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SOCIOECONOMIC STATUS, INSTRUMENTAL MUSIC PARTICIPATION, AND
MIDDLE SCHOOL STUDENT ACHIEVEMENT

by

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A dissertation in practice submitted in partial fulfillment of the requirements
for the degree of Doctor of Education
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ABSTRACT

The purpose of this study was to determine the differences in growth on the reading and mathematics FCAT 2.0 across varying levels of instrumental music participation by both low- and high-socioeconomic status (SES) middle school students, and to determine whether or not there is a relationship between instrumental music participation and socioeconomic status. The differences between instrumental music participation groups were not found to be statistically significant for both the reading and mathematics FCAT 2.0 growth by high-SES status students, and for reading FCAT 2.0 growth by low-SES status students. The differences between groups were found to be significant for mathematics FCAT 2.0 growth by low-SES students, but a Tukey HSD post-hoc test found no significant differences between the individual groups. The study also found that high-SES students had a higher rate of instrumental music participation in sixth grade, and a lower attrition rate between sixth and seventh grade than the low-SES students.

To Ruthie, Kathleen, Julia, and Matthew

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CHAPTER 1 INTRODUCTION

Background of Study

Public schools in the United States consist of a diverse population of students from many cultures. These cultures represent a wide range of beliefs, customs, and values. The value of music to individuals is a commonality among the many diverse cultures in the United States (NAfME, 2007). Americans not only value music, but also value music education in the public schools. A Gallup poll conducted in 2003 showed that 95% of Americans thought music is part of a well-rounded education, 93% thought that music should be a part of the regular curriculum in schools, and 79% thought music should be required for students (Lyons, 2003). The importance of music and the arts has also been recognized by the United States government, which labeled the arts as a core academic subject in the No Child Left Behind Act of 2001 (Lyons, 2003).

Research has shown positive effects and relationships associated with instrumental music education (Davenport, 2010; Johnson & Memmott, 2006). More specifically, research has shown positive relationships between instrumental music participation and academic achievement in students of low-socioeconomic status (Catterall et al., 2012; Fitzpatrick, 2006; Kelly, 2012). Furthermore, music education has been associated with other positive non-academic outcomes (Catterall et al., 2012; Harris poll, 2007). Although there is a relationship between music participation and student achievement, low socioeconomic status students participate in music at a significantly

lower rate than their high socioeconomic status counterparts (Abril & Gault, 2008; Elpus & Abril, 2011; Gillespie & Hamann, 1998).

Statement of the Problem

Research has shown that the majority of Americans value music education (Lyons, 2003), but access to music education, and more specifically instrumental music education, is disproportionately low in low socioeconomic status groups (DeLorenzo, 2012; Elpus & Abril, 2011; Schuler, 2011). While much research exists examining the relationship between music participation and student achievement, little research exists that examines the relationship between student growth on standardized tests and enrollment in instrumental music classes, and more specifically for low-socioeconomic status students.

Purpose of the Study

The purpose of this study was to examine the differences in growth on the reading and mathematics FCAT 2.0 across varying levels of instrumental music participation by both low- and high-socioeconomic status (SES) middle school students, and to examine the differences in instrumental music participation between socioeconomic status groups.

Significance of the Study

The findings of this study were anticipated to be significant to determine the differences in growth on the reading and mathematics FCAT 2.0 between varying levels

of instrumental music participation by both low- and high-socioeconomic status (SES) middle school students, and the differences in instrumental music participation between socioeconomic status groups. Little research has been conducted examining the relationship between instrumental music participation and growth on standardized tests. Furthermore, research has shown that low-socioeconomic status students participate in instrumental music at a lower rate than high-socioeconomic status students. Results of this study could be used as rationale to improve access to participation in instrumental music for low-socioeconomic status students.

Definition of Terms

FCAT 2.0 – “The Florida Comprehensive Assessment Test® 2.0, which measures student success with the Next Generation Sunshine State Standards, includes assessments in reading (grades 3-10), mathematics (grades 3-8), writing (grades 4, 8, and 10), and science (grades 5 and 8) in the 2013-2014 school year (Florida Department of Education, 2014).”

Developmental Scale – allows the charting of progress over time by linking assessment in consecutive grades together; also called a vertical scale (Florida Department of Education, 2014)

Instrumental Music -- band or orchestra courses, including all “M/J Band,” “M/J Orchestra,” and “M/J Instrumental Ensemble” course codes

Low-socioeconomic status students -- students who are eligible for free or reduced lunch at school during the sixth grade.

High-socioeconomic status students -- students who are not eligible for free or reduced lunch at school in the sixth grade.

Theoretical Framework

This study relied on Gardner's theory of multiple intelligences. According to Gardner and Pinker (as cited in Holding, 2009), intelligence is "the ability to solve problems, or to create products, that are valued within one or more cultural settings," and "the ability to attain goals in the face of obstacles by means of decisions based on rational (truth-obeying) rules" (p. 194). Gardner's theory originally included seven intelligences: linguistic, logical-mathematical, spatial, bodily kinesthetic, interpersonal, intrapersonal, and musical (Holding, 2009).

According to Gardner (as cited in Holding, 2009), music is a "distinct and autonomous intelligence because it does not depend upon the physical world, like bodily-kinesthetic intelligences, nor human introspection and interaction, as do the personal intelligences" (p. 197). Musical talent is one of the earliest talents to emerge in young children, but opportunities for musical development may be limited to private music instruction (Holding, 2009). This may be truer for low-socioeconomic status students, or students from low-income families, as these students typically have less access to music in the public schools (Costa-Giomi, 2008; Elpus & Abril, 2011).

Research Questions

The following research questions and associated null hypotheses were used to guide this study.

1. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students?

H₀₁ – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students.

2. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by low-socioeconomic status students?

H₀₂ – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students.

3. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students?

H₀₃ – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students.

4. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students?

H_{04} – There is no significant difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students.

5. What is the difference in 6th grade instrumental music participation rates between high- and low-socioeconomic status groups?

H_{05} – There is no difference in 6th grade instrumental music participation rates between high- and low-socioeconomic status groups.

6. What is the difference in instrumental music retention rates from 6th to 7th grade between high- and low- socioeconomic groups?

H_{06} – There is no difference in instrumental music retention rates from 6th to 7th grade between high- and low-socioeconomic status groups.

Table 1
Research Questions and Data Sources

	Question	Independent Variable(s)	Dependent Variable(s)
1	What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students?	Instrumental Music Participation	Growth on FCAT 2.0 Math Test
2	What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by low-socioeconomic status students?	Instrumental Music Participation	Growth on FCAT 2.0 Reading Test
3	What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students?	Instrumental Music Participation	Growth on FCAT 2.0 Math Test
4	What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students?	Instrumental Music Participation	Growth on FCAT 2.0 Reading Test
5	What is the difference in 6 th grade instrumental music participation rates between high- and low-socioeconomic status groups?	Socioeconomic Status	Instrumental Music Participation in 6 th Grade
6	What is the difference in instrumental music retention rates from 6 th to 7 th grade between high- and low- socioeconomic groups?	Socioeconomic Status	Instrumental Music Retention Between 6 th and 7 th Grades

Methodology

Research Design

The research design for this study used quantitative data from a large urban school district in central Florida. The data included students' fifth and seventh grade scale scores from the Florida Comprehensive Assessment Test (FCAT) 2.0 reading and mathematics tests, student schedule information related to participation in instrumental music, and student free or reduced lunch status. The student growth was determined by the difference between the seventh and fifth grade FCAT 2.0 scores. A quantitative, non-experimental design was used because the research examined the differences between multiple groups. Research questions one through four examined the differences in student growth on the FCAT 2.0 between instrumental music participation groups. Research questions five and six examined the differences in instrumental music participation between socioeconomic status groups.

Participants

The target population for this study included all eighth grade students enrolled in the large urban school district in Central Florida. The sample of this study consisted of students from middle schools where the instrumental music program, both band and orchestra (if applicable), have participated in and received only either a "Superior" or "Excellent" rating at the large group music performance assessment (MPA) during both the 2012-2013 and 2013-2014 school years.

Data Collection

Approval was obtained from the Institutional Review Board (IRB) at the University of Central Florida and the Orange County Public School (OCPS) District. The data obtained from OCPS included the following for each student: free or reduced lunch status, fifth grade FCAT 2.0 reading scale score, fifth grade FCAT 2.0 mathematics scale score, seventh grade FCAT 2.0 reading scale score, seventh grade FCAT 2.0 mathematics scale score, sixth grade instrumental music participation data, and seventh grade instrumental music participation data. Each student was assigned a unique identifier by the school district. Student growth in mathematics was determined by calculating the difference between the fifth and seventh grade FCAT 2.0 mathematics scores. Student growth in reading was determined by calculating the difference between the fifth and seventh grade FCAT 2.0 reading scores.

Variables

For research questions one through four, the independent variable for this study was instrumental music participation. The dependent variables are student growth on the mathematics FCAT 2.0 and student growth on the reading FCAT 2.0. The moderator variable is socioeconomic status, which is determined by student participation in the free or reduced lunch program during 6th grade. For research questions five and six, the independent variable was socioeconomic status, and the dependent variable is instrumental music participation.

Data Analysis

The following statistical tests were performed to answer the research questions. For research questions 1-4, descriptive statistics were run to determine mean growth scores for three groups: students who have taken zero instrumental music courses, students who took an instrumental class for one year only, and students who took instrumental music courses in both sixth and seventh grades. An analysis of variance (ANOVA) was used to determine statistical significance.

For question 5, the percentage of students who enrolled in instrumental music courses in sixth grade was calculated for each (high and low) socioeconomic group. For question 6, to determine the retention rate, only the students who enrolled in instrumental music courses during the sixth grade were used. Of these students, the percentage of students who did not enroll in instrumental music courses was calculated for each socioeconomic group.

Limitations

1. This study was limited to examining only the growth in test scores over two years of middle school instead of three, due to changes in the FCAT scoring.
2. This study was limited by any misuse of course codes at the school level (e.g., a school that uses a general music course code for an instrumental music course).
3. This study was limited by Florida state statutes that could prevent lower-achievement students from participating in instrumental music programs.

4. Some students in the study may have participated in elementary instrumental music programs.

Delimitations

1. The sample for this study only included schools where the instrumental music programs earned either a “Superior” or “Excellent” rating at large-group music performance assessments (MPA).
2. For this study, only orchestra and band courses were included in instrumental music programs.

CHAPTER 2 REVIEW OF LITERATURE

Introduction

This chapter presents the rationale for a study examining the relationship between socioeconomic status, instrumental music participation, and middle school student achievement. The concept of equity in education has been a theme for much of the history of public education in the United States. This theme goes beyond music education, but students of low socioeconomic status traditionally have had less access to music programs than their high-socioeconomic status counterparts. This improved as a result of Title I of the Elementary and Secondary Education Act (ESEA) (Labuta & Smith, 1997), but still remains an issue in recent years (Abril & Gault, 2008; Elpus & Abril, 2011; Gillespie & Hamann, 1998).

Music education has been shown to have a positive relationship with student success in school (Bygrave, 1996; Kinney, 2008). In addition, research has shown benefits specifically for at-risk students, or students with a low socioeconomic status (Catterall et al., 2012; Fitzpatrick, 2006; Kelly, 2012). Although the benefits of music education are well documented, not all students have access to quality music education. Enrollment in music courses is disproportionately low in low socioeconomic and minority student subgroups (Abril & Gault, 2008; Elpus & Abril, 2011; Gillespie & Hamann, 1998). Possible reasons for this include the lack of funding, emphasis on standardized testing, cost of participation, and lack of relevance to individual students (Costa-Giomi, 2008; Schuler, 2011; Williams, 2011).

History of Music Education in American Schools

During the colonial period, the focus of education was religious and civic instruction. Education was intended for males only, and varied based on social class or socioeconomic status. There were also variances based on geography; in the south, affluent families hired tutors while children in less affluent families relied on church services or apprenticeships. The goal of apprenticeships was to create skilled labor, so there was little focus on academics. In the middle colonies, education was based in the need to preserve cultural or religious identities. Education was highly valued in northern colonies and was also based largely on religion; for example, families in Massachusetts were required to provide education for their children that included reading and religion. Towns of fifty or more households were required to appoint reading and writing teachers. If a town had one hundred or more households, they were required to have a grammar school. Grammar schools were the most formal version of schooling at the time, and included instruction in the liberal arts (Labuta & Smith, 1997).

Music was not typically part of a child's education during colonial times. It was, however, part of the culture and religious practices of the time. In the south, music was considered a privilege for people in the upper social classes. Many girls of upper-class families attended boarding schools, which often included music and dance instruction. Children in lower-class families typically did not have access to music education (Mark & Gray, 2007). In the middle colonies, children typically learned music by rote at religious services. Instrumental music was also present; string and woodwind instruments were common and often used for secular music in the southern and middle

colonies. Instrumental music was not as common in the northern colonials because of its connection to secular music; instead, psalm singing was common (Labuta & Smith, 1997). During this time in the north, music was not considered an appropriate part of a school curriculum (Mark & Gray, 2007).

Religious beliefs became more diverse in America during the eighteenth century. Education had long been based in religion, so this contributed to disagreement about the objectives of education. As a result, the direction of education moved towards a “curriculum designed to develop ethics and morals without endorsing a specific religious creed” (Labuta & Smith, 1997, p. 9). In addition, education also began to focus on the needs of cultural and ethnic groups. Charity schools appeared in Philadelphia to teach English to Anglicize immigrant children. Segregated schools started appearing in northern cities for the children of free black citizens. The government began to move towards publically funded schools with the passage of the Northwest Ordinance of 1787, which designated land to be rented in order to raise funds for schools (Labuta & Smith, 1997).

In the early eighteenth century, the north experienced the deterioration of music skills in churches. This was caused by lack of music instruction, as well as the lack of instrumental accompaniments in the northern churches. Meanwhile, religious groups in the middle colonies enjoyed high-quality music in their services. The German Moravians, for example, emphasized music instruction and included brass instrumental

music along with choral music. Inspired by the music in the middle colonies, singing schools began to appear in the north (Labuta & Smith, 1997).

Singing schools, modeled after the European *scholae cantoru*, developed in the north during the early eighteenth century. Congregational schools were singing school sponsored by churches; independently sponsored schools were non-denominational signing schools organized by the music instructor. These schools typically lasted three weeks; instructors often were itinerant and worked at multiple schools, or maintained other employment such as a trade (Labuta & Smith, 1997). The singing schools served both religious and social purposes; they prepared members of the congregation to better participate in services and provided social opportunity for participants (Mark & Gray, 1997).

