

MARCHING INTO THE FUTURE: THE RELATIONSHIP BETWEEN INSTRUMENTAL
MUSIC CLASS PARTICIPATION AND ADVANCED PLACEMENT ENGLISH
LANGUAGE AND COMPOSITION TEST RESULTS

by

Robert “Alston” Pettigrew

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

Over the decades, there have been countless claims that participation in a music class will influence the cognitive abilities of students. Yet many districts elect to eliminate these programs in times of budgetary crisis. During a period when our national education system is focused on test scores, educational reformists should focus on the implementation of courses that yield academic success. This study was designed to determine if there is a significant relationship between instrumental music class participation and Advanced Placement English Language and Composition exam scores. Data for the group comparison consisted of 529 samples from a large county school district in the upstate of South Carolina. Participants include Advanced Placement English Language and Composition course students and both instrumental music participants and non-instrumental music participants from the Parkwood County School District. The data gained from this study revealed that there is no significant relationship between Advanced Placement English Language and Composition exam scores and participation in instrumental music classes. This data was gathered through the use of three independent *t*-tests that sought to find a relationship between Advanced Placement English Language and Composition exam scores, instrumental music course participation, and the gender of the participants. Suggestions for further research are included.

Keywords: Instrumental, Music, Advanced Placement, Exam Scores, Gender

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Dedication

I would like to dedicate this dissertation to my Wife, Allison, and our two children, Anna Claire and Caroline. Without their love and support none of this would be possible. I would also like to dedicate this dissertation to my Lord and Savior, Jesus Christ. Without His love and guidance, I would not have been able to complete this journey.

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List of Abbreviations

Advanced Placement (AP)

Every Student Succeeds Act (ESSA)

End-of-Course (EOC)

Grade Point Average (GPA)

National Association for Music Education (NAFME)

Scholastic Aptitude Test (SAT)

Socioeconomic Status (SES)

CHAPTER ONE: INTRODUCTION

Overview

Instrumental music classes, consisting of classes such as band, strings, and guitar, have played a major role in the development of individuals for generations (Kelstrom, 1998). In addition to the positive social benefits that these types of courses bring, research on the cognitive advantages of music courses has been conducted for over a century. In a similar fashion, Advanced Placement courses provide students with curricular advantages outside of the realm of normal secondary education classes (Santoli, 2002). By seeking to identify a significant relationship in the effect of music education programs on Advanced Placement courses, educators can develop a curricular reform that encourages the success of the students through the active collaboration of varying courses. Throughout this chapter, the researcher will provide additional background information regarding the importance of music education in regard to its effect on testing. Additionally, the researcher will provide access to both the problem and purpose of this research study. Upon the conclusion of this chapter, the reader should be able to attain insight about why instrumental music courses are important for the academic success of today's student.

Background

In a study including more than 7,000 student test scores, Thornton (2013) found that the standardized test scores of students involved in music classes were significantly higher than non-music students. While it is no secret that instrumental music classes provide benefits to their participants far beyond those found in the "typical" classroom, the proliferation of high-stakes testing has created a situation where administrators must choose between courses that are designed to focus on these tests and "traditional" electives (West, 2012). An example of this can

be found in Baker's article on the effects of high-stakes testing on the arts. In his study, Baker (2012) identified that students are being encouraged to remove themselves from arts-related courses to devote more time to English and math. According to Elpus (2013), music classes have been linked to high achievement ratings in many forms of standardized exams.

Furthermore, we see that students who participate in these types of music courses have a higher quality of school life than other students (P. Eerola & T. Eerola, 2014). Equipped with these studies, supporters of music education are provided evidence that the effect that instrumental music classes have on students is overwhelmingly positive.

Advanced Placement (AP) courses offer high school students the opportunity to gain access to the rigor associated with collegiate coursework while still in high school. Enrollment in AP courses has increased tremendously since their inception. Specifically, the past three decades have yielded an increase in Advanced Placement course examinations of over 500 percent (Judson & Hobson, 2015). As a result of the increase in demand for these courses, guidance departments must modify course schedules to ensure that each student is provided an equal chance to enroll in as many Advanced Placement courses as desired. This modification to the schedule often requires students to withdraw from instrumental music classes to take specific Advanced Placement courses that take up a similar timeslot. Some of the most musically talented students withdraw from music courses to preserve their academic standing because Advanced Placement courses carry a heavier grade point average (GPA) weight.

Historical Overview

Instrumental music has played a valuable role in the education of children for decades. Just like AP courses, instrumental music courses provide students with opportunities that they cannot gain through any other outlet (Colwell & Hewitt, 2015). One of these opportunities is the

ability to increase their cognitive processing. According to Schellenberg (2005), participation in music-related activities has the possibility to increase the individual's cognitive abilities. When the positive cognitive benefits of music are paired with the individual's course of study, the students are able to achieve higher levels of intellectual development (Baker, 2013). As a result, the students are more likely to absorb the content in a manner that encourages long-term benefits (White-Schwoch, Carr, Anderson, Strait, & Kraus, 2013).

