music course.

Data indicate 275 ($N = 275$) or 60.6% of the music population are females and 179 ($N = 179$) or 39.4% of the music population are males. These numbers are disproportionate to the entire study population and the non music population. Data indicate that the entire study population is comprised of 927 ($N = 927$) or 53.2% females and 814 ($N = 814$) or 46.8% males. In comparison, data indicate that the non music population is comprised of 652 ($N = 652$) or 50.7% females and 635 ($N = 635$) or 49.3% males.

3. Among the study population, Asian/Pacific Islanders, Hispanics, Native Americans/Alaskan Natives, and the unspecified ethnic group are under represented among the formal music population.

Although data indicate ethnic groups are similar in structure across all populations, the aforementioned ethnic groups represent the smallest groups among the formal music population and should be encouraged to enroll in formal music education courses.

4. There is a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average among the study population with respect to subject and number of years enrolled in formal music courses or no

formal music courses and participation in formal music courses and in no formal music courses.

Data indicate music students earn a mean grade twelve weighted cumulative grade point average .27 points higher than non music students among the study population. The mean grade twelve weighted cumulative grade point average for the independent variable subject and number of years enrolled in formal music courses or no formal music courses for the entire study population (N = 1,741) was 2.62. However, only three out of the thirteen categories for the independent variable have a mean grade twelve weighted cumulative grade point average below that of the entire population's mean.

The categories are: (1) VMusic-4 or four years of vocal music courses (N = 2) with a mean grade twelve weighted cumulative grade point average of 2.46; (2) VIMusic-2 or a combination of vocal and instrumental music courses for two years (N = 10) with a mean grade twelve weighted cumulative grade point average of 2.49; and most importantly, the no music courses category VMusic-0; IMusic-0 (N = 1,287) with a mean grade twelve weighted cumulative grade point average of 2.55.

For most public school officials, the academic difference between these two populations is a significant factor in determining achievement. In any event, since the populations of the two music categories, VMusic-4 and VIMusic-2, have only two and ten participants, respectively, the validity of the study is questioned making the difference in academic achievement between the music population and the non music population all the more significant.

Nevertheless, as in the findings of The GRAMMY Foundation/The Leonard Bernstein Center for Learning, *Artful Learning: A School Reform Model* (2004) and those of Cheryl Brogla-Krupke (2003), this study confirms that at least ten of the thirteen categories for the independent variable subject and number of years enrolled in formal music courses or no formal music courses impact the academic success of the surveyed population as evidenced by higher grade twelve weighted cumulative grade point averages of music participants. With the exception of the categories VMusic-4 and VIMusic-2, due to low numbers of enrolled pupils, students that participated in a music course for at least one year earned a higher mean grade twelve weighted cumulative grade point average than those that did not.

In any case, the first research question is confirmed. There is a statistically significant difference in academic achievement as measured by mean grade twelve weighted cumulative grade point average among the study population with respect to subject and number of years enrolled in formal music courses or no formal music courses.

5. There is a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average among the study population with respect to gender and participation in formal music courses or in no formal music courses.

Data indicate that both female music students ($N = 275$) and male music students ($N = 179$) earned a mean grade twelve weighted cumulative grade point average higher than that of non music males ($N = 635$) and non music females ($N = 652$). Female music students earned a mean grade twelve weighted cumulative grade point average of 2.91 as compared to non music females with a mean grade twelve weighted cumulative grade point average of 2.63 - a difference of .28.

In comparison, male non music students earned a mean grade twelve weighted cumulative grade point average of 2.46 while male music students earned a mean grade twelve weighted cumulative grade point average of 2.68. Therefore, male music students earned a mean grade twelve weighted cumulative grade point average .22 points higher than did non music males.

Therefore, the second research question is confirmed. There is a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average with respect to gender and participation in formal music courses or in no formal music courses.

6. There is a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average among the study population with respect to ethnicity and participation in formal music courses or in no formal music courses.

Music students in all ethnic groups, with the exception of the unspecified ethnic group and Native Americans/Alaskan Natives, earned a higher mean grade twelve weighted cumulative grade point average than did non music ethnic groups.

Like the two previous independent variables - subject and number of years enrolled in formal music courses or no formal music courses and gender - data indicate music students earned a higher mean grade twelve weighted cumulative grade point average than non music students with respect to ethnicity and participation in formal music courses or in no formal music courses.

However, it is important to note that data indicate only one student in the music unspecified ethnic group ($N = 1$). Similarly, data indicate single digit numbers among the other populations for the unspecified ethnic group as well as small numbers for the ethnic group Native American/Alaskan Native. Therefore, the population for the unspecified ethnic group and Native American/Alaskan Native are not valid and were disregarded in analysis.

Conversely, data indicate other ethnic groups had larger populations and were utilized in analysis. For instance, there are 213 ($N = 213$) African American music students and 703 ($N = 703$) African American non music students. The mean grade twelve weighted cumulative grade point average among African American music students was 2.59 as compared to 2.30 among African American non music students.

Similarly, Asian/Pacific Islander music students ($N = 16$) earned a mean grade twelve weighted cumulative grade point average of 3.14 as compared to 49 ($N = 49$) Asian/Pacific Islander non music students who earned a mean grade twelve weighted cumulative grade point average of 2.85. This represents a .29 increase in academic achievement for African American music students and Asian/Pacific Islander music students as compared to non music students in the same ethnic groups.

Likewise, Hispanic music students earned a mean grade twelve weighted cumulative grade point average .14 higher than non music Hispanic students. White music students earned a mean grade twelve weighted cumulative grade point average .12 higher than non music White students. Therefore, the third research question is confirmed. There is a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average among the population with respect to ethnicity and participation in formal music courses or in no formal music courses.

As school divisions struggle to close the achievement gap between ethnic groups across the country, it would behoove educators to take into consideration the impact that music education may have on academic achievement, at least for the sampled school division and school divisions with similar ethnic structures. Nevertheless, the researcher is not suggesting that music education is the cause and affect to increase academic achievement. In fact, this may be the case. However, the statistics of this research study cannot confirm or dispel this statement. Additional research studies with a variety of statistical procedures are required to determine the notion that enrollment in a music education course causes increase academic achievement.

7. There is a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average among the population with respect to participation in formal music courses or in no formal music courses.

Students enrolled in formal music courses earned a mean grade twelve weighted cumulative grade point average .27 higher than did students enrolled in no formal music courses.

Students enrolled in formal music courses (N = 454) earned a mean grade twelve weighted cumulative grade point average of 2.82 as compared to students enrolled in no formal music courses (N = 1,287) who earned a mean grade twelve weighted cumulative grade point average of 2.55. Therefore, students enrolled in formal music courses earned a mean grade twelve weighted cumulative grade point average .27 points higher than students enrolled in no formal music courses.

The fourth research question is confirmed. There is a statistically significant difference in academic achievement as measured by grade twelve weighted cumulative grade point average among the population with respect to participation in formal music courses or no formal music courses.

8. There is a statistically significant difference in attendance rate as measured by the number of absences in grade twelve among the population with respect to subject and number of years and participation in formal music courses or in no formal music courses.

Analysis of data has determined that music students have fewer days absent than do non music students. However, for the independent variable subject and number of years enrolled in formal music courses or no formal music courses, data indicate that ten categories out of thirteen have a mean number of absences in grade twelve below that of the mean for the entire study population and the non music population. Most importantly, all ten categories are categories in which a music course was a factor.

The ten categories among the independent variable subject and number of years enrolled in formal music courses or no formal music courses that have a mean number of absences in grade twelve below the entire population and the non music population are: VMusic-2, VMusic-3, VMusic-4, IMusic-1, IMusic-2, IMusic-3, IMusic-4, VIMusic-1, VIMusic-3, and VIMusic-4. Therefore, VMusic-1, VIMusic-2, and, most significantly, VMusic-0; IMusic-0 have a mean number of absences in grade twelve above the mean of the music population.

Overall, music students had 2.34 fewer days absent than did non music students. However, the number of days absent in grade twelve may have been more significant for music students if the theory that music students participate in more outside classroom performances or field trips during the school day than do non music students.

Be that as it may, the difference in days absent between populations might have been greater had the sampled school division distinguished between excused and unexcused absences. It is difficult to determine relationships and make comparisons for the number of absences that a music student and a non music student earned based upon available data.

For example, since field trips are considered excused absences by the sampled school division, statistical significance and validity are difficult to determine from collected data. Perhaps music students are involved in more field trips for performance purposes in addition to district and state music competitions which require them to be out of school. On the other hand, perhaps non music students participated in more extended classroom experiences through their general education courses. Then again, music students would have participated in general education field trips as well as field trips through their music courses. Therefore, music students would have participated in more field trips which would have lead to more days absent than non music students.

In any case, an attempt was made to corroborate statistical significance for each of the independent variables and the dependent variable number of absences in grade twelve among the various populations. Since available data from the sampled school division does not distinguish between excused and unexcused absences, it is difficult, if not impossible, to determine if the suggested theory is justified. Nevertheless, the number of field trips in which music and non music students participate is not the focus of this study.

9. There is a statistically significant difference in attendance rate as measured by the number of absences in grade twelve among the population with respect to gender and participation in formal music courses or in no formal music courses.

Participation in a music course is a factor in decreasing the number of days absent among gender for the studied population. Data indicate that female music students earned a mean number of absences in grade twelve below that of female non music students ($N = 652$). Specifically, non music females were absent approximately three and one-half days more than female music students.

Similarly, male music students ($N = 173$) earned a lower mean number of absences in grade twelve than non music males ($N = 635$) - a difference of one and one quarter days to be exact. Although the difference is not as significant as that of female music students and non music students, male music students were present more often than non music male students.

Thus, it is determined that participation in a music course is a factor in decreasing the number of days absent among gender for the studied population. The second research question is confirmed. There is a statistically significant difference in attendance rate as measured by the number of absences in grade twelve among the population with respect to gender and participation in formal music courses or no formal music courses.

10. There is a statistically significant difference in the attendance rate as measured by the number of absences in grade twelve with respect to ethnicity and participation in formal music courses or in no formal music courses.

Data indicate that music students were consistently absent fewer days than were non music students. However, the ethnic group with the highest mean number of absences in grade twelve is the music population's unspecified ethnic group ($N = 1$) with a mean number of absences in grade twelve of 38.00. Similarly, data indicate the unspecified ethnic group for both the entire study population ($N = 5$) and the non music population ($N = 4$) have a high mean number of absences in grade twelve with 26.40 and 23.50, respectively. On the other hand, since the size of the unspecified group across all populations is small, the validity of that population is questioned.

Nevertheless, among remaining ethnic groups, music students were consistently absent fewer days than were non music students. In one instance, Asian/Pacific Islander music students were absent seven fewer days than their Asian/Pacific Islander non music classmates. Other music student ethnic groups yield similar results, although not as significant as the aforementioned ethnic group.

Therefore, it is inferred that participation in a music course is a factor in determining the mean number of absences in grade twelve among ethnic groups for the studied population. The third research question is confirmed. There is a statistically significant difference in attendance rate as measured by the number of absences in grade twelve with respect to ethnicity and participation in formal music courses or in no formal music courses.

11. There is a statistically significant difference in attendance rate as measured by the number of absences in grade twelve among the population with respect to participation in formal music courses or no formal music courses.

The fourth independent variable, formal music courses or no formal music courses, yields similar results as the three previous independent variables. Data indicate students enrolled in formal music courses (N = 454) earned at mean number of absences in grade twelve of 14.44 as compared to a mean number of absences in grade twelve of 16.78 among students enrolled in no formal music courses (N = 1,287). Therefore, data indicate that music students had almost 2.5 fewer days absent than did non music students.

The fourth research question is confirmed. There is a statistically significant difference in attendance rate as measured by the number of absences in grade twelve among the population with respect to participation in formal music courses or no formal music courses.

12. There is a statistically significant difference in student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to subject and number of years and participation in formal music courses or in no formal music courses.

Similar to the findings of the two previous dependent variables, data for the independent variable subject and number of years enrolled in formal music courses or no music courses indicate that ten out of the thirteen categories have a mean number of discipline referrals in grade nine through grade twelve lower than the mean of the entire population and the mean of the non music population.

The categories with a mean number of discipline referrals in grade nine through grade twelve lower than the mean of the entire population and the non music population include: VMusic-1, VMusic-2, VMusic-3, VMusic-4, IMusic-1, IMusic-2, IMusic-3, IMusic-4, VIMusic-1, and VIMusic-4. This leaves only the categories VIMusic-2, VIMusic-3, and most importantly, VMusic-0; IMusic-0 with a mean number of discipline referrals in grade nine through grade twelve higher than the mean of the music population. However, the categories VMusic-4 and VIMusic-1 have very small population sizes. In fact, only two ($N = 2$) participants. Therefore, the validity of the population is questioned in regard to these two categories.

In any case, similar to the research questions utilizing the previous dependent variables, data for the dependent variable number of discipline referrals in grade nine through grade twelve confirm that music courses, specifically subject and number of years enrolled in formal music courses or no formal music courses, are a factor in decreasing the number of discipline referrals in grade nine through grade twelve among the studied population. There is a statistically significant difference in student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to subject and number of years and participation in formal music courses or no formal music courses.

13. There is a statistically significant difference in student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to gender and participation in formal music courses or in no formal music courses.

As indicated, the mean number of discipline referrals in grade nine through grade twelve is 3.46 for the entire study population. Among the music population, the mean number of discipline referrals in grade nine through grade twelve per student is 2.00 as compared to the mean number of discipline referrals in grade nine through grade twelve per student of 3.98 among the non music population. Male non music students earned a mean number of discipline referrals in grade nine through grade twelve per student of 4.25, the highest among all study populations, as compared to the mean number of discipline referrals in grade nine through grade twelve per student of 2.77 among male music students.

On the other hand, female music students earned a mean number of discipline referrals in grade nine through grade twelve of 1.50. Female non music students earned a mean number of discipline referrals in grade nine through grade twelve of 3.71. This represents a difference of two discipline referrals between female music students and non music female students.

To summarize, for all cases, male and female music students earned fewer discipline referrals in grade nine through grade twelve than non music male and female students among the population.

Since previously collected data regarding gender studies and attendance rates for music and non music students at the secondary level is minimal, it is difficult to determine statistical significance beyond that of the study population. However, similar to the two previous dependent variables, data indicate that the second research question is again confirmed. There is a statistically significant difference in student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the study population with respect to gender and participation in formal music courses or in no formal music courses.

14. There is a statistically significant difference in student conduct as measured by the number of discipline referrals in grade nine through grade twelve with respect to ethnicity and participation in formal music courses or in no formal music courses.

The ethnic group with the highest number of discipline referrals in grade nine through grade twelve among all populations is African American non music students (*N* = 703) with a mean number of discipline referrals in grade nine through grade twelve of 5.54. Conversely, the ethnic group with the lowest mean number of discipline referrals in grade nine through grade twelve among all populations is Asian/Pacific Islander music students (*N* = 16) with a mean number of discipline referrals in grade nine through grade twelve of .63.

Although the number of participants in this ethnic group is small, data indicate music students consistently have the lowest mean number of discipline referrals in grade nine through grade twelve among all ethnic groups for all populations. The only exception is the unspecified non music ethnic group (*N* = 4) with a mean number of discipline referrals in grade nine through grade twelve of .75. However, since the number of participants in this ethnic group is so small, the validity of the population is questioned.

Nonetheless, music students had fewer discipline referrals in grade nine through grade twelve than non music students among all ethnic groups with the exception of the aforementioned unspecified ethnic group. Therefore, the third research question is confirmed. There is a statistically significant difference in student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the study population with respect to ethnicity and participation in formal music courses or no formal music courses.

15. There is a statistically significant difference in student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to participation in formal music courses or no formal music courses.

Finally, the fourth independent variable – formal music courses or no formal music courses - yields similar results as the three previous independent variables with regard to student conduct. Students enrolled in formal music courses ($N = 454$) earned a mean number of discipline referrals in grade nine through grade twelve of 2.00 as compared to a mean number of discipline referrals in grade nine through grade twelve of 3.98 among students enrolled in no formal music courses ($N = 1,287$). Therefore, data indicate that music students had 2.5 fewer discipline referrals than did non music students.

The fourth research question is confirmed. There is a statistically significant difference in student conduct as measured by the number of discipline referrals in grade nine through grade twelve among the population with respect to participation in formal music courses or no formal music courses.

Summary

As this study has determined, it is evident that music education has an impact on academic achievement, attendance rate, and on student conduct. The influence of music education is notated in the independent variables subject and number of years enrolled in formal music courses or no formal music courses, gender, ethnicity, and formal music courses or no formal music courses as measured by the dependent variables grade twelve weighted cumulative grade point average, the number of absences in grade twelve, and the number of discipline referrals in grade nine through grade twelve.

Sophisticated statistical tests have confirmed that music education courses impact academic achievement for each of the study populations. Moreover, for the studied population, the findings of The GRAMMY Foundation/The Leonard Bernstein Center for Learning, *Artful Learning: A School Reform Model* (2004) and the findings of Cheryl Brogla-Krupke (2003) are confirmed that when a student is enrolled in formal music courses, academic achievement will increase. In the case of the study population, the mean grade twelve cumulative grade point average per student increased as much as .29 points.

Furthermore, similar to the academic findings of Anderson (2000), Hetland (2000), Cromie (2000), and McLelland (2005), this study confirms that gender is a factor in determining academic success of the surveyed population as evidenced by higher grade twelve weighted cumulative grade point averages among music participants as compared to non music participants.

In opposition, the findings of this study dispel the conclusions of Gilleta et al. (2003), Hood-Mincey (2005), Hui (2004), and Rauscher and Zupan (2000) in which gender could not be confirmed or dismissed as a factor in determining academic success. For the study population, as concluded in this research study, gender and participation in formal music courses or no formal music courses is an indicator in determining academic success.

Equally important, in spite of the fact that comparable research studies provide little data at the secondary level, it is difficult to conclude that music education courses are definite indicators of academic achievement as measured by grade twelve weighted cumulative grade point average for a variety of ethnic groups beyond that of the studied population. At any rate, it is surmised, for the studied population, that participation in formal music courses or in no formal music courses is a factor that increases academic achievement as measured by grade twelve weighted cumulative grade point average with respect to ethnicity.

However, the researcher cautions that found relationships are not cause and effect. Further music education research is required to determine if specific independent variables or other factors are predictors of academic achievement as measured by grade twelve weighted cumulative grade point average, attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve. In addition, should this study be replicated, the conditions of this study should be carefully adhered to and monitored.

In any case, this study extends the research recommendations made in the 2004 report entitled *The Sound of Silence – The unprecedented decline of music education in California public schools: A statistical review,* published by the Music for All Foundation. A unified means to collect data regarding music students and non music students is needed across the United States to validate past and present research findings.

Finally, if this phenomenon can be generalized to other populations, shouldn't educators insist on enrolling more non music students, at risk students, and students in danger of academic failure into music courses? The data from this study would indicate that the answer is yes! Furthermore, legislatures must heed the impact of music education with regard to the No Child Left Behind Act and persevere that every child in public school be enrolled in music education.

Conclusions and Implications for Practice

The results of this study indicate that music education impacts academic achievement, attendance rate, and student conduct in a variety of facets. School divisions that are grappling with the notion of diminishing or cutting music programs should carefully consider the conclusions of this study before making decisions that positively affect the student population. Therefore, as a means to close the disparity gap in academic achievement, attendance rate, and student conduct, educators should adhere to the following recommendations:

1. Enroll more ninth grade students in a music course and encourage them to continue music study through tenth, eleventh, and twelfth grades to increase academic performance, decrease the number of absences, and decrease the number of discipline referrals in grade nine through grade twelve.
2. Increase the number of males in all music courses, particularly in vocal music courses to increase academic performance, decrease the number of absences, and decrease the number of discipline referrals in grade nine through grade twelve.
3. Increase the number of all ethnic groups in music courses to increase academic performance, decrease the number of absences, and decrease the number of discipline referrals in grade nine through grade twelve. For the study population, Asian/Pacific Islanders, Hispanics, and Native Americans/Alaskan Natives have the lowest number of participating students and should be encouraged and enrolled in formal music courses. Among the study population, data indicate that music courses begin to close, if not completely close, the disparity gap between ethnic groups.
4. Increase the number of non music students in music courses especially in grades nine through twelve to induce lasting positive academic achievement throughout secondary school.
5. Increase the number of males in all music courses, particularly in vocal music courses, in grades nine through twelve to increase academic achievement.

6. Increase the number of all ethnic groups in all music courses in grades nine through twelve to increase academic achievement.
7. Increase the number of non music students in music courses in grades nine through twelve to encourage higher academic achievement and induce lasting positive academic performance throughout secondary school.
8. Increase the number of non music students in music courses especially in grades nine through twelve to decrease the number of absences throughout secondary school.
9. Increase the number of males in all music courses in grades nine through twelve to decrease the number of absences throughout secondary school.
10. Increase the number of all ethnic groups in music courses in grades nine through twelve to decrease the number of absences across all ethnic groups.
11. Increase the number of non music students in music courses in grades nine through twelve to decrease the number of absences and induce lasting attendance rates throughout secondary school.
12. Increase the number of non music students in music courses in grades nine through twelve to induce lasting positive student conduct throughout secondary school.
13. Increase the number of males in all music courses, particularly in vocal music courses, in grades nine through twelve to decrease the number of discipline referrals and increase positive student conduct.
14. Increase the number of all ethnic groups in music courses in grades nine through twelve to decrease the number of discipline referrals and increase positive student conduct.

15. Increase the number of non music students in music courses in grades nine through twelve to decrease the number of discipline referrals and increase positive student conduct throughout secondary school.
16. Insist and encourage the adoption of a unified data collection process for all music and non music related agencies across the nation so that the impact of music education can be understood worldwide.

Recommendations for Practice

As determined in this research study, it can be surmised that enrollment in some type of music education course can impact academic achievement, attendance rate, and student conduct as evidenced by the grade twelve weighted cumulative grade point average, the number of absences in grade twelve, and the number of discipline referrals in grade nine through grade twelve for the study population. As boards of education, school administrators, and public officials contemplate the elimination or diminution of their school division's public school music programs, the researcher recommends that the findings of this study as well as future studies assist in determining if such drastic measures are beneficial to all students and the school division.

It is also recommended that music educators as well as general classroom teachers heed the findings of this study to speak with authority, confidence, and substance about the impact that music education can have on students. So many times, educators speak without statistical backing. Thus, this study provides support for educators to voice their protests with statistical data.

Recommendations for Future Study

Eisner (1998) states, "what is needed more than correlations or statistically significant differences between groups are a theory that links experience in the arts with academic achievement" (p. 56). Therefore, the researcher recommends a variety of qualitative studies be conducted to determine the impact of teaching styles and student learning styles on music and non music students that increase academic achievement, decrease absenteeism, and decrease poor student conduct.

Moreover, it is recommended that a qualitative study be conducted to determine what impact individual teachers may possess that increase success for music and non music students. Additionally, it would be constructive to investigate what factors parents and students believe make excellent music programs that lead to academic success. As students struggle with negative influences in their daily lives, one particular question should be explored to discover the impact of music education - What changes, if any, have been observed at home or at school in regard to academic achievement, attitude toward school, school attendance, and behavior?

Beneficial to the field of knowledge would be a study to determine whether music education empowers students to be successful in and out of the classroom or are music students naturally driven to do well academically. Research of this type would put to rest the myth of cause and effect for music education in public schools.

Additionally, it is recommended that this study be expanded to include elementary school, middle school, and higher education. Correlations and additional findings may be significant in longitudinal studies, studies across several academic levels or any number of public education settings.

Another recommendation for future research would be to determine if specific instruments, including vocal music instruction, has the greatest impact on particular variables. This study has attempted to uncover differences in vocal and instrumental music as well as that of music composition. However, combining many musical instruments into one or more categories did not delve into the impact that individual instruments may or may not have on academic achievement, attendance rates, and student conduct.

It is also recommended that research be completed to determine the impact that music education has on the special education population. With the increase of special education students in public schools across the United States, music education may play an important role in bridging the gap between a disability and academic success. Since Howard Gardner has uncovered eight multiple intelligences, one of which is musical, educators may very well discover that music courses have far reaching consequences than originally expected.

Furthermore, using music courses as an avenue to strengthen academic success, attendance rate, and student conduct, additional research should be completed to determine if gender differences among music students and non music students impact or impair the educational process. Although this study has confirmed findings of earlier research studies in regard to gender, the results are not compelling enough to determine what and if music education can make a difference academically in the public school setting.

Similarly, since this study was not intended to and has not determined cause and effect, further research studies must be completed to reveal the true impact of music education and its many variables.

Finally, should this study be replicated, data clearly identifying excused and unexcused absences, if obtainable, should be investigated to determine if music students are engaged in more field trips than their non music classmates. This determination has an impact on attendance rates. In addition, types of discipline referrals that music and non music students earn could be of interest to future researchers.

Research Reflections

As a person who has been involved in many aspects of public school music education as a student, a teacher, and a music administrator, the researcher has seen a long history of the benefits of taking a music course. As an educator, I have seen the lives of students turn completely around academically. In addition, the researcher has seen first hand the power that music education provides as lives are transformed at home and at school in regard to student-to-student and student-to-parent relationships. This study has statistically confirmed a gut reaction as to the power of music education.

In conclusion, this researcher agrees with Jensen in his 2001 book *Arts with the brain in mind* in which Jensen suggests that there is no evidence that higher standards “actually produce better human beings – unless accompanied by better quality teaching, more targeted resources, greater opportunities for underserved populations, stronger role models, high expectations, and a dozen other key variables” (Jensen, p. vi).

On the other hand, with a clear and thorough understanding of the brain and the impact that music has upon it, educators, regardless of content specialty, cannot exclude the possibility that there may be a link between listening to music, instruction in music, and increased academic achievement (Jensen, 2001). Additionally, the researcher would add a link between music courses and increased attendance rates as measured by the number of absences in grade twelve and decreased poor student conduct as measured by the number of discipline referrals in grade nine through grade twelve.

References

Akin, J. (n.d.). *Music makes a difference makes a difference: Resource guide to educational research.* Retrieved July 18, 2006, from http://www.nldline.com/music1.htm

Anderson, T. (2000, Spring). *The Mozart effect: a closer look.* Retrieved January 23, 2006, from http://lrs.ed.uiuc.edu/students/lerch1/edpsy/mozart_effect.html

Babo, G. D. (2001). *The impact of a formal public school instrumental music instruction program on an eighth grade middle school student's reading and mathematics achievement.* Retrieved October 20, 2005, from ERIC database.

BBC News (2005, March 7). *Schools 'should return to basics'.* Retrieved July 18, 2006, from http://news.bbc.co.uk/go/pr/fr/-/hi/us_politics/4323063.stm

Brogla-Krupke, C. (2003, May). *Improving student achievement through the use of music strategies.* Retrieved October 20, 2005, from ERIC database.

Business Week (1996). The changing workplace is changing our view of education. *Business Week, October,* 1996.

Campbell, D. (1997). Mozart - A friend for your mind, heart, and body. *Music for the Mozart effect: Unlock the creative spirit, 3*, CD recording.