In the south, the growing middle class led to an increase in secular music. More people were of a higher-socioeconomic status than before, leading to increased time and resources to study the arts. Southerners purchased instruments both locally and from Europe, and print music was available from local merchants. Instruction was available from itinerant music teachers, many who were musically trained in Europe, for a fee. Slaves were also active in music; many were self-taught, but commonly performed for public events including dances and informal concerts (Labuta & Smith, 1997).

American Revolution – World War II

Public music performances declined during the American Revolution, but instrumental music flourished in army camps and on battlefields. Military bands, as well

as fife and drum corps became popular and were supported by the government. This contributed to an increased interest in music after the war; in addition to immigrants, veterans also began offering music instruction. There was an increase in music publishing, and music in America became more sophisticated with the addition of dotted rhythms, fugues, and ornamentation. Post-revolution America also saw an increase in music by American composers. Singing-school masters moved south to meet the demand for more sophisticated musical performances; pianos became more common in homes and organs became more common in churches. In addition, music study started appearing in universities (Labuta & Smith, 1997).

After the American Revolution, the new government saw a need to promote patriotism and to educate the citizens about the new constitution. The nation's leaders saw schools as a method to meet these needs. The result was the "common school;" Spring defined the Common School as a school "under state control teaching a common body of knowledge to students from different backgrounds," or schools "that were attended in common by all children and in which a common political and social ideology was taught" (as cited in Labuta & Smith, 1997, p. 14). Horace Mann, considered "the father of the Common School," was a leader in the Common School movement. Mann was elected in 1837 to serve as the Secretary of the Massachusetts Board of Education (Only a teacher, n.d.), and was instrumental in the establishment of "Normal Schools" in 1838, which were developed for teacher training (Cheeks, 2004).

The common school movement led to schools more closely resembling modern public schools. Advocates of the common school supported the centralization and standardization of schools to promote efficiency and uniformity. Control was shifted towards the government with the addition of regulations and supervision. School superintendents at both the state level, to monitor processes, and local level, to monitor instruction, were introduced. Graded schools, supervised by principals, began to appear; students in the schools were assigned to classes based on age. Prior to the Civil War, common schools were not common in the south for a variety of reasons. After the war, northerners saw common schools as necessary to bridge differences with the south (Labuta & Smith, 1997).

Singing schools remained popular during the Common Schools movement, especially in the south. In the north, music education started to appear in schools. Lowell Mason, who was a singing-school teacher, is considered the “most important figure in American music education” (Keene, 1982, p. 142). Mason was an active musician as a child, attending singing schools and learning several instruments. As a young adult, he served as a church organist and choir director, singing-school teacher, and eventually became the president of Boston’s Handel and Haydn Musical Society. Mason had a strong interest in children’s music, and eventually helped establish the Boston Academy of Music. This academy offered instruction for both children and adults; leaders of the academy supported the inclusion of music in the Common Schools. In 1837, the Massachusetts School Board authorized an experimental vocal music

program at Hawes Primary School, and Lowell Mason volunteered to be the instructor.

The board then voted to include music in the elementary schools; this was the first time in American history that music education was officially included in public school curriculum (Keene, 1982; Labuta & Smith, 1997). This would spread to schools throughout the region.

Until the late nineteenth century, compulsory school attendance had not been enforced. Political leaders, however, believed school participation was necessary to meet the goals of the nation. By 1915, all states had passed legislation to enforce compulsory attendance in the schools. Segregated schools were common during this time, although this may not have been consistent with the Common School philosophy. Catholic schools also competed with public schools; the Catholic Church leadership issued a decree in 1884 that every Catholic Church should have a school, and that Catholic children should be required to attend these schools (Labuta & Smith, 1997).

Although the nation's first high school opened in 1821, high schools did not become popular until the late nineteenth century when curriculums were changed to appeal to more students. In an effort to attract more students, high schools moved towards a tiered model, where students could pick a track based on their interest or ability. Junior high schools appeared in New York City in 1905; these schools helped steer students towards the most appropriate high school track. Kindergarten programs became popular during the late nineteenth century, and helped prepare young children for formal schooling. The late nineteenth century also brought supplemental schools, which

were for students with physical, social, or intellectual needs (Labuta & Smith, 1997, p. 24).

Instrumental music became increasingly popular after the Civil War. Members of military bands returned from duty and tried to remain musically active in civilian life. Instrumental ensembles became popular in part due notable bandleaders such as Patrick S. Gilmore and John Philip Sousa. Although not as popular as bands, orchestras also became increasingly popular during this time. In the early twentieth century, group music instruction became common in the public schools. School orchestras started appearing during the school day, and school bands taught by trained and salaried directors were popular due to perceived extra-musical benefits (Labuta & Smith, 1997).

The popularity of instrumental music in schools led to the rise of music contests and competitions. The first band contest occurred in Kansas in 1912; similar contests in other states followed, which led to the first national band contest in 1923. The first vocal ensemble contest, which also occurred in Kansas, took place in 1914. While popular, some educators felt that music as competition hurt its value as an art (Labuta & Smith, 1997).

Religious Music in Public Schools

Religion in schools was a topic of regular legal debate in the second half of the twentieth century; this debate often involved school music programs. According the National Association for Music Education (NAfME), “the study and performance of religious music within an educational context is a vital and appropriate part of a

comprehensive music education. The omission of sacred music from the school curriculum would result in an incomplete educational experience” (NAFME, 1996, para. 1). Music, specifically Western European Art Music, which is the basis of music study in schools, has origins and a long history with religion. Gregorian chant, which is considered to be the origin of Western Music, was a medieval practice of the Christian Church (Seaton, 1991). The study of religious music is a significant part of the educational music repertoire, and is equally significant in the study of music history and theory. Some religious music is used to teach skills or concepts, which may not be able to be taught with secular music. Furthermore, students may be able to see real-life connections with religious music, improving retention and interest in musical skills (Grier, 1979).

In *Florey v. Sioux Falls School District 49-5* (1980), the appellants brought action seeking declaratory and injunctive relief on the basis that the school district’s policy concerning the activities related to religious holidays was a violation of the Establishment and Free Exercise clauses of the First Amendment of the United States Constitution. The district court found that the policy did not violate the First Amendment. The Supreme Court of the United States affirmed this ruling. The rules associated with the policy in question were:

1. The several holidays throughout the year which have a religious and secular basis may be observed in public schools.

2. The historical and contemporary values and the origin of religious holidays may be explained in an unbiased and objective manner without sectarian indoctrination.
3. Music, art, literature, and drama having religious themes or basis are permitted as part of the curriculum for school-sponsored activities and programs if presented in a prudent and objective manner and as a traditional part of the cultural and religious heritage of the particular holiday.
4. The use of religious symbols such as a cross, menorah, crescent, Star of David, crèche, symbols of Native American religions or other symbols that are a part of a religious holiday is permitted as a teaching aid or resource provided such symbols are displayed as an example of the cultural and religious heritage of the holiday and are temporary in nature. Among these holidays are included Christmas, Easter, Passover, Hanukkah, St. Valentine's Day, St. Patrick's Day, Thanksgiving, and Halloween.

Religion in the Curriculum

1. The District supports the inclusion of religious literature, music, drama, and the arts in the curriculum and in school activities, provided it is intrinsic to the learning experience in the various fields of study and is presented objectively.
2. The emphasis on religious themes in the arts, literature, and history should be only as extensive as necessary for a balanced and comprehensive study of

these areas. Such studies should never foster any particular religious tenets or demean any religious beliefs.

3. Student-initiated expressions to questions or assignments which reflect their beliefs or non-beliefs about a religious theme shall be accommodated. For example, students are free to express religious belief or non-belief in compositions, art forms, music, speech, and debate.

Dedications and Commencement

1. A dedication ceremony should recognize the religious pluralism of the community and be appropriate to those who use the facility. An open invitation should be extended to all citizens to participate in the ceremony.
2. Traditions, i.e., invocation and benediction, inherent in commencement ceremonies, should be honored in the spirit of accommodation and good taste.
3. Because the baccalaureate service is traditionally religious in nature, it should be sponsored by agencies separate from the Sioux Falls School District (*Florey vs. Sioux Falls School District* 49-5, 1980, p. 1319).

While *Florey* addressed the performance of music related to holidays, *Doe v. The Aldine Independent School District* (1982) addressed the singing or music performance of school prayer at all extra-curricular and after-school events. The plaintiff, who remained anonymous, brought suit against the Aldine Independent School District in the United

States District Court for the Southern District of Texas, Houston Division claiming that the singing of a school prayer at these activities was a violation of the Establishment Clause.

The words of the prayer, which were viewed as controversial, were posted over the entrance to the gym, and the prayer was sung by students as the band played at sporting events, pep rallies, etc. In addition, the school principal or other employees often initiated the singing. It is important to note, while the singing of the prayer consistently occurred at these events, attendance was not mandatory at any event at which the prayer singing occurred. Also, when students did attend, they were not required to sing, participate, or stand. The court applied the Lemon Test and found that there was no clear secular purpose, religion was advanced through the singing, and that there was excessive entanglement between church and state (*Doe v. The Aldine Independent School District, 1982*).

In *Bauchman v. West High School (1995,1997)* the student, Bauchman, filed suit in District Court claiming that her music teacher was requiring her to perform religious music at religious sites, and that this was a violation of the Establishment, Free Exercise, and Free Speech Clauses. She also claimed this was a violation of her rights under 42 U.S.C.S. § 1983 and 42 U.S.C.S. §2000bb. The Tenth Circuit Court of Appeals affirmed the decision of the District Court for the District of Utah to dismiss the federal law claims.

In the original complaint, Bauchman made claims including that she was required to perform Christian devotional music, the music was selected for religious messages, she was required to perform in venues with religious symbols, and the teacher scheduled performances and venues with the desired effect of having the choir identified with religious institutions. She also claimed that the teacher ostracized students who did not approve of his “religious advocacy” (Bauchman v. West High School, 1997). According to Judge Brorby, who wrote the opinion, the Lemon Test alone is not enough to determine if the Establishment Clause has been violated. For this case, a combination of the Lemon Test and the Endorsement Test (as outlined by Justice O’Connor in Lynch) was used to make this determination. The court would first apply the purpose and effect components of the Endorsement Test, and then the entanglement prong of the Lemon Test.

The purpose of the selections of music and venues was questioned first. For them to be in violation of the Establishment Clause Ms. Bauchman had to show that they had no secular purpose; the actions of the teacher had to be only to promote religion. This would be difficult to do, as a large portion of serious choral literature has religious themes, background, or origins. Also, sacred music is often chosen for its educational value. Furthermore, choral programs often choose churches or other religious buildings because they offer better acoustics than school gyms, cafeterias, or auditoriums. Therefore, it was very likely that the teacher had some secular purpose for his actions (Bauchman v. West High School, 1997).

The next question is whether the choir repertoire or activities had the “principal or primary effect of advancing or promoting religion” (Bauchman v. West High School, 1997). Does the activity, in the eyes of a reasonable observer, advance a particular religion or belief? Judge Brorby argued that a “reasonable observer aware of the purpose, context, and history of public education in Salt Lake City,” including the tense history between the Mormon Church and government, and the relationship between religion and choral music, would find that the high school choir differs from a church choir in that it includes repertoire that is both religious and secular, performs in venues that are both religious and non-religious, and whose performances are representative of the culture and traditions of the community. For these reasons, the curriculum and activities of the school choir were not found to have the primary effect of endorsing religion.

The third question is whether the government was unconstitutionally entangled with religion. As previously stated in *Florey v. Sioux City School District 49-5* (1980), most cases where excessive entanglement exists involve some sort of government aid. In this case, the state was not directly involved with a religious activities or institutions, so the court found no excessive entanglement.

Finally, the court also ruled that the Free Exercise Clause and Free Speech Clause were not violated. Ms. Bauchman claimed that she was required to sing the Christian songs, in Christian buildings, but also stated that she was given an option to not

participate, without any penalty. For the same reason, the court also affirmed the District Court's dismissal of the §1983 claim (*Bauchman v. West High School*, 1997).

While most cases involving religious or sacred music in schools are related to choral literature, *Nurre v. Whitehead* (2009) focused on the performance of instrumental music. The student, Ms. Nurre, sued the school superintendent (Whitehead) for not allowing the school's wind ensemble to perform an instrumental "Ave Maria" at graduation. Whitehead ruled the piece could not be performed because it might be seen as endorsing religion. Ms. Nurre claimed that this action violated her First and Fourteenth Amendment rights. She also appealed the dismissal of her civil rights claim brought under 42 U.S.C. §1983. The United States Court of Appeals for the Ninth Circuit affirmed the decision of United States District Court for the Western District of Washington that Nurre's rights were not violated.

The case was appealed to the Supreme Court, which denied certiorari (*Nurre v. Whitehead*, 2010). Justice Alito, in the dissenting opinion, expressed concern that the circuit court's decision could have implications for all students within the Ninth Circuit. The decision could be applied to other public school music performances, preventing the study and performance of religious music in the schools. This ruling could reach even further, and be used to place restrictions on speech at graduations, events, concerts, etc.

Post-World War II

The civil rights movement and Cold War both brought significant changes to education. In *Plessy v. Ferguson* (1896), the Supreme Court of the United States ruled

that minority children could be educated separately from white students, as long as the education provided is equal to that of the white students. This decision was challenged in *Brown v. The Board of Education* (1954). The Supreme Court of the United States decided that the *Plessy* decision denied minority students the equal protection guaranteed by the Fourteenth Amendment of the United States Constitution, and mandated the schools become desegregated.

Concerns rose in the 1950s that American public schools were not adequately preparing students for college. The launch of Sputnik I, the world's first earth-orbiting satellite, brought this issue to the forefront, and led to significant reform efforts in the public schools. Federal funding of schools increased to account for about 10% of total school funding, and the National Defense Education Act (NDEA) was passed to improve mathematics, science, and foreign language instruction (Labuta & Smith, 1997).

President Johnson's "War on Poverty" preceded the Elementary and Secondary Education Act (ESEA) of 1965, and provided significant federal funding for schools. Title I of ESEA provided additional funding for schools in low-income areas (Labuta & Smith, 1997). This was significant to music education as it led to the hiring of music teachers in low-income schools, providing music education to students who did not previously have access. In 1966, about one-third of students in title I schools were participating in a school music program (Mark & Gary, 2007).