Highlighted as one of Gardner's (2006) multiple intelligences, music plays a vital role in the overall development of students. Just as students learn through vision, hearing or touching, many children are academically influenced by music. For example, the Mozart effect has been linked to a temporary increase in special abilities after participants listen to music composed by Mozart (Thompson, Schellenberg, & Husain, 2001). As educators begin to understand the positive aspects of music programs, reformers can start to modify the curriculum in a way that allows all participants to benefit.

Over the years, many educators have started to understand the benefits of incorporating these programs into their schools. Observing the benefits that music inclusion brought to the core curriculum, Horace Mann, circa 19th century, was among the first to advocate for the inclusion of music classes in public schools (Madden, Orenstein, Oulanov, Novitskaya, Bazan, Ostrowski & Ahn, 2014). As a result of advocates like Mann, educators are now witnessing the benefits of music inclusion. For example, because of the relationship between music and math, music students are more likely to identify connections between both disciplines (Jones & Pearson, 2013).

Social Context

Instruction in music has been a part of a well-rounded education for over two millennia (Mark & Gary, 2007). The effect of music on society can be seen throughout history. For example, social themes from both the Classical and the Renaissance eras can be identified through characteristics found in the music of the times (Burkholder, Grout, & Palisca, 2014). In addition to music's identifiable characteristics throughout history, music education has become a part of militaries, churches, and political alliances. This is because music provides participants with the ability to evoke emotion directed toward a specific ideal (Eerola & Vuoskoski, 2013). By channeling this energy, participants can shape our society in ways that we may not have ever imagined. An example of this phenomenon can be found in the Nationalist music utilized throughout the world war eras. Countries demanded composers focus their efforts on building national pride to help encourage support for their respective conflicts (Burkholder et al., 2014).

Even though music education has provided society with access to an art that has been practiced for thousands of years, many programs are being removed from schools (Burrack, Payne, Bazan, & Hellman, 2014). This practice of eliminating music programs will soon affect all the organizations that the nation holds sacred. Military bands will no longer play in celebration, churches will become silent, and the sound of revolution will become empty chants. As a result of this elimination, society will become affected by a loss of a feature that once defined it. This sentiment is expressed in a quote often attributed to Winston Churchill when asked about cutting the arts to help the war: "Then what are we fighting for?"

Theoretical Background

While music education can easily apply to a variety of educational theories, Gardner's (2006) theory of multiple intelligences and Maslow's theory of human motivation provide a fundamental background for researching the relationship instrumental music education courses

have with academic success. Just as Gardner (2006) sought to explain how individuals display intellectual strengths in different areas and Maslow provided educational researchers with evidence that individuals will be most successful when placed in an environment that provides them with basic needs, the typical instrumental music class can provide students with a type of education that will supplement the whole curriculum. Using these theories, the researcher will highlight how instrumental music classes can increase the student's cognitive abilities through exploring a new intelligence, while also discussing how the unique environment of an instrumental music class provides all students with a stability not found in other classrooms.

Gardner's theory of multiple intelligences. The idea that music provides support for other disciplines has become more accepted overtime. Commonly associated with Howard Gardner's theory of multiple intelligences, an intelligence in music provides support that music classes can be used as a conduit for success in other areas of academia (Gardner, 2006). Just as Gardner isolated many other areas of intelligence in his study, he believed that certain people are "wired" to understand the processes that are characteristics of music more efficiently than the ones evident in other areas. As a result, Gardner believed that, for an educator to be most effective, the teacher should utilize these strengths in all areas of academics. In his article, Schellenberg (2011) discussed how the practice of music increases the participant's intelligence quotient. As a result, students are able to process a variety of tasks in a more efficient manner than their non-musical counterparts. In using this theory, educators can apply Schellenberg's research to assist in increasing the success rate of various exams. For example, students who are involved in extracurricular activities, such as music, will display a higher level of academic achievement than their counterparts (Bradley & Conway, 2016).

Maslow's theory of human motivation. In addition to the belief that music provides students with various academic advantages, participation in music programs has also been linked to providing students with the stability factors within Maslow's theory of human motivation (Maslow, 1968). Starting with physiological factors and reaching through self-actualization, music classes provide each student with the motivation necessary to achieve success in his or her life. This is accomplished through the interactions with peers and educators that are not found in other parts of the curriculum because of the amount of time that is spent within instrumental music programs. By pairing music classes with classes associated with high levels of stress, educators can provide the students with a level of homeostasis needed to be successful (Shaunessy-Dedrick, Suldo, Roth, & Fefer, 2015). McCorkle (2014) expounded upon this idea by providing evidence that students involved in music classes are more efficient in advanced classes because of the positive social aspects that are found within a music education program.

Problem Statement

While the study of music's effect on academic achievement is no new phenomenon, the link between high school instrumental music students and their achievement in Advanced Placement (AP) tests is a factor that has yet to be explored. The problem is that no data exists that proves, or disproves, that participation in music education has a direct relationship with the students' performance in AP English Language and Composition courses. With the importance of grade point averages (GPAs) and rigor of schedule being highlighted by college admission boards, students are striving to increase their chances to get into the college of their choice (Alwahibee, 2015). By identifying a relationship between participation in instrumental music classes and AP course exam success, educators can use the results to increase the support for programs in both realms of education.