Campbell, D. (2000a). *The Mozart effect for children; Awakening your child's mind, health, and creativity with music*. New York, NY: William Morrow, an imprint of HarperCollins Publishers.

Campbell, D. (2000b, October 13). *The "Mozart Effect".* Retrieved July 4, 2006, from http://www.excel-ability.com/Models/MozartEffect.html

Campbell, D. (2005). *About Don Campbell.* Retrieved July 8, 2006, from http://www.mozarteffect.com/MoreonTME/AboutDon/AboutDon.html

Campbell, D., & Stanley, J. (1963). *Experimental and quasi-experimental designs for research*. Chicago, IL: Rand-McNally.

Carter, S. (2002). *The impact of parent/family involvement on student outcomes: An annotated bibliography of research from the past decade*. Eugene, Oregon: Consortium for Appropriate Dispute Resolution in Special Education.

Children's Music Workshop (n.d.a). *Instrumental lessons do not harm students' academic achievement.* Retrieved January 8, 2006, from http://www.childrensmusicworkshop.com/advocacy/researchontherelatioship.html

Children's Music Workshop (n.d.b). *Research on the relationship of music and other academic areas.* Retrieved January 8, 2006, from http://www.childrensmusicworkshop.com/advocacy/researchontherelationship.html

Christensen, T. (2005, March 7). History of music-brain and wellness research. *Healing Drummer, 2005, March*, pp. 1 - 5. Retrieved July 5, 2006, from http://healingdrummer.blogspot.com/2005/03/history-of-music-brain-and-wellness.html

Coff, R. (1998-2002). *For the professional music educator the "Mozart Effect" - Research on music and the developing brain, and more...,.* Retrieved July 4, 2006, from http://parenting-baby.com/Parenting-Baby-Music-Research/Music-Research.html

Corbett, D., Wilson, B., & Morse, D. (2002). *The arts are an "R" too*. Jackson, MS: Mississippi ARTS Commission.

Costa-Giomi, E. (2004). Effects of three years of piano instruction on children's academic achievement, school performance and self-esteem. *Psychology of Music, 32* (2), 139-152.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed method approaches* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Cromie, W. (2000, Oct-Dec). Arts-to-smarts link overblown: Researchers sing a new tune for the Mozart effect. *The Harvard University Gazette,* pp. 1- 4. Retrieved May 16, 2006, from http:///www.new.harvard.edu/gasette/2000/10.12/1-mozart.html

Cromie, W. J. (1999, September 16). Mozart effect hits sour notes. *The Harvard University Gazette, September 19, 1999*, pp. 1-3. Retrieved July 10, 2006, from http://www.hno.harvard.edu/gazette/1999/09.16/mozart.html

Davidson, C. W., & Powell, L. A. (1986, Sept-Oct). The effects of easy-listening background music on the on-task-performance of fifth grade children. *Journal of Educational Research, 80* (1), 29-33.

Deasy, R. J. (2002). *Critical links: Learning in the arts and student academic and social development*. Washington, DC: Arts Education Partnership.

Donlan, D. (1975). Writing to music: A content analysis of eighty spontaneous writings of high school students. *Documents in Psychology, 5,* 343-344.

Dryden, S. (1992). *The impact of instrumental music instruction on the academic achievement of fifth grade students.* Retrieved October 20, 2005, from ERIC database.

Eady, I., & Wilson, J. D. (2004, Winter). The influence of music on core learning. *Education, 125*, 243-248. Retrieved January 23, 2006, from ERIC database.

Eisner, E. W. (1998). Does experience in the arts boost academic achievement? *National Society for Education in Art and Design,* 51-60.

Fiske, E. B. (2002). *Champions of change: The impact of the arts on learning*. Seattle, Washington: New Horizons for Learning.

Flury, J. (2002, November 11). Thy will be done.... *Perspective, 11*, p. 1-3. Retrieved July 18, 2006, from http://www.educationnews.org/writers/jan/THY_WILL_BE_DONE.htm

Foundation for Music Literacy (2003). *How music can dramatically affect your child's development and life-time success: A summary of the current literature concerning music and the mind.* Retrieved July 8, 2006, from http://www.pianowizard.com/media/pdfs/ChildrenandMusicResearch.pdf

Garson, G. D. (2006). *Multiple regression.* Retrieved April 22, 2006, from http://www2.chass.ncsu.edu/garson/PA765/regress.htm

Gilleta, K. S., Vrbancic, M. I., Elias, L. J., & Saucier, D. M. (2003). A Mozart effect for women on a mental rotations task. *Perceptual and Motor Skills, 96*, 1086-1092. Retrieved July 6, 2006, from ILLiad database.

Gouzouasis, P., Guhn, M., & Kishor, N. (n.d.). *The relationship between achievement and participation in music and achievement in core grade twelve academic subjects.* Retrieved July 3, 2006, from http://bcmusiccoalition.homestead.com/Predict_music_pg_mg_v_B40C7.pdf

Haynes, S. E. (2003). *The effect of background music on the mathematics test anxiety of college algebra students.* Retrieved October 20, 2005, from ERIC database.

Hetland, L. (2000, Fall/Winter). *Listening to music enhances spatial-temporal reasoning: Evidence of the "Mozart Effect".* Retrieved July 5, 2006, from ERIC database.

Hodges, D. A., & O'Connell, D. S. (n.d.). *The impact of music education on academic achievement.* Retrieved December 12, 2005, from http://www.uncg.edu/mus/SoundsOfLearning/AcdemicAchievement.pdf

Hood-Mincey, H. (2005). *An analysis of the influence of music on academic achievement in urban education.* Retrieved January 23, 2006, from OCLC FirstSearch database.

Horowitz, R. (2005, April). *Connections: The arts and cognitive, social and personal development.* Retrieved May 15, 2006, from http://www.artsconnection.org/sympHorowitz.html

Hui, K. (2004, November 12). Mozart effect in preschool children? *Early Child Development and Care, 176*, 411-419. Retrieved July 3, 2006, from http://www.metapress.com.ezproxy.lib.vt.edu:8080/media/84v16cpkgmcrxwbe1u5m/contributions/l/5/7/0/l570534332165887_html/fulltext.html

Ingram, D., & Reidel, E. (2003). *Arts for academic achievement: What does integration do for students*? University of Minnesota: Center for Applied Research and Educational Improvement, College of Education and Human Development.

Jaffers, S. E. (2006, Spring). The intersection of informal and formal music learning practices. *International Journal of Community Music,* pp.1-29. Retrieved October 27, 2006, from http://www.intljcm.com/articles/Volume%204/Jaffurs%20Files/Jaffurs.pdf

Jensen, E. (2001). *Arts with the brain in mind*. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Koppelman, D., & Imig, S. (1995). *The effect of music on children's writing content.* Retrieved July 7, 2006, from ERIC database.

LaRussa, T. (2006, Sunday, February 26). *Many schools getting back to the basics in education.* Retrieved July 14, 2006, from http://pittsburglive.com/x/pittsburghtrib/news/specialreports/enterprise2006/print_427041

Levy, Y. (n.d.). *The effects of background music on learning: A review of recent literature.* Retrieved July 6, 2006, from http://edweb.sdsu.edu/Courses/Ed690DRExamples/LitRev/Levy.htm

Lichtenstein Creative Media (2002, December 28). *The infinite mind: Music and the mind.* Retrieved December 30, 2005, from http://www.lcmedia.com/mind250.htm

Linton, M. (1999, March). The Mozart effect. *First Things, 91*, 10-13. Retrieved July 10, 2006, from http://print.firstthings.com/ftissues/ft9903/linton.html

Mason, C., Steedly, K., & Thormann, M. (n.d.). *Arts integration: How do the arts impact social, cognitive, and academic skills?* Retrieved December 2005, from ERIC database.

Mavrogenes, N. A., & Bezrucko, N. (1994). A study of the writing of fifth-grade disadvantaged children. *Journal of Educational Research, 87* (4), 228-238.

McLelland, M. J. (2005, January). *The impact of instrumental music on student academic achievement.* Retrieved October 20, 2006, from ERIC database.

Morrison, S. J. (1994). Music students and academic growth. *Music Educators Journal, 81* (2), 33-36.

Music Educators National Conference (1994a). *Fast facts from arts education in public elementary and secondary schools: A report from the National Center for Education Statistics.* Retrieved January 28, 2006, from http://www.menc.org/information/advocate/ncesrept.html

Music Educators National Conference (1994b). *Music education.* Retrieved July 18, 2006, from http://en.wikipedia.org/wiki/Music_education

Music Educators National Conference (2002, Spring). *Benefits of music education in our schools.* Retrieved January 8, 2006, from http://www.childrensmusicworkshop.com/advocacy/benefits.html

Music for All Foundation (2004). *The sound of silence - The unprecedented decline of music education in California public schools: A statistical review.* Retrieved September 9, 2006, from http://music-for-all.org/sos.html

Nantais, K. M., & Schellenberg, E. G. (1999, July). The Mozart Effect: An artifact of preference. *Psychological Science, 10*, pp. 370-373. Retrieved July 4, 2006, from EJournals database.

National Arts Education Consortium (n.d.). *Transforming education through the arts challenge: Final project report*. The Ohio State University, Columbus, OH: The National Arts Education Consortium.

National Data Resource Center (1992). National education longitudinal study. *National Education Longitudinal Study, 88*, second follow-up. Retrieved Virginia Tech, from ERIC database.

No Child Left Behind (n.d.). *No Child Left Behind.* Retrieved July 18, 2006, from http://www.whitehouse.gov/news/reports/no-child-left-behind.html#2

Patten, A. T. (1999, Sept/Oct). The serene sound of success. *Priorities, 3*. Retrieved July 10, 2006, from www.franklincovey.com

Potosky, A., & Gridley, C. (1986). *Testimony to music*. Reston, Virginia: Music Educators National Conference.

PTA (2005). *Parent involvement in promoting arts education.* Retrieved January 28, 2006, from http://www.pta.org/archive_artcile_details_1117567150375.html

Quinn, C. L. (2003, November). Anatomy of a budget cut: For boards faced with tough financial choices, maintaining credibility is critical. *School Spending: An Online Anthology from ASBJ,* pp. 1-5. Retrieved July 18, 2006, from http://www.asbj.com/schoolspending/Quinn.html

Rabkin, N., & Redmond, R. (2004). *Putting the arts in the picture: Reframing education in the 21st century*. Chicago: Columbia College.

Rauscher, F. H. (1997). A cognitive basis for the facilitation of spatial-temporal cognition through music instruction. In V. Brummett (Ed.), *Ithaca conference '96 music as intelligence: A sourcebook* (pp. 31-44). Ithaca: Ithaca College Press.

Rauscher, F. H. (1999, Fall). Music exposure and the development of spatial intelligence in children. *Bulletin of the Council for Research in Music Education,* (142), 35-47.

Rauscher, F. H. (2000, August). Is the Mozart effect "debunked"? Poster presented at the bi-annual meeting of the International Conference on Music Perception and Cognition, Keele University, Keele, UK.

Rauscher, F. H. (2003a). *Effects of piano, rhythm, and singing instruction on the spatial reasoning of at-risk children.* Retrieved July 8, 2006, from Proceeding of the European Society for the Cognitive Sciences of Music, Hannover, Germany; Hannover University Press.

Rauscher, F. H. (2003b, September). *Can music instruction affect children's cognitive development? ERIC Digest.* Retrieved October 26, 2005, from ERIC database.

Rauscher, F. H., & Shaw, G. L. (1998). Key components of the Mozart effect. *Perceptual and Motor Skills, 83* (3, Part 1), 835-841.

Rauscher, F. H., & Zupan, M. A. (2000). Classroom keyboard instruction improves kindergarten children's spatial-temporal performance: A field experiment. *Early Childhood Research Quarterly, 15* (2), 215-228.

Rauscher, F. H., Shaw, G. L., & Ky, K. N. (1993, October). Music and spatial task performance. *Nature, 365* (14), 611.

Rauscher, F. H., Shaw, G. L., & Ky, K. N. (1994, December). *Listening to Mozart enhances spatial-temporal reasoning: towards a neurophysical basis.* Retrieved January 23, 2006, from ERIC database.

Rauscher, F. H., Shaw, G. L., Levine, L. J., Wright, E. L., Dennis, W. R., & Newcomb, R. L. (1997, February). Music training causes long-term enhancement of preschool children's spatial-temporal reasoning. *Neurological Research, 19,* 2-8.

Sampled School District (2001a). Class Rankings/Grade Point Averages/Honor Graduates. *Policies and Procedures Manual*: Sampled School District.

Sampled School District (2001b). Student attendance. *Policies and Procedures Manual:* Sampled School District.

Sampled School District (2001c). Student discipline. *Policies and Procedures Manual:* Sampled School District.

Sampled School District (2006). *Demographics and student achievement profiles at a glance 2005-2006:* Sampled School District.

Schmidtlein, J. (1997). *Preliminary estimates from the 1996 national household survey on drug abuse.* Retrieved July 25, 2006, from http://www.marininstitute.org/Youth/alcohol_youth.htm

Schneider, T. W., & Klotz, J. (2000, Fall). *The impact of music education and athletic participation on academic achievement.* Retrieved October 20, 2005, from the ERIC database.

Shaw, G. L. (2004). *Keeping Mozart in mind* (2nd ed.). San Diego, California: Elsevier Academic Press.

Siribhakdi, K. (2006, April 16). *Family matters; Mozart for your toddlers.* Retrieved June 30, 2006, from http://global.factiva.com.ezproxy.lib.vt.edu:8080/ha/default.aspx

Solso, R. L., Johnson, H. H., & Beal, K. M. (1998). *Experimental psychology: A case approach* (6th ed.). New York: Longman.

Steele, K. M., Bass, K. E., & Crook, M. D. (1999, July 1999). The mystery of the Mozart effect: Failure to Replicate. *Psychological Science, 10*, pp. 366-369. Retrieved July 4, 2006, from EJouranls database.

Texas Commission on Drug and Alcohol Abuse (1998). *Secondary student's drug and alcohol abuse report*. Houston, TX: Houston Chronicle.

The College Board (1998a). *1998 College-Bound seniors: State profile report* (Virginia ed.). New York: College Board.

The College Board (1998b). *College-Bound Seniors: Total Group Profile Report*. New York: College Board.

The College Board (2000a). *2000 College-Bound Seniors: Total Group Profile Report*. New York: College Board.

The College Board (2000b). *2000 College-Bound seniors: State profile report* (Virginia ed.). New York: College Board.

The College Board (2005a). *2005 College-Bound seniors: State profile report* (Virginia ed.). New York: College Board.

The College Board (2005b). *2005 College-Bound seniors: Total Group profile report* (National Report ed.). New York: College Board.

The College Board (2005c). *About PSAT/NMSQT.* Retrieved September 21, 2006, from http://www.collegeboard.com/student/testing/psat/about.html

The GRAMMY Foundation: Leonard Bernstein Center for Learning (2004). *Artful learning: A school reform model.* Retrieved May 27, 2006, from http://artfullearning.com/index.html

The Partnership for Family Involvement in Education, the U.S. Department of Education, and the GTE Foundation (n.d.). *The study of opportunities for and barriers to family involvement in education.* Retrieved January 28, 2006, from http://www.projectappleseed.org/barriers.html

Tillmann, J. D., & Ford, L. (1996, March 15). *African American family involvement in early childhood special education programs.* Retrieved June 4, 2005, from http://eric.ed.gov/ERICWebPortal/Home.portal?_nfpb=true&eric_viewStyle=list&N...

University of Newcastle upon Tyne (2002, November 13). *How to perform and interpret regression analysis.* Retrieved October 29, 2006, from http://www.ncl.ac.uk/iss/statistics/docs/regression.html

University of Washington (n.d.). *The Musical Brain.* Retrieved July 2, 2006, from http://faculty.washington.edu/chudler/music.html

Vaughn, K. (2000). Music and mathematics: Modest support for the oft-claimed relationship. *Journal of Aesthetic Education, 34* (3-4), 149-166.

Virginia Commission for the Arts (1994, September - December). Arts education means business [Arts education advocacy information] Resources & talking points: statistics, research, quotations, economic impact sources & publications. Richmond, Virginia.

Virginia Department of Education (1999, December 9). *Virginia Department of Education September 30, 1999 Student Membership PK-12.* Retrieved July 19, 2006, from http://www.doe.virginia.gov/VDOE/dbpubs/Fall_Membership/1999/fm016.html

Virginia Department of Education (2000). *Virginia Standards of Learning Assessments: Virginia Technical Report.* Retrieved July 20, 2006, from http://www.pen.k12.us/go/Sols/html

Virginia Department of Education (2006a). *Virginia Standards of Learning.* Retrieved July 19, 2006, from http://www.doe.virginia.gov/VDOE/Superintendent/Sols/musicartsk-12.pdf

Virginia Department of Education (2006b, February 7). *Virginia Department of Education September 30, 2005 Student Membership PK-12.* Retrieved July 19, 2006, from http://www.doe.virginia.gov/VDOE/dbpubs/Fall_Membership/2005/fm_sch_sum.xls

Virginia Department of Education (2006c, January 23). *Virginia Department of Education September 30, 2005, Student Membership.* Retrieved July 19, 2006, from http://www.pen.k12.va.us/VDOE/dbpubs/Fall_Membership/2005/fm_div_grade.xls

Virginia Department of Education (n.d.a). *Division of instruction: High school instructional services.* Retrieved July 25, 2006, from http://www.doe.virginia.gov/VDOE/Instruction/high.html

Virginia Department of Education (n.d.b). *Standards of learning currently in effect for Virginia public schools.* Retrieved July 25, 2006, from http://www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml

Von Zastrow, C. (2004). *Academic atrophy: The condition of the liberal arts in America's public schools*. Washington, DC: Council for Basic Education.

Whitaker, V. L. (2005, February 9, 2005). *The effects of the advancement via individual determination on course taking patterns and achievement of high school students.* Retrieved May 30, 2006, from Virginia Tech Electronic Thesis and Dissertation database.

Wikipedia (n.d.). *Music education.* Retrieved July 18, 2006, from http://en.wikipedia.org/wiki/Music_education

Wikipedia.org. (n.d.). *Mozart Effect, History of.* Retrieved July 8, 2006, from http://www.geocities.com/god_bless_america_lyrics/mozart-effect.html

Zdzinski, S. F. (1996, Spring). Parental involvement, selected student attributes, and learning outcomes in instrumental music. *Journal of Research in Music Education, 44,* pp. 34-48.

APPENDIX A

APPENDIX B

VirginiaTech

Institutional Review Board

Initial Review Application

Directions

- **Type responses to all questions / requests below. It is recommended that you read through this document before completing.**
- **Do not leave a question blank unless directed. If a required question is not applicable to your study, explain why.**
- **Do not restrict your responses to the space provided. Provide a thorough response to each question. Be as specific as possible, keeping in mind that you are introducing the study to the IRB. Incomplete applications will result in requests for clarification from researchers and will cause delays in review and final approval.**
- **Type responses in the designated shaded boxes or check the designated check boxes.**
- **Use non-technical language throughout your application. Federal regulations require IRB applications to be written in lay language at an 8th grade reading level. Do not use jargon or scientific terms in your explanations/descriptions.**
- **Check for grammatical or typographical errors before submitting. Protocols with substantial errors will be returned for corrections.**
- **This form must be completed and submitted (as a Word document) electronically. Submit all required documents (e.g., Review Form, Initial Review Application, all study forms requested within this application, and bio-sketches) to irb@vt.edu. For questions, contact Carmen Green, IRB Administrator, at ctgreen@vt.edu or (540) 231-4358.**

Section 1: General Information

What is the Study Title: An Analysis of the Academic Achievement of Grade 12 Music Students and Non-Music Students in One Southeast Virginia Public School Division

[Note: If this protocol has been submitted to a federal agency for funding, the title of that application **must** match the title of this submission.]

☒ Check this box if this study **only involves the collection or study of existing data,** documents, records, pathological specimens, or diagnostic specimens **and respond only to the following sections within this document:** Section 1: General Information; Section 2: Justification; Section 8: Confidentiality / Anonymity; Section 14: Research Involving Existing Data; and Section 15: Additional Information below (Note: Section 15 is optional).

1. Will this research involve collaboration with another institution?
   ☒ No
   ☐ Yes

   If yes,

   A. Provide the name of the institution(s):

   B. Indicate the status of this research project with the other institution's IRB:
      ☐ Pending approval
      ☐ Approved [submit approval letter with this IRB application]
      ☐ Other institution does not have a human subject protections review board
      ☐ Other, explain:

Section 2: Justification

2. Describe the background of this study, including supporting research: **Music education has suffered a number of cutbacks over the past several decades due to higher student and teacher accountability, increasing budget cuts, the federal No Child Left Behind Act (NCLB), and stringent state standards of learning. A number of music educators have argued that education in music can boost test scores, attendance, attitudes toward school, and overall academic achievement. This study will investigate these claims by examining grade 12 weighted cumulative Grade Point Average (GPA) of the 2006 graduating class in one Southeast Virginia public school division to determine if such claims are viable.**

   Describe the purpose / objectives of this study and the anticipated findings/contributions: **The purpose of this study is to investigate the affects of music participation and non-music participation on twelfth grade weighted cumulativeGrade Point Average. Anticipated findings/contributions will attempt to reveal that music education has an impact on academic achievement.**

   Therefore, school administrators, school boards, general educators, and music educators will have additional information and statistics to support music education during budget development processes, music advocacy events, and overall inclusion in the public school curricula.

4. Explain what the research team plans to do with the study results (e.g., publish, use for dissertation, etc.): **Use for dissertation**

5. Briefly describe the study design: **The research design used in this study will include the independent variables of music students (vocal, instrumental, composition, or a combination thereof) or non-music students in eleven levels: VMusic-4, VMusic-3, VMusic-2, VMusic-1, VMusic-0, IMusic-4, IMusic-3, IMusic-2, IMusic-1, IMusic-0, and VIMusic-#. The dependent variable will be grade 12 weighted cumulativeGrade Point Average (GPA). Weighted cumlative grade point average is a numerical average based on the course taken, the grade received, and the rigor or weight assigned to the course. Relationships, if any, will be determined within and between independent variables. Ethnicity, gender, number of years enrolled in formal public school music or no music courses will be determined through data collection. Four hypothesis and four null hypothesis will drive the research study to determine statistical significance.**

Section 3: Recruitment

6. Describe the subject pool, including inclusion and exclusion criteria (e.g. sex, age, health status, ethnicity, etc.) and number of subjects: **Subjects will include all music students and a random sample of the 2006 graduation class in one Southeast Virginia public school division. Data (weighted GPA) will be collected on all music students in grade 9-12 that meet the following criteria: vocal music students with four or more years of vocal music instruction = VMusic-4; vocal music students with three to three and one-half years of vocal music instruction = VMusic-3; vocal music students with two to two and one-half years of vocal music instruction =VMusic-2; vocal music students with one to one and one-half years of vocal music instruction = VMusic-1; and students with one-half (1 semester) or no vocal music instruction = VMusic-0. Similarly, instrumental (band, orchestra, guitar, piano, and music composition) students are classified as follows: instrumental music students with four or more years of instrumental music instruction = VMusic-4; instrumental music students with three to three and one-half years of instrumental music = IMusic-3; instrumental music students with two to two and one-half years of instrumental music = IMusic-2; instrumental music students with one to one and one-half years of instrumental music = IMusic-1; and instrumental music students with one-half (1 semester) or no instrumental music instruction = IMusic-0. Finally, there may be students who enrolled in a combination of vocal and instrumental music courses. These students will be identified as VIMusic-# with the total number of years enrolled in music instruction in place of the number sign. For these criteria, students must have been enrolled in the same school division within the study timeline. The class of 2006 entered high school in the fall of 2002. Data will be collected as to gender, ethnicity, weighted grade point average (GPA) and the criteria listed above. There are approximately 2,054 subjects. All music students in the sample school division will serve as the music population. However, due to large numbers, a random sample will be taken from the population of non-music students in the sample school division.**

7. How will subjects be identified to participate in this research study (If searching existing records to identify subjects, indicate whether the records are public or private. If private, describe the researcher's privileges to the data)? **Each subject in this research study graduated from the sampled school division in the spring of 2006. Each subject will be assigned a number by the researcher. No sampled school division identification information will be used. Exisiting records from which data will be gathered are public information and will be collected from the sampled school division's electronic student information system with permission of the division superintendent, research/data supervisor, and the technology department.**

8. The IRB must ensure that the risks and benefits of participating in a study are distributed equitably among the general population and that a specific population is not targeted because of ease of recruitment. Provide an explanation for choosing this population: **Participants in this study have the same chance at academic success in regard to course offerings including music and general curriculum courses within the same school division. The 2006 graduating class will provide adequate data to complete the study.**

9. Describe recruitment methods, including how the study will be advertised or introduced to subjects [submit all advertising / recruitment forms (e.g., flyers/posters, invitation letter/e-mail, telephone recruitment script, etc.) with this IRB application]: **Since data will be collected from existing (public) information from the sampled school divison's technology and statistical information offices, no recruitment methods or advertisements will be used.**

Section 4: Requesting a Waiver for the Requirement to Obtain Signed Consent Forms from Participants

This section (Section 4) <u>not</u> required for studies qualifying for exempt review

Many minimal risk socio-behavioral research studies qualify for a waiver of the requirement for the investigator(s) to obtain signed consent forms from subjects [i.e., researcher does obtain verbal or implied (i.e., consent implied from the return of completed questionnaire) consent from subjects; however, does not obtain written consent from subjects]. Examples of types of research that typically qualify for this type of waiver are as follows: internet based surveys, anonymous surveys, surveys not requesting sensitive information, and oral history projects. You may request a waiver of signed consent for either some or all of the study's procedures involving human subjects.

10. Are you requesting a waiver of the requirement to obtain signed consent forms from participants?
☐ No, consent forms will be signed by all research participants prior to participating in all research procedures [submit consent document template(s) with this IRB application]
☐ Yes

If yes,

A. Select **<u>one</u>** of the criteria listed below and describe how your research meets the selected criteria:

☐ **Criteria 1:** [Typically used for anonymous surveys] The only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confidentiality. Each subject will be asked whether the subject wants documentation linking the subject with the research, and the subject's wishes will govern:

Or

☐ **Criteria 2:** The research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context (e.g., sitting down and talking with someone, calling someone at home and asking everyday questions, mall survey, mail survey, internet survey, etc.):

Either selection of either Criteria 1 or Criteria 2 above, the IRB suggests and may require the investigator to provide subjects with a written or verbal (for telephone interviews) statement regarding the research, which should provide subjects with much of the same information that is required within a consent document. This is typically accomplished by providing subjects with an information sheet (i.e., a document similar to a consent form; however, does not request signatures), supplying the information within the invitation letter, or reading the information sheet to the subject over the phone.