In the 1970s, students' academic achievement and the world economy were in decline. This "baby boom" of the 1960s had subsided and school enrollments had

declined. The poor economy had a direct impact on school funding. In 1978, California voters passed Proposition 13, which provided relief to taxpayers by making government spending dependent on economic growth. This led to lower property taxes, which in turn led to decreased funding for most government services, including education. By 1980, math SAT scores were at an all-time low, and juvenile crime was up. The decline in public education eventually led to the publishing of *A Nation at Risk*, which reported on issues including, “problems in curriculum, time in class, teaching, and subject matter content” (Mark & Gray, 2007, p. 390). The report did not recommend the arts as a part of the basic curriculum.

In January 2002, President Bush signed the No Child Left Behind (NCLB) Act into law. This act implemented increased accountability measures in education; schools’ success would be measured by the standardized testing of what were labeled as core subjects. These “core academic subjects” included “English, reading or language arts, mathematics, science, foreign languages, civics and government, economics, arts, history, and geography (Mark & Gary, 2007, p. 453).” It is important to note that the act did not specifically mention music, but it is commonly considered part of the arts, and the law did not require testing in all core subjects. Specific testing requirements were to be determined at the state level (Mark & Gary, 2007).

Research has shown that the accountability and testing movement has had an effect of school music programs. A 2006 study surveyed elementary school principals to examine their beliefs about how certain variables impacted their music programs.

Principals believed that both No Child Left Behind (NCLB) and standardized tests had a negative impact on music in their schools. Budgets and scheduling were also noted as having a negative impact on music programs, both of which may be impacted by additional demands caused by increased accountability and other legislation (Abril & Gault, 2008).

While the era of accountability and testing may have taken a toll on music programs, research has shown that reducing time for music may have no benefit related to school test scores. A 2003 study of Virginia elementary schools investigated the relationship between the time in school spent on the arts and physical education and student achievement on standardized tests. The foundation of the study was the argument that more time spent in the tested subjects would improve test scores. Results showed that there was no significant statistical relationship between reduced time in these classes and test scores. Furthermore, if anything, the results indicated that students who participate in art, music, and physical education might have performed better on standardized tests. This study supports the argument that music should be offered in schools (Wilkins et al., 2003).

Florida Legislation

In Florida, legislation focused on fine arts education has been introduced almost every year during the legislative session. Some legislation has come directly from legislators, and some has been the result of work by professional organizations and lobbyists (Reynolds, 2013). In the past, legislation focused mostly on the graduation

requirements for students or specific credit requirements. In recent years, focus has shifted to accountability for schools as it related to fine arts participation and access.

In January of 2011, Representative McBurney filed House Bill 289, which would have changed the calculation of school grades to include participation in fine arts courses. According to the bill, the school grade would include “the participation rate of all eligible students in schools comprised of any of the grades kindergarten (sic) through grade 8 who are enrolled in fine arts courses, which are visual art, music, dance, and theatre” (H.B 289, 2011, p. 2). The grade would also take into account the increase or decline in participation rates. The identical bill in the Senate, Senate Bill 988, was filed by Senator Detert in February of 2011. Both bills eventually died in committee and were withdrawn in May of 2011. This bill was reintroduced in September of 2011 by Representative McBurney as H.B. 121 (2012). The Senate companion, Senate Bill 338 (2012) was introduced by Senator Detert around the same time. Both bills, however, died in subcommittee.

In the 2013 legislative session, four bills, two in the House and two in the Senate, were introduced related to fine arts participation in the public schools. Representative McBurney introduced another bill, which added fine arts participation to the school grade (H.B. 283, 2013). This bill, however, specifically mentioned a fine arts report which would be prepared by the Commissioner of Education which would include student access to and participation in the fine arts, the number of educators teaching these classes and their certifications, and “the manner in which schools are providing the core

curricular content for fine arts established in the Next Generation Sunshine State Standards” (H.B. 283, 2013, p. 1). Senator Detert introduced S.B. 428 (2013), which had similar requirements. Senator Thompson sponsored S.B. 1626 (2013), which took the proposed report a step further and would have required the Department of Education to establish a separate grading system for fine arts courses. Both senate bills died in committee. H.B. 283 (2013) however, made it out of committee and through the first reading in the House, but died on the second reading calendar.

Also in 2013, Representative Joe Saunders first filed H.B.1239, titled the “Arts for All Students Act.” Similarly to the version filed for the 2014 session, H.B. 1239 (2013) would have required the Department of Education to publish a detailed report outlining student participation in fine arts courses across various subgroups, defined a fine arts curriculum as including visual arts, music, dance, and theatre courses, and established an advisory committee to oversee the creation of “Arts for All Students” model school and model school district designations. In addition to the required components of the report in the 2014 bill, the 2013 version of the “Arts for All Students Act” would have required the reports to include the number of hours dedicated to fine arts in each discipline, arts integration professional development for non-arts instructors, and professional development for teachers in the fine arts (H.B. 1239, 2013). This bill also died in committee.

Representative Saunders filed the current version of the “Arts for All Students Act” for the 2014 legislative session in September of 2013 (H.B. 83, 2014).

Representative McBurney also filed a similar bill, House Bill 87 (2014). Like H.B. 83, this bill would require the Commission of Education to prepare an annual report about fine arts participation:

The Commissioner of Education shall prepare an annual report that includes a description, based on annual reporting by schools, of student access to and participation in fine arts courses, which are visual arts, music, dance, and theatre courses; the number and certification status of educators providing instruction in these courses; educational facilities designed and classroom space equipped for fine arts instruction; and the manner in which schools are providing the core curricular content for fine arts established in the Next Generation Sunshine State Standards. The report shall be posted on the Department of Education’s website and updated annually. (p. 1)

Unlike H.B. 83 (2014), H.B. 87 (2014) would not require an “Arts for All Students” model school or school district designation. Senator Detert filed an identical bill, Senate Bill 420 (2014) in the Florida Senate.

Socioeconomic Status and Student Achievement

The relationship between socioeconomic status and student achievement is well-documented (Caldas & Bankston, 1997; Nichols, 2003; Herbers et al., 2012). According to the U.S. Department of Education (as cited in Lacour & Tissington, 2011), data had “clearly demonstrated student and school poverty adversely affected student achievement” (p. 522), and in a study of students in high-poverty elementary schools,

“The students scored below norms in all years and grades tested; students who lived in poverty scored significantly worse than other students; schools with the highest percentages of poor students scored significantly worse initially, but closed the gap slightly as time progressed (p. 522).” Research has also shown that this is also the case for middle and high school students. High school students of low socioeconomic status perform worse on proficiency exams than their higher-socioeconomic status counterparts (Nichols, 2003), and the relationship between socioeconomic status and student achievement has been shown to be significant across all subgroups in middle-school aged students (Lacour & Tissington, 2011).

Nichols (2003) examined possible predictors of student failure on high school proficiency tests in mathematics and English/language arts in the state of Indiana. The study focused on data from the graduating classes of 2000, 2001, and 2002 from six different high schools. The data included test scores from earlier grades, absence statistics, and demographic information including gender, race, and socioeconomic status of the students who failed to meet Indiana graduation requirements. Socioeconomic status was determined by a student’s free or reduced lunch status. First, the results found that third grade test scores were an indicator of success on high school proficiency exams; in general, students who failed to meet proficiency requirements in third grade were the same students who failed in high school. Next, absentee rates were found to be an indicator of failure on high school proficiency exams. Finally, the study did find that low-socioeconomic status was an indicator of student failure on the proficiency exams.

About half of students that failed to meet the graduation requirements were of low-socioeconomic status, and more than two-thirds of students who failed both the mathematics and English/language arts proficiency exams were of low-socioeconomic status. Absentee rates of the low-socioeconomic students were also higher than those of high-socioeconomic status students.

A 2012 study investigated the relationship between socioeconomic status, oral reading ability in the first grade, and later academic achievement (third through eighth grade) in math and reading. Students were separated into four groups for socioeconomic status: homeless/high-residential mobility (HHM), free lunch, reduced lunch, and all other students. The study showed significant relationship between oral reading ability in first grade and later achievement in math and reading, as well as a significant relationship between socioeconomic status and later achievement in math and reading. In addition, the study showed a relationship between first grade oral reading ability and socioeconomic status: when accounting for special education status, English-language learner status, and attendance rates, the HHM students achieved at a lower rate than all other socioeconomic status groups. The study also revealed, however, that higher oral reading ability in the first grade could overcome some of the negative effect associated with a low-socioeconomic status (Herbers et al., 2012).

While socioeconomic status has been found to have a significant relationship with student achievement on standardized tests (Nichols, 2003), research has also shown that a family's social status may have a stronger relationship. Caldas and Bankston (1997)

examined the relationship between individual and peer socioeconomic status, individual and peer family social status, and student achievement on the Louisiana Graduation Exit Examination. This study based socioeconomic status on participation in the federal free and reduced lunch program; social status was based on the educational and occupational background of the parents. Results showed that when accounting for all other variables, low-socioeconomic status did have a “small, independent negative effect on academic achievement” (Caldas & Bankston, 1997, p. 274). In addition, attending school with higher-socioeconomic status students did result in higher achievement for the low-socioeconomic status students. Social status, however, was found to have a stronger influence on student achievement. The authors suggest that elements of the family social status may be more useful in determining socioeconomic status than free and reduced lunch participation alone.

A 2012 study examined the math growth trajectories of students with disabilities from age seven through seventeen. The nationally representative sample included eleven of the twelve disability categories included in the Individuals with Disabilities Education Act (IDEA), and also included gender, race/ethnicity, and socioeconomic status data. Among the findings, the study found a significant positive relationship between family income and achievement in math by students with disabilities. The study did not find a significant difference in the trajectory of math scores over time based on family income (Wei et al., 2012).

Music and Student Achievement

Research has shown a positive relationship between music participation and success beyond high school. A 2007 poll by Harris Interactive showed a positive relationship between music education in high school and both income and post-graduate degrees. According to the poll, 88% of those polled with post-graduate degrees participated in music education. Also, 83% of those polled who had income of \$150,000 or greater also participated in music education (Harris poll, 2007).

The “Mozart Effect”

A 1993 study investigated the effect of listening to classical music on students’ spatial task performance. Thirty-six college students were given three sets of IQ spatial reasoning tasks. One set was preceded by ten minutes of Mozart piano music, the second set by a ten-minute “relaxation tape,” and the third set by ten minutes of silence. The difference between the Mozart results and the other two groups were statistically significant; students achieved higher spatial-task IQ’s after listening to the classical music. Student pulses were also recorded after listening to the music, relaxation tape, and silence; there was no statistically significant difference in pulse between the three groups, which eliminated arousal as a possible cause of the score differences. Finally, effects of the music listening were found to be temporary (Rauscher et al., 1994).

The study by Rauscher quickly gained national attention. Shortly after the experiment, and prior to the official publication of the study, the Associated Press had learned of the results and published the story. The results of the study had started to be

called, the Mozart Effect.” The “Mozart Effect” received significant national media attention in the late 1990s (Helding, 2014). As a result of the research, both the governors of Georgia and Tennessee distributed classical music CDs to each child born in the state at no cost. Companies began selling products for babies and young children based on study. Rauscher believed the findings were distorted, stating, “Generalizing these results to children is one of the first things that went wrong. Somehow or another the myth started exploding that children that listen to classical music from a young age will do better on the SAT, they'll score better on intelligence tests in general, and so forth (Spiegel, 2010, para. 17).” The “Mozart Effect” became a topic of debate in the research community (Helding, 2014).

One of the most well-known companies that capitalized on the “Mozart Effect” was Baby Einstein, which was eventually purchased by Disney. The company produced books, DVDs, toys, clothing, and more all based on the premise that exposure to classical music would make children smarter. The products were very popular; at one point, about one-third of babies between the ages of six and twenty-four months had one or more of the company’s videos. This trend was in spite of a recommendation by the American Academy of Pediatrics that children under the age of two should have no screen time, which includes time in front of televisions. In 2003, after a complaint filed with the Federal Trade Commission, the company stopped calling their products educational. In 2008, a class-action lawsuit was threatened, claiming that the educational claims were “false because research shows that television viewing is potentially harmful for very

young children” (Lewin, 2009, p.9). The Baby Einstein Company eventually offered refunds or exchanges for families who purchased the videos.

Several studies were performed to try and replicate the results of the original “Mozart Effect” study (Rauscher et al., 1993). One of these studies examined the effects of music listening and performance on Raven’s Progressive Matrices – Advanced Form, which “measures high-level observation skills, clear thinking ability, and intellectual capacity” (PreK – 16 Education, n.d., para. 1). 114 students were placed into three groups: students who listened to (1) eight minutes of music by Mozart, (2) eight minutes of relaxation instructions, and (3) eight minutes of silence. Students were asked to provide information related to music background and preferences, and were given the test both before and after listening to the music, relaxation instructions, or silence. Results showed no significant difference in scores between the three groups. Furthermore, musical background and preference had no relationship with scores of the students who listened to the music by Mozart (Newman et al., 1995).

Wells (1995) investigated the relationship between music listening and abstract-visual reasoning performance, but in contrast to the original “Mozart Effect” study, tested the relationship in high school students. A sample of sixty students was used. The first group of thirty students had been enrolled in band classes for at least three years. The other group of thirty was volunteers from a group of students selected at random, none of which were enrolled in music courses. Each student was given three abstract-visual reasoning tasks. Prior to one task students listened to ten minutes of a Mozart sonata,

prior to another task they listened to a ten minutes of a relaxation tape, and prior to the third task they sat in silence for ten minutes. Findings of the study included: (1) students did not perform better after listening to Mozart than after the relaxation tape or silence, (2) the band students did not score higher after listening to the band music than they did after the other two tasks, and (3) there was no statistically significant difference between the band and non-band groups (Wells, 1995). These findings were contrary to the original “Mozart Effect” study (Rauscher et al., 1993).

Bowman, Punyanunt-Carter, Cheah, Watson, and Rubin (2007) attempted to replicate the “Mozart Effect” on listening comprehension abilities. The sample for this study included undergraduate communications students who were placed into one of five groups: (1) students who listened to ten minutes of slow-tempo Mozart music, (2) students who listened to ten minutes of faster-tempo Mozart music, (3) students who listened to ten minutes of rock-and-roll music, (4) students who sat in silence for ten minutes, and (5) students who completed a crossword puzzle for ten minutes. After the ten-minute period, students completed the Communications Competency Assessment Instrument (CCAI). Results showed that the slow-tempo Mozart group scored higher than all of the groups, although the difference was only statistically significant for the faster-tempo Mozart group and the rock-and-roll group. There was no statistically significant difference between the slow-tempo Mozart group and both the silence and crossword-puzzle groups. Finally, both the silence and crossword puzzle groups scored

higher than the rock-and-roll groups, and the difference was statistically significant (Bowman et al., 2007).