Students start to realize the importance of their GPA when they begin applying for colleges. Accordingly, Advanced Placement course participation becomes imperative for students jockeying for class rankings because these courses offer a chance to receive a higher GPA than college prep or honors classes (Klopfenstein & Thomas, 2009). As each student progresses to higher grade levels, they continue the process of taking higher tiered courses with the hope of maintaining a level of academic achievement that allows them to continue towards their educational goals (Klopfenstein & Lively, 2016).

In addition to increasing their academic ranking, students also seek to increase their amount of extracurricular activities. This is to set themselves apart from others during the admissions process. During the selection process, colleges like to see that their applicants are able to maintain high levels of academic achievement while being active in other activities. One of the most popular options students have is a music class. As these students enroll in these types of courses they become privy to increased cognitive abilities and academic achievement (Baker, 2013).

By approaching music and other core courses in a collaborative manner, educators can create a system that yields successful results (Y. Goddard, R. Goddard, & Tschannen-Moran, 2007). Unfortunately, many educational reformists are unaware of the positive aspects of instrumental music programs (Jorgensen, 2003). This creates a situation where students seeking higher GPAs are often encouraged to withdraw from music programs because of the level of “rigor.” Ultimately, educational reformers fail to recognize the positive benefits that instrumental music classes bring to the student, while placing a higher focus on boosting the numbers of colligate level courses. This practice leads to instrumental music programs being cut from schools because of the increased focus on high-stakes testing and its associated programs.

As a result, many students who would benefit from these programs are denied access to supplemental programs that would improve their academic success (Smith, 2003). The researcher is attempting to fill the gap in the literature that explains how instrumental music classes positively affect the student's achievement in the Advanced Placement courses that are being pushed in our modern education system. The problem is that there is evidence that instrumental music classes have a significant relationship with the student's success in mathematics and science, but it fails to address how instrumental music classes affect English language arts courses (R. Guillot & I. Guillot, 2015; Jones & Pearson, 2013).

Purpose Statement

The purpose of this quantitative causal-comparative study is to determine if participation in an instrumental music class has a positive impact on achieving high results in an Advanced Placement (AP) exam. As there is scant data regarding this specific subject, it is important for this study to be completed in order to justify the practice of advocating for instrumental music classes.

The testing data were gathered from the Parkwood County School District. Located near the major city of Jonesboro, SC, the Parkwood County School District consists of nine high schools that serve a population that is diverse in nature. This population was selected because of the wide spread of demographics that are represented throughout the high schools. Found within the population, consisting of sixteen- through eighteen-year-old students, the independent variable (IV) is identified as enrollment on instrumental music programs. The dependent variable (DV) is the Advanced Placement English Language and Composition exam score.

Significance of the Study

Identifying a significant relationship between instrumental music classes and Advanced Placement (AP) English Language and Composition exam performance will provide educators with access to information that has yet to be presented. Should a connection be apparent, instrumental music program advocates will possess empirical data that can assist them in pushing forward the agenda for continued music education. Therefore, the significance of this study was built around providing support for music education in our schools during a time when many programs are being eliminated. If the study yields results that support the incorporation of instrumental music classes in the curriculum, a collaborative approach to education (one that pairs instrumental music classes with other courses) may be viable in the future

As new programs such as the Every Student Succeeds Act (ESSA) become law, administrators are seeing a push for public schools to endorse the arts as a core subject (Bradley, 2016). Unfortunately, the incorporation of these programs, while beneficial to districts who have funding, do not protect all forms of arts education. As one of the costlier programs, instrumental music classes have been targeted for elimination for budgetary reasons (Major, 2013). This practice leads to many students suffering because of the lack of the musical outlet they need to succeed. By identifying data that supports the need for instrumental music classes, instrumental music advocates will be armed with data-driven research that contains evidence supporting the need for these programs (Shorner-Johnson, 2013).

As a result of the application of this causal-comparative study, the results can play a role in the reformation of instrumental music curricula throughout the country. This will be accomplished through the provided empirical evidence that illustrates that participation in instrumental music courses affect the student's performance in AP English Language and

Composition. In a social context, this study will encourage the collaboration between various areas of academia. As a result of the collaboration, a synthesized approach to education, one that encourages an arts integrated curriculum, may be adopted nationally. With organizations such as the National Association for Music Education (NAFME) dedicating entire divisions to the support of music education, this study, featuring a diverse population, will add to the body of knowledge by exploring the idea that instrumental music classes can have a positive effect on other areas of the curriculum.

Research Question

RQ1: Is there a statistically significant difference in the Advanced Placement English Language and Composition exam scores among high school students who are involved in instrumental music classes and those who are not involved in instrumental music classes?

Definitions

1. *Advanced placement (AP)* - Courses that provide high school students with the opportunity to participate in classes that assist them in their preparation for college course work (Moore & Slate, 2008).
2. *Arts education* - A variety of courses whose accreditation is supported by the Council of Arts Accreditation Association. These courses include music, art and design, theater, and dance (Tutt, 2014).
3. *Arts integration* - The practice of incorporating the art disciplines within other core classes with the hope of providing a bridge between the curriculums (Lackey, 2016).
4. *Cerebral hemispheres* - The division of the cerebrum into two separate halves, with each half controlling a vital portion of the brain's computing ability (Hiscock & Kinsbourne, 1987).