B. Will you be providing subjects with a written or verbal statement regarding the research?

☐ Yes [submit supporting document(s) (e.g., information sheet, invitation letter) with this IRB application]

If yes, check all methods that will be utilized to provide subjects with a statement regarding the research:

☐ Information sheet physically provided to subjects
☐ Information sheet will be read to subject over the phone
☐ Information captured within the invitation document
☐ Other, describe:

☐ No, provide justification for not supplying subjects with this information:

C. Does this waiver of written consent cover all study procedures involving human subjects?

☐ Yes
☐ No, list the study procedures for which this waiver is being requested to cover (Note: a consent document may be required for the study procedures not included under this waiver):

Section 5: Consent Process

11. Check all of the following that apply to this study's consent process:

☐ Verbal consent will be obtained from participants
☐ Written consent will be obtained from participants
☐ Consent will be implied from the return of completed questionnaire (if the study only involves implied consent, skip to Section 6 below)
☒ Other, describe: **Data will be collected from existing public information through the sampled school division's central records, electronic information system, and the technology department.**

12. Provide a general description of the process the research team will use to obtain and maintain informed consent **and** respond specifically to A-D below: **Exemption requested**

. A. Who, from the research team, will be overseeing the process and obtaining consent from subjects? **Exemption requested**

B. Where will the consent process take place? **Exemption requested**

C. During what point in the study process will consenting occur (Note: unless waived, participants must be consented before completing any study procedure, including screening questionnaires)? **Exemption requested**

D. If applicable [e.g., for complex studies, studies involving more than one session, or studies involving more of a risk to subjects (e.g., surveys with sensitive questions)], describe how the researchers will give subjects ample time to review the consent document before signing: **Exemption requested**

☒ Not applicable to this study

Section 6: Procedures

13. Provide a step-by-step thorough explanation of all study procedures expected from study participants, including the length of sessions involved, and total time commitment: Exemption requested

14. Describe how data will be collected and recorded [submit all data documents (e.g., questionnaire, interview questions, etc.) with this IRB application]: **Data will be collected, with permission, from the sampled school division's division Superintendent, research department, and technology department. Data will be recorded through SPSS 13 software and stored on the researcher's personal computer and/or flash drive/disk.**

15. Where will the study procedures take place? **Exemption requested**

Section 7: Risks and Benefits

16. What are the potential risks (e.g., emotional, physical, social, legal, economic, or dignity) to study participants? (do **not** state, "There are no risks involved." Acceptable language = "There are no more than minimal risks involved.") **There are no more than minimal risks involved.**

17. Does this study involve (check one box): ☒ minimal risk or ☐ more than minimal risk to study participants?
Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily activities or during the performance of routine physical or psychological examinations or tests.

18. Explain the study's efforts to reduce the potential risks to subjects? **Subjects will not be identified through previous or the sampled school division's indentification numbers. The researcher will assign each subject a new number to provide for anonymity. Therefore, the potential risk to subjects and the sampled school division is reduced to provide no more than minimal risk.**

19. What are the direct or indirect anticipated benefits to study participants and/or society? **Direct or indirect anticipated benefits/findings/contributions will attempt to reveal that music education has an impact of academic achievement as measured by grade twelve weighted cumulative grade point average. Therefore, school administrators, school boards, general educators, and music educators will have additional statistical information to support music education or not support music education during budget development processes, music advocacy events, and overall inclusion in the public school curricula.**

Section 8: Confidentiality / Anonymity

20. Will the study release personally identifying study results to anyone outside of the research team (e.g., participants identified in publications with individual consent)?
☒ No
☐ Yes

If yes,

To whom will identifying data be released?

21. Will researchers be collecting and/or recording identifying information (e.g., name, contact information, etc.) of study participants?
☒ No (identifying information of participants will not recorded in study files)
☐ Yes

If yes,

The IRB strongly suggests and may require that all data documents (e.g., questionnaire responses, interview responses, etc.) do not include or request identifying information (e.g., name, contact information, etc.) from participants. If you need to link subjects' identifying information to subjects' data documents, use a study ID/code on all data documents.

A. Describe if/how the study will utilize study codes:

B. If applicable, where will the linked code and identifying information document (i.e., John Doe = study ID 001) be stored and who will have access (Note: this document must be stored separately from subjects' completed data documents and the accessibility should be limited)?

22. Where will data documents (e.g., questionnaire, interview responses, etc.) be stored? **Data documents will be maintained for at least five years on a removable disk drive (SimpleTech 8GB) on the researcher's personal computer.**

23. Who will have access to study data? **The dissertation team, upon request, and the researcher only.**

24. Describe the study's plans for retaining or destroying the study data: **Data will be maintained on a removable disk drive for at least five years and deleted at the end of the five year period or at a date agreeable with the dissertation committee.**

25. Does this study request information from participants regarding illegal behavior?
☒ No
☐ Yes

If yes,

Does the study plan to obtain a Certificate of Confidentiality [visit our website at http://www.irb.vt.edu/pages/studyforms.htm#COC for information about these certificates]?
☐ No
☐ Yes (Note: participants must be fully informed of the conditions of the Certificate of Confidentiality within the consent process and form)

Section 9: Compensation

26. Will subjects be compensated for their participation?
☒ No
☐ Yes

If yes,

A. What is the amount of compensation?

Unless justified by researcher (in letter B below), compensation should be prorated based on duration of study participation. Payment must not be contingent upon completion of study procedures. In other words, even if the subject decides to withdraw from the study, he/she must be compensated, at least partially, based on what study procedures he/she has completed.

B. Will compensation be prorated?
☐ Yes, please describe:
☐ No, explain why and clarify whether subjects will receive full compensation if they withdraw from the study?

Section 10: Audio / Video Recording

27. Will your study involve video and/or audio recording?
☒ No
☐ Yes

If yes,

A. Select from the drop-down box → select one

B. Provide compelling justification for the use of audio/video recording:

C. How will data within the recordings be retrieved / transcribed?

D. Where will tapes be stored?

E. Who will have access to the recordings?

F. Who will transcribe the recordings?

G. When will the tapes be erased / destroyed?

Section 11: Research Involving Students

28. Does your study include students as participants?
☐ No (if no, skip to Section 12 below)
☒ Yes

If yes,

A. This study involves (select all that apply):
☒ Students in elementary, junior or high school (or equivalent)
☐ College students (select all that apply):
☐ College upperclassmen (Juniors, Seniors or Graduate Students)
☐ College freshmen – please note that some college freshmen may be minors (under the age of 18). If the study meets the specified criteria, the IRB may grant a waiver of parental permission to include these minors without individual guardian permission [see question 32B for further information].
Select one of the following:
☐ These minors will be included in this research
☐ Minors will be excluded from this study. Describe how the study will ensure that minors will not be included:

NOTE: Data collection includes information (gender, ethnicity, GPA, and number of years enrolled in or not enrolled in formal music education courses) from 2006 graduates of the sampled school division that were enrolled in the fall of 2002 to the spring of 2006.

B. Does this study involve conducting research with students of the researcher? (Note: If it is feasible to use students from a class of students not under the instruction of the researcher, the IRB recommends and may require doing so):
☒ No
☐ Yes, describe safeguards the study will implement to protect against coercion or undue influence for participation:

C. Will the study need to access student records (e.g., SAT or GRE scores, or student GPA scores)?
☐ No
☒ Yes [if yes, a separate signed consent/assent form (for student's approval) and permission form (for parent's approval if subject is a minor) must be obtained and submitted to the Registrar's office] [submit consent form template(s) with this IRB application]

Section 11A: Students in Elementary, Junior, or High School

[Answer questions 29 & 30 below if your study involves students in **elementary, junior or high school (or equivalent)]**

29. Will study procedures be completed during school hours?
☒ No
☐ Yes

If yes,

A. Students not included in the study may view other students' involvement with the research during school time as unfair. Address this issue and how the study will reduce this outcome:

B. Missing out on regular class time or seeing other students participate may influence a student's decision to participate. Address how the study will reduce this outcome:

30. You will need to obtain school approval. This is typically granted by the Principal or Assistant Superintendent and classroom teacher. Approval by an individual teacher is insufficient. School approval, in the form of a letter or a memorandum should accompany the approval request to the IRB. Is the approval letter(s) attached to this submission? ☒ Yes or ☐ No, if no, explain why:

Section 11B: College Students

[Answer question 31 below if your study involves **college students**]

31. Will extra credit be offered to subjects?
☒ No
☐ Yes

If yes,

A. Include a description of the extra credit to be provided in Section 9: Compensation above

B. What will be offered to subjects as an equal alternative to receiving extra credit without participating in this study?

Section 12: Research Involving Minors

For more information about involving minors in research, visit our website at http://www.irb.vt.edu/pages/newstudy.htm#Minors

32. Does your study involve minors (under the age of 18) (Note: age constituting a minor may differ in other States)?
☒ No
☐ Yes

If yes,

A. The procedure for obtaining assent from these minors and permission from the minor's guardian(s) should have been described in **Section 5** (Consent Process) in this form.

Researchers may request a waiver of parental permission if the study meets the criteria specified under letter B below. Requesting a waiver for the requirement to obtain informed permission from guardians may be helpful when recruiting college students for minimal risk socio/behavioral research. Most studies involving minors must obtain parental permission prior to the recruitment of minors.

B. Are you requesting a waiver of parental permission?
☐ No, parents/guardians will provide their permission
☒ Yes, describe below how your research meets **all** of the following criteria:
A) The research involves no more than minimal risk to the subjects: **Subjects will not be identified by existing sampled school division identification numbers or by name.**
B) The waiver will not adversely affect the rights and welfare of the subjects: **Subjects are 2006 graduates of the sampled school division.**
C) The research could not practicably be carried out without the waiver: **The 2,054 subjects graduated in the spring of 2006 from the sampled school division. Many students are currently studying at the university level or have joined the workforce. Gaining parent permission and/or student permission would be virtually impossible. Existing data is public information.**
D) (Optional) Subjects will be provided with additional pertinent information after participation: **No**

C. Does your study reasonably pose a risk of reports of current threats of abuse and/or suicide?
☒ No
☐ Yes, thoroughly explain how the study will react to these reports (Note: subjects must be fully informed of the fact that researchers must report reasonable threats of abuse or suicide to the appropriate authorities/persons in the Confidentiality section of the Consent or Permission documents):

Section 13: Research Involving Deception

For more information about involving deception in research and for assistance with developing your debriefing form, visit our website at http://www.irb.vt.edu/pages/newstudy.htm#Deception

33. Does your study involve deception?
☒ No
☐ Yes

If yes,

A. Describe the deception:

B. Why is the use of deception necessary for this project?

C. Describe the process of debriefing [submit your debriefing form with this IRB application]:

D. By nature, studies involving deception cannot provide subjects with a complete description of the study during the consent process; therefore, the IRB must waive a consent process which does not include, or which alters, some or all of the elements of informed consent. Provide an explanation of how the study meets **all** the following criteria for an alteration of consent:
A) The research involves no more than minimal risk to the subjects:
B) The alteration will not adversely affect the rights and welfare of the subjects:
C) The research could not practicably be carried out without the alteration:
D) (Optional) Subjects will be provided with additional pertinent information after participation (i.e., debriefing for studies involving deception):

The IRB requests that the researcher use the title "Information Sheet" instead of "Consent Form" on the document used to obtain subjects' signatures to participate in the research. This will adequately reflect the fact that the subject cannot fully consent to the research without the researcher fully disclosing the true intent of the research.

Section 14: Research Involving the Collection or Study of Existing Data Documents, Records, Pathological Specimens, or Diagnostic Specimens

34. Will your study involve the collection or study of existing data?
☐ No
☒ Yes

If yes,

A. From where does the existing data originate? **Existing data originates from the sampled school division's electronic student information system and central records. The technology department will be instrumental in retrieving requested data.**

B. Provide a description of the existing data that will be collected: **The following data will be collected: gender, ethnicity, grade twelve weighted cumulative grade point average, type (vocal, instrumental, composition or no formal music instruction) and total number of years each subject was enrolled or not enrolled in formal music education courses.**

Section 15: Additional Information

35. Provide additional information not captured within this worksheet here [response to this question **not** required]:

APPENDIX C

VirginiaTech **Institutional Review Board**

Request for Exempt Review

Directions

This form must be typed and submitted (as a Word document) to the IRB office electronically along with the other required documents (e.g., Initial Review Application, all study forms relating to human subjects, and bio-sketches of investigators) to irb@vt.edu. In addition to submitting electronically, this form, signed by all appropriate parties, must be received by the IRB office before the submission is processed. Mail or deliver the original signed copy of this form to: IRB, Virginia Tech, Office of Research Compliance, 1880 Pratt Drive, Suite 2006 (0497), Blacksburg, VA 24061. To speed up the approval process, signed Review Forms may be scanned or faxed [(540) 231-0959] to the IRB office; however, the original signatures must also be mailed or delivered to the IRB office for documentation.

Section 1: Contact Information

Principal Investigator [Faculty or Faculty Advisor] (all fields required) **HST = Human Subjects Training**

Name: **Dr. Travis Twiford** PID: **ttwiford** HST completed through: VT in-class training
What is a PID? (scroll over)
Department: **Virginia Tech/ELPS** Email: **ttwiford@vt.edu** Mail Code:

Signature on file ______________________ ______________
Signature of Principal Investigator Date

Co-Investigator(s) [Faculty or Student] (all fields required for each Co-Investigator)

Co-Investigator #1
Name: **George Darryl Waller** PID: **gdwaller** HST completed through: VT in-class training
Organization Name: **Virgnia Tech/ELPS** Email: **gdwaller@vt.edu**

Signature on file ______________________ ______________
Signature of Co-Investigator #1 Date

Co-Investigator #2
Name: PID: HST completed through: select source
Organization Name: Email:

______________________ ______________
Signature of Co-Investigator #2 Date

Co-Investigator #3
Name: PID: HST completed through: select source
Organization Name: Email:

______________________ ______________
Signature of Co-Investigator #3 Date

Co-Investigator #4
Name: PID: HST completed through: select source
Organization Name: Email:

______________________ ______________
Signature of Co-Investigator #4 Date

Departmental Reviewer: (not required for all departments) Name: PID: ______________________________ _______________ Signature of Departmental Reviewer Date

Section 2: General Information

1. Project Title: **An Analysis Of The Academic Achievement Of Grade 12 Music Students And Non-Music Students In One Southeast Virginia Public School Division**

Enter title as you would like it to appear on the official IRB approval letter.

2. Number of Human Subjects: **2,054 (attrition may have occurred)**

3. Do any of the investigators on this project have a reportable conflict of interest? No If yes, explain:

☒ All investigators of this project are qualified through completion of human subject protections education. Visit our website at http://www.irb.vt.edu/pages/training.html to view training opportunities accepted by the VT IRB. (Note: Do not submit your IRB application until all investigators are qualified)

☐ All investigators listed on this project, along with the departmental reviewer (if applicable), have reviewed this IRB application and all requested revisions from these parties have been implemented into this submission. (Note: Do not submit your application until all parties have reviewed and signed off on the final draft of the materials)

Section 3: Source of Funding

4. Source of Funding Support (check one box):
   ☒ Departmental Research [if Dept. Research, skip to Section 4]
   ☐ Sponsored Research, including VARIOUS funds & OSP/VT foundation funds [if Sponsored Research, respond to letters A-D below]
   A. Name of Sponsor [if NIH, specify department]**:**
   B. Title of study as listed on OSP application:
   C. OSP number: * Proposal # (enter 8 digit number, **no** dashes/spaces): , OR
   * Grant # (enter 6 digit number, **no** dashes/spaces): , OR
   * OSP # pending (check box if pending): ☐
   D. Is this project receiving federal funds (e.g., DHHS, DOD, etc.)? select one

Section 4: Exemption Criteria

***Note*:** To qualify for Exemption, the research must meet **all** of the following criteria (a – f):
(a) Be of minimal risk to the subjects; AND
(b) Must not involve pregnant women, prisoners or mentally impaired persons; AND
(c) Must not include survey research with minors unless involving standard educational activities (e.g., educational tests) within the particular education system; AND
(d) Must not include observation of a minor's public behavior unless there is no researcher interaction, AND
(e) Research must not involve video or audio recording of subjects; AND
(f) must be in one or more of the following categories:

5. Please mark/check the appropriate category or categories below which qualify the proposed project for exemption:

☒ 1. Research will be conducted in established or commonly accepted educational settings, involving normal educational practices, such as (a) research on regular and special education instructional strategies, or (b) research on the effectiveness or the comparison among instructional techniques, curricula, or classroom management methods.

☐ 2. Research will involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, **unless** the subjects can be identified directly or through identifiers linked to the subjects **and** disclosure of responses could reasonably place the subjects at risk or criminal or civil liability or be damaging to the subjects' financial standing, employability or reputation.

☒ 3. Research will involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under item (2) above, **if** (a) the subjects are elected or appointed public officials or candidates for public office; **or** (b) Federal statute(s) require(s) that the confidentiality or other personally identifiable information will be maintained throughout the research and thereafter.

☒ 4. Research will involve the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified directly or through identifiers linked to the subjects.

☐ 5. Research and demonstration projects which are conducted by or subject to the approval of federal agency sponsoring the research, and which are designed to study, evaluate or otherwise examine (a) public benefit or service programs, (b) procedures for obtaining benefits or services under those programs, (c) possible changes in or alternatives to those programs or procedures, or (d) possible changes in methods or levels of payment for benefits or services under those programs.

☐ 6. Taste and food quality evaluation and consumer acceptance studies, if (a) wholesome foods without additives are consumed, or if (b) a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

APPENDIX D

VirginiaTech

Office of Research Compliance
1880 Pratt Drive (0497)
Blacksburg, Virginia 24061
540/231-4358 Fax: 540/231-0959
E-mail: ctgreen@vt.edu
www.irb.vt.edu
FWA00000572(expires 7/20/07)
IRB # is IRB00000667.

DATE: October 16, 2006

MEMORANDUM

TO: Travis W. Twiford
George Waller

FROM: Carmen Green

SUBJECT: **IRB Exempt Approval:** "An Analysis of the Academic Achievement of Grade 12 Music Students and Non-Music Students in One Southeast Virginia Public School Division" , IRB # 06-572

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of October 13, 2006.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.

2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File

APPENDIX E

Date: September 20, 2006

SAMPLED SCHOOL DIVISION
RESEARCH AND PROGRAM EVALUATION SERVICES
APPLICATION FOR RESEARCH AUTHORIZATION

Name of Applicant: George Darryl Waller

Mailing Address: 108 Wendy Court

Newport News, Virginia

Position Supervisor of Music *Telephone* 757-591-4561

[redacted]

School or Office Administration Building

email [redacted]

1. Title of proposed project:
An Analysis of the Academic Achievement of Grade 12 Music Students and Non-Music Students In One Southeast Virginia Public School Division

2. Statement of problem to be researched (simply, what are you trying to find out?):
Does music education have an impact on academic achievement? What impact does music or non-music participation have on Grade 12 weighted grade point average, the number of absences, and the number of discipline referrals?

3. School or location where project is proposed to be carried out:
All high schools (the 2006 graduating class)

4. List testing or survey instruments being used for this research.
Attach a copy of all instrument(s).
All data will be entered in SPSS 13 for analysis. No identification of students or the sample school division will be made throughout the project. Three dependent variables will serve as the survey instrument in this study - Grade 12 weighted grade point average, the number of absences, and discipline referrals. Descriptive statistics will be collected to include: gender, ethnicity, total number of years enrolled or not enrolled in formal music education courses in grades 9-12.

5. List resources and support being requested (time, participation of groups, etc.):
I request the assistance of the technology department in securing requested data. The sample population is 2006 graduates. Data collection through the technology department will be critical.

6. Will you be conducting research requiring an Informed Consent Form?
If yes, attach a copy of your Informed Consent Form.

Yes

No **XX**

7. Estimate of timeframe planned to complete the proposed project:
Data collection completed by December 15, 2006.
Final defense in March/April 2007.

8. How will participation in this project benefit students or advance the professional knowledge of teachers?
This project will benefit students or advance the professional knowledge of teachers through increased awareness of music and music education. If music education is found to benefit students academically, music and arts integration techniques can be fused into curricula and classroom instruction to improve academic test scores for all students. If music education is found not to benefit students academically, a complete music program audit will be proposed.

9. What is the purpose of your research? (Please check all that apply.)

- [ ] Graduate / Undergraduate Work *(College or University)* Virginia Tech
- [X] Doctoral Dissertation

If this proposal is for a project at the doctoral level, please attach an abstract of the research proposal.

- [ ] Educational Project *(Specify Type)*
- [ ] Educational Grant (Grant Agency)
- [ ] Publication *(Specify Type)*
- [ ] Personal Research
- [ ] Other *(Specify Type)*

Signature on file
Applicant's Signature

20-Sep-06
Date

20-Oct-06

FOR OFFICE USE ONLY
Date Received
20-Sep-06
Signature on file
Authorization
Approved **X**

Not Approved
Date

APPENDIX F

Sampled School Division

Accountability Department ♦ Dr. Daniel Curry-Corcoran, Director

November 20, 2006

Mr. George Darryl Waller
108 Wendy Court
Newport News, VA

Dear Mr. Waller:

It is my pleasure to inform you that the Research Authorization Committee has approved your request to study the academic achievement of Grade 12 music and non-music students in [redacted]. Please remember that your research interests must remain confined to the provisions outlined in your research request form. Authorizations for additional research must first be submitted to the Research Authorization Committee. A copy of your research request form is attached for your reference.

Please note that your study is approved to access and utilize relevant data files received from the Technology Department. Please include a copy of this letter to the eSIS help desk along with your eSIS data request form. No identifying student information will be available, e.g. name, student identification number, state testing identification number, or social security number, in the data files. It is important that the confidentiality of all students in your study remain protected as highlighted under the Family Educational Rights and Privacy Act (FERPA).

The Research Authorization Committee requires that you use pseudonyms in place of the names of the school division and school in any documentation produced from your study. This precaution is taken to ensure the safety and anonymity of all personnel participating in the study, and add to the rigor and integrity of all reported results.

I wish you much success on your dissertation, and look forward to reading the results of your final study. The Research Authorization Committee requests that a final draft of all research proposals be submitted to the chairperson upon completion. Please feel free to contact me at 591-4547 or at daniel.curry-corcoran@nn.k12.va.us with any additional questions.

Sincerely,

Daniel Curry-Corcoran, Ph.D.
Research Authorization Committee Chair

APPENDIX G

eSIS Report Request Form

Requestor Name: **George Darryl Waller**
Requestor Location: **Administration Building**
Requestor Job Title: **Supervisor of Music**
Requestor Phone or e-mail: [redacted]
Date of Request: **September 21, 2006**
Date Report Required: **October 1, 2006**
Recurring Report: **One time only**
New or Change: **New**
Report Description:
2006 Graduating Class Statistics

- **Gender**
- **Ethnicity**
- **Distinguish between vocal and/or instrumental music, music theory or NO music courses**
- **If music courses, how many years? (i.e. 4+ years, 3-3.5 years, 2-2.5 years, 1-1.5 years, or 0-.05 (1 semester) year**
- **Grade 12 weighted Grade Point Average (GPA)**
- **Total number of absences (Grade 12 only)**
- **Total number of discipline referrals (grades 9-12)**
- **Eliminate all students not attending the school division for all four years (Grades 9-12). Students who attend all four years but transfer to another high school should be included. All others eliminated.**

Priority: Select One: **Critical**

Priority Justification (how will the report be used and why is it Urgent or Critical)

The report will be used in reporting data in a research study toward the PhD dissertation. Specifically the research topic is the impact of music education on academic achievement. A goal has been set to have all data collection and analysis completed by December 15 so that chapters four and five can be written during the winter holiday break.

Request Approved By: Select One: **Director**

Approver's Name:
Signature on file

▼▼ ▼▼▼▼▼▼▼▼▼▼▼▼▼▼Tech Center Use▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼
Help Desk Assessment:

Development Log Date:
Development Log Report Name:

APPENDIX H

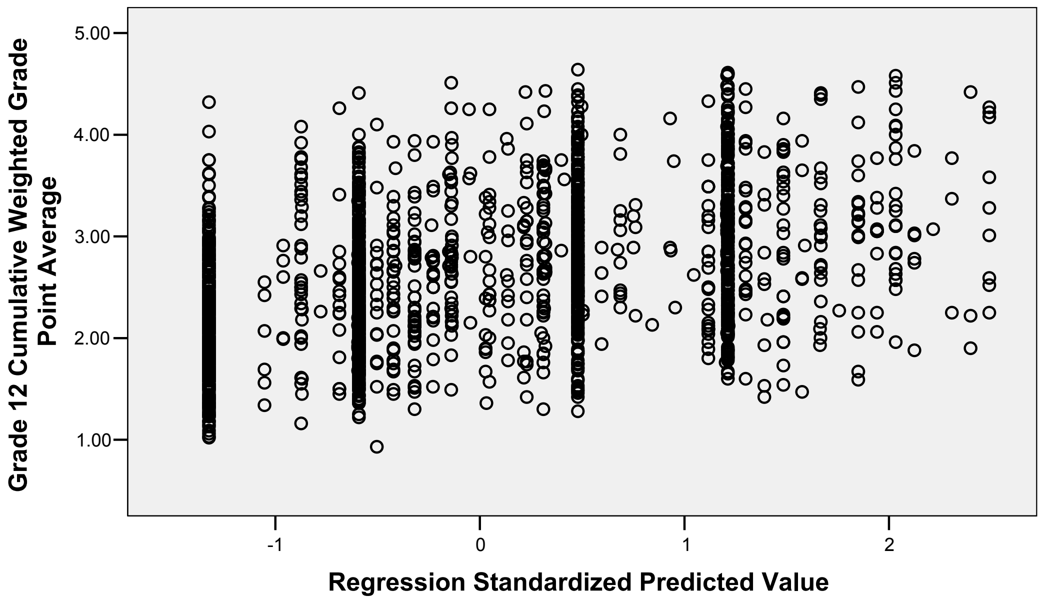


Figure 16. Scatter Plot.

Regression Standardized Predicted Value (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

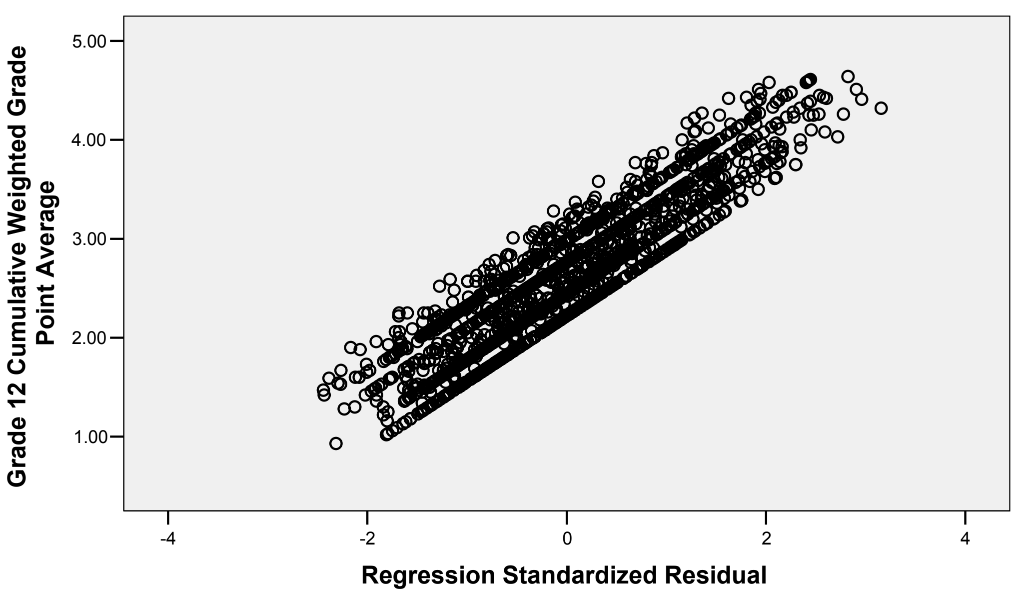


Figure 17. Scatter Plot.