Heltand (2000) performed a meta-analysis of studies of research related to the “Mozart Effect” and concluded that the effect does exist but has limitations. Furthermore, the effect is short-lived, and should not be generalized to an increase in intelligence, academic achievement, or other long-term effects. The positive effects of music listening are not limited to the music of Mozart, but at the time of this research, specific attributes of music that do enhance spatial tasks had not been identified. Finally, it was unclear whether or not a student’s preference for the music had any impact on its effectiveness. Heltand (2000) argued that while research does support the “Mozart Effect,” further research was needed.

A study by Taylor and Rowe (2012) investigated the “Mozart Effect” on college students’ performance in mathematics. The sample included 128 undergraduate aviation students enrolled in a required trigonometry course. Students were split into two groups and each group took six tests. One group listened to music by Mozart during the tests, and the second group tested in silence. The researchers used SAT scores to test for homogeneity of the groups. Students in the music group were offered to take tests in an alternative location if they thought the music would be distracting, but no students requested this accommodation. Results of the study indicated, “the “Mozart Effect” does impact the demonstration of learning in mathematics. Whether it is through priming cortical firing patterns, reducing anxiety, and/or generated arousal it is a theoretical

matter beyond the scope of this experiment” (p.60). Students who listened to the Mozart music during trigonometry tests scored higher than those who took the tests in silence; the results were statistically significant.

Christopher Chabris of Harvard University challenged the findings of the original 1993 study in a 1999 article. Chabris wrote, “Here I use a meta-analysis to demonstrate that any cognitive enhancement is small and does not reflect any change in IQ or reasoning ability in general, but instead derives entirely from performance on one specific type of cognitive task and has a simple neuropsychological explanation” (Chabris et al., 1999, p. 826). Chabris’ meta-analysis included twenty different studies that, similar to the original study, compared music listening to silence. Results of the analysis showed a very low effect size ($d=0.09$). The improvement was not statistically significant, and was “smaller than the average variation of a single person’s IQ-test performance” (p. 826). Chabris concludes by giving a possible explanation for the positive effects shown in some studies,

I conclude that a shared right-hemisphere locus provides a plausible explanation for an intermittent, small positive ‘enjoyment arousal’ effect of Mozart’s music on difficult spatial tasks. It also explains the failure to find an effect from other stimulation, which may not be sufficiently enjoyable or arousing to subjects, or on abstract reasoning or other cognitive abilities, which do not depend critically on those brain areas (pp. 826-827).

Rauscher, one of the authors of the original “Mozart Effect” study, wrote a response to Chablis,

Our results on the effects of listening to Mozart’s *Sonata for Two Pianos in D Major K. 448* on spatial-temporal task performance have generated much interest but several misconceptions, many of which are reflected in attempts to replicate the research. The comments by Chabris and Steele *et al.* echo the most common of these; that listening to Mozart enhances intelligence. We made no such claim. The effect is limited to spatial-temporal tasks involving mental imagery and temporal ordering (Chabris et al., 1999, p. 827).

It is important to distinguish between exposure and learning. According to Holding (2014),

A basic tenet of learning from the field of cognitive neuroscience holds that a thing is truly learned as evidenced by its repeatability; this is true for both facts and motor movements. While exposure may be the necessary first step in the learning process, it must be followed by practice in order to encode it in memory and make it available to habituation. (p. 476)

Holding argues that students cannot learn, and their deficiencies cannot be overcome simply by being exposed to music. “Exposure is not engagement, and engagement is a fundamental requirement to learning and understanding” (p.477). The conflicting finds

of research related to the “Mozart Effect” may suggest that music participation, rather than exposure to music, may have a better impact on student success.

Research has shown conflicting results when trying to test the “Mozart Effect.” The value of these findings has been a topic of great debate; research into the effects of music participation rather than music listening may have more educational value. According to Rauscher, whose research is the basis of the “Mozart Effect,” and Hinton, “We believe researchers should continue to search for links between music instruction and cognitive performance because disregarding these effects may overlook a potentially important educational intervention (Rauscher and Hinton, 2006, p. 237).”

Music and Non-Musical Outcomes

The “Mozart Effect” helped inspire numerous other studies related to music study and non-musical outcomes. Various stakeholders believed that music study could enhance student learning or success. For example, Abril and Gault (2006) examined the perceptions of music curriculum by elementary school principals. Overall, principals believed that their music programs were meeting various music standards as well as broader, non-musical educational goals. The broader educational goals included “developing creativity,” “foster critical thinking,” “facilitate learning in other subjects,” and “improve tolerance, understanding, and the acceptance of other culture” (p. 17). The results also revealed that principals rated these non-musical goals even higher if their programs had “ideal conditions” (p. 17).

Research has linked music study to positive, non-musical outcomes in students of all levels (Costa-Giomi, 1999; Degé et al., 2011; Miksza, 2007; Runfola et al., 2012). A two-year study sponsored by the National Endowment of the Arts (NEA) examined the “impact of ‘musically-trained’ early childhood specialists on the music achievement and emergent literacy achievement of preschool students” (Runfola, et al., 2012, p. 192). Teachers received pedagogical training for the development of young children’s music skills during the first year, and then implemented the program in the second year. The study had mixed results for music skills; students in the experimental group outperformed the control group in tonal patterns, but there was no statistically significant difference for rhythm patterns. The second part of the study was related to literacy skills; the music intervention was shown to have a statistically significant relation with literacy scores, and “was especially effective at improving literacy achievement for children who began with lower literacy skills” (p. 19).

Many studies have been performed linking music study and non-musical outcomes in elementary-aged students (Costa-Giomi, 1999; Roden et al., 2012). Much attention has been given to music and the development of Kindergarten-aged children (Gromko, 2005; Schellenberg, 2004). Schellenberg (2004) investigated the relationship between music lessons and IQ in six-year old students. The researcher verified that participating students had a keyboard available at home with a minimum of a four-octave range. Students were divided randomly into one of four groups: (1) students receiving keyboard lessons, (2) students receiving voice lessons, (3) students receiving drama

lessons, and (4) students receiving no lessons. Students in the various lesson groups received instruction at the Royal Conservatory of Music in Toronto for thirty-six weeks. The students took two different IQ tests prior to the lesson program, and in the summer following the lesson program. The results showed that the students in all four groups had significant increases in IQ, which may be due to normal growth of students entering school. The music groups, however, had larger increases than the other groups, with a small to moderate effect size ($d = .35$) (Schellenberg, 2004).

A study by Gromko (2005) investigated the relationship between music instruction with an emphasis on aural perception and the development of phonemic awareness in Kindergarten students. Four Kindergarten classes in one elementary school received four months of music instruction and the control group of students at another elementary school did not receive music instruction. “Results revealed that kindergarten (sic) children ($n = 43$) who received four months of music instruction showed significantly greater gains in development of their phoneme-segmentation fluency when compared with children ($n = 60$) who did not receive music instruction” (p. 206). Gromko (2005) states that a possible explanation for these results could be that “children may have benefited from music intervention because of music's emphasis on aural skill development” (p.207). Other possible alternative causes are offered as well, including differences in curriculum between the two schools and the extra attention given to the students at the treatment school.

Costa-Giomi (1999) investigated the relationship between music study and cognitive abilities of students. For this study, students were separated into two groups: students who were provided with piano lessons from fourth to sixth grade, and students who were not provided piano lessons. Prior to the study, there was no difference in cognitive or music abilities, self-esteem, motor proficiency, academic achievement, or interest in piano lessons between the two groups. The study revealed small but significant improvement in cognitive abilities by the piano-lesson group after one and two years. This improvement was only temporary; results at the end of the third year showed no significant difference between the groups. Costa-Giomi (1999) suggested that this might have been due to diminished interest in the piano lesson group. Differences within this group suggested that students who were more dedicated to their lesson still had improved cognitive ability; further research may be needed to investigate this finding.

Roden, Kreutz, and Bongard (2012) investigated the effect of instrumental music training on visual and verbal memory skills in elementary school students. Students were in three groups; one group took weekly, forty-five minute instrumental music classes, the second group received extended natural science instruction, and the third group received no additional instruction. Students took visual and verbal memory tests three times over eighteen months. After controlling for age, IQ, and socioeconomic status, the results showed that students in the music group experienced greater improvement in verbal

memory than the other groups. There was no significant difference in visual memory improvement.

Research has also shown relationships between the music study of secondary-school students and non-musical outcomes, including social outcomes (Miksza, 2010), audio and visual memory (Degé et al., 2011), and other cognitive skills (Bugos & Jacobs, 2012). Miksza (2010) examined the relationship between participation in high school music ensembles and non-musical outcomes. The study had a sample that included a representation of white and minority tenth grade students from 603 schools from across the United States, including rural, suburban, and urban schools. Results showed that “students in high school music ensembles are significantly more likely to (a) have higher standardized math achievement scores, (b) be more concerned about community ethics (i.e., building friendships, helping others, correcting social inequalities), and (c) be more committed to school (i.e., less late arrivals, less cut/skips, less absences)” (Miksza, 2010, p. 7). This result remained consistent when controlling for other variables, including socioeconomic status, minority status, and school-level factors. The study also showed that students of low-socioeconomic status were less committed to school than their high-socioeconomic status counterparts. According to the author, this could support the idea that music participation might be even more important for these students.

A similar study by Degé, Wehrum, Stark, and Schwarzer (2011) examined the effects of music training on secondary school students. Students in the treatment group received two years of an extended music curriculum, which included music theory,

instrumental music, and auditory perception training. Students took tests of auditory and visual memory both before the start of the program and after completion. When controlling for confounding variables, including socioeconomic status and intelligence, results showed that the music students experienced significant improvement in both auditory and visual short-term memory. Students in the control group did not experience this improvement. The results may be due in part to the musical training experienced by the students, which included both the visual and audio memorization of music (Degé et al., 2011).

The benefits of music education are not limited to instrumental music courses. A study by Bugos and Jacobs (2012) evaluated the effects of a program teaching music composition “on cognitive skills essential for academic success” (para. 1). Two groups of sixth grade students were studied; one group participated in the composition class, and the other did not. Results showed a significant improvement in arithmetic skills in the composition group over the control group. Many of the skills used in composition are consistent with necessary skills for other academic subjects, including arithmetic.

Music Participation and Student Academic Achievement

In the current climate of testing and accountability in education, much attention has been given to the relationship between music and student achievement, often measured by grades or test scores. A 2013 study investigated whether or not students who like or perform music have better grades than students who do not. The students in the sample were a part of the International Baccalaureate (IB) program at their school.

Students in this program were required to take music courses during the first two years, and then had the option of continuing in the third, fourth, and fifth years, or selected a plastic or dramatic art course instead. Students classified as liking music were those who chose to continue music after the second year. Results of the study showed that these students earned better grades than the students who did not continue in music. In the discussion of the results, the authors stated that “this gives a strong support to the hypothesis that music helps overcoming stress due to cognitive dissonance, helps accumulating knowledge, and music is fundamental for human evolution” (Arnaud et al., 2013, p. 259).

“Music, as a means of learning, provides structure, rhythms, and patterns of sound, as well as the opportunities for the use of analytical and reflective skills” (Bygrave, 1996, p. 28). A study by Bygrave (1996) examined the effects of music instruction on the receptive vocabulary development in students with learning difficulties. Results of the study found that the music instruction did have a significant effect on the development of receptive vocabulary. The effects of the music instruction, however, were not immediate. This delay could have been because the positive outcomes of the music instruction had to be applied to the vocabulary acquisition. For example, the students may have developed improved listening skills that could have been applied in other subject areas.

Southgate and Roscigno (2009) examined the relationship between music involvement and academic achievement in both elementary and high school students.

For this study, music involvement was classified in three groups: participation in school, participation outside of school, and parental involvement/concert attendance. Results showed that music involvement was associated with academic achievement in both reading and mathematics. Logistic and ordinary least squares (OLS) regression techniques were used to control for other variables; the results were consistent even when accounting for prior student achievement levels. Another important finding of this study was that levels of music involvement varied by social class in the high school group, but not in the elementary group. This may be due to lack of available resources to lower-socioeconomic status students, which is consistent with prior studies (Elpus & Abril, 2011; Gillespie & Hamann, 1998; Smith, 1997).

A 2006 study of middle school students from throughout the United States compared standardized test scores of music and non-music students. Students were classified into five categories based on their music participation: exemplary instrumental programs, exemplary choral programs, deficient instrumental programs, deficient choral programs, and non-music. Both the exemplary choral and the exemplary instrumental groups outperformed the non-music group. In addition, the deficient instrumental group also outperformed the non-music group. The deficient choral group scored the lowest of all groups. Results of the study were similar for both the students' math and reading scores. It is important to note that student scores were higher in both the exemplary and deficient instrumental music groups, regardless of quality (Johnson & Memmott, 2006). While research has shown positive benefits for all students who participate in music, it is

important to look at the research that specifically examines music study and low-socioeconomic status students.

Much of the research about music study and student achievement has focused on SAT scores (Americans for the Arts, 2011; Kelly, 2012; Vaughn & Winner, 2000). Vaughn and Winner (2000) examined twelve years of SAT scores and arts participation data. The study revealed a positive correlation between arts participation and student success on the SAT. Students who took at least one year of arts instruction outperformed students who did not have any arts instruction. Furthermore, students who took four years of arts instruction significantly outperformed students who had no arts instruction and students who had at least one year of arts instruction but less than four. These results were consistent for both the math and verbal sections of the test.

The study then went on to look at differences between arts content areas including: acting, music history/theory/appreciation, drama appreciation, music performance, studio art, art history/appreciation, and dance. On the verbal portion of the test, acting had the highest mean score, and dance had the lowest (seventh). On the math portion of the test, music history/theory/appreciation had the highest mean score, and dance had the lowest. Of the seven arts content areas, music performance had the fourth-highest mean score on the verbal portion, and the third highest mean score on the math portion of the SAT. It is important to note that all seven arts content areas outperformed the group of students who had no arts instruction on both the verbal and math SAT.

Americans for the Arts (2011) also published findings from a report of SAT scores of college-bound seniors. Students who took four or more years of arts classes in high school scored about 100 points higher than students who took a half-year of arts classes or less. In addition, students with four or more arts credits scored an average of 61 points higher than students with a half-credit or less.