5. *Cognitive development* - The level at which the mind processes information depending on the student's age, maturity, or other influences (Cowan, 2014)
6. *Every Student Succeeds Act (ESSA)* - The authorization for arts classes to be incorporated into the broad curriculum to achieve a well-rounded education (Everything ESSA - National Association for Music Education, 2016).
7. *Instrumental music* - A sector of music education in which the students are required to utilize instruments to produce the sounds necessary for completing their musical tasks (Simon, 2014).
8. *Instrumentation* - The type of musical “set up” in the instrumental music classroom when referring specifically to the type of instruments each student is playing (Mitchell, Rudolph, Whitman, & Taylor, 1982).
9. *Private lessons* - An educational setting where instrumental students can receive additional assistance with their instruments from an instrumental specialist in a private arrangement (Rife, Shnek, Lauby, & Lapidus, 2001).
10. *Socioeconomic status (SES)* - Socioeconomic status refers to two aspects of one’s life, resources and status, where income and education represent the resources (Fujishiro, Xu, & Gong, 2010).
11. *Spatial intelligence* - The ability for an individual to think about objects in three dimensions in order to complete tasks relating to said objects (Byrne & Johnson-Laird, 1989).
12. *The College Board* - The governing institution that prepares students for a variety of collegiate level entry and placement exams (College Board - About Us, 2014).

CHAPTER TWO: LITERATURE REVIEW

Overview

Throughout the following chapter, the researcher will provide information regarding the background of the study. The first portion of this review will consist of a discussion of three theories that have led to the framework of this study. The first theory discussed is Gardner's (2006) theory of multiple intelligences, the second theory is that of pragmatism, and the third, and final, theory is Piaget's theory of constructivism. After the framework for the study has been provided, the researcher will discuss the literature that supports the need for additional research on music's effect on Advanced Placement English Language and Composition exam scores. The related literature being discussed will highlight the following areas: brain-based research, music's effect on core curriculum subjects, music's effect outside the classroom, and music and standardized testing.

Theoretical Framework

Since the dawn of mankind, music has dominated our society in a manner that brings growth and connectivity between people of all walks of life. This magnetism has been linked to theories of nature constantly seeking internal harmonies on all levels (Proust, 2009). While some accept this theory, others are drawn to music because of the "hard" science behind its benefits. For example, research provides evidence that an education in music can lead to increased cognitive abilities for students (Schellenberg, 2005). In addition to this fact, neuroscientists have attributed music education to the increased activity and additional development of synapses within the brain (A. Bennet & D. Bennet, 2008). While many theories have been developed to explain this phenomenon, three of them provide researchers with the ability to understand how

music positively affects the academic abilities of participating students: Gardner's theory of multiple intelligences, Dewey's theory of pragmatism, and Piaget's theory of constructivism.

Gardner's Theory of Multiple Intelligences

Since the dawn of standardized testing, educators have seen how test results provide an inaccurate snapshot of the intelligence level of the student being tested. This is due to the focus of standardized testing being designed to assess students of one particular type of intelligence. A common analogy of this practice is judging a fish on its ability to climb a tree. Gardner's theory of multiple intelligences is in direct contrast with this practice. Instead of implying that all students have one type of intelligence that can be generally assessed, Gardner's approach states that individuals could have up to eight different types of intelligence: linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalistic (Helding, 2009). This theory allows for the understanding that students process information differently depending on the way they are "wired." As part of his theory, Gardner believed that educators should utilize these intelligences to help students achieve in all areas of the curriculum. For example, he encouraged teachers to modify their lessons to incorporate activities that would reach children of each type of intelligence (Gardner, 1983). This practice would provide each student with an equal opportunity to grasp the concept being taught.

Using Gardner's theory of multiple intelligences, neuroscientists have been able to isolate areas of the brain that are attributed to specific intelligences. While each intelligence triggers brain activity within either hemisphere of the brain, those who possess an intelligence in music display activity within both hemispheres (Tramo, 2001). This dual-hemisphere activity has led researchers to dive deeper into the study of the "mind on music." While observing brain activity, researchers identified that those who possess musical intelligence have additional synapses along

the corpus callosum (Smith, 2003). As a result of this increased brain activity, musical intelligence has been linked to higher levels of cognitive abilities when students are compared to those who do not possess musical intelligence (Schellenberg, 2004).

Pragmatism

Music is something that cannot be truly described by words. One must experience the tug and pull on the emotions prior to understanding the meaning of each piece that is being learned and performed. As a result of this need to experience music to understand it, Dewey's theory of pragmatism provides a framework for understanding how music effects the students who participate in it. Relying on the aesthetic experience, Dewey believed that actively involving your students in the lesson would provide them with the ability to fully grasp the concept being taught (Tan, 2016). For example, students need to be active participants in learning from the point of topic introduction to the point of assessment. This occurs most often within instrumental music classes when the class is introduced to a new piece of music. The teacher takes the "raw material" and provides the students with the ability to create music from the introduction of the new piece to its performance. This development of the "raw material" occurs through hundreds of hours of hands-on work, in which the teacher is providing a "sandbox" for the children to experience the music as they learn performance components.