Regression Standardized Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

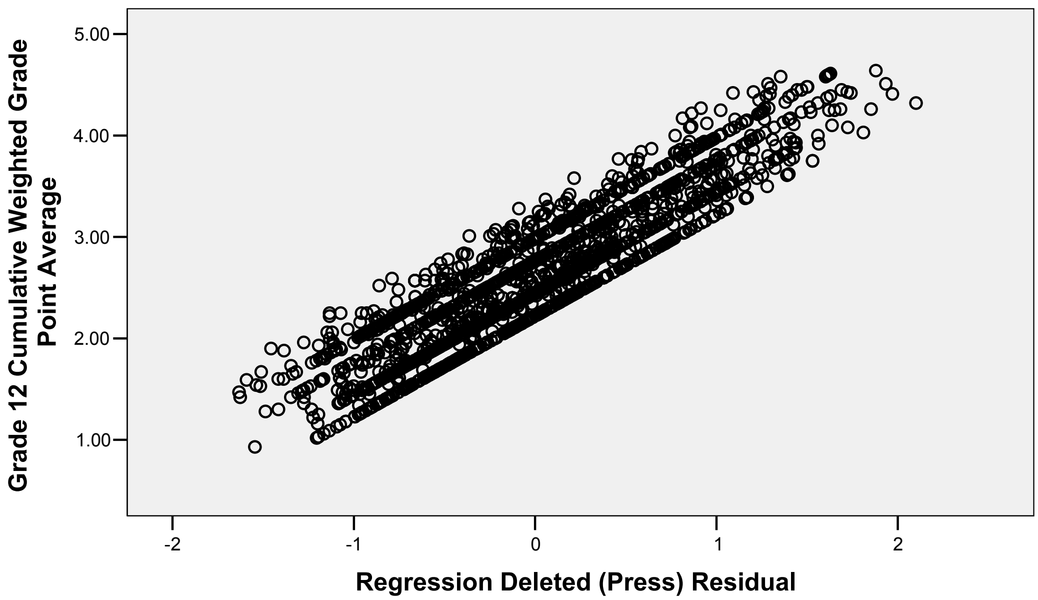


Figure 18. Scatter Plot.

Regression Deleted (Press) Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

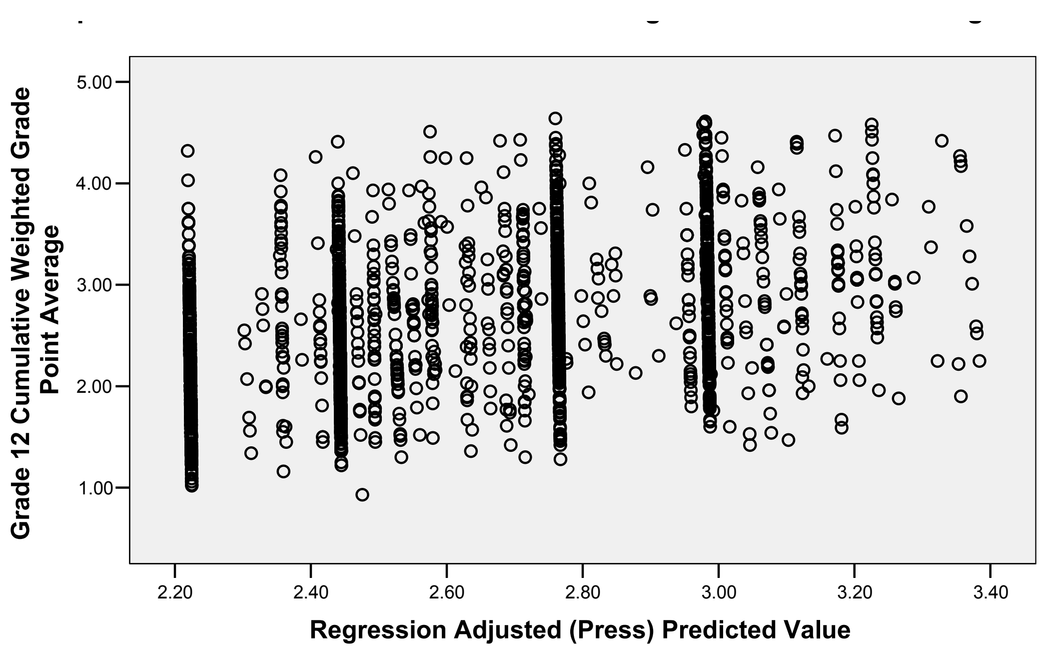


Figure 19. Scatter Plot.

Regression Adjusted (Press) Predicted Value (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

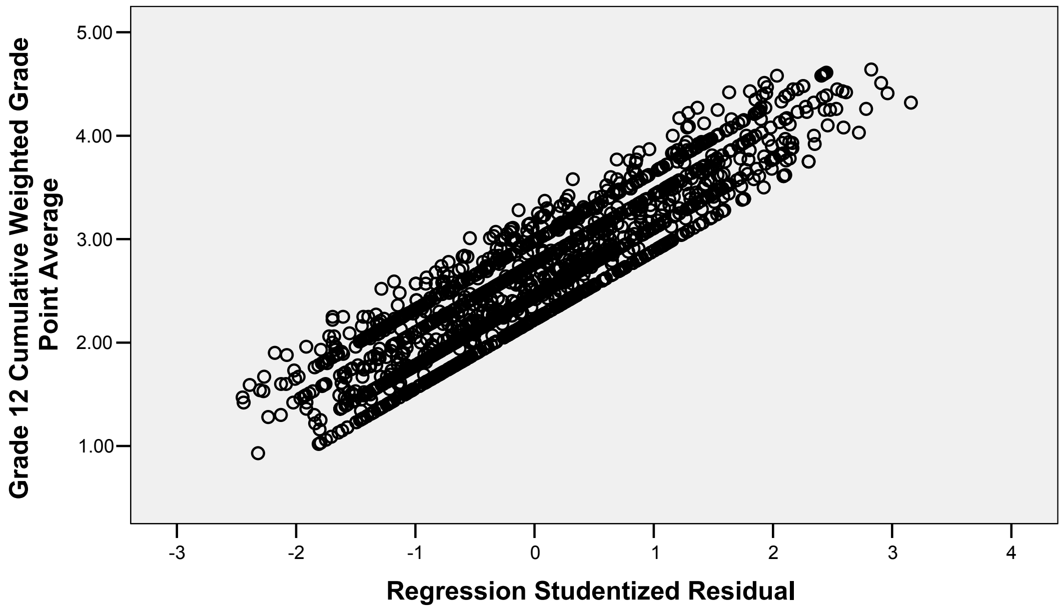


Figure 20. Scatter Plot.

Regression Studentized Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

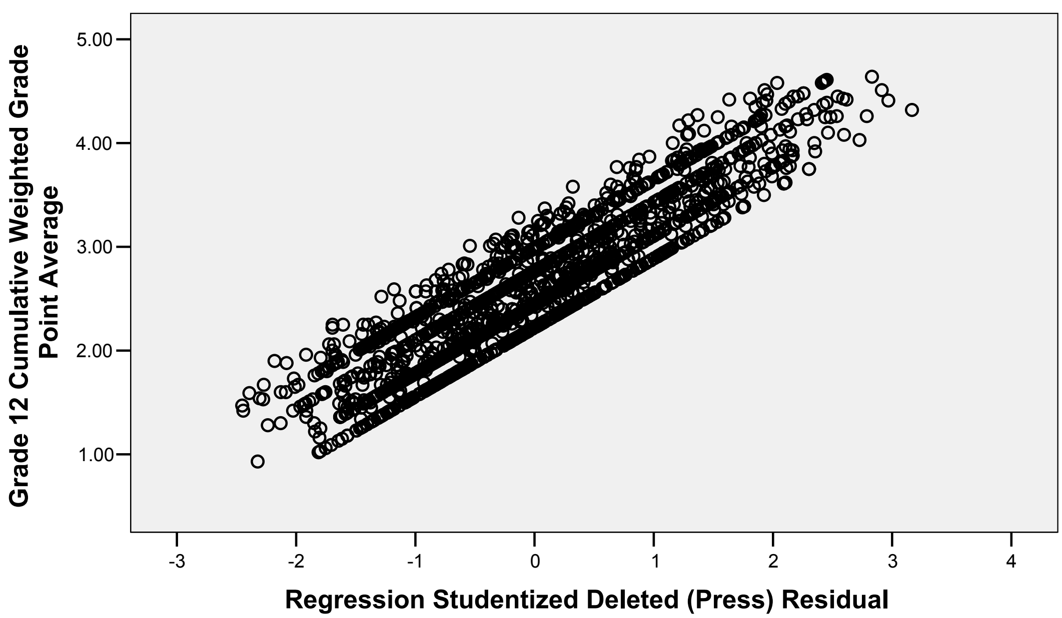


Figure 21. Scatter Plot.

Regression Studentized Deleted (Press) Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

APPENDIX I

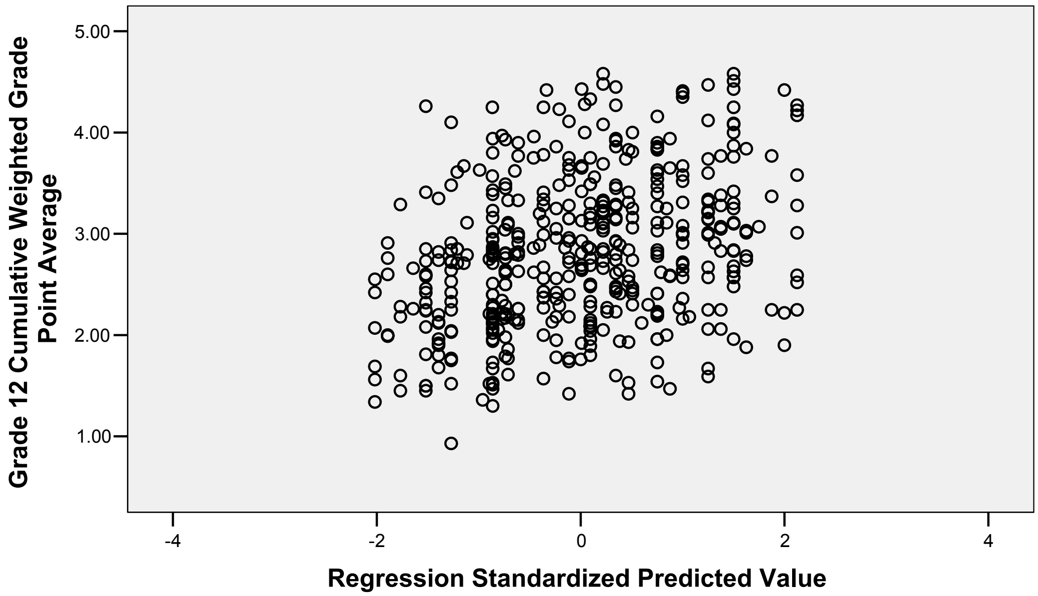


Figure 22. Scatter Plot.

Regression Standardized Predicted Value (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

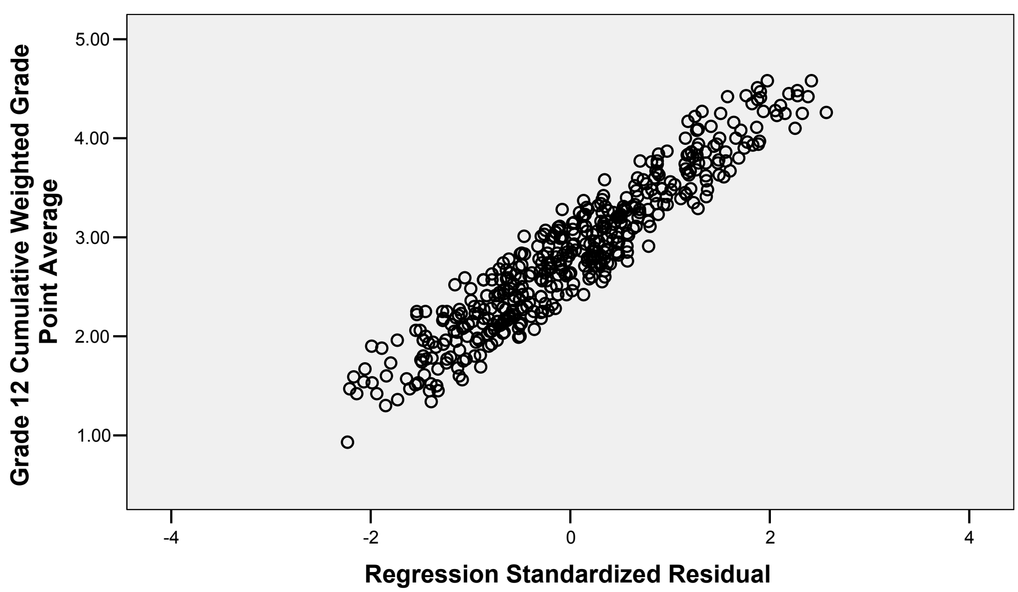


Figure 23. Scatter Plot.

Regression Standardized Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

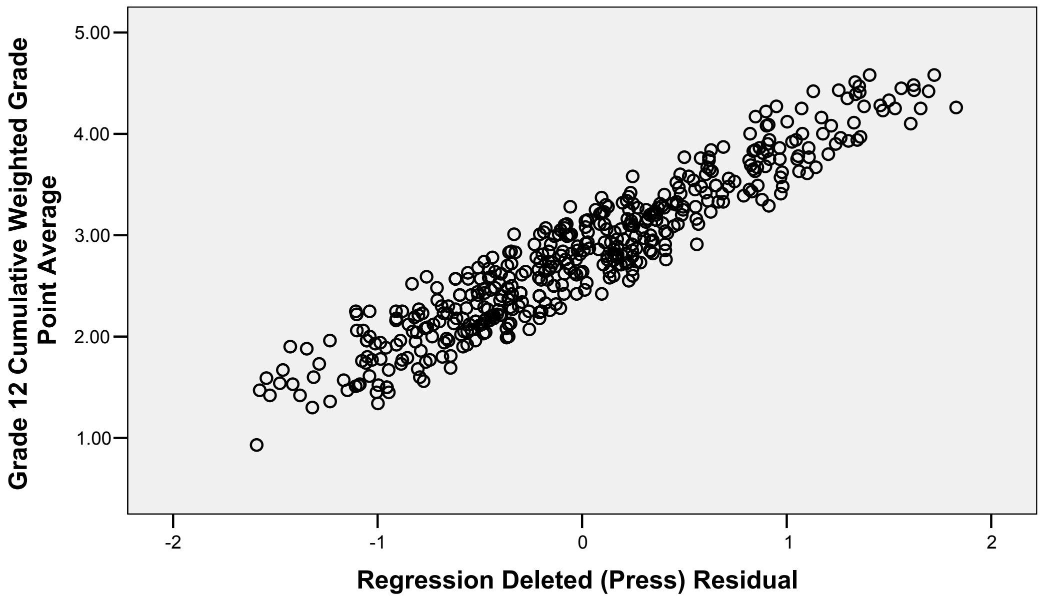


Figure 24. Scatter Plot.

Regression Deleted (Press) Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

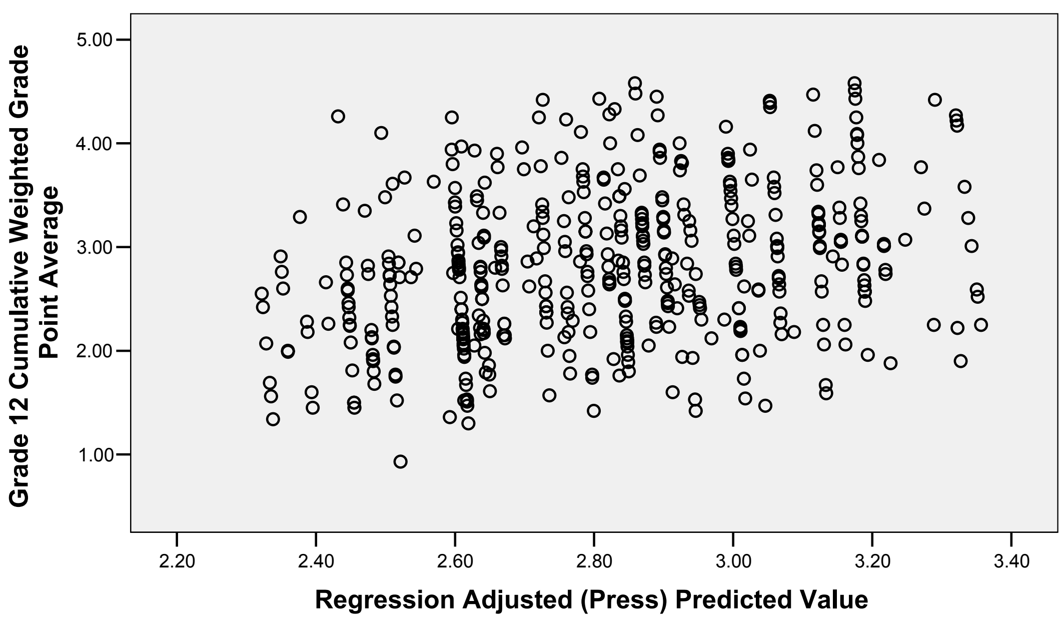


Figure 25. Scatter Plot.

Regression Adjusted (Press) Predicted Value (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

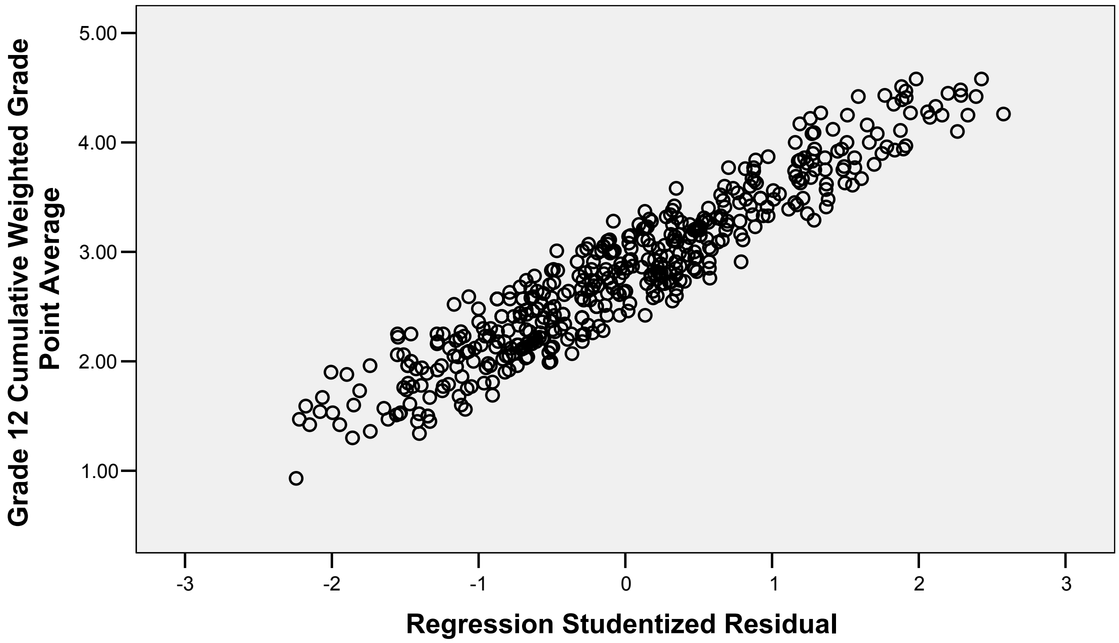


Figure 26. Scatter Plot.

Regression Studentized Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

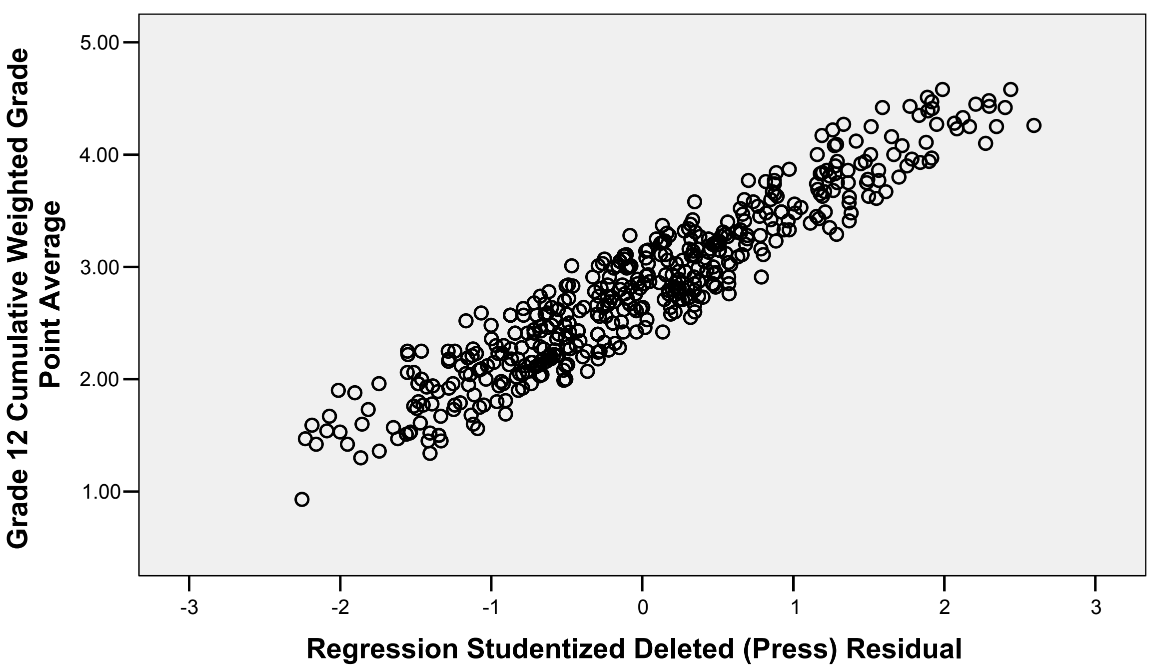
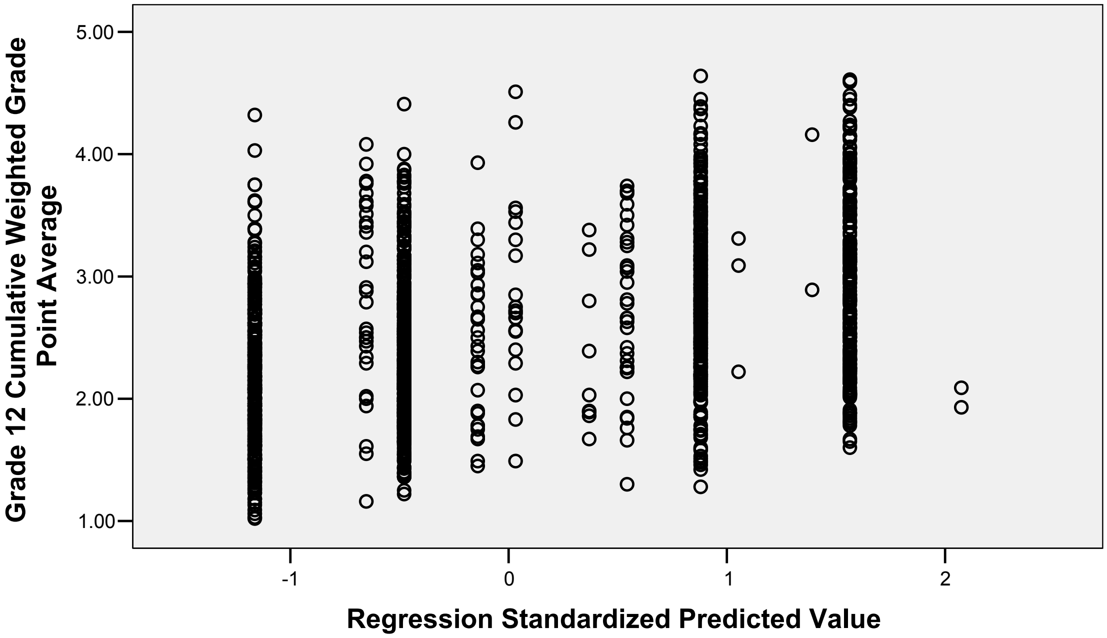


Figure 27. Scatter Plot.

Regression Studentized Deleted (Press) Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).



Fi

Regression Standardized Predicted Value (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

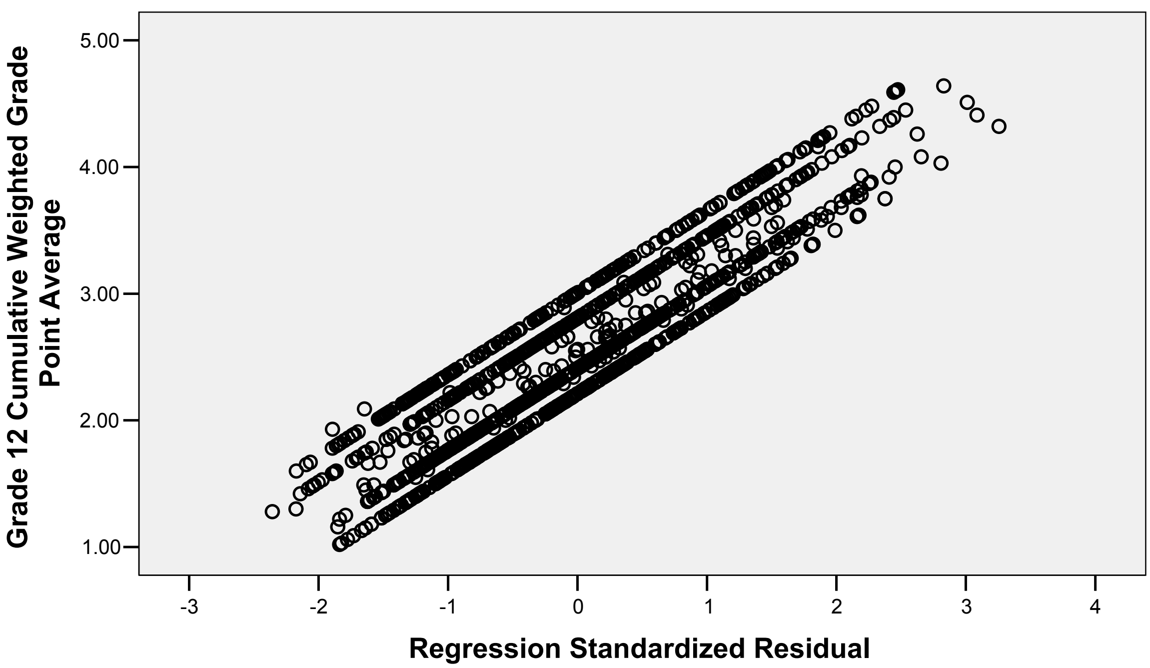


Figure 29. Scatter Plot.