A study by Kelly (2012) looked specifically at arts instruction and student achievement in Florida. Data included SAT scores, the Florida Comprehensive Achievement Test (FCAT), student Grade Point Averages (GPA), and dropout rate. Results showed a strong relationship between arts participation and student achievement and high school completion. Students who took only one arts course outperformed students who did not, but students who completed eight semesters of arts courses (four years) significantly outperformed non-participants. These results were consistent across all subgroups, including race and socioeconomic status.

In addition to the relationships with individual achievement, research shows a positive relationship between arts (including music) education and school success. In Texas, schools rated as “Exemplary” by the state have an average fine arts enrollment that is 17 percentage points higher than schools rated as “Low-Performing.” The study also found a positive relationship between fine arts enrollment and dropout rates. The average fine arts enrollment in schools with the lowest dropout rates was found to be 52%, while the average enrollment in schools with the highest dropout rates was 42% (Academic performance, 2007).

Instrumental Music Participation and Student Achievement

Several studies that examined the relationship between music participation and students achievement focused specifically on instrumental music participation (Cheek & Smith, 1999; Davenport, 2010; Kinney, 2008; Wallick, 1998). Wallick (1998) compared scores on the Ohio Proficiency Test (OPT) between elementary orchestra students and non-orchestra students. Students in the elementary orchestra program were pulled out of their regular classroom for thirty minutes, twice per week. Students in the two groups were ability matched using their verbal scores on the Cognitive Abilities Test. While Wallick's hypothesis was that there would be no difference between the two groups, the study actually found a significant positive relationship between orchestra participation and achievement on the reading and citizenship sections of the OPT. This study found no significant difference between the two groups on the mathematics and writing sections of the test.

A 1999 study examined the relationship between private instrumental music lessons and mathematics achievement on the Iowa Basic Skills Test (IBST) by middle school students who are enrolled in music classes at school. First, when comparing students who took music lessons outside of school and students who took music in school only, the results showed no significant difference. There was, however, a significant difference between students who had taken at least two years of private instruction and student who had none; the students with two years scored significantly higher on the mathematics section of the IBST. For students with no outside music instruction, there was no significant difference in mathematics achievement between students who had less

than two years of music in school and students who had more than two years of music in school. Finally, students who received private lessons on keyboard scored significantly higher than students who had received lessons on instruments other than keyboard (Cheek & Smith, 1999).

Kinney (2008) studied the standardized test scores of sixth and eighth grade urban middle school students. The study used the student scores from their fourth and sixth grade tests including reading, math, citizenship, and science, and eighth grade tests including reading, math, social studies, science, and language arts. Findings showed that band students scored significantly higher than nonparticipants on every test except for eighth grade social studies. While band students outperformed other students, this was also the case in fourth grade before these students started band, indicating the results might be because higher-achieving students chose to be in band.

Davenport (2010) studied the relationship between music participation and student achievement on the Maryland School Assessment (MSA) and the Maryland High School Assessment (HSA). The study compared students who participated in instrumental music with students who did not at three middle schools and three high schools in Baltimore, Maryland. Results showed significant differences between the high school students who participated in instrumental music and those who did not on both the English and Algebra portions of the HSA. In addition, the study also showed a positive relationship between instrumental music participation and the school attendance of high school students.

A 2011 study investigated the relationship between band participation, specifically pullout band lessons, and scholastic achievement by eighth grade students. Pullout lessons involve students leaving academic classes on a regular schedule for band instrument instruction. First, the results showed that the band students outperformed their non-band peers on every part of the ACT Explore College Readiness test. This is consistent with previous studies that show a positive relationship between music study and achievement, but also consistent with other literature that suggests the band classes may attract students who are already high achieving (Kinney, 2008). The study then compared students who were enrolled in band during eighth grade with students who initially joined band, but dropped out before eighth grade. Result showed that students who were participating in band during eighth grade outperformed the students who dropped out prior to eighth grade.

Socioeconomic Status, Instrumental Music, and Student Achievement

Research has shown a significant relationship between instrumental music participation and student achievement, but this relationship has also been shown to be significant for students of low socioeconomic status (Babo, 2004; Fitzpatrick, 2006; Miksa 2007). *The Arts and Achievement in At-Risk Youth: Findings from Four Longitudinal Studies*, published by the National Endowment for the Arts in 2012, examined the “academic and civic behavior outcomes of teenagers and young adults who have engaged deeply with the arts in or out of school” (Catterall et al., 2012, p. 8). Four national databases were used to study a representative sample of U.S. students over time.

For this study, at-risk students were defined as students who were in the bottom quartile of socioeconomic status (SES). Low SES students with high arts participation outperformed low SES students with low arts participation in all categories. Based on these findings, Catterall et al. (2008) presented the following conclusions:

1. Socially and economically disadvantaged children and teenagers who have high levels of arts engagement or arts learning show more positive outcomes in a variety of areas than their low-arts-engaged peers.
2. At-risk teenagers or young adults with a history of intensive arts experiences show achievement levels closer to, and in some cases exceeding, the levels shown by the general population studied.
3. Most of the positive relationships between arts involvement and academic outcomes apply only to at-risk populations (low SES). But positive relationships between arts and civic engagement are noted in high SES groups as well. (p. 24)

Babo (2004) investigated the relationship between instrumental music participation and student academic performance. A multiple regression analysis was used to control for other variables, including gender, socioeconomic status, and IQ score. Results showed that instrumental music participation had a significant positive relationship with student performance in language arts when controlling for the other variables. Of all of the variables, IQ score had the strongest relationship with test scores.

When controlling only for gender and socioeconomic status (not IQ), instrumental music participation was also found to have a significant relationship with math scores. This may be in part due to the significant relationship between instrumental music and IQ score. One variable not accounted for in this study was the level/quality of music instruction the students received. The sample included students from two middle schools, so there may have been differences between the two music programs (Babo, 2004).

Miksa (2007) examined relationships between music participation, socioeconomic status, and student achievement on standardized tests. This study used the results of the National Educational Longitudinal Study of 1988, which included math, reading, social studies, and science tests in the eighth, tenth, and twelfth grades. Results showed that music students (band, chorus, and orchestra) scored higher than non-music students throughout the longitudinal study in all subject areas. There was a small relationship between growth and music participation on the reading tests; the rate of growth was actually slightly slower for music students than for non-music students. The rate of growth between the two groups was the same for the math, social studies, and science tests. This was consistent for all students regardless of socioeconomic status.

This study also revealed that higher socioeconomic-status students outperformed lower-socioeconomic students on all subjects at each grade level. In addition, the rate of growth was higher for high socioeconomic-status students, which created an even larger achievement gap by the end of twelfth grade. According to the author, while the study does not show causal relationships, it is possible that low socioeconomic-status students

would benefit from the relationship between music participation and achievement. This is because music students experienced consistent growth from eighth to twelfth grade regardless of socioeconomic status (Miksa, 2007).

Finally, Fitzpatrick (2006) compared the student achievement data of high school instrumental music students and non-instrumental students over time within socioeconomic categories. The data used was from the Ohio Proficiency Test (OPT), which tested the subjects of citizenship, math, science and reading. Results from the students' fourth, sixth, and ninth grade years were compared. Students were categorized as having low socioeconomic status if they received free or reduced-price lunch. All other students were considered high socioeconomic status students. In both categories, instrumental music students outperformed non-instrumental students in every subject and at each grade level. All results were significant with the exception of math in sixth grade. While not the purpose of this study, the author found that the low socioeconomic status instrumental music students actually surpassed the non-instrumental, high socioeconomic status students in all subjects by ninth grade. This finding could have significant implications for low socioeconomic status students, but may require further research.

Much literature exists that supports instrumental music in secondary schools or that shows positive academic benefits associated with participation in instrumental music education. There is some literature, however, that does not show this positive relationship, or that does not support access to instrumental music education for all students. As previously discussed, Davenport (2010) found a positive relationship

between instrumental music study and both standardized test scores and school attendance in high school students. The same study showed no relationship between instrumental music study and both standardized test scores and school attendance in middle school students. This study showed no academic benefit to instrumental music for middle school students.

Elpus (2013) examined data from the Education Longitudinal Study of 2002, which was conducted by the National Center of Educational Statistics. Fixed-effects regression procedures were used to control for other variables including demographics and prior academic achievement. Results showed no significant difference in SAT scores between students who studied music and students who did not. Other factors, including the presence of an individualized educational plan (IEP), socioeconomic status, and prior academic achievement were found to be significant predictors of SAT scores. Elpus (2013) argued that when examining literature that shows positive relationships between music study and achievement, it might be important to consider that music may be more attractive to students who are already likely to experience higher levels of achievement.

Similar to Elpus (2013), Cox and Stephens (2006) found no significant relationship between music study and achievement in mathematics. The sample included students in grade nine through twelve, and mathematics achievement was measured by calculating the students' mathematics grade point averages (GPA). The study then split the music students into two groups: (A) students with at least two music credits at each grade level, and (B) students with fewer than two music credits at each grade level.

Results did show that students with higher participation in music (group A) did have a slightly higher GPA than the students with a lesser amount of music participation. This difference, however, was found to be statistically insignificant (Cox & Stephens, 2006). This study included all math in mathematics achievement; the authors suggested that future studies should investigate certain aspects of mathematics.

Vaughn and Winner (2000) did find a positive relationship between music participation and student achievement on the SAT, but cautioned that the results do not indicate a causal relationship. This study also found an even stronger relationship between academic subjects and SAT scores. Students who took four years of any academic subject (e.g., math) outperformed students who took less than four. Furthermore, when comparing SAT results of students who took four years of any subject, all academic subjects had a higher mean score than the arts. The authors suggest that higher-achieving students probably go beyond minimum requirements to take four years of some courses.

Other studies have also shown no significant relationship between music education and academic success. A study by Cox and Stephens (2006) examined the relationship between participation in high school music courses and both math grade point averages, and cumulative grade point averages. Students were separated into two groups; group A consisted of students with at least two music credits per grade level and group B consisted of all other students. While grade point averages were higher on

average, the finding was not statistically significant. It is important to note, however, that in this study both groups had students with music credits.

A study by Elpus (2013) had similar results. The study compared college-entrance test (SAT) results of high school students who had taken music, and those who had not. This study, however, controlled “for variables from the domains of demography, prior academic achievement, time use, and attitudes toward school” (p. 175). Results showed no significant difference between the music and non-music students. The results remained consistent when data was desegregated by the content of the music credit. This was a comprehensive study that included over 15,000 students from throughout the United States, but it is important to note that the music group included students with at least one music credit. It is possible that desegregating students by the number of music credits earned may show different results, as previous research has shown increased performance with increased music credits (Kelly, 2012). While these studies show no significant relationship between music study and student achievement, they also do not show a negative relationship. The studies may not cause a school leader to improve access to music, but they also do not provide a reason to reduce access.

According to some school leaders, narrowing the curriculum, or cutting back on some courses to make space in the day for others, may be necessary. Starting with the launch of Sputnik, legislation requiring increased standards has forced school leaders to make tough decisions. If schools are required to meet certain minimum requirements in

reading and mathematics, than school priorities need to be shifted to meet these requirements. The argument can be made that if a school fails to meet these requirements, than more time could or should be spent on these subjects, leaving little time for the arts. Although further research may be needed, some data suggests that this approach has improved test scores (Dillon, 2006).

Socioeconomic Status and Music Participation

Relationships between music education, and arts education in general, and positive non-musical outcomes have been well documented (Davenport, 2010; Kelly, 2012; Miksza, 2010). In 2008, Secretary of Education Arne Duncan sent a letter to school leaders supporting arts education:

In June, we received the 2008 National Assessment of Educational Progress (NAEP) in the Arts results for music and visual arts. I was reminded of the important role that arts education plays in providing American students with a well-rounded education. The arts can help students become tenacious, team-oriented problem solvers who are confident and able to think creatively. These qualities can be especially important in improving learning among students from economically disadvantaged circumstances. However, recent NAEP results found that only 57 percent of eighth-graders attended schools where music instruction was offered at least three or four times a week, and only 47 percent attended schools where visual arts were offered that often (Arts at the Core, 2009, p.3).

Around 2007, the College Board's Board of Trustees charged that National Task Force on the Arts in Education (NTFAE) to develop vision for arts education. The following recommendations were included in the executive summary:

- The NTFAE believes that the College Board can promote and utilize arts programming as an effective tool to improving education in general and as a solution to achieving access and equity for all students. (p. 5)
- The NTFAE urges the College Board to exercise its broad influence to encourage its members to implement and sustain quality programs for all K–16 students in dance, music, theater and the visual arts. (p. 6)
- The College Board can strengthen education by promoting creativity, by recognizing achievement in the arts and by raising the visibility of the arts throughout its programs. (p. 6)
- The NTFAE further believes the College Board must integrate the arts into its programs and services, recognizing that infusing arts across the curriculum is an invaluable learning tool. (p. 6)
- The NTFAE would like to see a more global perspective in both arts and non-arts programming within the College Board. (p. 7)
- The NTFAE recommends that the College Board collaborate with member institutions, policymakers, education and arts communities, and funders to

promote policies that lead to effective practices and quality programs in the arts. (p. 7)

- The NTFAE recommends that the College Board initiate and sustain alliances with arts and education organizations to develop collaborations that support the arts in K–16 education. (p. 8)

The NTFAE specifically addressed underserved students in the report, stating that professional development opportunities in the arts should be created for teachers in low-income communities (Arts at the Core, 2009).

The benefits of music education for all students, and specifically low socioeconomic students, are well documented. Research shows, however, that low socioeconomic status students are significantly under-represented in music courses. A study by Elpus and Abril (2011) found that the number of high school seniors who participated in music ensemble classes decreased by about 33% since 2001. This study also found that high schools are not serving and not meeting the needs of low socioeconomic status students. Reasons for decreased overall enrollment could be new curricular demands, reduction in course offerings, and funding shifts due to increased standardized testing. One possible reason for the low enrollment of low socioeconomic status students is the cost of participation; these students cannot afford the equipment and other associated costs (Elpus & Abril, 2011).

A 2008 study by Abril and Gault examined the music course offerings at secondary schools in the United States, as well as principals' perceptions of music courses. 98% of schools were found to offer music courses, with 34% of schools requiring students to take music courses. There was a significant variance in the quantity of music offerings based on the socioeconomic status of the school. Schools with a high socioeconomic status were found to have a significantly higher number of music courses than schools with a moderate or low socioeconomic status. In addition, rural schools offered significantly fewer course offerings in music than urban and suburban schools. The most commonly offered courses were band and chorus.