By focusing on the experience, music educators are able to utilize pragmatism to actively engage students in the learning process. This "learning-by-doing" process, that is a fundamental idea in Dewey's philosophy, allows all students a chance to process and synthesize new information on a higher level (Schmidt, 2010). In addition to the benefits that this process has in the student's music class, the results of this learning theory become evident in all aspects of the student's schooling. Students are able to take the experiences they have gained in their music

classes and apply them to other areas of study. This practice can be witnessed when one sees a student develop a jingle, or tune, when attempting to memorize definitions or required documentation.

Constructivism

Just like math or English, success in music education requires a foundation that is built on years of practice and study. This type of approach, known as constructivism, has provided music educators with a pedagogical framework that encourages students to build on previous knowledge by using the process of scaffolding (Jonassen, 1999). Scaffolding provides the student with the ability to learn through the teacher providing enough support at the initial stages of understanding to provide a base for all future knowledge (McComas, 2014). This practice continues as the student continues to move toward a more complex understanding of the subject. Developed by Piaget, the theory of constructivism is based around the belief that the brain synthesizes information by connecting new ideas with previously held beliefs or facts (Powell & Kalina, 2009). Constructivism encourages teachers to require students to constantly utilize information that has been generated in prior lessons. As this process continues, students can develop a greater understanding through the various connections that have been made through the process (Blackwell, 2016). In his 2015 report, Shively discussed how music education has shifted toward a more constructivist approach. Calling for a more progressive approach to music education, he provided evidence that the experiences music has to offer have the most effect when presented in a constructivist approach. In addition to the belief that this theory provides a more efficient way to learn new information, the constructivist approach is designed to provide educators with the ability to address education from an interdisciplinary perspective (Kaufman & Brooks, 1996).

Constructivists' ability to integrate. Outside of the music classroom, a constructivist approach to education provides educators with a perfect conduit to implement music integration into their classrooms. This practice allows the classroom teacher to utilize music exercises, such as songs, dances, and rhythms, when they are introducing various topics to their students. In a study conducted by Scripp and Gilbert (2016), researchers identified that students who were provided access to classes that incorporated music integration showed significant improvement over their peers who did not receive the same treatment. These results are evident because the utilizing of music components in this capacity encourages the students to understand the topics in a more efficient manner (2016). Utilizing the results of this research study, music education activists are provided with valuable information that shows all students can benefit from music.

The practice of integrating music into the classroom is a topic that has gained interest with the incorporation of S.T.E.A.M. programs throughout the country. S.T.E.A.M., standing for Science, Technology, Engineering, Arts, and Mathematics, is a program that is designed to provide all students with the ability to receive arts instruction in conjunction with their daily curriculum (Herro & Quigley, 2016). In some areas, this type of program has allowed students to have access to a quality arts education while programs have been cut for financial reasons. For example, a school district in Everett, Massachusetts, was able to implement this program through a grant provided by the United States Department of Education. After three years of implementation, this school district has witnessed a drastic improvement in academic achievement to the point that they have been awarded Level One status (the highest possible) by the State Department of Education (E. Mackin, R. Mackin, Obremski, & McKie, 2017).

Related Literature

The amount of literature that covers the effects of music education on student performance and development continues to grow. This is due to the advocacy community within the spectrum of music education having published all of their findings on a national scale. In addition to having such a strong network of advocacy, an education in music has been proven to provide benefits to the students that far outweigh the benefits of similar areas of study. Whether it is brain-based research or studies on the Mozart effect, the positive effects of music education are present in every student that comes into our school system's music classes. Accordingly, educators should realize how beneficial these programs are to their students and seek to incorporate music into all areas of academic study. By utilizing this practice, even students who have not had the opportunity to participate in their band or strings class can reap the cognitive, emotional, and social benefits that an education in music offers (Fautley, 2017).

Brain-Based Research

An area that has received a lot of attention over the past few decades is the effect of music on the brain. Referred to as "brain-based research," researchers focus their studies on how participation in, or exposure to, music can affect the development of the brain. As a result of this focus, neuroscientists have been able to identify various characteristics that have been positively influenced by participation in music (Collins, 2014). As research continues to become more readily available, music advocates are able to provide additional support for the implementation of these programs in our schools.

It is understood that music provides a unique opportunity for students to thrive regardless of background. In a research study conducted by Sarkar and Biswas (2015), researchers identified that music plays a positive role in the development of the brain through three key

factors. The first factor that Sarkar and Biswas (2015) explored is that music lessons require the student to utilize both hemispheres of the brain. When students are tasked with reading rhythm, rhyme, and other musical components, they must tap into both hemispheres of the brain to properly perform. This rapid and continuous use of the “whole” brain is similar to a workout for a body builder. It requires the neurons and synapse to strengthen for future use.