Regression Standardized Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

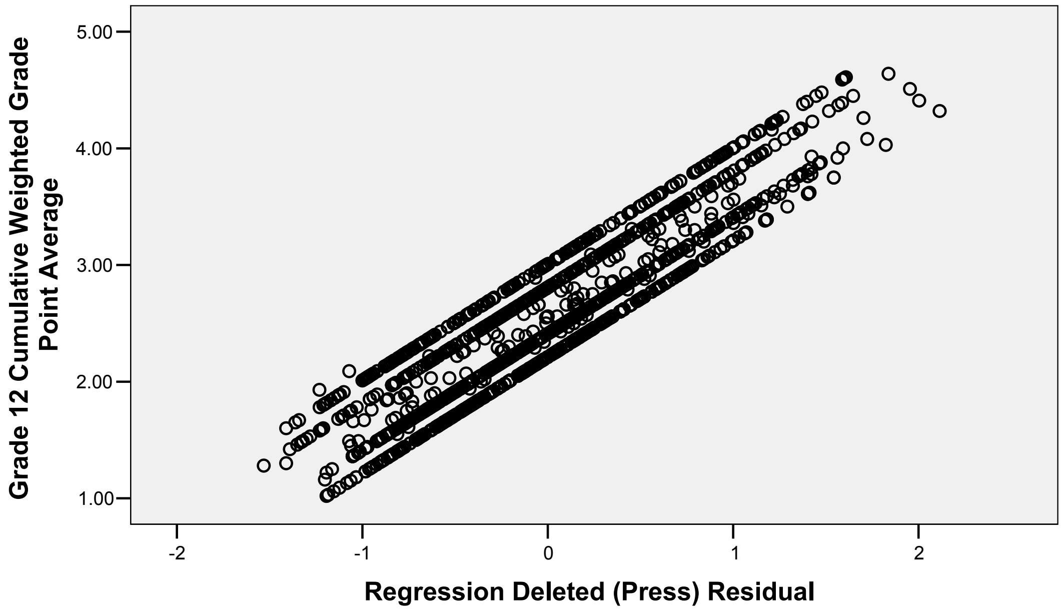


Figure 30. Scatter Plot.

Regression Deleted (Press) Residual (x axis).

Dependent Variable: Grade 12 Grade Point Average (y axis).

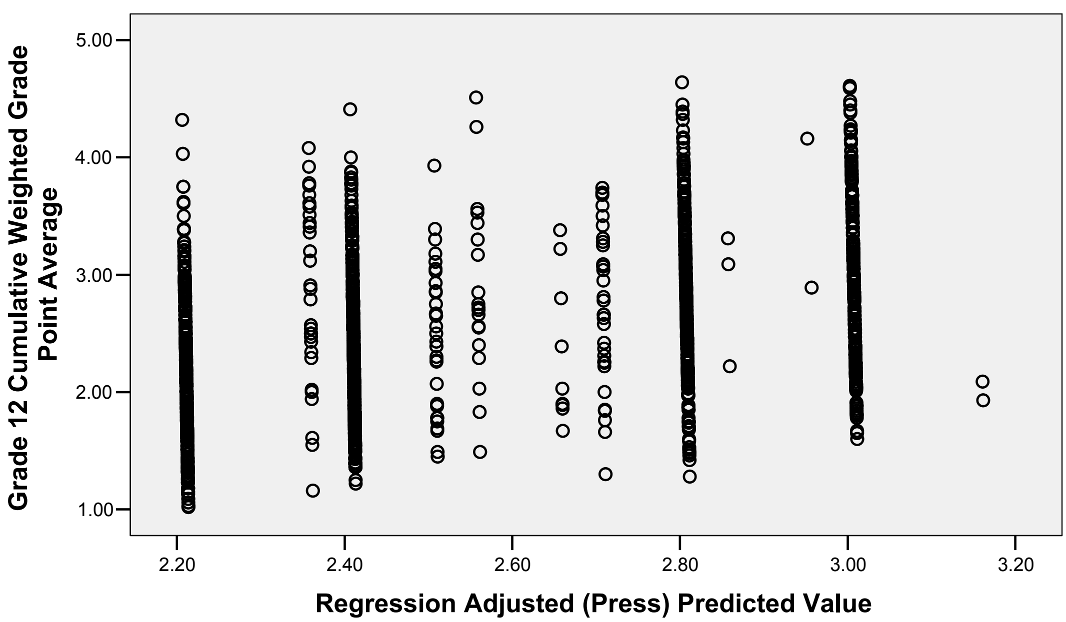


Figure 31. Scatter Plot.

Regression Adjusted (Press) Predicted Value (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

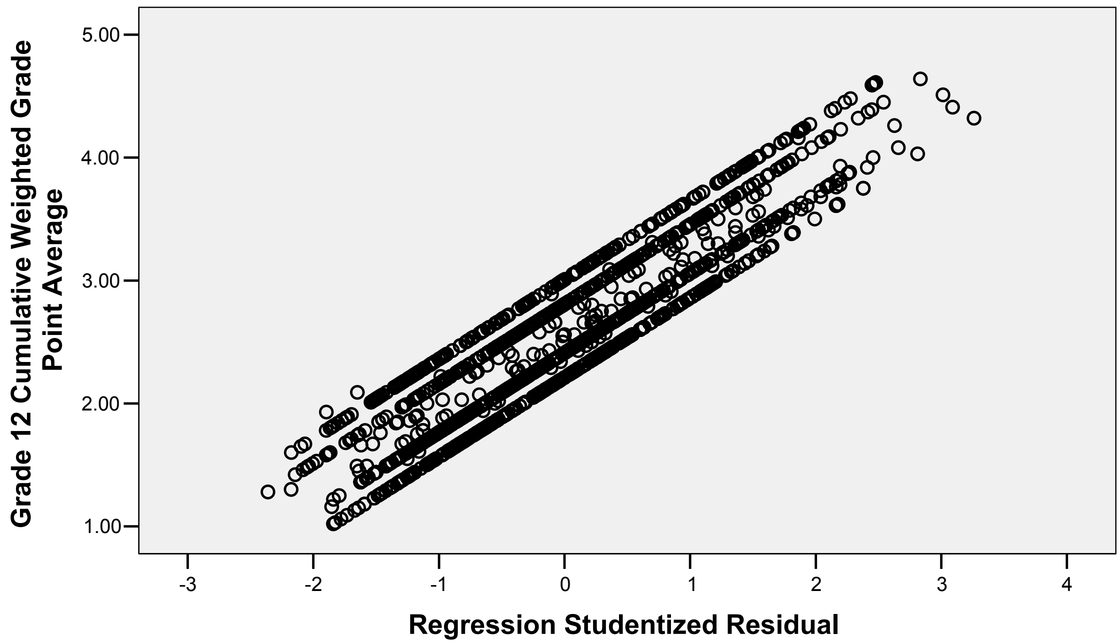


Figure 32. *Scatter Plot.*

Regression Studentized Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

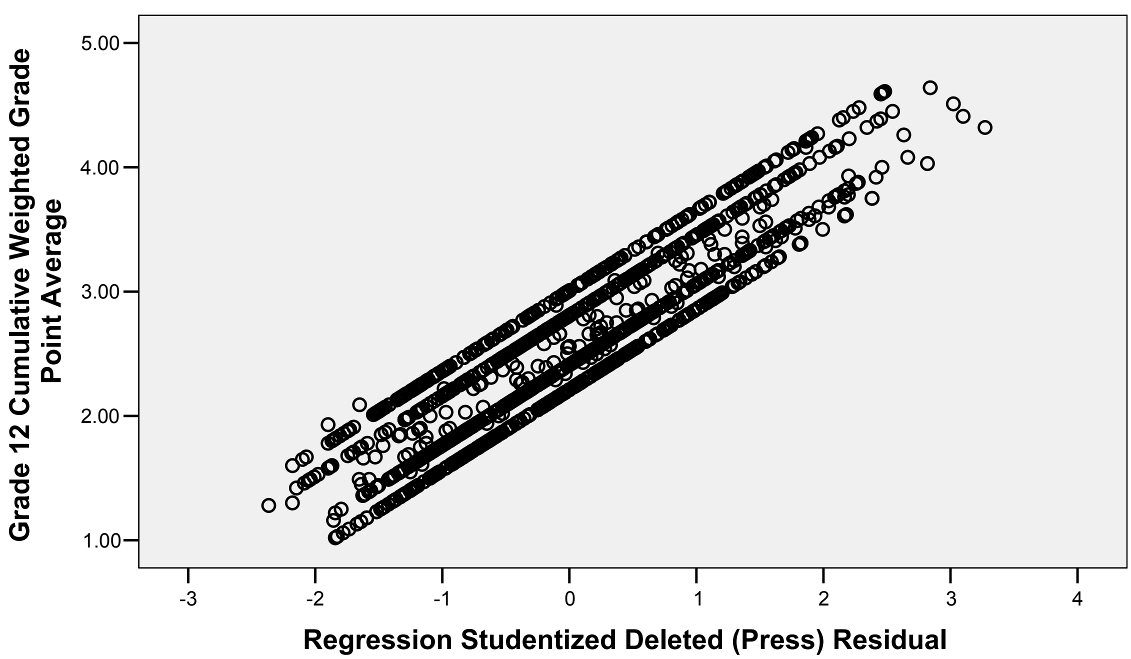


Figure 33. *Scatter Plot.*

Regression Studentized Deleted (Press) Residual (x axis).

Dependent Variable: Grade Twelve Grade Point Average (y axis).

APPENDIX K

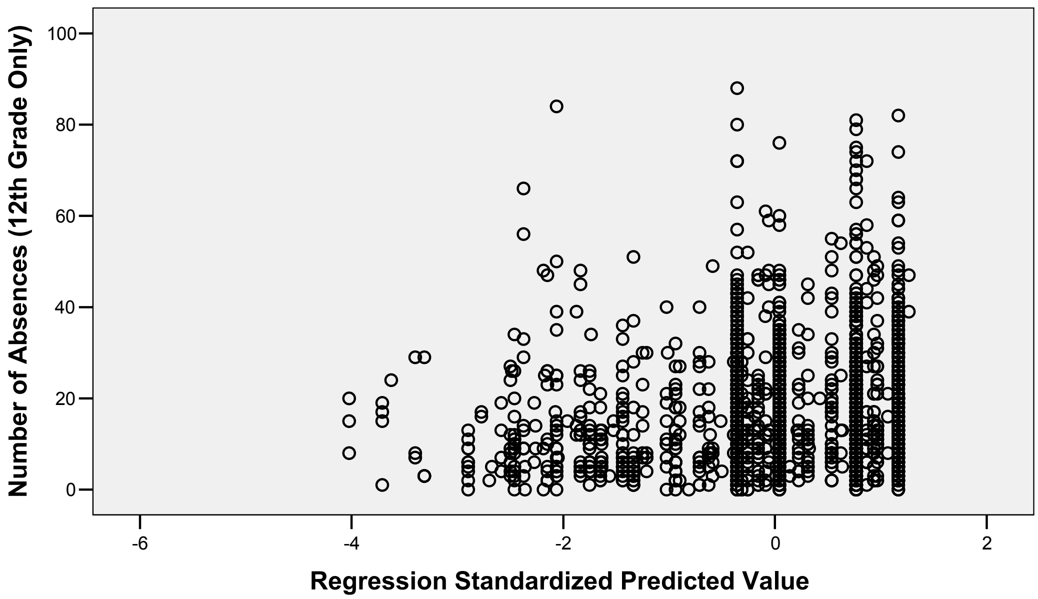


Figure 34. Scatter Plot.

Regression Standardized Predicted Value (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

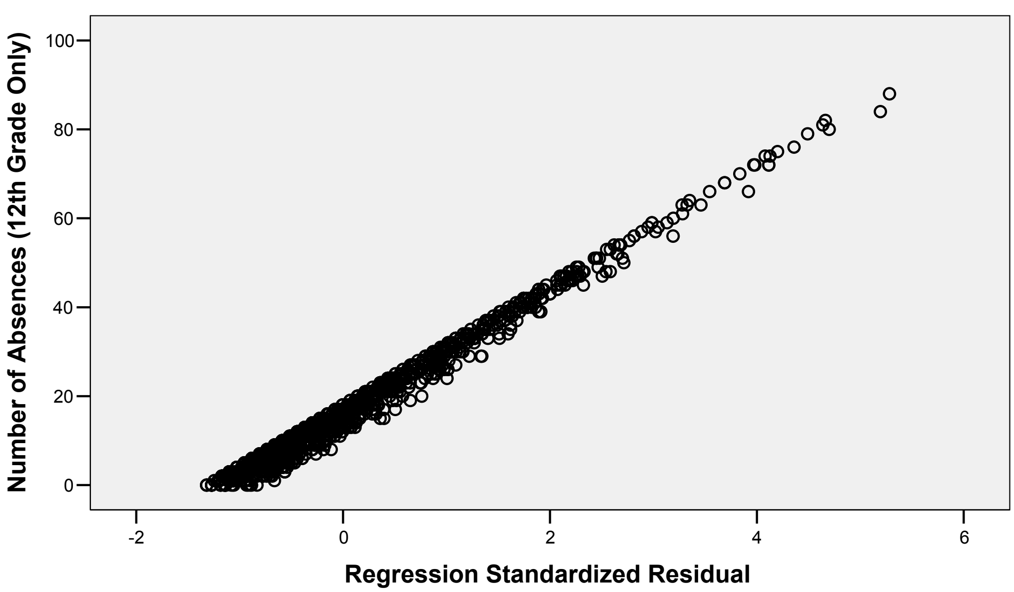


Figure 35. Scatter Plot.

Regression Standardized Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis)

.

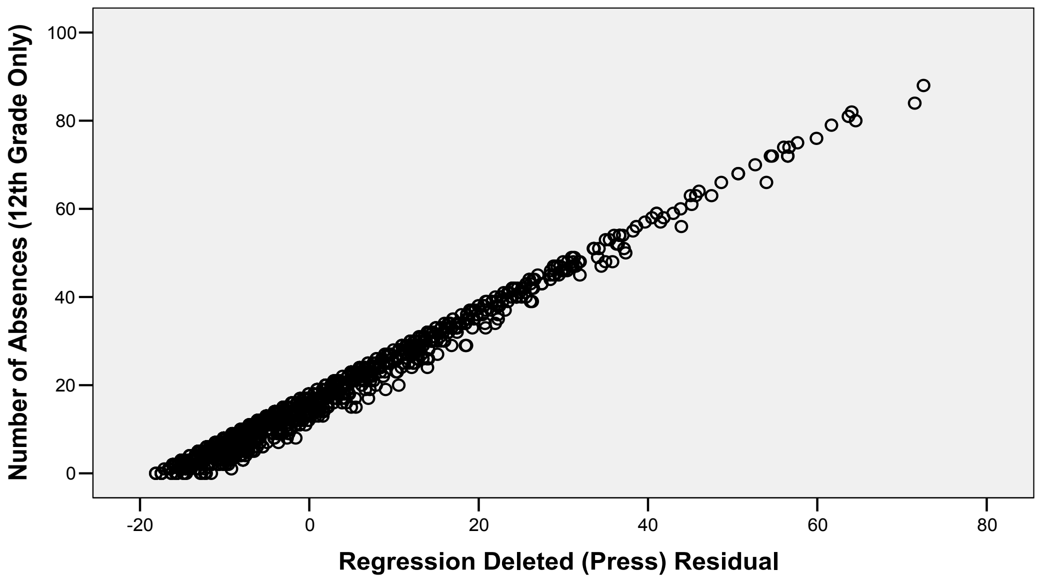


Figure 36. Scatter Plot.

Regression Deleted (Press) Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

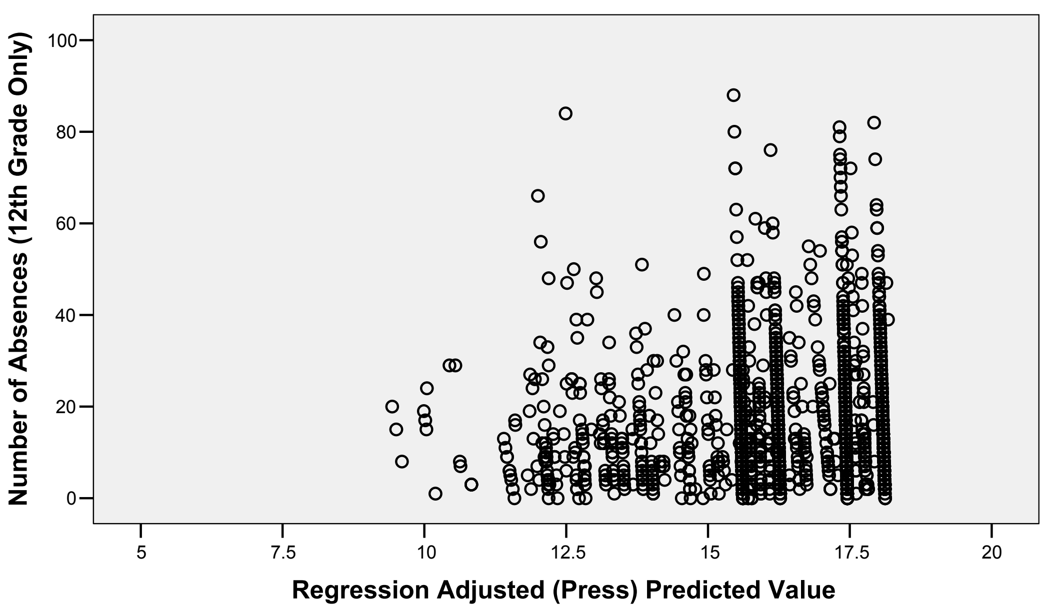


Figure 37. Scatter Plot.

Regression Adjusted (Press) Predicted Value (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

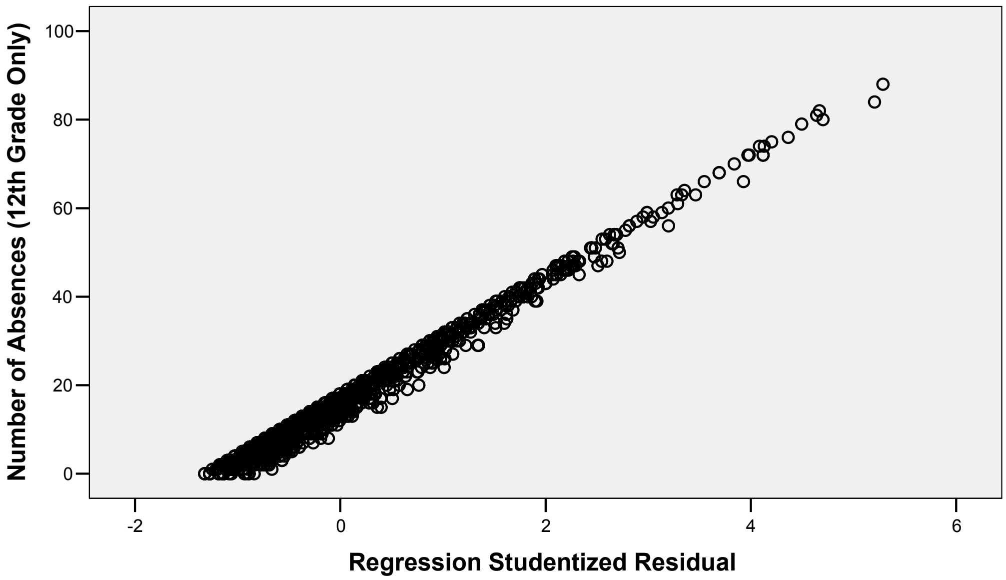


Figure 38. Scatter Plot.

Regression Studentized Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

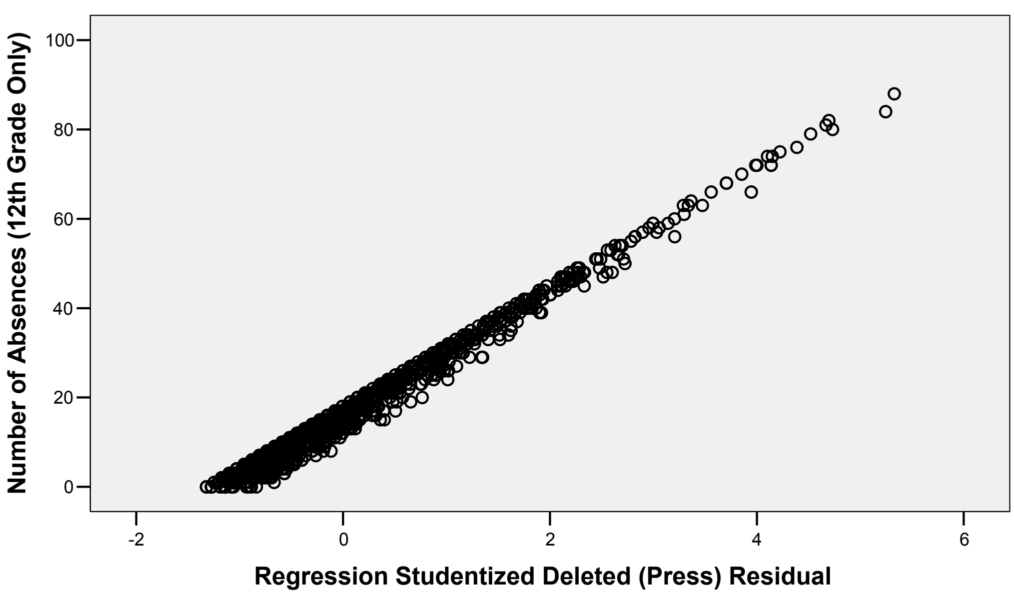


Figure 39. Scatter Plot.

Regression Studentized Deleted (Press) Residual (x axis).

Dependent Variable: Number of Absence in Grade Twelve (y axis).

APPENDIX L

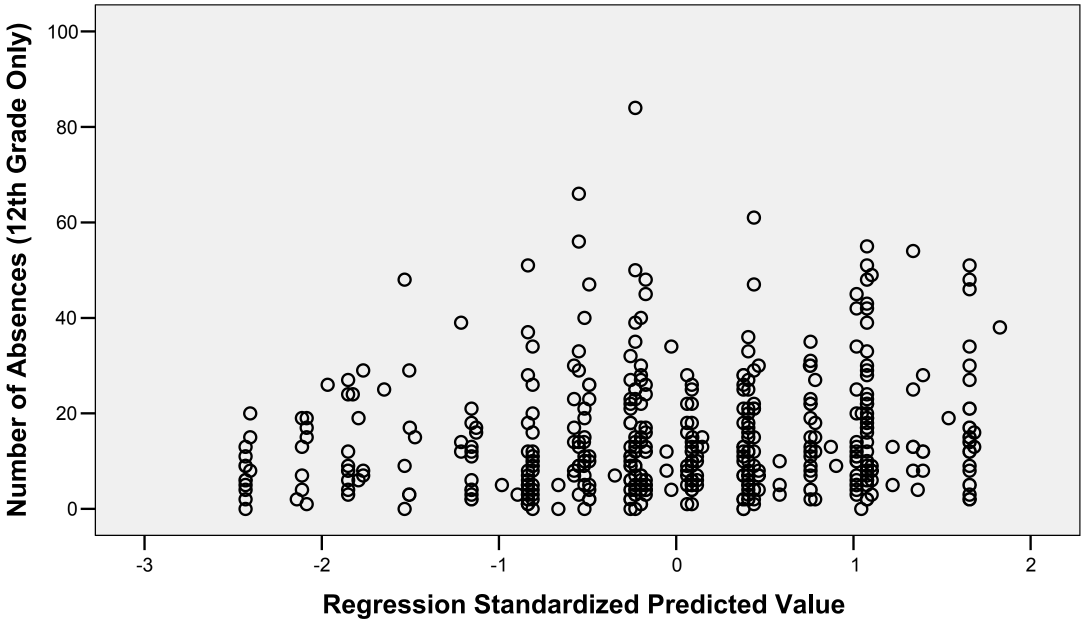


Figure 40. Scatter Plot.

Regression Standardized Predicted Value (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

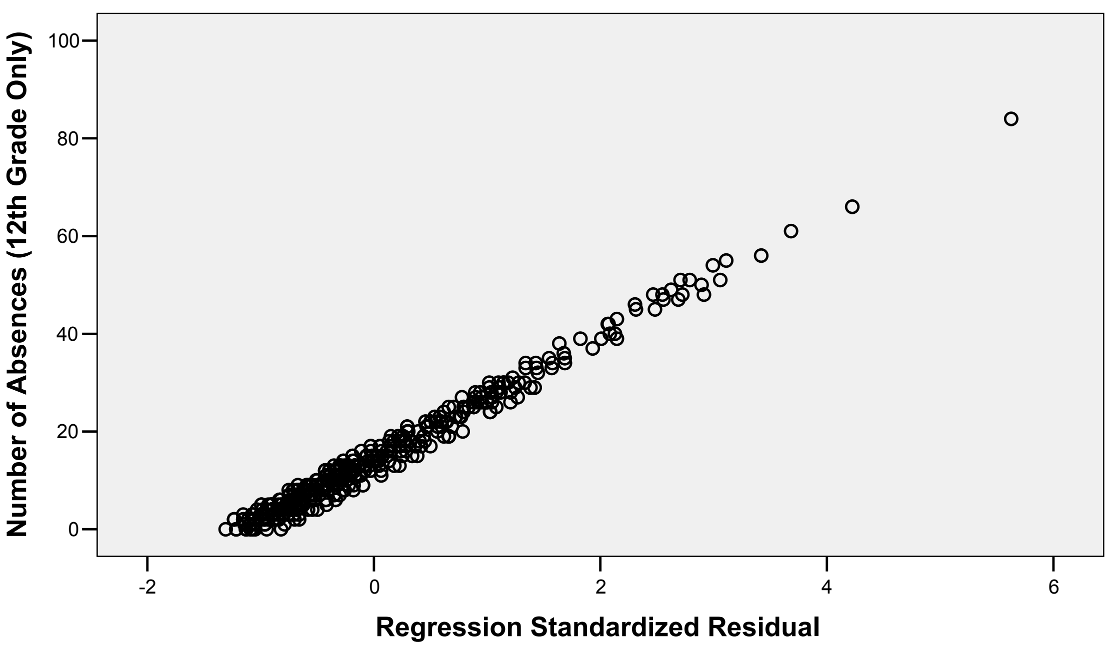


Figure 41. Scatter Plot.