Abril and Gault (2008) also studied the perceptions of secondary school principals related to music education and obstacles to offering music courses. Performing was the highest rated music-specific outcome of music courses. Cooperation, self-esteem, and creativity were the highest-perceived broad educational outcomes. While principals generally had a positive perception of music courses, there are factors that may be an obstacle to offering these courses. Principals perceived No Child Left Behind and standardized testing as potential obstacles, and this was consistent throughout all socioeconomic groups. The high cost for music classes was also perceived to be an obstacle to offering music classes.

Inequality in access to instrumental music education is especially evident in string education (orchestra). Smith (1997) examined string programs in school districts throughout the United States and found that low-SES schools offered string education

programs at a significantly lower rate than average and high-SES schools. For this study, SES status was determined by the percentage of school-aged children falling below the United States Census poverty line. Low-SES schools had 25% below the poverty line, average-SES schools were between 5%-25%, and high-SES had 5% or fewer below the poverty line. The results showed that 64% of schools offering strings education were of average SES, 32% were of high SES, and 4% were of low SES (Smith, 1997).

Gillespie and Hamann (1998) also looked specifically at orchestra programs throughout the United States. The study found that most orchestra programs are in suburban schools and consist primarily of white students. This is consistent with the findings of Abril and Gault (2008); orchestra is not as common as band or chorus, so it would be less likely to be available in lower socioeconomic status schools. This could be due to the cost associated with orchestra programs, and the inability of a student to acquire an instrument.

A study by Costa-Giomi (2008) examined the characteristics of elementary school music programs in a large, urban area of Texas, and investigated possible inequalities based on the student population. The study found that on average, students in high economic status schools went on more music-related field trips than those in low economic status schools. The high economic status schools also had more favorable music facilities, instructional resources, instrument quality, and technology. According to the teachers surveyed, reasons for the inequalities could include the availability of financial resources and parental support, which was perceived as being lower at the low

economic status schools. A common perception among the teachers was that although the funding in these schools was comparable, funds were often used for academic resources in the low economic status schools.

While Costa-Giomi (2008) found that inequalities, based on economic level, existed in the elementary school music programs, the attributes of the music teachers were largely consistent. The attributes that were found to have no significant difference across economic levels include, “teacher preparation, teaching experience, teacher certification, intention to continue teaching, involvement in music activities outside school, and involvement in school and professional activities” (p.22). There were some differences found in the attendance at or participation in professional conferences, although these differences were statistically significant. This could be due to a difference in the allocation of funding between high and low economic status schools.

An earlier, similar study by Costa-Giomi and Chappell (2007) examined the characteristics of band programs in a large Texas school district. The characteristics were compared between the band programs in low-socioeconomic status and high-socioeconomic status schools. Students in band programs at high-socioeconomic schools had greater financial resources, better facilities, and more parent support than the students at low-socioeconomic status schools. Not only did the programs at high-socioeconomic status schools have more funds from fees and fundraising, they also had greater access to external funds. Students in these schools enjoyed greater access to financial assistance and technological resources. While this study did not look specifically at student

participation, it did show differences in the quality of experience for participating students.

Ester and Turner (2009) investigated the effects of a school loaner-instrument program on the attitudes and achievements of low socioeconomic-status students. Students participating in the program completed a survey related to attitudes towards music study at the beginning and end of the school year. Teachers also completed surveys related to the students' academic, musical, and personal growth. Results suggested that providing loaner instruments to students who otherwise might not have been able to afford music study might have actually reduced the negative effects of low intellectual self-esteem and happiness associated with low socioeconomic status. In addition, students who have a school loaner instrument achieved at the same levels as students who had their own instrument.

Based on relevant literature, there is disparity in access to instrumental music education (Abril & Gault, 2008; Elpus & Abril, 2011). To better understand the disparity, it is important to study the characteristics of students who participate in instrumental music courses. A study by Kinney (2010) examined predictors for band participation by urban middle school students, both in initial participation in sixth grade and continued participation into eighth grade. The study showed a significant relationship between students from two-parent households as well as those with academic success and both participation in band in sixth grade, and continued participation in

eighth grade. In addition, female students and high socioeconomic status (SES) students were more likely to continue band in eighth grade than other students.

While the study found that socioeconomic status was a significant predictor for participation in eighth grade band, it also found that it was not a significant predictor for participation in sixth grade band. The author cited financial cost as one possible reason for the difference between eighth and sixth grade. Schools may find ways to lessen costs for middle school band students; many schools have instruments and uniforms that can be provided at no cost to the students. There are other costs, however, that may create a financial barrier to participation for low-SES students. These include supplies such as reeds, valve oil, music, etc. The cumulative costs associated with school band may prevent students from participating in band after sixth grade (Kinney, 2010).

Consistent with the Kinney (2010) study, Corenblum and Marshall (1998) found socioeconomic status to be a significant predictor of student retention in music courses; students of low-socioeconomic status were less likely to continue studying music at school. These findings may be due to several reasons. Low socioeconomic-status students may not have access to the same high-quality music programs as their high socioeconomic-status counterparts (Costa-Giomi & Chappell, 2007), and may not experience the same success. Also, these students and their families may not value music education in the same way other students do. To retain these students in music programs, teachers should be sensitive to cultures and traditions and build on the strengths and

interests of their students when making programming and curriculum decisions (Corenblum & Marshall, 1998).

The findings of Corenblum and Marshall (1998) that socioeconomic status is a predictor of a student's continuation of music study could possibly be partially due to students' prior attitudes and beliefs. Nierman and Veak (1997) studied the effects of different recruiting strategies on the participation decisions of beginning instrumentalists. Students were placed into three groups: one group spent ten weeks learning the recorder, the second group learned about instruments through videos and live student performance, and the third group was the control group. Results of the study showed that the type of recruiting strategy did have a significant affect for both the middle- and high-socioeconomic status groups, but had no impact of the low-socioeconomic status group. This could be due to the influence of family and peers, or possibly due to the funds necessary for participation.

Albert (2006) discussed possible reasons for the disparity in access to instrumental music education. The establishment and maintenance of instrumental music programs requires the allocation of resources. In high-SES schools, the families and communities may be better able to contribute through donations, instrument purchases, fundraising, etc. While the music teacher is responsible for implementing music activities, school leaders or administrators ultimately determine access to music programs through funding decisions.

Based on the research presented, there is a significant disparity between music enrollment and participation in low and high socioeconomic status students (Abril & Gault, 2008; Elpus & Abril, 2011; Gillespie & Hamann, 1998). Currently the courses predominantly offered in public schools are band, orchestra, and chorus classes. These class options may provide financial barriers that could prevent students from participating, as uniforms, instruments, fees, and other costs are typically associated with these courses (Abril & Gault, 2008; Schuler, 2011). Furthermore, some students may not find these classes, as well as lower cost alternatives such as music theory and history, appealing. These students may have a strong interest in music, but may not be interested in the music courses offered at school (Williams, 2011). In order to address the problem, new courses and options should be presented that are both relevant to the student, and affordable for both the family and school.

Doyle (2012) examined the perceptions of music teachers in urban elementary schools. All of the students in the included schools were economically disadvantaged; all were classified as lower-middle class or below. Results showed that most of the teachers in these schools were “highly educated Caucasian females from two-parent, suburban, and middle- or upper-class backgrounds” (p. 46). Many of the teachers came from university programs with an emphasis on Western-European art music that prepared them for work in traditional music classrooms or secondary performing ensembles. Similar to Williams (2011), Doyle (2012) suggested improving relevance for these students.

However, music teachers may be able to connect more meaningfully with urban students by using other styles of music, such as popular music, jazz, or other culturally relevant music such as the music of their student population's culture or ethnicity. Universities can assist teachers by offering more courses in other music styles and legitimizing these styles for use in the classroom, which could lead to teachers developing more openness and positive dispositions toward learning about and teaching styles of music that may be unfamiliar to them but are relevant and meaningful to their students (p.47).

About 80% of high school students choose not to participate in a music ensemble, and a disproportionate amount of these students are of minority or low socioeconomic status (Elpus & Abril, 2011). Schuler (2011) presented criteria that could be used to determine whether or not a music program is successful, "1. Achievement – the scope and depth of what students learn; 2. Participation – how many students benefit from music classes; and 3. Impact – whether participating students are motivated and empowered to continue their musical involvement after moving on to the next level" (p. 8). Finding ways to include more of these students will require a shift in the current music education model.

While the band, orchestra, and chorus (BOC) model impacts many students, more options may be needed to reach others. Additional classes could be offered that may be more relevant to other students. Some new classes have appeared in recent years which

could be successful in recruiting new students, including mariachi bands, steel drum ensembles, music technology, rock bands, hip-hop music classes, and others. Music teachers and administrators should ask the following questions before adding a class:

1. Will the strand appeal to students who are already electing to participate in BOC?
2. Will the strand provide opportunities to teach a variety of standards, including listening and creating?
3. Will student participants find opportunities to continue their involvement after graduation? (Schuler, 2011, p. 11)

One option to consider might be courses that teach music through the use of technology. The cost of technology is becoming increasingly affordable, and some schools may already have the necessary technology to implement these classes. Also, students may find these courses relevant; public school students today have grown up with technology integrated into their lives. Current music courses are using the same technologies as they were decades ago. Technology-based music courses may be more appealing to all students, and more affordable as well, making them much more accessible to students with financial challenges (Williams, 2013).

Summary

Educational practices varied by region prior to the American Revolution, and music was generally not part of school curriculum. Access to music also varied by region as well as social status. The need for greater musical skills in church congregations

contributed to the development of singing schools that were often sponsored by churches (Labuta & Smith, 1997; Mark & Gray, 2007). Common schools appeared in the early nineteenth century, and music was officially included in public school curriculum for the first time by the Massachusetts school board in 1837 (Labuta & Smith, 1997).

As public schools evolved in the United States, so did music education. School bands and orchestras became common in the twentieth century, but access varied from district to district, or even from school to school; access to music instruction varied based on socioeconomic status. Title 1 of the Elementary and Secondary Education Act (ESEA) of 1965 helped alleviate this problem (Mark & Gray, 2007). Music education was often directly or indirectly affected by court decisions and legislation. The religious heritage of music often led to litigation, and legislation focused on accountability and assessment has created obstacles to access to music instruction (Abril & Gault, 2006).

The achievement gap in terms of socioeconomic status is well documented (Caldas & Bankston, 1997; Nichols, 2003; Herbers et al., 2012). Students of low socioeconomic status have been shown to score lower on standardized tests (Nichols, 2003). It is important to note however, that while socioeconomic status is a predictor of success of standardized tests, family social status could be a stronger predictor (Caldas & Bankston, 1997). Perhaps even more concerning, low-socioeconomic status students may start school behind, having less success at reading early in elementary school (Herbers et al., 2012).

Research has shown a strong relationship between music study and student achievement. While its validity was a topic of significant debate (Rauscher & Hinton, 2006), the “Mozart Effect” led to great interest in the relationship between music study and non-musical outcomes. Music has been shown to have significant relationships with positive outcomes including IQ (Schellenberg, 2004), aural perception (Gromko, 2005), and other positive social outcomes (Miksza, 2010). Instrumental music study has also been shown to have a statistically significant relationship with student achievement on standardized tests in all age groups (Davenport, 2010; Southgate & Roscigno, 2009; Kinney, 2008). In addition, a significant portion of research examining the relationship between music study and achievement has focused on SAT or ACT scores (Kelly, 2012; Americans for the Arts, 2011).

The relationship between music study and student academic achievement has also been shown to be true for students of low-socioeconomic status (Miksa, 2007). Much of this research focused on SAT score data (Catterall et al., 2008). While a significant amount of research exists that examines music study, student achievement, and socioeconomic status, only a small amount of research was found that specifically examined music study, socioeconomic status, and student achievement by middle school students (Fitzpatrick, 2006). In addition, some research has shown no relationship between music study and student achievement (Elpus, 2013; Cox & Stephens, 2006). Finally, even though research has shown a significant positive relationship between music study and achievement by low-socioeconomic status students, these students have

lower participation rates in instrumental music than their higher-socioeconomic status counterparts (Elpus & Abril, 2008; Gillespie & Hamann, 1998; Smith, 1997).

CHAPTER 3 METHODOLOGY

Introduction

The primary goal of this study was to test the research questions that relate to the relationships between socioeconomic status, instrumental music participation, and growth in standardized test scores, and between socioeconomic status and participation in instrumental music by middle school students as stated in Chapter 1. The FCAT 2.0 was the instrument used to determine growth in standardized test scores, and student-scheduling data was used to determine instrumental music participation. This chapter presents the methodology used to test the research questions; it is organized into five sections: (a) research questions (b) selection of participants, (c) instrumentation, (d) data collection, and (e) data analysis.

Research Questions

The following research questions and associated null hypotheses were used to guide this study.

1. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students?

H01 – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students.

2. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by low-socioeconomic status students?

H₀₂ – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students.

3. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students?

H₀₃ – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students.

4. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students?

H₀₄ – There is no significant difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students.

5. What is the difference in 6th grade instrumental music participation rates between high- and low-socioeconomic status groups?

H_{05} – There is no difference in 6th grade instrumental music participation rates between high- and low-socioeconomic status groups.

6. What is the difference in instrumental music retention rates from 6th to 7th grade between high- and low- socioeconomic groups?

H_{06} – There is no difference in instrumental music retention rates from 6th to 7th grade between high- and low-socioeconomic status groups.

Table 2
Research Questions and Data Sources

	Question	Independent Variable(s)	Dependent Variable(s)	Statistical Test
1	What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students?	Instrumental Music Participation	Growth on Math FCAT 2.0	ANOVA
2	What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by low-socioeconomic status students?	Instrumental Music Participation	Growth on Reading FCAT 2.0	ANOVA
3	What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students?	Instrumental Music Participation	Growth on Math FCAT 2.0	ANOVA
4	What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students?	Instrumental Music Participation	Growth on Reading FCAT 2.0	ANOVA

5	What is the difference in 6 th grade instrumental music participation rates between high- and low-socioeconomic status groups?	Socioeconomic Status	Instrumental Music Participation in 6 th Grade	Chi-Square Analysis
6	What is the difference in instrumental music retention rates from 6 th to 7 th grade between high- and low-socioeconomic groups?	Socioeconomic Status	Instrumental Music Retention Between 6 th and 7 th Grades	Chi-Square Analysis

Selection of Participants

The target population for this study was all middle school students enrolled in public middle schools in the state of Florida. For this study, 3,000 eighth-grade students from ten middle schools were selected from a large urban school district in central Florida. Purposive sampling was used to select ten middle schools with high performing instrumental music programs. An instrumental music program was considered high performing if its instrumental music programs received only “Superior” or “Excellent” ratings at large-group music performance assessments (MPA). For band programs, the Florida Bandmasters Association Concert Band MPA was used. For orchestra programs, the Florida Orchestra Association Orchestra MPA was used.