The second area of the brain that is positively influenced by music lessons includes the sectors that focus on emotion and memory. In a study conducted by Hudziak, Albaugh, Karama, Spottswood, Crehan, Evans, and Botteron (2014), the research group identified that participation in music training provided the students with an increased cortical thickness within their brain. The researchers reported that this increased thickness has a direct correlation with the development and maturity of emotions found within the children. As an area that is constantly explored in music education, the development of these emotional behaviors usually develop from exposure to a variety of music that is designed to explore different moods. For example, students may be exposed to a song that has the intention of emulating a bright, new day while being encouraged to understand the “happy” nature of the piece. Another example of this practice would include exposing the students to a minor song and asking why it may come across as sad or depressing. As students become more familiar with the variety of emotions, they are able to increase the pallet from which they can draw.

The third area of the brain that is affected by participating in music activities is the area that focuses on creating connections of learning. In a similar fashion to activities found within a physical education class, music courses for young students are encouraged to allow students to experience music through movement and physical participation (Wiens, 2015). As students are provided opportunities to make connections to the music through movement, their brains become

stimulated and start to develop connections to learning (Sarkar & Biswas, 2015). In a study released by Wiens (2015) regarding music, movement, and the brain, the researcher revealed that encouraging movement in the study of music encourages brain development through rhythm, synchronization, and motor entrainment. Rhythm is said to have a positive effect on the development of the brain because of its relationship with the dorsal premotor cortex. This area, which allows us to associate sound with movement, also plays a major role in the development of our cognitive and motoric areas of the brain (Krumhansl, 2000). In a similar fashion to rhythm, synchronization requires the brain to utilize temporal fidelity to perform in sync with a given tempo. This increased stimulation leads to the maturity of the cerebellum (Brown & Parsons, 2008). As a result of this development, students are able to perform motor and rhythmic activities more efficiently. Lastly, entrainment allows the brain to utilize auditory and motor systems in a combined fashion. As these systems work in unison, the prefrontal and cerebellar activations become more actively engaged (Thaut, 2005). As a result of engaging these sectors of the brain, the individual begins to create an overlapping neural network that serves their processing abilities.

The brain is most volatile from a child's birth through adolescent years. It is during these periods that students begin to show growth in the various sectors. Just as gold wire works as a conductor to provide a more efficient use of energy when compared to other viable materials, music classes provide students with an "enzyme-like" component that positively influences brain development. In a 2014 study conducted by Moreno, Lee, Janus, and Bialystok, researchers identified that participants (aged 4–6 years old) who participated in music training exhibited positive hemispheric changes to their brains. The areas most affected by the changes involved the sectors of the brain that allow students to process and apply information.

Creating connections. As one of the most heavily debated subjects in music education advocacy, the effect of music on the development of the student's brain is something that is undeniable (Putkinen, Tervaniemi, Saarikivi, Vent, & Houtilainen, 2014). When a student is in the process of playing instrumental music, they are required to complete multiple tasks at the same time. For example, a student who is reading a passage of music for any wind instrument must complete the following before making any musical sound: process the notes that are being played, read dynamic markings, account for any stylistic variance, apply the correct combination of fingerings to the instrument, take an adequate breath to sustain the full passage, set the embouchure to the mouthpiece, apply the air to the horn in a controlled fashion, and articulate with the correct tongue position. While this may seem like a painstaking process, these events all occur in a matter of milliseconds and are repeated as each new note is arrived upon. As the student completes this practice, the mind is processing information on both hemispheres (Critchley & Henson, 2014). As a result of this occurrence, the brain begins to develop stronger connections across the longitudinal fissure. These stronger connections arise from the development of new synapses and dendrites across both hemispheres (Altenmüller & Schlaug, 2013). As the process continues, the brain repeats the process, allowing for the development of more synapses. The long-term benefits of this process include an increase in brain plasticity. The increase in plasticity allows the brain to modify itself in a fashion that works to prevent degeneration or other various forms of disease (Schlaug, 2015).

In addition to the increased creation of synapses, increased exposure to participation in music has been linked to the more efficient development of white matter throughout the brain (Giacosa, Karpati, Foster, Penhune, & Hyde, 2016). Similar to synapses, white matter assists in the efficiency of brain function. For example, when comparing a dancer's white matter to a

musician's, brain researchers have identified that a dancer's white matter may consist of wider fibers, an increased number of crossing fibers, and axons that have a higher diameter; a musician's white matter, however, may consist of smaller, more focused developments within the effector-specific pathways (2016). These focused developments lead to the brain utilizing more efficient pathways to complete the required task at hand (Zamm, Schalug, Eagleman, & Loui, 2013).

Brain health. In addition to the development of dendrites and synapses, music education has been associated with providing additional health benefits, such as the strengthening of the brain. In a study conducted by Hudziak et al. (2014), researchers revealed that participating in a music class leads to cortical thickness maturation. In other words, the participation in a music class leads to the development of a healthier brain. In addition to this type of maturation, the participation in music education provides students with access to a program that has been linked to the improvement of both short- and long-term memory. In a study conducted by Anita Collins (2014), researchers identified that the plasticity of the brain is positively influenced by participation in music education. With the positive influence on the plasticity of the brain, participants in music education will see the benefits of a younger, and healthier, brain long after their non-musical peers.