Regression Standardized Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

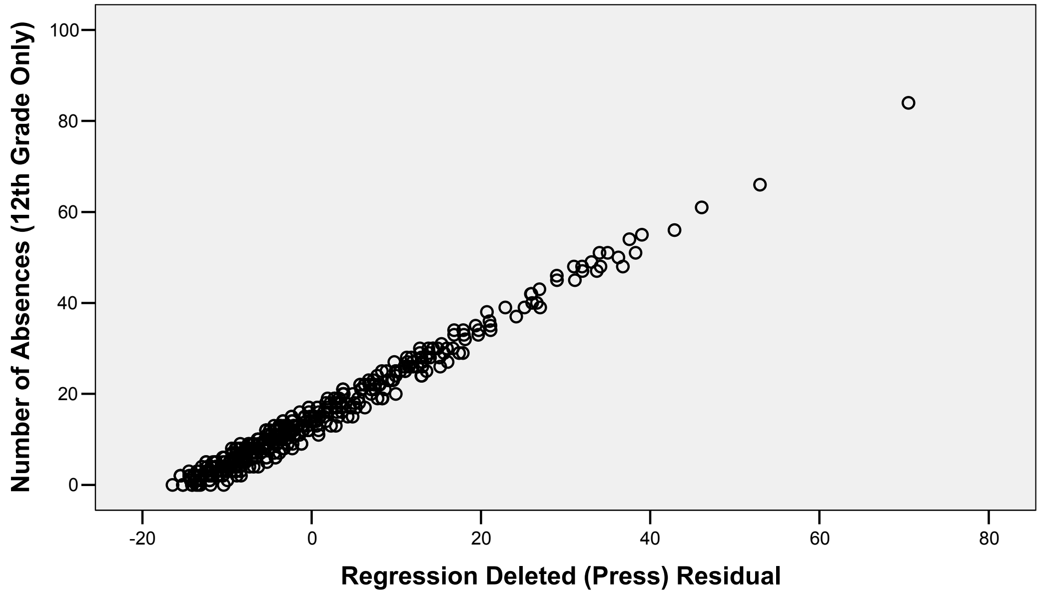


Figure 42. Scatter Plot.

Regression Deleted (Press) Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

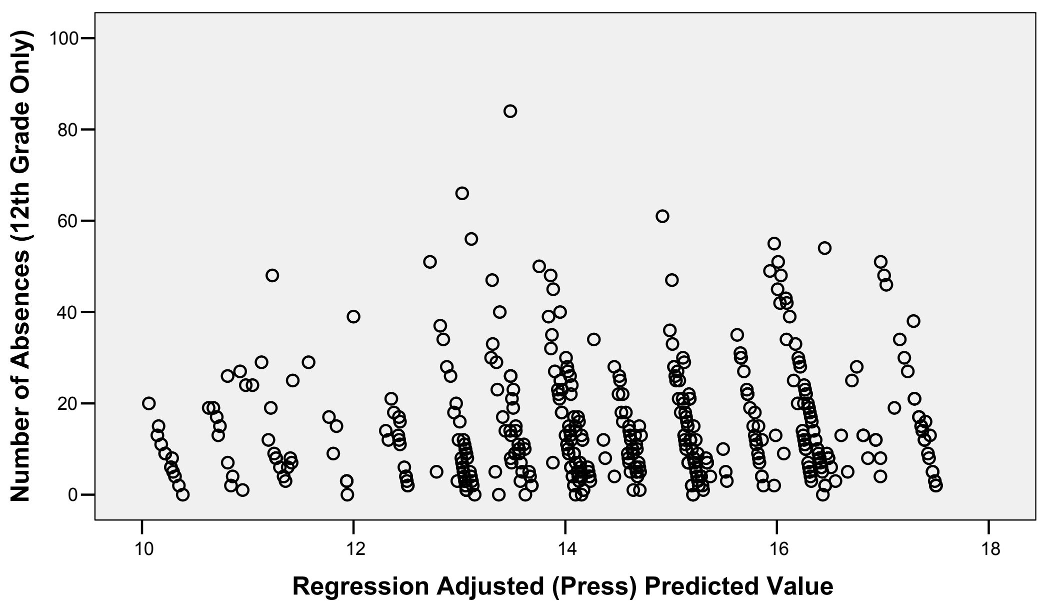


Figure 43. Scatter Plot.

Regression Adjusted (Press) Predicted Value (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

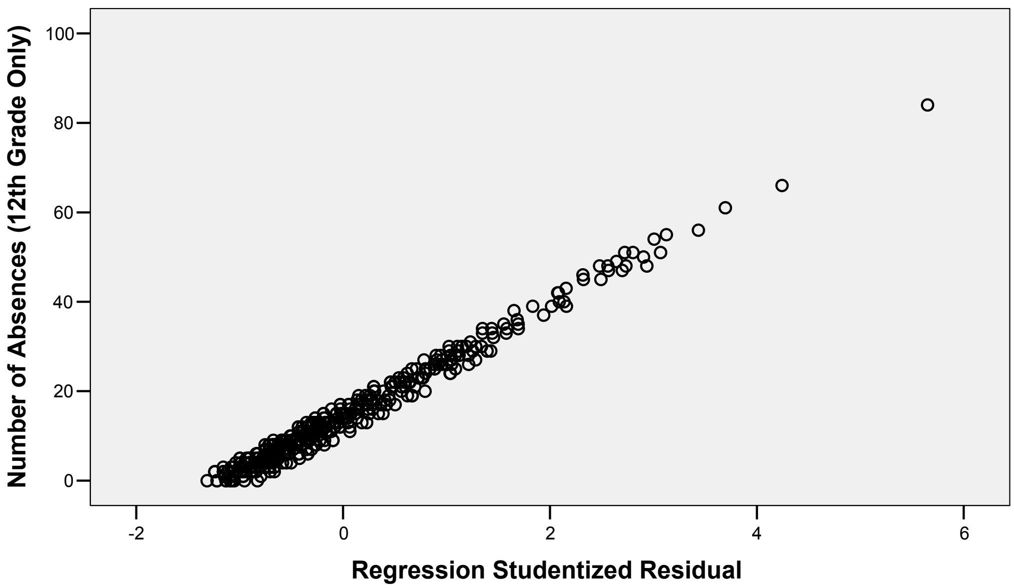


Figure 44. Scatter Plot.

Regression Studentized Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

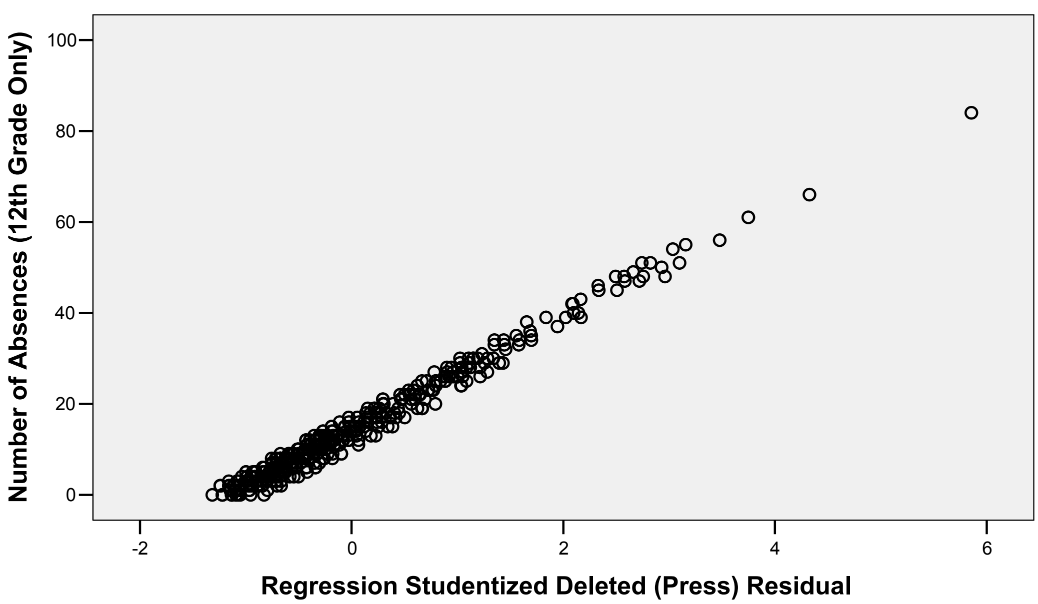


Figure 45. Scatter Plot.

Regression Studentized Deleted (Press) Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

APPENDIX M

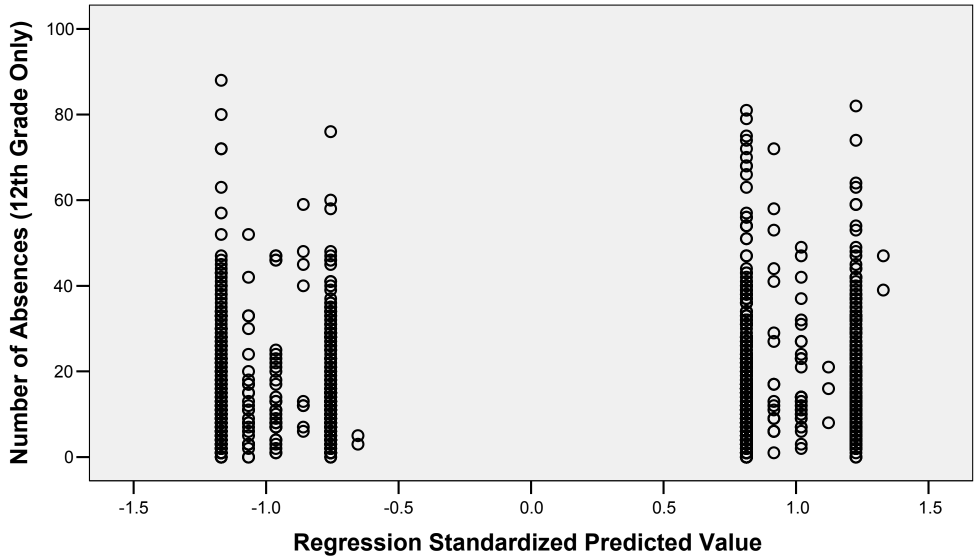


Figure 46. Scatter Plot.

Regression Standardized Predicted Value (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

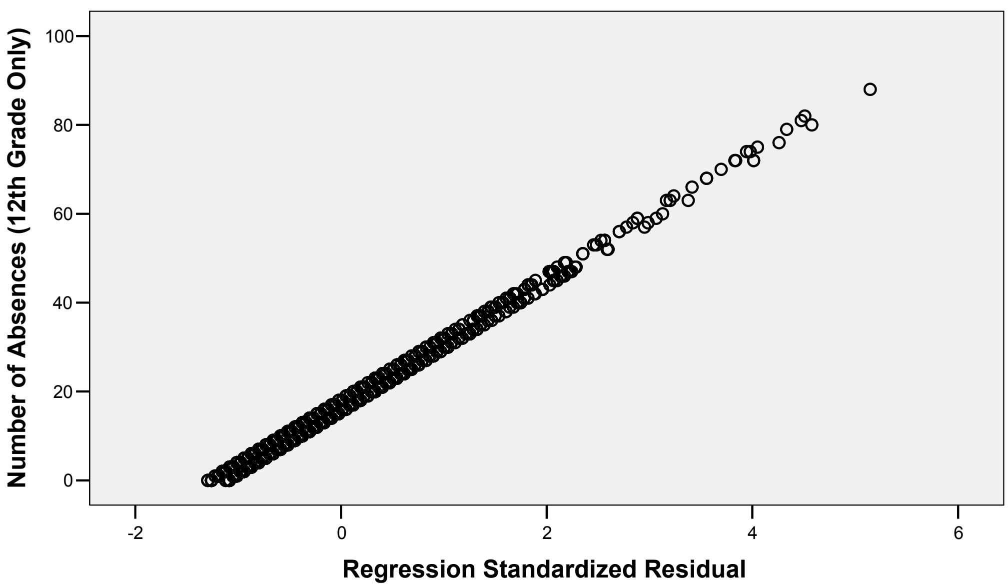


Figure 47. Scatter Plot.

Regression Standardized Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

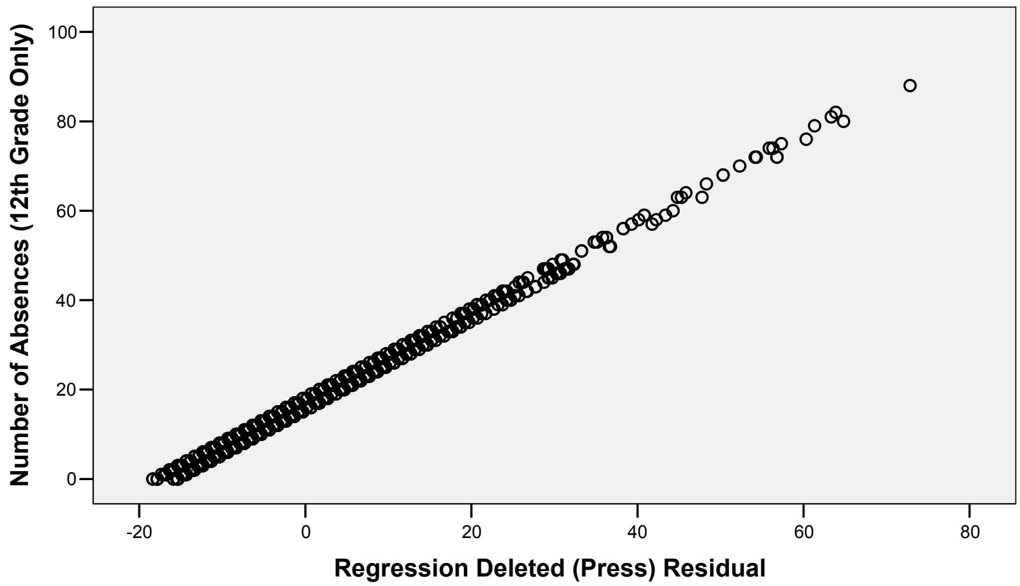


Figure 48. *Scatter Plot.*

Regression Deleted (Press) Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

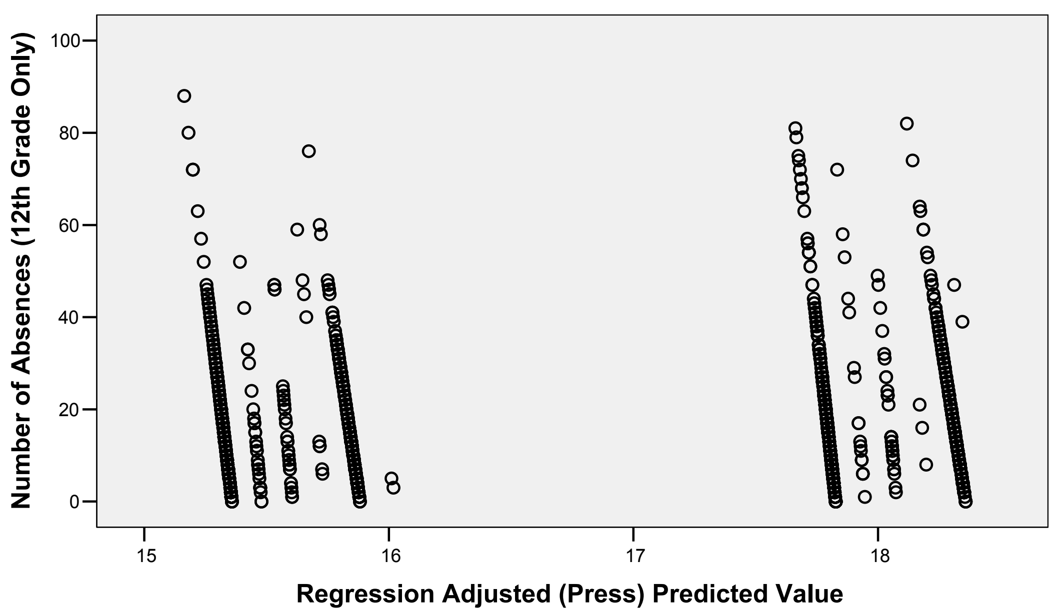


Figure 49. *Scatter Plot.*

Regression Adjusted (Press) Predicted Value (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

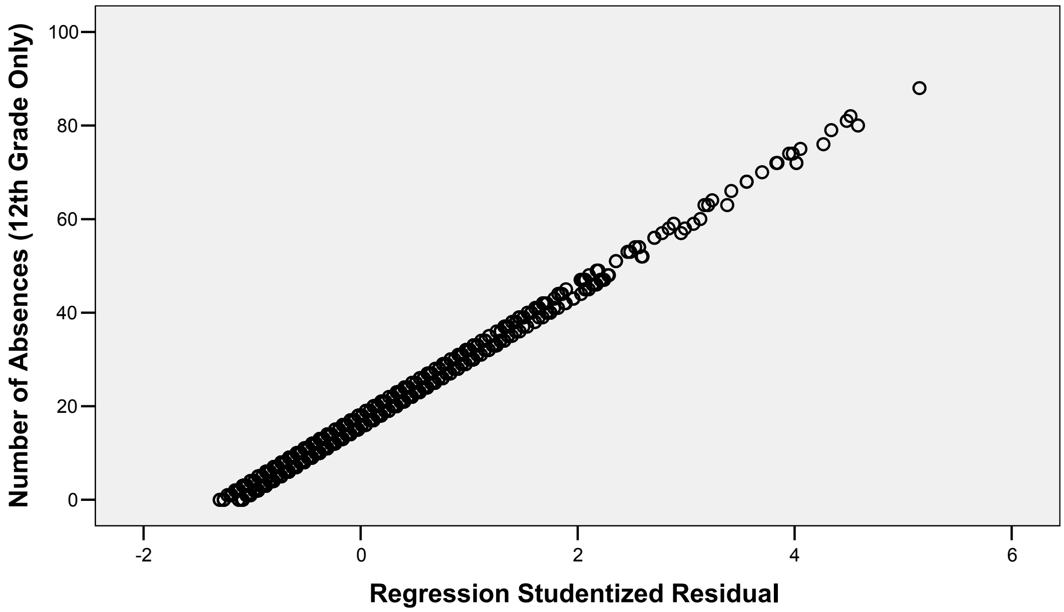


Figure 50. *Scatter Plot.*

Regression Studentized Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

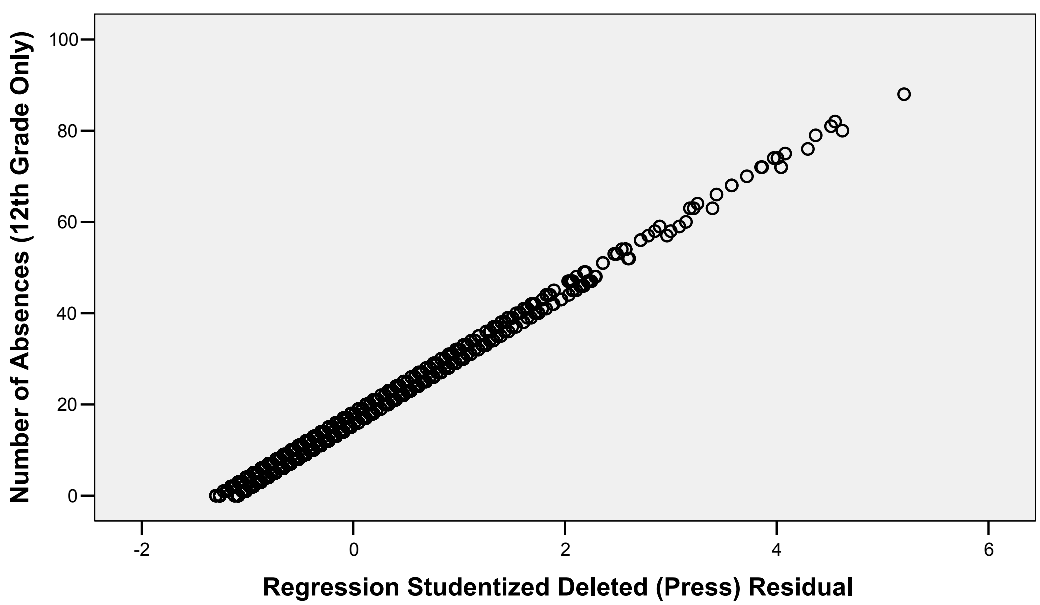


Figure 51. *Scatter Plot.*

Regression Studentized Deleted (Press) Residual (x axis).

Dependent Variable: Number of Absences in Grade Twelve (y axis).

APPENDIX N

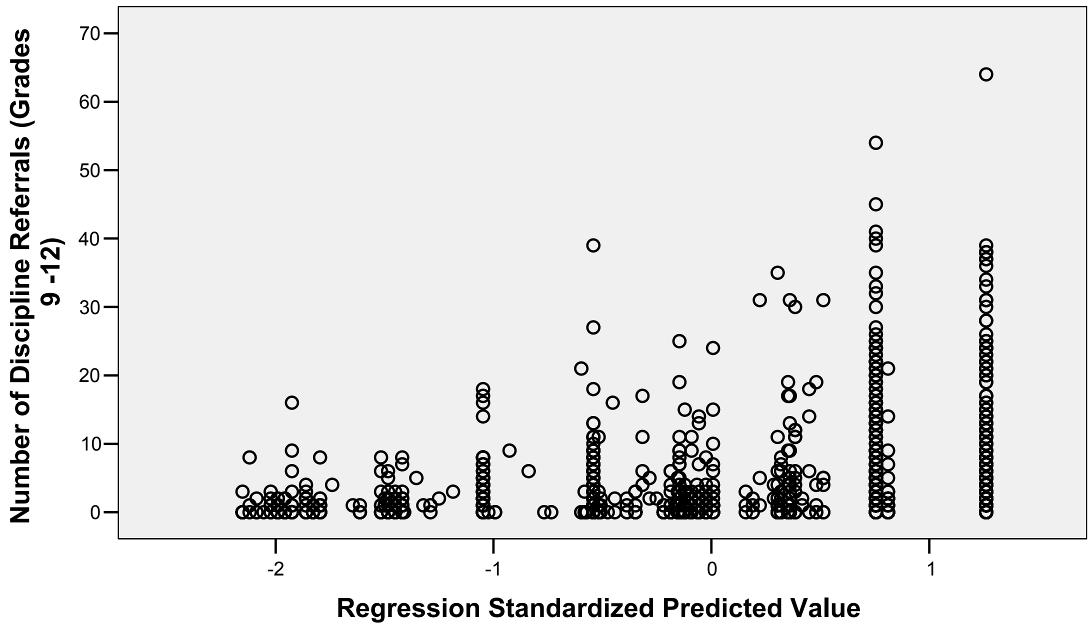


Figure 52. Scatter Plot.

Regression Standardized Predicted Value (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9 - 12 (y axis).

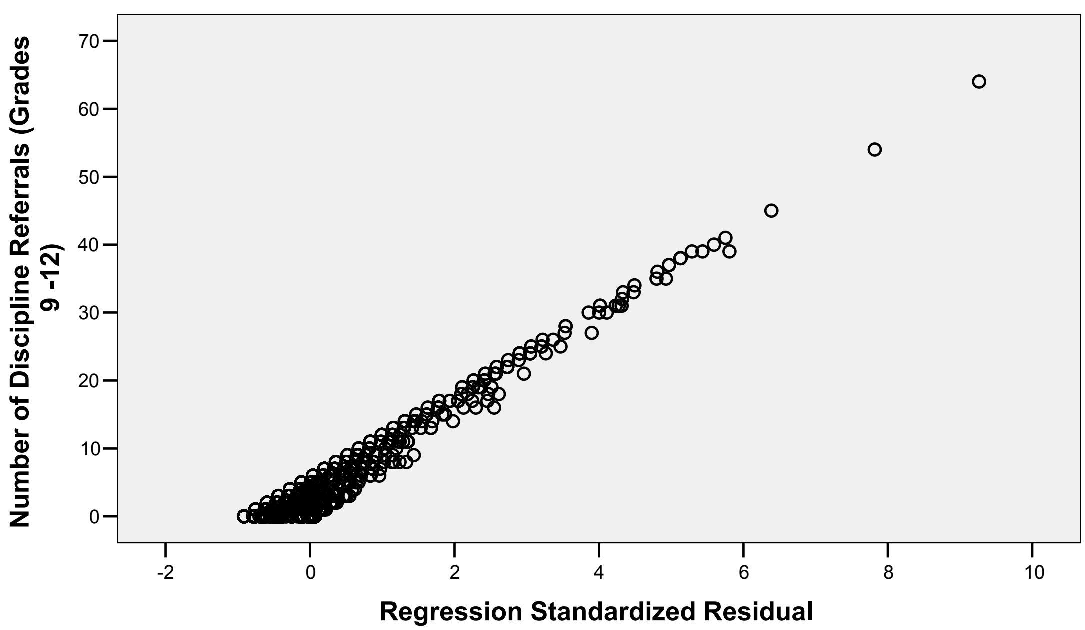


Figure 53. Scatter Plot.

Regression Standardized Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

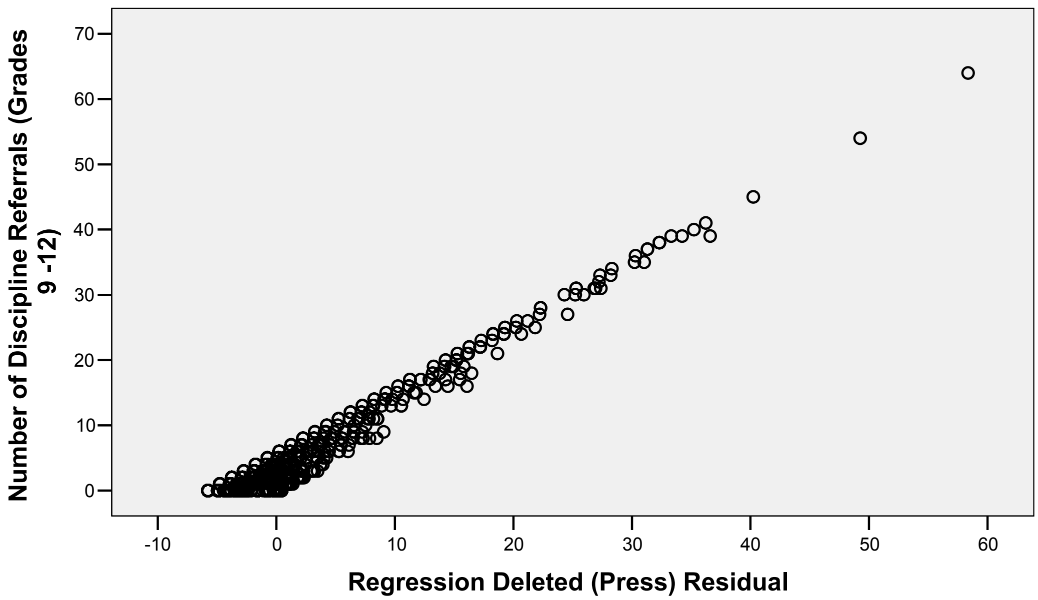


Figure 54. Scatter Plot.