Instrumentation

FCAT 2.0

“The FCAT 2.0 measures student achievement of the Next Generation Sunshine State Standards (NGSSS), which replaced the Sunshine State Standards, in reading, mathematics, science and writing. FCAT 2.0 Reading and Mathematics were first administered in spring 2011, FCAT 2.0 Science was first administered in spring 2012 and FCAT 2.0 Writing was first administered in spring 2013. FCAT 2.0 Reading, Mathematics, Science and Writing are administered each spring, and the Grade 10 FCAT 2.0 Reading Retake is offered in the spring and fall each year” (FCAT 2.0, 2014, p. 1).

Scores are reported as scale scores, content area scores, and achievement levels. Scale scores were used for this study. “A developmental scale, also called a vertical

scale, allows the comparison of student academic progress over time in a particular subject by linking assessments at adjacent grades together. The FCAT 2.0 developmental scale represents the success students demonstrate over time with the Next Generation Sunshine State Standards (NGSSS) content assessed” (FCAT 2.0 Parent, 2014, p. 1).

Data Collection

This study was conducted using a quantitative methodology of data collection and analysis. The data used were student mathematics and reading test scores from the FCAT 2.0, student free or reduced lunch status, and student course schedule information. A request was made to the school district to provide data for each participant including: (a) free or reduced lunch status, (b) sixth-grade instrumental music participation, (c) seventh-grade instrumental music participation, (d) sixth grade FCAT 2.0 reading development scale score, (e) seventh grade FCAT 2.0 reading development scale score, (f) sixth grade FCAT 2.0 mathematics development scale score, and (g) seventh grade FCAT 2.0 mathematics development scale score. Course codes were provided to the school district to classify instrumental music participation; the codes provided were for M/J Band, M/J Orchestra, and M/J Instrumental Ensemble courses.

Data Analysis

Data Analysis for Research Questions 1-4

An analysis of variance (ANOVA) was conducted to examine the difference between the independent variable, instrumental music participation, and the dependent

variable, student growth on the FCAT 2.0, and to determine if the difference was statistically significant. Three categories were used for instrumental music participation: (a) two years of instrumental music participation, (b) one year of instrumental music participation, and (c) no instrumental music participation. Growth on the FCAT 2.0 was determined by calculating the difference between the sixth grade developmental scale score and the seventh grade developmental scale score.

Data Analysis for Research Question 5

The percentage of students participating in instrumental music in sixth grade was calculated for both the high-socioeconomic status (SES) students and the low-SES students.

Data Analysis for Research Question 6

The retention rate for each group was determined by dividing the number of students who participated in instrumental music in both sixth and seventh grade by the number of students who participated in instrumental music in sixth grade.

Summary

The method used to conduct this study was presented in this chapter. The purpose of the study and the research questions were restated. The selection of participants, instrumentation, data collection, and data analysis were also presented. Results of the data analysis are presented in Chapter 4.

CHAPTER 4 RESULTS

Introduction

This study intended to examine the differences in growth on the reading and mathematics FCAT 2.0 across varying levels of instrumental music participation by both low- and high-socioeconomic status (SES) middle school students, and to examine the relationship between instrumental music participation and socioeconomic status. This chapter presents the data for the six research questions, and is divided into three sections: (a) Descriptive Statistics, (b) Testing the Research Questions and Hypotheses, and (c) Summary.

Descriptive Statistics

The population for this study included all 8th grade students in the Orange County public school (OCPS) district. The sample ($N = 6725$) included eighth grade OCPS students who met the following conditions:

1. The student attended a middle school where both the band and orchestra (if applicable) participated in and earned only “Superior” and/or “Excellent” final ratings at large-group music performance assessments (MPA).
2. The student attended the same middle school in both 6th and 8th grades.
3. The student had FCAT 2.0 test scores for reading and mathematics in both 5th and 7th grades.

For this study, socioeconomic status was determined by the students' participation status in the free or reduced lunch program in the 6th grade; students who were eligible for free or reduced lunch were classified as low-socioeconomic status, and students who were not eligible were classified as high-socioeconomic status (see Table 3). 27.4% of students in the sample were of high-socioeconomic status ($n = 1844$), and 72.6% were of low-socioeconomic status ($n = 4881$). 61.2% of the students had 0 years of instrumental music participation ($n = 4114$), 16.8% had 1 year of instrumental music participation ($n = 1127$), and 22.1% had 2 years of instrumental music participation ($n = 1484$).

Table 3
Descriptive Statistics: Socioeconomic Status and Instrumental Music Participation

Status	Socioeconomic Status	
	Frequency	Percentage
High-SES	1844	27.4%
Low-SES	4881	72.6%
Years	Instrumental Music	
	Frequency	Percentage
0	4114	61.2%
1	1127	16.8%
2	1484	22.1%

Testing the Research Questions and Hypotheses

Research Question #1

What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students?

H01 – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students.

Math growth scores were calculated for each low-socioeconomic status student by subtracting the fifth grade FCAT 2.0 mathematics developmental scale score (DSS) from the seventh grade FCAT 2.0 mathematics DSS. Mean growth scores were then calculated for each of the instrumental music participation groups: 0 years, 1 year, and 2 years (see Table 4). Students with 0 years of instrumental music participation had the highest mean growth score ($M = 13.89$, $SD = 12.70$), followed by students with 2 years ($M = 12.96$, $SD = 11.21$), and then students with 1 year ($M = 12.91$, $SD = 11.21$). Students with 2 years of instrumental music participation had the highest average math score in 5th and 7th grades, followed by students with 1 year, and then students with 0 years.

Table 4
Instrumental Music Participation and Mathematics Growth by Low Socioeconomic Status Students

Years of Music	<i>N</i>	Math DSS Grade 5	Math DSS Grade 7	Math DSS Growth	<i>SD</i>
0	3098	218.13	232.02	13.89	12.70
1	822	223.65	236.56	12.91	11.21
2	961	231.38	244.34	12.96	11.21

Note. DSS = developmental scale score, *SD* = standard deviation

An *Analysis of Variance* was then performed to determine the significance of the results (see Table 5). *F* at 2 and 4878 degrees of freedom is 3.43, $F(2, 4878) = 3.43, p = .03$. There are less than five chances in one hundred that the difference in growth scores is due to mere chance, therefore; the null hypothesis can be rejected at the $p < .05$ level.

Table 5
ANOVA - Instrumental Music Participation and Mathematics Growth by Low Socioeconomic Status Students

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P</i>
Between	1017.42	2	508.71	3.43	.03
Within	723194.43	4878	148.26		
Total	724211.78	4880			

Note. *SS* = sum of squares; *df* = degrees of freedom; *MS* = mean square

A Tukey HSD post hoc test was then performed to determine whether or not the differences between any two groups were significant (see Table 6). Based on the results, there are no statistically significant differences between any of the groups.

Table 6
Tukey HSD Post-Hoc Test - Instrumental Music Participation and Mathematics Growth by Low Socioeconomic Status Students

Years of Music	Years of Music	<i>MD</i>	<i>SE</i>	<i>P</i>	95% CI
0	1	0.97	0.48	.10	[-0.15, 2.09]
	2	0.93	0.45	.10	[-0.13, 1.98]
1	0	-0.97	0.48	.10	[-2.09, 0.15]
	2	-0.05	0.58	1.00	[-1.41, 1.31]
2	0	-0.93	0.45	.10	[-1.98, 0.13]
	1	0.05	0.58	1.00	[-1.31, 1.41]

Note. *MD* = mean difference; *SE* = standard error; CI = confidence interval

Research Question #2

What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by low-socioeconomic status students?

H_{02} – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students.

Reading growth scores were calculated for each low-socioeconomic status student by subtracting the fifth grade FCAT 2.0 reading developmental scale score (DSS) from the seventh grade FCAT 2.0 reading DSS. Mean growth scores were then calculated for each of the instrumental music participation groups: 0 years, 1 year, and 2 years (see Table 7). Students with 0 years of instrumental music participation had the highest mean growth score ($M = 10.99$, $SD = 13.68$), followed by students with 2 years ($M = 10.98$, $SD = 13.31$), and then students with 1 year ($M = 10.18$, $SD = 13.21$). Students with 2 years of instrumental music participation had the highest average reading score in 5th and 7th grades, followed by students with 1 year, and then students with 0 years.

Table 7
Instrumental Music Participation and Reading Growth by Low Socioeconomic Status Students

Years of Music	<i>N</i>	Math DSS Grade 5	Math DSS Grade 7	Math DSS Growth	<i>SD</i>
0	3098	216.98	227.97	10.99	13.68
1	822	222.35	233.32	10.98	13.31
2	961	230.14	240.32	10.18	13.21

Note. DSS = developmental scale score, *SD* = standard deviation

An *Analysis of Variance* was then performed to determine the significance of results (see Table 8). *F* at 2 and 4878 degrees of freedom is 1.36, $F(2, 4878) = 1.36$, $p = .26$. There are greater than five chances in one hundred that the difference in growth

scores is due to mere chance, therefore; the null hypothesis cannot be rejected at the $p < .05$ level.

Table 8
ANOVA - Instrumental Music Participation and Reading Growth by Low Socioeconomic Status Students

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P</i>
Between	498.48	2	249.24	1.36	.26
Within	892434.27	4878	182.95		
Total	892932.75	4880			

Note. *SS* = sum of squares; *df* = degrees of freedom; *MS* = mean square

Research Question #3

What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students?

H01 – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students.

Math growth scores were calculated for each high-socioeconomic status student by subtracting the fifth grade FCAT 2.0 mathematics developmental scale score (DSS) from the seventh grade FCAT 2.0 mathematics DSS. Mean growth scores were then

calculated for each of the instrumental music participation groups: 0 years, 1 year, and 2 years (see Table 9). Students with 1 year of instrumental music participation had the highest mean growth score ($M = 14.80$, $SD = 10.83$), followed by students with 0 years ($M = 14.63$, $SD = 11.79$), and then students with 2 years ($M = 13.51$, $SD = 11.12$). Students with 2 years of instrumental music participation had the highest average FCAT 2.0 mathematics DSS in 5th and 7th grades, followed by students with 1 year, and then students with 0 years.

Table 9
Instrumental Music Participation and Reading Growth by High Socioeconomic Status Students

Years of Music	<i>N</i>	Math DSS Grade 5	Math DSS Grade 7	Math DSS Growth	<i>SD</i>
0	1016	231.28	245.91	14.63	11.79
1	305	232.79	247.59	14.80	10.83
2	523	239.69	253.20	13.51	11.12

Note. DSS = developmental scale score, *SD* = standard deviation

An *Analysis of Variance* was then performed to determine the significance of results (see Table 10). *F* at 2 and 1841 degrees of freedom is 1.94, $F(2, 1841) = 1.94$, $p = .15$. There are greater than five chances in one hundred that the difference in growth scores is due to mere chance, therefore; the null hypothesis cannot be rejected at the $p < .05$ level.

Table 10
ANOVA - Instrumental Music Participation and Math Growth by High Socioeconomic Status Students

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P</i>
Between	507.31	2	253.66	1.94	.15
Within	241262.49	1841	131.05		
Total	241769.81	1843			

Note. *SS* = sum of squares; *df* = degrees of freedom; *MS* = mean square

Research Question #4

What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students?

H01 – There is no significant difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students.

Reading growth scores were calculated for each high-socioeconomic status student by subtracting the fifth grade FCAT 2.0 reading developmental scale score (DSS) from the seventh grade FCAT 2.0 reading DSS. Mean growth scores were then calculated for each of the instrumental music participation groups: 0 years, 1 year, and 2 years (see Table 11). Students with 1 year of instrumental music participation had the highest mean growth score ($M = 12.71$, $SD = 13.35$), followed by students with 0 years ($M = 11.42$, $SD = 14.18$), and then students with 2 years ($M = 11.30$, $SD = 14.31$). Students with 2 years of instrumental music participation had the highest average reading score in 5th and 7th grades, followed by students with 1 year, and then students with 0 years.

Table 11
Instrumental Music Participation and Reading Growth by High Socioeconomic Status Students

Years of Music	<i>N</i>	Reading DSS Grade 5	Reading DSS Grade 7	Reading DSS Growth	<i>SD</i>
0	1016	229.79	241.21	11.42	14.18
1	305	232.03	244.74	12.71	13.35
2	523	238.21	249.51	11.30	14.31

Note. DSS = developmental scale score, *SD* = standard deviation

An *Analysis of Variance* was then performed to determine the significance of the results (see Table 12). *F* at 2 and 1841 degrees of freedom is 1.14, $F(2, 1841) = 1.14, p = .32$. There are greater than five chances in one hundred that the difference in growth scores is due to mere chance, therefore; the null hypothesis cannot be rejected at the $p < .05$ level.

Table 12
ANOVA - Instrumental Music Participation and Reading Growth by High Socioeconomic Status Students

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P</i>
Between	452.37	2	226.17	1.14	.32
Within	365321.46	1841	198.44		
Total	365773.83	1843			

Note. *SS* = sum of squares; *df* = degrees of freedom; *MS* = mean square

Research Question #5

What is the difference in 6th grade instrumental music participation rates between high- and low-socioeconomic status groups?

H₀₅ – There is no difference in 6th grade instrumental music participation rates between high- and low-socioeconomic status groups.

Instrumental music participation rates were calculated for each socioeconomic status group by dividing the number of students who were registered for instrumental music in 6th grade by the total number of students in the group (see Table 13). The high-socioeconomic status group ($n = 1844$) had a participation rate of 40.13%; the low-socioeconomic status group ($n = 4881$) had a participation rate of 30.73%. A Chi-Square goodness of fit test was performed to determine the significance of the results. χ^2 at 1 degree of freedom is 53.22; $\chi^2 (1, N = 6725) = 53.22, p = .000$. There are less than five chances in one hundred that the difference is due to mere chance, therefore; the null hypothesis can be rejected at the $p < .05$ level.