Cognitive advantages. In building on the evidence that participation in music classes leads to the development of stronger brain function, many researchers have discovered evidence that participation in music leads to advancement in the cognitive abilities of students (Costa-Giomi, 2014). Over the years, music education researchers have advocated that music helps us think in a more efficient manner. However, it was not until the development of medical devices, such as magnetic resonance imaging (MRI) and positron emission tomography (PET) scans, that

researchers and scientists were able to actually observe the effect of music on the brain (Dana Foundation, 2013). By using these tools, researchers can now isolate specific areas of the brain where music has the most effect. For example, these scans have provided evidence that music plays a major role in the development of spatial reasoning (Giannouli, Lytras, & Syrmos, 2012).

Spatial reasoning. Defined in a study conducted by VanderPlas and Hofmann (2016), spatial reasoning refers to the ability of the individual to process multiple dimensional objects and draw conclusions about how these objects may relate to another. In other words, spatial reasoning is the process in which an individual processes how objects relate to each other in a given field. In a report released by Bruce, Davis, Sinclair, McGavrey, Hallowell, Drefs, Francis, Hawes, Moss, Mulligan, Okamoto, Whiteley, and Woolcott (2016), researchers identified that a student's ability to process information through spatial reasoning plays a major role in the student's full curriculum. Specifically, spatial reasoning abilities affect the student's ability to problem-solve, utilize instructional materials such as graphs or maps, and manipulate objects. Additional studies conducted by Cheng and Mix (2014) revealed that students must have a strong understanding of spatial reasoning to be successful in the area of mathematics. This is because many areas of mathematics, especially geometry, require students to process information three-dimensionally.

When working with students it is important to understand how we, as educators, can assist in the development of spatial reasoning skills. In a study conducted by Bell, McIntyre, and Hadley (2016), researchers revealed that exposing students to classical music yields a positive relationship to increased spatial reasoning abilities. Within the study, researchers had participants listen to classical music at increasing periods of time. As the time period increased to provide longer exposure time to classical music, the participants displayed an increased ability

to process spatial reasoning tasks. Additionally, participants exposed to classical music displayed a more positive mood, less anxiety, and a lower stress level when compared to those who did not receive the same treatment.

Just as listening to music has a positive impact on the development of spatial reasoning, participating in a music class that focuses on playing and creating music can have a positive effect on the development of spatial reasoning abilities among students. In a study conducted by Tezer, Meryem, and Hursen (2016), researchers identified that students between the ages of eight and eleven who were currently participating in an instrumental music class displayed an increased ability to perform spatial memory task compared to their peers who were not in a similar class. Observers also noticed during this study that the students who had exposure to instrumental music classes were able to utilize non-conventional methods to solve the problems that were presented to them.

Abstract processes. In addition to increased spatial reasoning, participation in music has been linked to the ability to understand and link abstract thought(s). In the study conducted by Bell et al. (2016), researchers identified that participants who had experience in music education were able to complete tasks that required an unorthodox approach in a more efficient manner than their non-music peers. Researchers believe that these results were evident because of the link between music education and linguistics. As participants learn how to process music, their brain begins to create connections that are similar to those formed when learning a new language. By requiring both hemispheres of the brain to work together, the student's ability to process information is accomplished at a higher level (Perlovsky, 2015).

The Mozart effect. In a similar fashion to cognitive advantages, many studies have provided evidence that simply listening to music will increase brain function. The most popular

version of this study is known as the Mozart effect. A term coined in the seminal work of Rauscher, Shaw, and Ky (1993), the Mozart effect describes how students who were exposed to the music of Mozart scored higher on IQ spatial reasoning tasks than their peers that were not exposed to the same treatment. Within this study, the researchers required the subject to either listen to 10 minutes of a Mozart piece, listen to 10 minutes of a relaxation tape, or sit in silence for 10 minutes. At the conclusion of the treatment, the subjects completed a spatial reasoning task. Using the results from this study, the researchers utilized a repeated measures analysis of variance (ANOVA) to reveal that subjects performed better on the reasoning tasks after listening to the Mozart tape when compared to the relaxation tape or nothing.

What is most interesting about the Mozart effect is that it seems to only apply to the music of Mozart. In a study conducted by Verrusio, Ettoree, Vicenzini, Vanacore, Cacciafesta, and Mecarelli (2015), researchers revealed that when compared to the music of other “classical” music composers, the music of Mozart, as a treatment, yields more positive results in the area of neurophysiological activity. Specifically, this study compared the music of Beethoven’s “Für Elise” to Mozart’s “K. 448.” At the conclusion of the study, researchers revealed that exposure to Mozart’s music yielded a more alpha band EEG pattern when compared to exposure to Beethoven. The EEG pattern with increased alpha band levels is linked to the participant’s increased ability to display memory, cognition, and open mindedness in regard to problem solving (2015).

Music’s Effect on Core Curriculum Subjects

Music’s effect on core curriculum classes is one of the most heavily debated subjects, and researchers have dedicated decades to preparing theories, providing empirical evidence, and offering plans for reformation in support of music education for all students. As a result of the

substantial relationship with the concepts and ideas addressed in music classes, data gathered from studies on math and science lead the way when advocates are trying to justify music classes to administrators (Major, 2013).