Regression Deleted (Press) Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

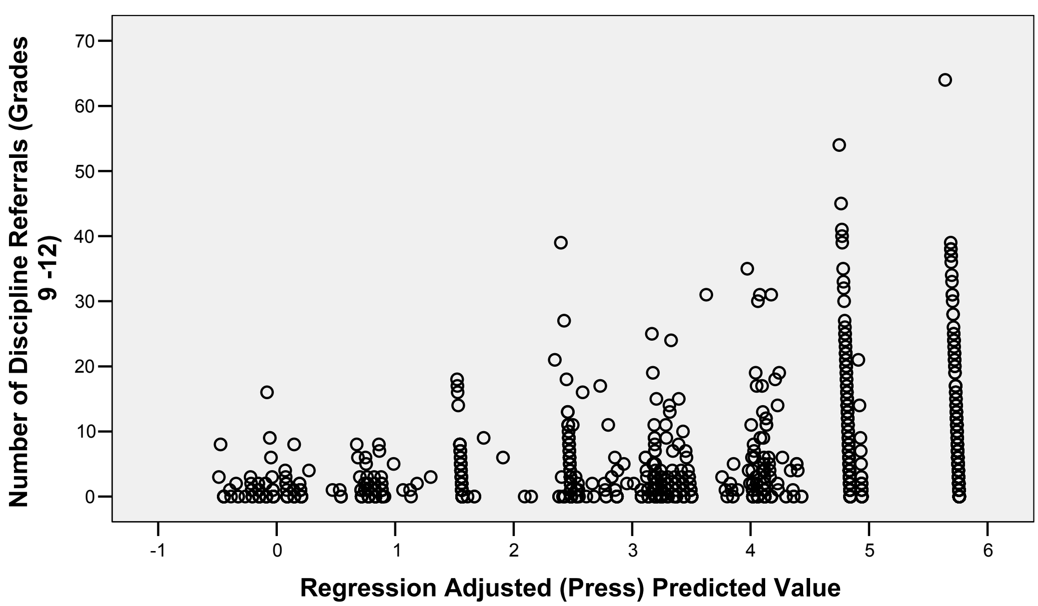


Figure 55. Scatter Plot.

Regression Adjusted (Press) Predicted Value (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

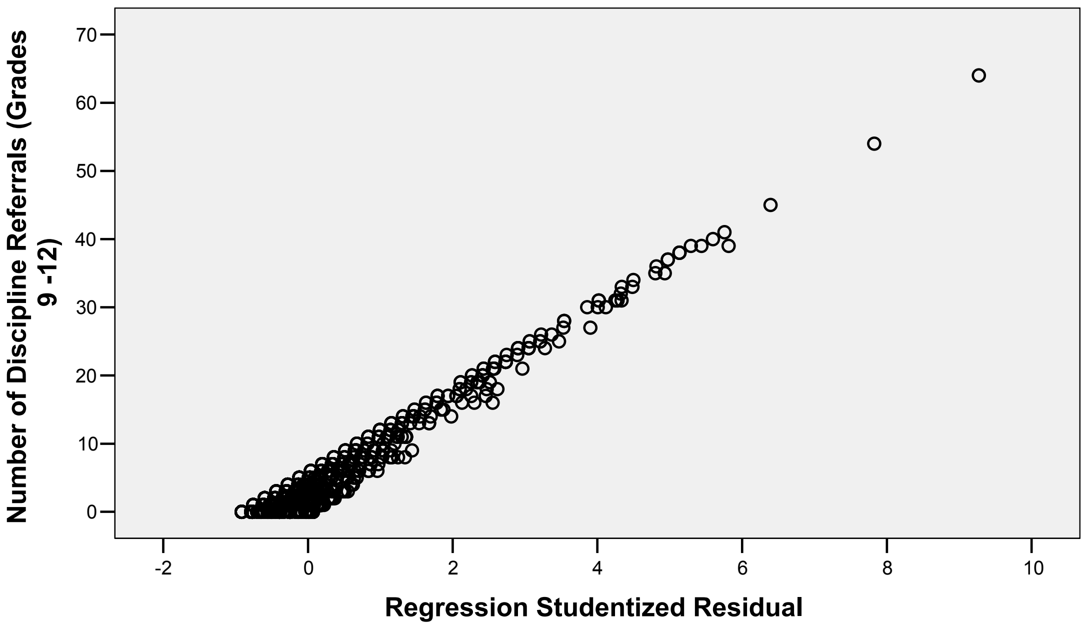


Figure 56. Scatter Plot.

Regression Studentized Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

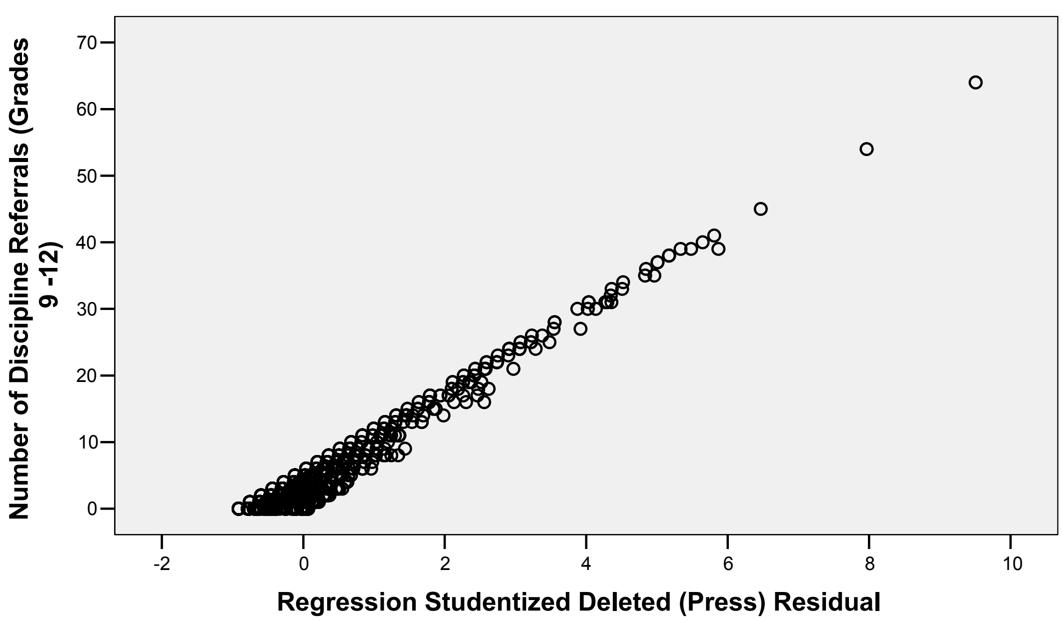


Figure 57. Scatter Plot.

Regression Studentized Deleted (Press) Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

APPENDIX O

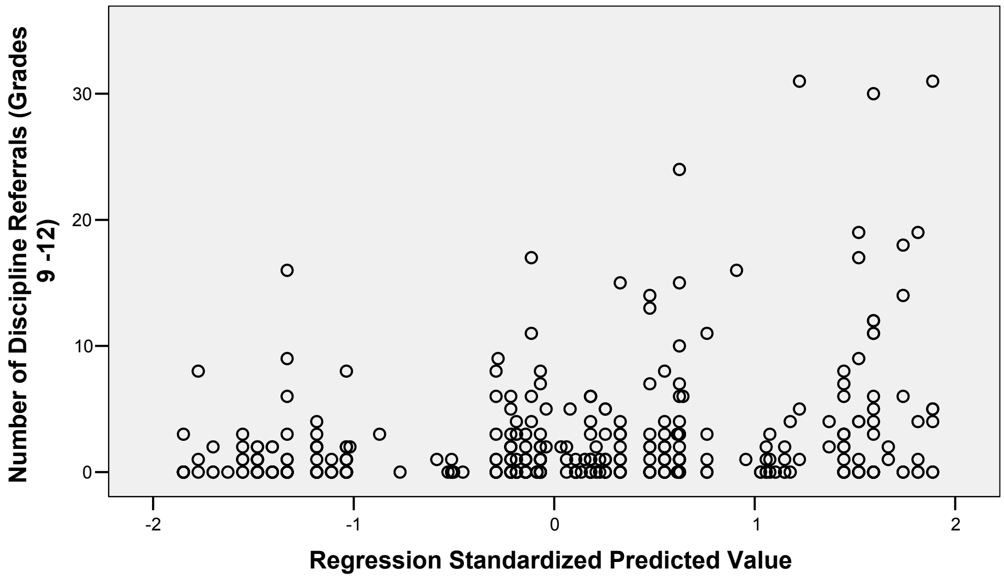


Figure 58. Scatter Plot.

Regression Standardized Predicted Value (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

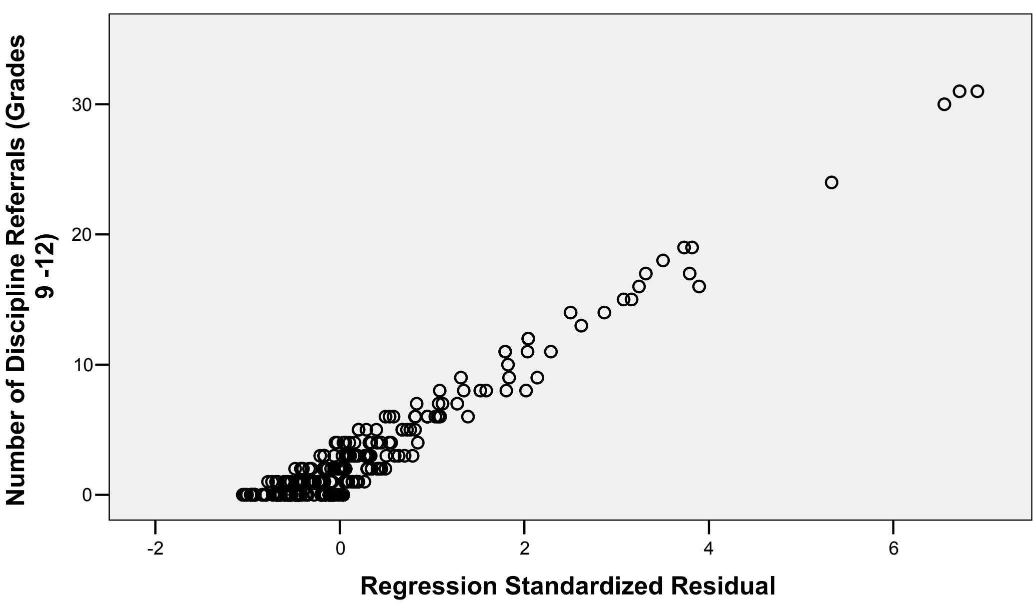


Figure 59. Scatter Plot.

Regression Standardized Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

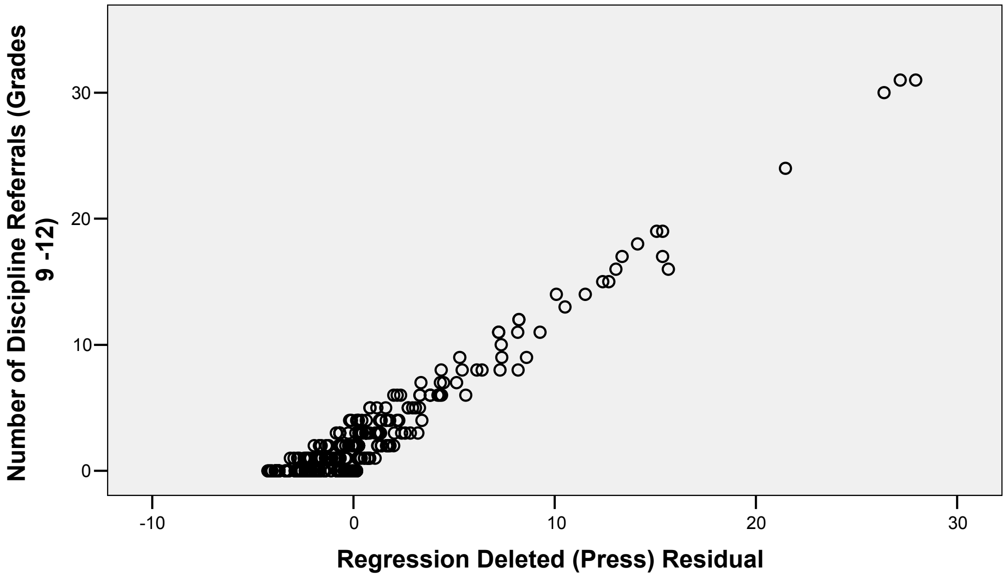


Figure 60. Scatter Plot.

Regression Deleted (Press) Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

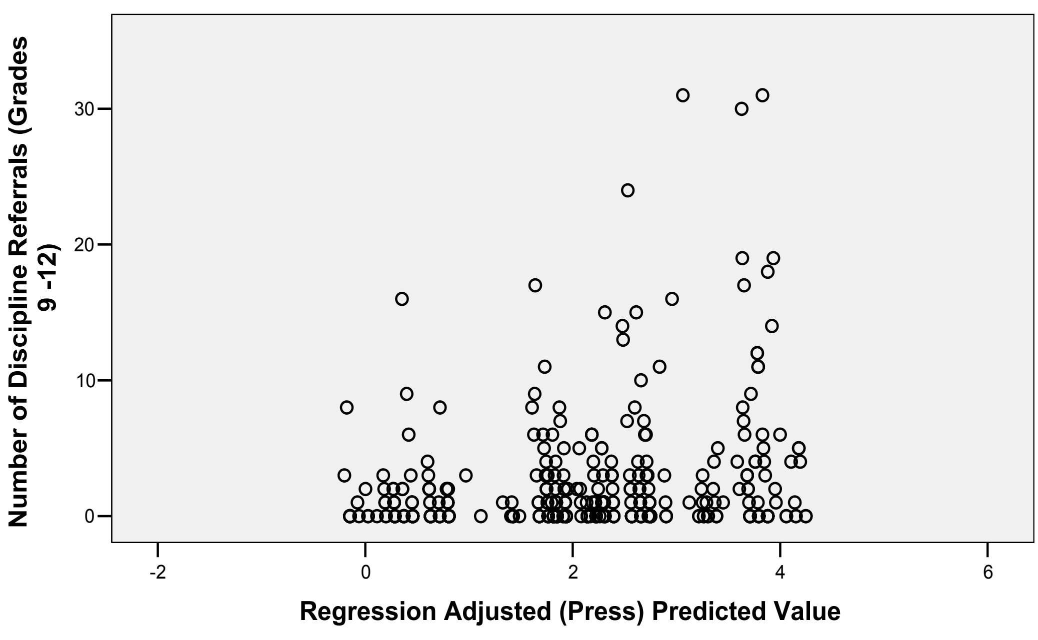


Figure 61. Scatter Plot.

Regression Adjusted (Press) Predicted Value (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

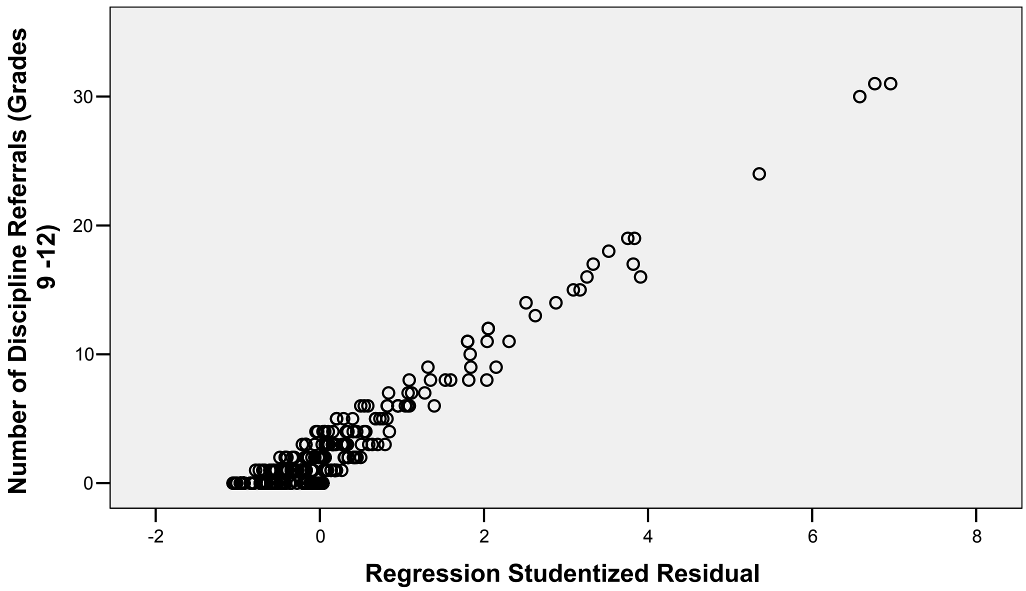


Figure 62. Scatter Plot.

Regression Studentized Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

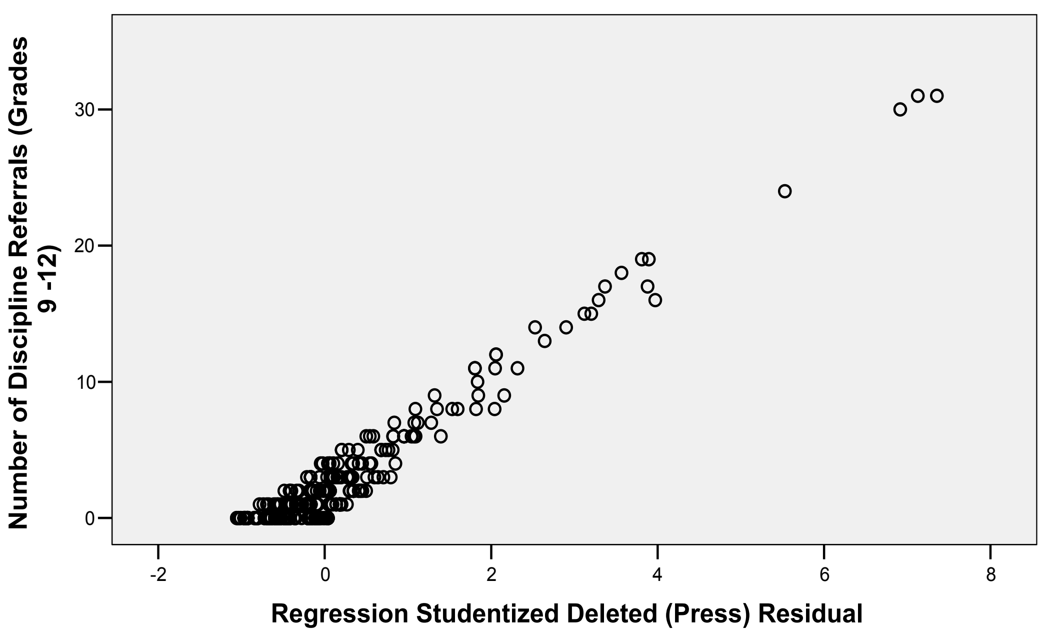


Figure 63. Scatter Plot.

Regression Studentized Deleted (Press) Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

APPENDIX P

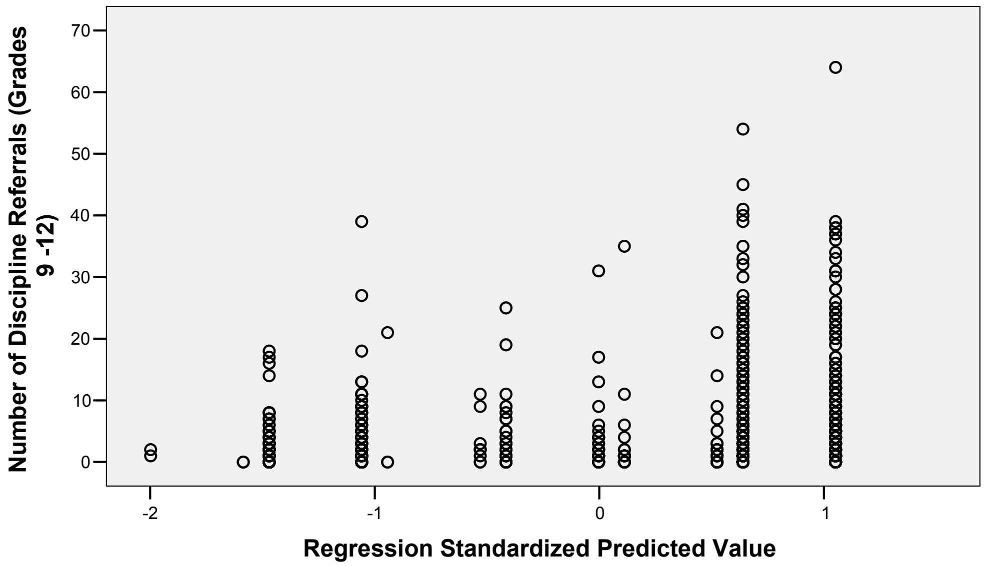


Figure 64. Scatter Plot.

Regression Standardized Predicted Value (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

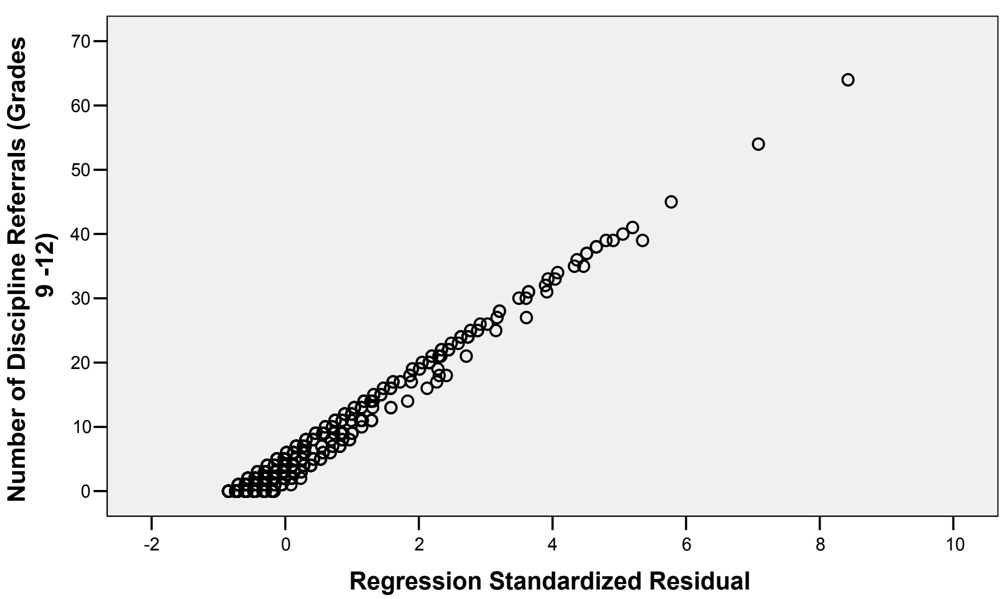


Figure 65. Scatter Plot.

Regression Standardized Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

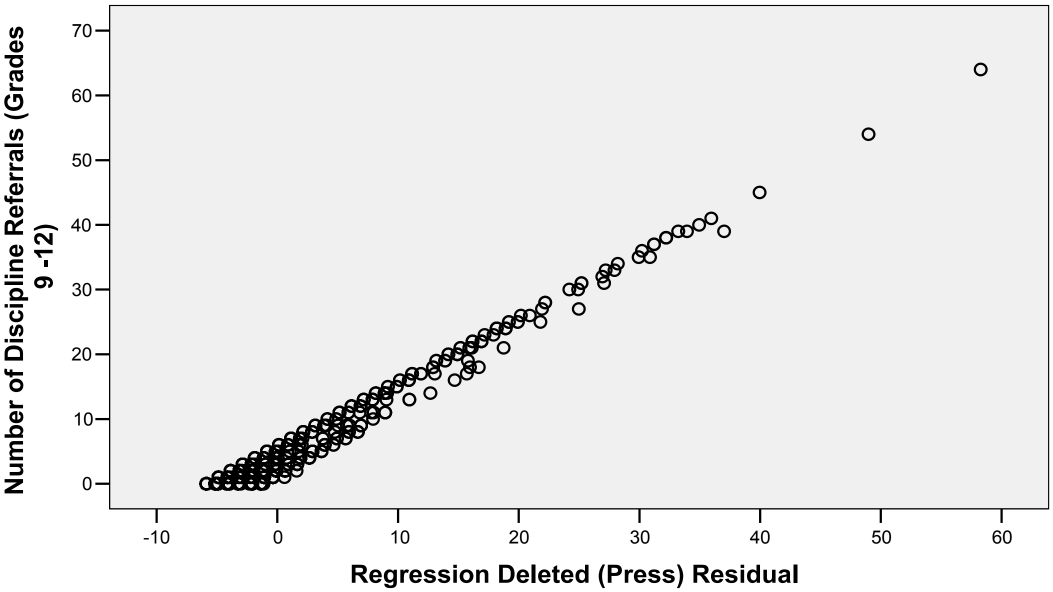


Figure 66. Scatter Plot.

Regression Deleted (Press) Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

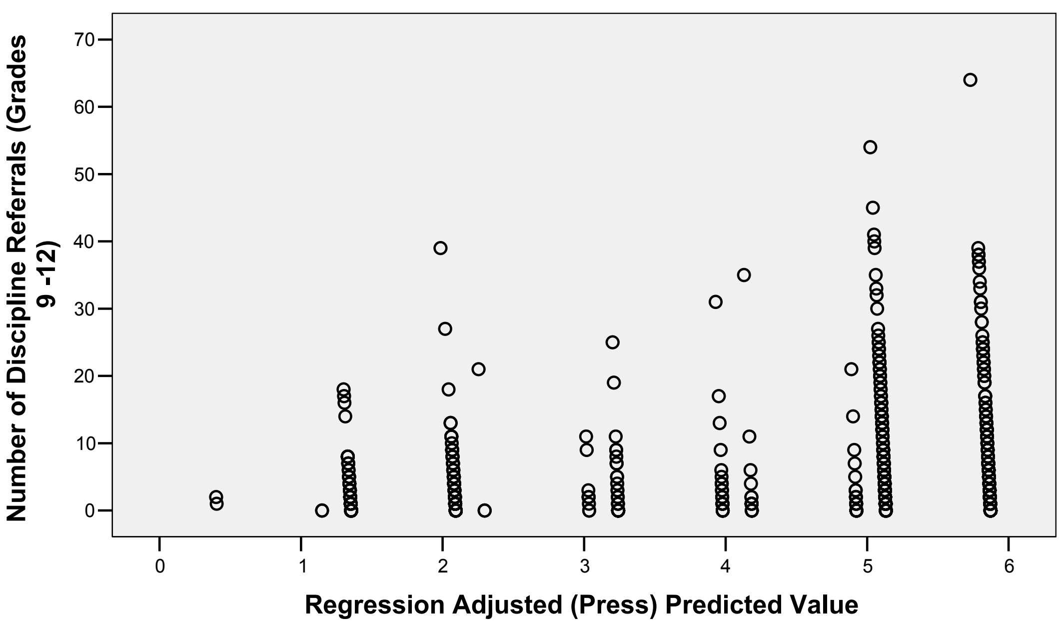


Figure 67. Scatter Plot.