Table 13

Percentage of 6th Grade Students Taking Instrumental Music by Socioeconomic Status

	Instrumental Music Participation		Total	% Yes
	No	Yes		
High - SES	1104	740	1844	40.13%
Low - SES	3381	1500	4881	30.73%
Total	4485	2240	6725	33.31%

<i>Post-Hoc Test: Chi-Square</i>			
	Value	df	p
Pearson Chi-Square	53.22 ^a	1	.000

Note. *df* = degrees of freedom, *p* = significance

a. 0 cells have expected count less than 5. The minimum expected count is 614.21.

Research Question #6

What is the difference in instrumental music retention rates from 6th to 7th grade between high- and low-socioeconomic status groups?

H₀₆ – There is no difference in instrumental music retention rates from 6th to 7th grade between high- and low-socioeconomic status groups.

Instrumental music retention rates were calculated for each socioeconomic status group by dividing the number of students who were registered for instrumental music in both 6th grade and 7th grade by the total number of students who were registered for

instrumental music in 6th grade (see Table 14). The high-socioeconomic status group ($n = 740$) had a retention rate of 70.68%; the low-socioeconomic status group ($n = 1500$) had a retention rate of 64.07%. A Chi-Square goodness of fit test was performed to determine the significance of the results. χ^2 at 1 degree of freedom is 9.68; $\chi^2 (1, N = 2240) = 9.68, p = .002$. There are less than five chances in one hundred that the difference is due to mere chance, therefore; the null hypothesis can be rejected at the $p < .05$ level.

Table 14
Percentage of 6th Grade Instrumental Music Students Who Continued in 7th Grade, by Socioeconomic Status

	Instrumental Music Participation		Total	% Yes
	No	Yes		
High - SES	217	523	740	70.68%
Low - SES	539	961	1500	64.07%
Total	756	1484	2240	66.25%
<i>Post-Hoc Test: Chi-Square</i>				
	Value	<i>df</i>	<i>p</i>	
Pearson Chi-Square	9.68 ^a	1	.002	

Note. *df* = degrees of freedom, *p* = significance

a. 0 cells have expected count less than 5. The minimum expected count is 249.75.

Summary

The results of the data analysis for each research question were presented in this chapter, as well as the descriptive statistics of the sample. ANOVA for research question #1 showed that the overall differences in growth on the mathematics FCAT 2.0 between the low-socioeconomic (SES) status groups were significant. Post-hoc analysis, however, showed that differences between individual groups were not statistically significant. ANOVA showed that results for research questions #2 through #4 were not statistically significant. Results for research question #5 showed that high-SES students participated in instrumental music in 6th grade at a higher rate than their low-SES counterparts, and results from research question #6 showed that the high-SES group had a higher retention rate in instrumental music between 6th and 7th grades. Chi-square analysis showed that the results from research question #5 and #6 were statistically significant. A summary of the study, discussion, and recommendations will be presented in Chapter 5.

CHAPTER 5 DISCUSSION

Introduction

In the preceding chapter, the data from the study was presented and analyzed. Chapter 5 includes a summary of the study and a discussion of findings. The discussion of findings will relate the findings of this study to prior research presented in the literature review. The discussion of findings will be in two parts: (1) research questions #1-4, which include findings related to student growth on standardized tests, and (2) research questions #5-6, which include findings related to student participation in instrumental music. Implications for practice and recommendations for further research will then be presented.

Summary of the Study

The purpose of this study was to examine the differences in growth on the reading and mathematics FCAT 2.0 across varying levels of instrumental music participation by both low- and high-socioeconomic status (SES) middle school students, and to examine the differences in instrumental music participation between socioeconomic status groups. The FCAT 2.0 for mathematics and reading was the instrument used to determine growth in standardized test scores, and student-scheduling data was used to determine instrumental music participation.

The sample of the study included 6725 students from 29 schools. To be included in the study, students met three conditions: (1) the student attended a middle school

where both the band and orchestra (if applicable) participated in and earned only “Superior” and/or “Excellent” final ratings at large-group music performance assessments (MPA), (2) the student attended the same middle school in both 6th and 8th grades, and (3) the student had FCAT 2.0 test scores for reading and mathematics in both 5th and 7th grades. Data was provided for each student including FCAT 2.0 developmental scale scores, instrumental music participation data, and free and reduced lunch program participation data. The study included six quantitative research questions:

1. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students?

H_{01} – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students.

2. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by low-socioeconomic status students?

H_{02} – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by low-socioeconomic status students.

3. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students?

H₀₃ – There is no significant difference in scale scores between the 5th and the 7th grade FCAT 2.0 math test across varying levels of instrumental music participation by high-socioeconomic status students.

4. What is the difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students?

H₀₄ – There is no significant difference in growth in scale scores between the 5th and the 7th grade FCAT 2.0 reading test across varying levels of instrumental music participation by high-socioeconomic status students.

5. What is the difference in 6th grade instrumental music participation rates between high- and low-socioeconomic status groups?

H₀₅ – There is no difference in 6th grade instrumental music participation rates between high- and low-socioeconomic status groups.

6. What is the difference in instrumental music retention rates from 6th to 7th grade between high- and low-socioeconomic status groups?

H₀₆ – There is no difference in instrumental music retention rates from 6th to 7th grade between high- and low-socioeconomic status groups.

Research questions one through four were answered using data from the mathematics and reading FCAT 2.0 tests in the fifth and seventh grades. Growth was determined by subtracting the fifth grade developmental scale score (DSS) from the seventh grade DSS. Students were grouped by the number of years in which they participated in instrumental music, either zero, one, or two years. An ANOVA was performed for each question to compare the mean growth scores between groups.

Research questions five and six were answered using student schedule data provided by the school district, and students were grouped by socioeconomic status (SES). Research question five compared the participation rate in instrumental music between SES groups. Research question six compared the instrumental music retention rates between SES groups; retention rates were determined by using the seventh grade instrumental music participation rates of only the students who participated in instrumental music during sixth grade. Chi-square analysis was used to determine the statistical significance of the results from research questions five and six.

Discussion of the Findings

Research Questions #1-4

For research questions one through four, the mean growth scores on the FCAT 2.0 for all groups were very similar. An ANOVA for research questions two, three, and four, which included growth on the reading FCAT 2.0 by low-SES students and both the reading and mathematics 2.0 by high SES-students, showed the differences to not be

statistically significant. An ANOVA for research question one, which examined growth on the mathematics FCAT 2.0 by low-SES students, did show the results to be significant. Post-hoc analysis, however, revealed no statistically significant differences between the individual groups. While statistically significant differences between growth scores were not found, it is important to note that the instrumental music students did score higher, on average, than their non-instrumental music counterparts on both tests for each SES group. Furthermore, students with two years of instrumental music scored better than students with one year of instrumental music on both tests for each SES group.

These findings suggest that middle school instrumental music students do outperform their non-instrumental music peers on standardized tests. The lack of statistically significant differences in growth, however, suggests the high-achieving students may be more likely to participate in instrumental music. These findings are consistent with previous studies which have also shown that music students perform better on standardized tests than their non-music peers (Kelly, 2012; Kinney, 2008; Vaughn & Winner, 2000). Kinney (2008) found that music students also scored higher than non-music students before music study even began, and suggested that the higher-achieving students may have been more attracted to music instruction. Miksa (2007) also investigated music participation, socioeconomic status, and growth of standardized scores, and found no relationship between music participation and growth in mathematics achievement, as well as a small relationship with growth in reading achievement.

Research Questions #5-6

Results from research question five showed that high-SES students had a higher instrumental music participation rate than their low-SES counterparts. Results from research question six showed that high-SES students had a higher instrumental music retention rate between sixth and seventh grade. Chi-square analysis showed the results from both research questions to be statistically significant.

The results of these research questions show that high-SES students are more likely than low-SES students to participate in instrumental music, and to continue in instrumental music after sixth grade. These findings are consistent with the findings of previous studies, which also found that low-SES students were less likely to participate in instrumental music (Abril & Gault, 2008; Elpus & Abril, 2011; Gillespie & Hamann, 1998). Elpus and Abril (2011) suggested that the costs associated with instrumental music create a barrier preventing participation by low-SES students. Another possible reason is that low-SES schools may have fewer instrumental music course options available (Abril & Gault, 2008; Smith, 1997). Also, while all schools in this study offered instrumental music courses to students, research has shown the music programs at high-SES schools have better resources, equipment, and facilities (Costa-Giomi & Chappell, 2007). Finally, Kinney (2010) also found that high-SES students had a higher retention rate in instrumental music than their low-SES peers. Kinney suggested that even though middle schools may have provided instruments or supplies to help low-SES students join band programs, the cumulative costs associated with band might have prevented these students from continuing.

Implications for Practice

Although this study did not show significant differences in growth on the FCAT 2.0 between instrumental music participation groups, the findings can be used to guide school leaders in planning and supervising an instrumental music program. The following recommendations are presented based on the findings of this study:

1. Schools should make instrumental music courses available to all students, and showcase the instrumental music program in the community. The results of this study, as well as previous research, suggest that high-achieving students are attracted to instrumental music courses. With the increasing number of options for parents, including charter schools, private schools, home-schooling, and virtual school, instrumental music could be a useful tool in attracting students.
2. School districts should explore ways to enhance funding for music programs in Title I schools. These schools may already have increased funding, but funds should be specifically earmarked for music use. Students at these schools may not be able to afford the instruments or supplies associated with instrumental music; making the supplies available at the schools may help increase participation.
3. School district leaders should review the facilities and staffing for music at schools to ensure all students have access to a quality instrumental music education. Research has shown that lower-SES schools have fewer instrumental music offerings, as well as lower-quality facilities than higher-SES schools. This

could improve participation at these schools, as well as make these schools a more attractive choice for parents and students.

Recommendations for Further Research

The following recommendations for future research are offered based on the findings of this study:

1. This study could be expanded to include all music courses, or could look at each type of music course separately (e.g., orchestra). The non-instrumental music group in this study included general and vocal music students. Separating these groups could possibly produce different results.
2. Future studies may investigate music participation and growth on standardized tests, specifically for students performing in lowest quartile. These students often do not have access to music classes because of mandated remedial classes, and the ability for these students to study music may depend on the school's schedule structure.
3. Future research could examine the reasons that low-socioeconomic status students do not participate in instrumental music, or reasons they do not continue after the first year of instrumental music. This could include both quantitative and qualitative methods.
4. Further research may investigate the relationship between the teacher qualifications (e.g., experience, education, etc.) and student participation in the instrumental music program, as well as the relationship between the

socioeconomic status of the school and the qualifications of the instrumental music teacher.

Conclusions

1. Results of this study showed that students in instrumental music courses did not have statistically significant differences in growth on their mathematics or reading FCAT 2.0. These students, however, had higher developmental scale scores in both 6th and 8th grade than their non-instrumental music peers. This compliments previous literature that suggests that the higher-scoring students are more attracted to the instrumental music courses. It is important for music education supporters to consider this when advocating for music in schools. Much attention is given to studies that show that music students achieve higher than non-music students. While this may be true, the relationship may not be causal.
2. Results of this study also showed that low-SES students participate in instrumental music at a lower rate than their high-SES peers. The goal of this study was to examine the difference in participation rates, but not the possible causes. This difference in participation could possibly be due in part to differences in availability, access, or equity based on socioeconomic status. Higher-SES schools have been shown to have better facilities (Costa-Giomi & Chappell, 2007) and more music course offerings (Abril & Gault, 2008; Smith, 1997).

3. Socioeconomic status has also been shown to be a predictor of academic achievement; low-SES students achieve at lower rates than other students (Caldas & Bankston, 1997; Nichols, 2003; Herbers et al., 2012). Students who do not meet certain score requirements may have to take mandatory remedial classes, rather than enrolling in instrumental music classes. This could be a reason for lower instrumental music participation by low-SES students.
4. Another possible reason for lower participation rates by low-SES students is the cost of participation. Elpus and Abril (2011) suggested that the financial cost of participation might create a barrier to access by these students. Many schools offer loaner instruments and uniforms to their students to offset the financial barrier, but low-SES students drop out of instrumental music at a higher rate than high-SES students. The often-unanticipated cumulative cost of supplies might be a reason for this difference. Time requirements outside of school could be another factor; attendance at evening and weekend events may be difficult for parents who are working evenings or multiple jobs.

APPENDIX A
IRB APPROVAL



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

From : UCF Institutional Review Board #1
FWA00000351, IRB00001138

To : Michael Antmann

Date : August 12, 2014

Dear Researcher:

On 8/12/2014 the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review: Not Human Research Determination
Project Title: SOCIOECONOMIC STATUS, INSTRUMENTAL
MUSIC PARTICIPATION, AND MIDDLE SCHOOL
STUDENT ACHIEVEMENT
Investigator: Michael Antmann
IRB ID: SBE-14-10480
Funding Agency:
Grant Title:
Research ID: N/A

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 08/12/2014 10:16:46 AM EDT

A handwritten signature in cursive script that reads "Joanne Muratori".

IRB Coordinator

APPENDIX B
SCHOOL DISTRICT APPROVAL



Orange County Public Schools

445 West Amelia Street • Orlando, FL 32801-1129 • Phone: 407.317.3200 • www.ocps.net

Notice of Approval

Approval Date: October 27, 2014

Project Title: Socioeconomic Status, Instrumental Music Participation, and Middle School Student Achievement

Principal Investigator: Michael Antmann

Project Director/Advisor: Dr. Kenneth Murray

Sponsor Agency/Institutional Affiliation: University of Central Florida

Thank you for your request to conduct research in Orange County Public Schools.

If your study requires communication with school-based personnel or students, please call our office to discuss a communication strategy. We typically reach out to principals first, then ask that you contact only the principals agreeing to partner with you. This notice does not obligate administrators, teachers, students, or families of students to participate in your study; participation is entirely voluntary.

You are responsible for notifying this office prior to implementing any changes to the currently approved protocol. If any problems or unexpected adverse reactions occur as a result of this study, you must notify this office immediately.

For as long as the study is active, an annual renewal request letter is required. This letter should include any changes to your protocol and an estimated completion date. If necessary, the first letter should be dated on or before October 26, 2015.

Should you have questions or need assistance, please contact Mrs. Mary Ann White at (407) 317-3201 or mary.white@ocps.net.

Best wishes for continued success,

Digitally signed by Tavy Chen
DN: cn=Tavy Chen, o=Orange County Public
Schools, ou=Accountability and Research,
email=tavy.chen@ocps.net, c=US
Date: 2014.10.27 09:48:07 -0500

Tavy Chen, Ed.D.
Director, Accountability and Research
Orange County Public Schools

Cc: Brandon McKelvey, Senior Director, brandon.mckelvey@ocps.net

The Orange County School Board is an equal opportunity agency.

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