Regression Adjusted (Press) Predicted Value (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

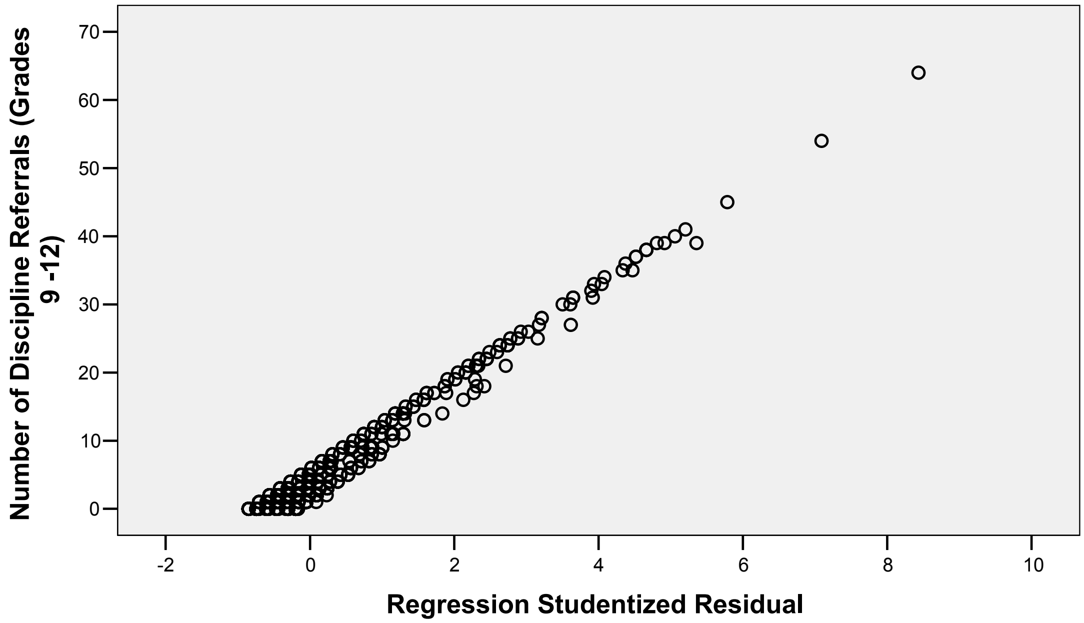


Figure 68. *Scatter Plot.*

Regression Studentized Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

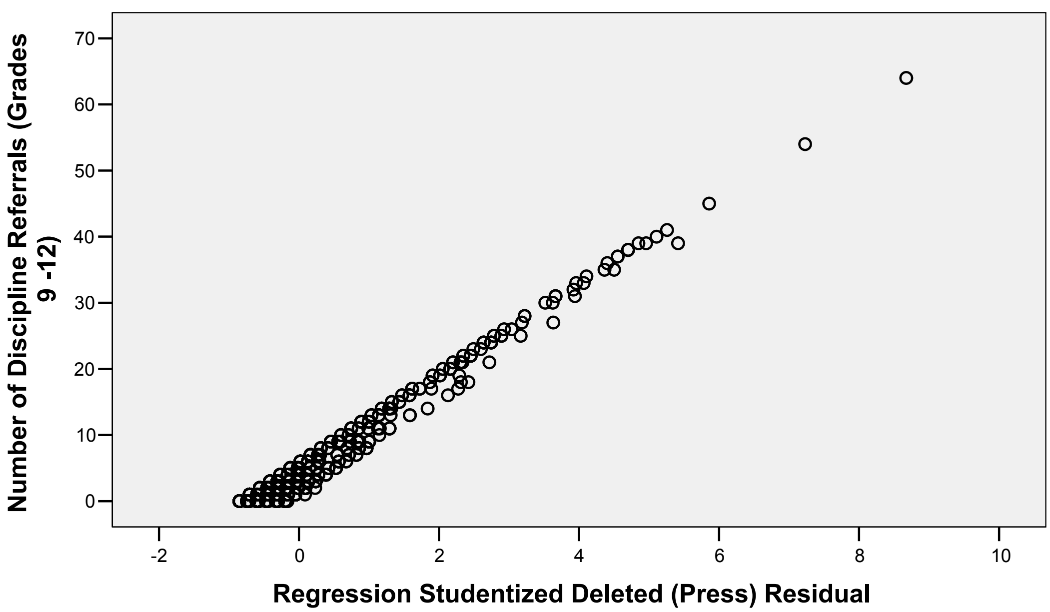


Figure 69. *Scatter Plot.*

Regression Studentized Deleted (Press) Residual (x axis).

Dependent Variable: Number of Discipline Referrals in Grades 9-12 (y axis).

APPENDIX Q

GEORGE ***DARRYL*** WALLER

108 Wendy Court
Newport News, VA 23601
Telephone: (757) 595-4177 (Home)
(757) 725-4177 (Cell)
E-mail: darrylwaller@cox.net

PROFESSIONAL OBJECTIVE

Educational Leadership and Policy Administrator

SUMMARY OF QUALIFICATIONS

Offering a strong and focused background acquired through direct professional leadership experience at all levels in an educational environment. Demonstrated ability to determine long and short-range objectives, implement activities which achieve positive results and efficiently utilize resources. Expertise includes:

- Performing as an administrator
- Conducting meetings and conferences
- Handling multiple tasks simultaneously
- Implementing school master schedule and master calendar
- Educational and business software
- Liaison with school, resources, and community
- Professional staff development and in-service conferences
- Fast paced/high stress environments
- Interviewing/Evaluating/Counseling Personnel
- Developing, coordinating, and implementing programs
- Developing, coordinating, and implementing budgets

CERTIFICATIONS

Virginia Post Graduate Professional
Virginia Superintendent Endorsement
General and Instructional Supervisor Endorsement
Elementary, Middle, and High School Administration Endorsement
Music: Vocal/Choral Music PreK-12 Endorsement

EDUCATION

Doctor of Philosophy
Educational Leadership and Policy Studies
Virginia Polytechnic Institute and State University, Blacksburg, Virginia
Final Defense, March 29, 2007
Graduation, May 11, 2007

Master of Arts in Education and Human Development
The George Washington University, Washington, D.C., 1996

Bachelor of Music in Voice
Greensboro College, Greensboro, North Carolina cum laude, 1983

Professional Teaching Certificate – Music: Vocal/Choral Music PreK-12
Christopher Newport College, Newport News, Virginia
Old Dominion University, Norfolk, Virginia
Hampton University, Hampton, Virginia
Thomas Nelson Community College, Hampton, Virginia

Advanced Graduate Work
The College of William and Mary, Williamsburg, Virginia

ADMINISTRATOR EXPERIENCE

Supervisor of Music, Newport News Public Schools, Newport News, Virginia, 2001 to present.

Responsible for the creation and maintenance of an organizational and instructional culture in which teachers can be leaders and inventors of quality work for students. The program consists of the leadership, evaluation, and recruitment of 75 full-time music teachers in 49 schools. Duties include:

- Supervision of all aspects of the music program including general music, band, chorus, guitar, piano, orchestra, music theory, and Advanced Placement music theory grades Pre-K through Grade 12.
- Develop and conduct staff development courses for all music teachers PreK through Grade 12.
- Develop, implement, and evaluate curriculum for assigned content areas.
- Develop, implement, and evaluate on-line curriculum using designated Understanding by Design format.
- Develop, evaluate, and recommend programs, equipment, and related items that have budget implications.
- Develop and make recommendations for annual music department budget.
- Using allocated funds, order additional music instruments, equipment, and instructional materials.
- Interview potential music candidates and make recommendations to building level principals.
- Organize students/teacher transportation and support vehicles for all aspects of the music program.

- Develop, organize, and implement all-city events to include: elementary school chorus, middle school and high school band, middle school and high school chorus, middle school and high school orchestra, high school guitar, and selected music ensembles.
- Maintain inventory of all musical instruments and equipment and recommend equipment for replacement and/or salvage.
- Maintain emergency cards, instrument rental forms and fees, uniform rental forms and fees, transportation requests, and accidental damage and/or theft to music equipment forms.
- Implement and maintain an on-line music library.
- Maintain a well organized, clean, and stocked music warehouse.
- Recommend salary supplements for all music positions.
- Attend national, state, and local music education and arts education meetings, workshops, and clinics.
- Attend monthly division-wide administrator and curriculum and instruction meetings.
- Maintain contact with building administrators to support all aspects of the instructional process.
- Work with state level supervisor to develop, implement, and evaluate measurable music Standards of Learning.
- Develop testing materials for all music related courses.
- Recommend revisions, additions, and/or deletions to existing music courses.
- Evaluate computer software for appropriate use in music classrooms.
- Attend football games, concerts, and district and state events involving the music department.
- Coordinate and assist in the testing of advanced placement music theory students.
- Coordinate, evaluate, and make recommendations for the Summer Institute for the Arts as it pertains to the music program.
- Supervise and evaluate all members of the music magnet staff including secretaries and music warehouse personnel.
- All other duties as assigned.

Program Administrator, Newport News Public Schools, *The Center for the Arts and Communications* at Woodside High School, Newport News, Virginia, 1996 to 2001.

Responsible for the creation and maintenance of an organizational and instructional culture in which teachers can be leaders and inventors of quality work for students. The program consists of six arts and communications areas: the visual arts, music, dance, theatre arts, creative writing, and communications (television broadcasting). Duties include:

- Develop a high school arts and communications magnet program for Newport News Public Schools from concept to reality. Specific requirements: overall magnet school development; take the Virginia Department of Education graduation requirements and develop a magnet program in conjunction with stated guidelines; hiring of magnet personnel; develop clear expectations for each magnet area and for each teacher; develop a vision and mission statement; develop new course to meet the needs and demands of the magnet program; maintain, evaluate, and supervise the program.
- Develop and implement curriculum activities in the magnet program.
- Assist in developing the master schedule.
- Develop and implement staff development activities.
- Provide presentations to students, parent, the community and other educators explaining the magnet school program.
- Develop and oversee all showcase events.

- Recruit all magnet program students.
- Communicate with parents of students concerning magnet program status and achievement.
- Attend various student activities, departmental meetings, PTA meetings, and faculty meetings.
- Schedule special events that include arts programs, quest appearances, workshops, clinics, master classes, morning announcements, in-school activities, field trips, business partnership activities, school calendar, building volunteers, mentorships, and other activities as requested by the principal.
- Prepare magnet student class schedules.
- Develop and maintain a budget as it relates to the magnet school.
- Prepare purchase orders and assist in the distribution and inventory of school supplies, equipment, and instructional materials.
- Develop a magnet school improvement plan to serve as the agenda to achieve the vision.
- Coordinate and assist in the testing of students.
- Assist in the development of emergency evacuation plans, drills, and other school policies as requested.
- Supervise and evaluate a team of teachers within the magnet program.
- Supervise and evaluate all members of the magnet staff including guidance counselors, secretaries, custodians, and security officers.
- Perform any other related duties as assigned by the secondary principal.

Choral Director, Fine Arts Department Chair, Newport News Public Schools, Denbigh High School, Newport News, Virginia, 1983 to 1996, 1989 to 1996 respectively.

Coordinate and manage all education related activities of eight high school faculty members and develop an award winning choral department of 200+ members:

- Observe and evaluate teachers
- Report fine arts activities to principal and music supervisor
- Schedule teachers and assist in hiring
- Develop fine arts department events calendar
- Develop curriculum in the arts
- Develop city-wide testing in the arts
- Re[resent the arts in the community and at school board meetings
- Audition students and assign classes at appropriate levels
- Teach voice and vocal performance at various levels in a high school setting
- Teach music theory and music history
- Establish and execute proper lesson plans
- Conduct/Coordinate all vocal performing groups for school and community activities and concerts
- Select and order music within a given budget
- Maintain music inventory
- Develop and maintain a workable music library
- Develop budget, fund raising campaigns, grading policies, and procedures
- Conduct field trips, teacher/parent/students conferences, evaluations, and other teaching strategies

<u>Music Coordinator and Voice/Choral Instructor</u>, Newport News Public Schools Summer Institute for the Arts, *Christopher Newport University,* Newport News, Virginia, Summer 1993 and 1994, Summers 1990 to 1994 respectively.

Direct a large city-wide music institute and supervise twenty-two faculty and staff:

- Coordinate all music activities
- Contact and schedule all clinicians for workshops
- Organize teaching materials
- Supervise faculty and staff
- Maintain positive contacts with students, parents, and community
- Distribute student interim reports and report cards
- Schedule and maintain effective student recitals
- Maintain accurate faculty and staff payroll time sheets
- Coordinate field trips
- Teach music theory, ear training, sight singing, keyboard skills, conducting, vocal technique, and large vocal/choral ensemble
- Prepare vocal music students to perform on weekly recitals and concerts
- Prepare vocal music students to perform at the culminating showcase event at the end of the Summer Institute for the Arts

<u>Music Director</u>, Hilton Christian Church, Newport News, Virginia, July 1993 to present;
Deer Park Baptist Church, Newport News, Virginia, January 1988 to March 1991;
Hilton Baptist Church, Newport News, Virginia, October 1983 to 1986.

Coordinate and direct all music activities in the church:

- Conduct Adult, Youth, Children's Choirs, and congregation
- Conduct handbell choirs
- Coordinate a graded choir system
- Coordinate activities of the organist and pianist
- Supervise children's choir directors
- Supervisor and evaluate all instrumentalists including the organist and pianist
- Prepare choirs and ensembles for cantatas and special music events
- Select and order all music within a given budget
- Select hymns for all worship services
- Maintain music inventory
- Propose budget request to appropriate committees
- Develop and maintain a workable music library
- Report to pastor, boards, and committees of music activities

RELATED EXPERIENCE

Music Adjudicator, Spectrum of Richmond/Fiesta-Val, Richmond, Virginia; Various music competitions throughout the Commonwealth of Virginia for a variety of district, state, and national events. September 1984 to present.

Music Teacher, Newport News Public Schools, Dozier Middle School, Newport News, Virginia, September 1984 to June 1986.

Teach sixth grade exploratory music in four nine week sessions. Duties include:

- Establish and execute proper lesson plans.
- Instruction in music theory.
- Instruction in music history.
- Instruction in piano/keyboard skills.
- Instruction in recorder.
- Instruction in guitar.
- Instruction in vocal.
- Curriculum development.
- Conduct field trips, teacher/parent/student conferences, evaluations, and other teaching strategies.

Server/Performer/Vocal Coach and Instructor, Spirit of Norfolk, Norfolk, Virginia, July 1995 to April 1996.

Provide customer service and perform for passengers in a cruise ship atmosphere:

- Maintain customer service to assigned tables.
- Maintain expense account for each assigned table and/or patron.
- Perform shows and solos in a professional manner.
- Maintain safety for all passengers and crew.
- Maintain high energy an enthusiasm throughout the cruise.

President, Virginia Association of Music Education Administrators (VAMEA), elected by the members of VAMEA, June 2002 to June 2006.

- Develop and attend staff development opportunities for state music administrators at the Virginia Music Educators Association (VMEA) Annual In-Service Conference.
- Develop VAMEA Constitution and By-Laws
- Submit quarterly articles to state magazine – *VMEA Notes*
- Attend quarterly state meetings.
- Develop and attend staff development opportunities for the annual ArtsWorks for Virginia Conference.
- Coordinate with and make recommendations for funding with the VAMEA Treasurer and with the VMEA Treasurer.
- Submit and announce treasurer's reports to VMEA treasurer, secretary, executive board, and council of review at all VMEA meetings.
- Submit and announce VAMEA activities to VMEA secretary, executive board, and council of review at all VMEA meetings.
- Develop and maintain membership directory.
- Develop and maintain an on-line listing of staff development opportunities, guest conductors, accompanists, and adjudicators database.
- Be an advocate for music and music education at all state, district, and local events.

<u>Treasurer,</u> Virginia Choral Directors Association (VCDA), appointed by the Virginia Music Educators Association and the Music Educators National Conference, June 1994 to 1996.

- Pay all bills related to the Virginia Choral Directors Association.
- Maintain monthly balance of all financial accounts.
- Make quarterly reports to membership and to the Treasurer of the Virginia Music Educators Association.
- Scout perspective All-Virginia Chorus sites with the president of the choral director's organization to find appropriate and adequate rehearsal and concert space.
- Scout perspective All-Virginia Chorus sites with the president of the choral director's organization to find appropriate and adequate housing and meal accommodations.

<u>Private Voice and Piano Instructor,</u> in my home, Newport News, Virginia, June 1983 to June 1986. Community Music and Fine Arts Department, Greensboro College, Greensboro, North Carolina, Spring semester 1982.

Teach formal voice and/or piano lessons to experienced and inexperienced musicians:

- Teach posture and breathing.
- Teach music theory.
- Teach music history.
- Teach performance skills through proper vocal production and/or piano skills.
- Teach ear-training and sight-reading/singing skills.

EDUCATION

<u>Doctor of Philosophy</u>, Educational Leadership and Policy Studies, *Virginia Polytechnic Institute and State University,* (Virginia Tech) Blacksburg, Virginia, Final Defense – March 29, 2007; Graduation - May 11, 2007.

Related course work:

- Planning Educational Facilities
- Theories of Educational Administration
- Administration and Supervision of Special Education
- Advanced School Law
- Advanced School Finance
- Educational Governance and Policy Studies
- School Community Partnerships
- School Personnel Administration and Instructional Supervision
- Quantitative Research Methods
- Qualitative Research Methods
- Research and Dissertation

Dissertation Title:
The Impact of Music Education on Academic Achievement, Attendance Rate, and Student Conduct on the 2006 Senior Class in One Southeast Virginia Public School Division

Master of Arts in Education and Human Development, Administration and Supervision: *The George Washington University,* Washington, D.C., 1996.

Related course work:

- Public Relations for Educational Organizations
- School Finance
- School Law
- Curriculum Development
- The Principalship
- Observations, conferences, and evaluations for instructional staff

Bachelor of Music, Vocal Production, *Greensboro College,* Greensboro, North Carolina, *cum laude,* May 1983.

Related course work:

- Voice Lessons
- Vocal Pedagogy
- Vocal Literature
- Concert Choir
- Piano Ensemble
- Piano Accompanying
- Music Theory
- Music History
- 16th Century Counterpoint
- 18th Century Counterpoint
- 20th Century Techniques
- Orchestra and Form
- Ear-Training and Sight-singing
- Conducting
- Foreign Language – French, German, Italian, English
- Junior and Senior Voice Recital

Postgraduate Professional License, Commonwealth of Virginia
Effective July 1, 2006 to June 30, 2011

- Elementary School Principal
- Secondary Principal
- Superintendent
- General and Instructional Supervisor and Administration
- Music: Vocal/Choral PreK-12
- Music: General

Professional Teaching Certificate, Vocal/Choral Music PreK – 12, 1984 – present.
Thirty-nine (39) semester hours (graduate and undergraduate) beyond Bachelor of Music to meet Commonwealth of Virginia teaching certificate requirements:

- *Christopher Newport College,* Newport News, Virginia
- *Old Dominion University,* Norfolk, Virginia
- *Thomas Nelson Community College,* Hampton, Virginia
- *Hampton University,* Hampton, Virginia

Course work in education to renew Commonwealth of Virginia Teaching Certificate, 1987 – 1997.

- *The College of William and Mary,* Williamsburg, Virginia
- *Program for Effective Teaching (PET),* Newport News Public Schools, Newport News, Virginia
- *Leadership Academy for Aspiring Newport News Administrators,* Newport News Public Schools, Newport News, Virginia

PROFESSIONAL AND COMMUNITY ORGANIZATIONS

- Association for Supervision and Curriculum Development
- American Choral Directors Association
- Virginia Choral Directors Association
- Virginia Association of Music Education Administrators
- Virginia Music Educators Association
- Music Educators National Conference
- National Association of Teachers of Singing
- National Art Educators Association
- Virginia Art Educators Association
- Virginia Theatre Association
- Southeastern Theatre Conference
- Virginia Health, Physical Education, Recreation, and Dance Educators Association
- Peninsula Music Teachers Association
- The Chamber Singers
- Peninsula Youth Orchestra – Board member
- Newport News Commission for the Arts – Commissioner

SKILLS AND INTERESTS

Musical Ability

- Formal training in voice and piano
- Experience in performing teaching private and class voice and piano
- Periodical performances and recitals
- Perform with *The Chamber Singers* – an a cappella vocal ensemble that performs in Colonial Williamsburg and the Hampton Roads area
- Experience in high school choral music and choral conducting
- Experience in middle school choral music and choral conducting
- Experience in church music – Handbell choirs, adult, youth, and children's choirs, congregational hymns, piano accompaniments, and piano and organ personnel management
- Experience in choral conducting at the local, district, and state levels
- Experience as a choral music adjudicator at the local, district, state, and national levels
- Experience as a vocal and instrumental music adjudicator at the local, district, state, and national levels

REFERENCES

Available upon request

ADDENDA

PROFESSIONAL HIGHLIGHTS

- 2007 – Newport News Public Schools selected as "Best 100 School Divisions in America for Music Education" by the American Music Conference.
- 2002 to present – Commissioner on the Newport News Arts Commission for the City of Newport News
- 2001 Guest Conductor for Virginia Music Educators Association District VI Women's Chorus, Blacksburg High School, Blacksburg, Virginia
- 2002 Guest Conductor for Lynchburg City Public Schools All-City Chorus, Lynchburg High School, Lynchburg, Virginia
- 2005 Guest Conductor for Virginia Music Educators Association District VIII SATB Chorus, Heritage High School, Newport News, Virginia
- Spring 2003, 2004, 2005, and 2006 Choral Music Adjudicator for Fiesta-Val, Spectrum of Richmond per invitation
- As per invitation of Dr. Wayne Lett, Superintendent of Newport News Public Schools, soloist for a presentation at the 2000 Superintendent's Coalition for Technology Conference sponsored by the National Science Foundation at The Founder's Inn, Virginia Beach, Virginia
- June 2000 and 2001 – Developed and taught Newport News Public Schools Professional Development Institute to magnet school teachers at Woodside High School, Newport News, Virginia
- March 1999 - Developed and taught *Integrating the Arts in the Classroom to Foster Success for a Diverse Population,* Newport News Public Schools Race Relations and Diversity Conference
- 1997 and 1999 Guest Conductor for the Montgomery All-County Chorus, Montgomery County, Virginia
- 1997 soloist for the Newport News Public Schools Technology Expo as per invitation of Dr. Wayne Lett, Superintendent, Newport News Public Schools
- 1995-2000 developed and maintained *The Center for the Arts and Communications* at Woodside High School, a public school magnet program consisting of the visual arts, dance, drama, music, creative writing, and communications (radio and television broadcasting).
- 1994 directed the Denbigh High School Troubadours to provide background vocals for WVEC-TV Channel 13, Norfolk, Virginia documentary on teen violence. The documentary won an Emmy Award
- 1989 Denbigh High School Teacher of the Year
- District Choral Chairman/Representative for Virginia Music Educators Association and Virginia Choral Directors Association, 1989 – 1995
- President for Virginia Association of Music Education Administrators, a division of the Virginia Music Educators Association, 2002 – 2006
- Conductor of several choral numbers for the 1984, 1985, and 1986 Newport News Public Schools All-City High School Chorus
- 1986 Guest Conductor – Newport News Public Schools Middle School Chorus

- December 1986, 1988, 1993 conducted the Denbigh High School Troubadours, chamber/madrigal group, at The White House, Washington, D.C., per invitation from The President of the United States

- November 1988, 1990, and 1993 – Conducted the Denbigh High School Troubadours at the Virginia Music Educators Association In-Service Conference per invitation

- February 1990 – Conducted the Denbigh High School Troubadours at the National Music Clinic in Philadelphia, Pennsylvania, sponsored by Festivals of Music, Inc. per invitation

- January 1991 – Developed and taught staff development workshop to Newport News high school and middle school choral directors – *Vocal/Choral Music Techniques – A Refresher Course*

- February 1991 – guest conductor for the District VIII Festival Chorus – an affiliate of the Virginia Music Educators Association, the Virginia Choral Directors Association, and the Music Educators National Conference

- April 1991 – guest conductor of the Hampton All-City High School Chorus

- April 1992 – guest conductor of the Middle Peninsula and Northern Neck High School Chorus (grades 9-12)

- May 1992 – guest conductor of the Hanover County Public Schools Senior High School Chorus (grades 9-12)

- Soloist, section leader, and chaperone for the 1986 All-Virginia Chorus European Tour

- Guest soloist for the 1987 Newport News All-City High School Chorus performance of Schubert's *Mass in G*

- February and March 1992 – soloist and chorus member of the Composer's Chorus under the direction of Joel Subin, *The College of William and Mary,* Williamsburg, Virginia

- January 1993 – 1994 – Tenor soloist and member of *The Chamber Singers,* a chamber/madrigal group made up of six professional singers that specialize in a cappella performance

- Performed "Pirelli/choral member" in *Christopher Newport College* production of *Sweeney Todd,* Newport News, Virginia

- Performed "Larry/Matt" in *Christopher Newport College* production of *Face on the Barroom Floor,* Newport News, Virginia

- 1985 and 1989 – Cooperating teacher for student teachers from *Hampton University,* Hampton, Virginia and *Christopher Newport College,* Newport News, Virginia

- Host of the 1985 and 1992 District VIII Regional/Workshop Chorus held at Denbigh High School, Newport News, Virginia

- 1988 – 1989 served with a select group of educators to recommend Denbigh High School as a school for the National Excellence Award in Education. Distinction was awarded in 1989 from the United States Department of Education

- Host of the 1992-1994 Virginia Music Educators Association Honors Choir Auditions, *Longwood College,* Farmville, Virginia

- Soloist for various weddings, funerals, ceremonies, dedications, and events as needed and as requested

- 1986 – Served on the steering committee to develop the Newport News Public Schools Summer Institute for the Arts, Newport News, Virginia

HONORS

Professional:

- 2005-2006 and 2006-2007 *The Marquis Who's Who in American Education*
- 2006 *The National Scholars Honor Society*
- 2000 – *Faculty Life Membership* induction into the *Tri-M Music Honor Society* sponsored by the *Music Educators National Conference*
- 1999 – Former choral music student *Crystal Dawn Lewis* selected as ***Miss Virginia 2000*** and represented the Commonwealth of Virginia at the ***2000 Miss America Pageant*** in Atlantic City, New Jersey. Crystal won the preliminary talent competition at the ***Miss America Pageant***
- 1990 – Album dedication and thank you from former choral music student Brian Eggleston, vocal soloist
- 1989 Denbigh High School *Teacher of the Year*
- November 1990 – Virginia Music Educators Association *Music Educator of the Year* nominee
- April 1991, 1992, 1993 – *Award of Distinction in Recognition of Notable Contribution to Musical Excellence* – Atlanta, Georgia; Lakeland, Florida; and Pigeon Forge, Tennessee – Fiesta-Val, Spectrum of Richmond, Richmond, Virginia
- 1993, 1994, and 1995 – Recognized as an *Outstanding Educator* by the *Governor's School for the Arts and Humanities, University of Richmond,* Richmond, Virginia
- 1994, 1996, 1997, 1998, 1999 – *Who's Who Among America's Teachers*
- December 1986, 1988, and 1993 – *Denbigh High School Troubadours* performed at *The White House,* Washington, D.C., as per invitation from The President of the United States
- December 1988 and 1990 - *Deer Park Baptist Church Handbell Choir* performed at *The White House,* Washington, D.C., as per invitation from The President of the United States

College (Undergraduate):

- Presser Scholar
- Fletcher Scholar
- Recipient of the A. J. Fletcher Scholarship for musical excellence
- 1983 *Who's Who Among Students in American Universities and Colleges*
- Dean's List
- Junior Marshall – Junior year students with grade point averages of 3.0 or higher
- Senior Superlatives – *Most Talented*
- Graduated with honors – *cum laude*

ADDITIONAL INFORMATION

The following items and opportunities for additional information are available upon request:

- Portfolio
- Video of choral music classroom instruction
- Video of various choral concerts
- Vocal music repertoire
- Choral conducting repertoire
- Interview
- Recommendations
- Undergraduate and Graduate School transcripts
- Dissertation
- Other information upon request