Music and mathematics. As a subject that is based around patterns and symbols assigned to numerical values, it is no wonder that music education would provide students with an additional benefit in mathematics. For example, when a student is performing a piece of music they are constantly working with fractions as they approach new rhythmic combinations. Each note duration requires the musician to divide the measure into different amounts. By completing this process time and time again, students begin to develop what is known as high levels of numeracy achievement (Cranmore & Tunks, 2015). Numeracy achievement refers to the student's ability to utilize simple numerical concepts in various situations.

In addition to the fact that playing rhythms requires the students to understand how fractions are prevalent in their music, mathematics classes are benefitted by music courses because the latter encourage students to think in a creative manner. For example, improvising music requires students to apply combinations of rhythms that most would not deem "traditional." By approaching problems in a creative manner, the students are able to approach mathematical concepts without a preconceived notion as to how to address the problem (Hoffmann, Ivcevic, Zamora, Bazhydai, & Brackett 2016). As a result, students who have experience of a music class are more likely to provide quality approaches to problems that may seem unconventional to their non-musical peers.

Neuroscientists believe that music plays such an important role in the area of mathematics because of the relationship between music and math within the brain. In a study conducted by Szirony, Burgin, & Pearson (2007), researchers identified that music and

mathematics are affected by hemispheric laterality. A term that is used heavily in the area of brain science, hemispheric laterality refers to how an individual's brain function may show increased neural function in one side of the brain (Nagel, Herting, Maxwell, Bruno, & Flair 2013). Due to the fact that music requires a dual hemispheric approach—because of the logical and artistic components of the subject—increased neural functions can be identified within both hemispheres of the music student's brain (Szirony et al., 2007). One of the targeted areas for brain research in the study of music on the brain is the area which is associated with mathematical functions. Due to the commonality of tasks required in both subjects, the location neural activity associated with mathematical functions is also stimulated by music-related tasks (Fattorini & Gallagher, 2015).

Music and science. In a similar fashion to the effect of music on mathematics, the study of how music is a quality supplement for science classes became more prevalent during the 20th century. In a review conducted by R. Guillot and I. Guillot (2015), the researchers highlighted evidence that music plays a major role in providing support to scientific breakthroughs by offering a deeper insight to the problem. This deeper insight is associated with the fact that experience in music offers its participants an increased cognitive ability. In some ways, scientific discovery has been associated with composing a new song. In an article written by Stephane Detournay (2013), the writer describes how both music and science rely on the “A-ha” factor. In other words, both music composition and scientific breakthroughs are linked through spontaneous creation. In music, this process can be witnessed through the act of improvisation, where in science this may be observed through the development of a new chemical composition.

Another similarity that is observed between music's effect on math and science is the study of musical intervals on scientific processes. As Pythagoras witnessed the similarities

between the intervals in musical harmony and the intervals between celestial bodies, modern day researchers have identified more correlations between music and science that are being expounded upon every day (A. Cabanac, Perlovsky, Claude, B. Cabanac, & M. Cabanac, 2013). Naturally, the field of acoustics is prevalent within the study of music in relation to science. Through the study of acoustics, scientists have discovered a set of ratios that affect all aspects of music (Rogers, 2016).

Music and language arts. When one thinks of music's effect on specific areas of academia, the idea that this belief extends to language arts is not normally discussed. However, there are many factors in music education that have been identified as assisting in the development of language skills across all levels of students. In his seminal work, Leon Lewis (1981) identified that participation in music provides the students with the ability to utilize phonological patterns in music to assist in their pronunciation of new vocabulary terms. This practice encourages language arts teachers to utilize music-based mnemonic devices while exposing their students to new words or phrases. In a study conducted by Cogo-Moreira, Brandao de Avila, Ploubidis, and Mari (2013), it was found that students who participated in music-related activities scored six times higher on a word reading accuracy test. Researchers identified that participation in music classes provided the students with the ability to identify words faster than their peers because of the cognitive advantages music classes offer.

As we all know, our understanding of language is a product of the environment which constantly surrounds us. As English as a Second Language students sometimes have trouble understanding slang terms used by their peers, educators must realize that these idioms affect our students' ability to perform in class (Namvar & Ibrahim, 2014). This case holds true in the area of music education. In a research study conducted by Kraus, Hornickel, Strait, Slater and

Thompson (2014), researchers identified that students that come from a disadvantaged background suffer from environments that can be considered impoverished auditory domiciles. According to Kraus et al. (2014), these living arrangements are contributing factors to academic failure and dropout rates. To combat this phenomenon, these researchers adopted a model called the Harmony Project and implemented it with students from these impoverished environments. After two years of implementation, students who participated in the Harmony Project displayed increased reading ability, stronger speech, and improved health and wellness. As a result of these findings, the students who received the treatment in the study displayed an increase in academic achievement and class attendance when compared to their peers.

Music meeting individual needs. A concept that all educators have become familiar with is Maslow's Hierarchy of Needs. Starting at the bottom of the hierarchy (providing physiological needs) and moving to the top (reaching a level of self-actualization), music classes provide students with the ability to reach and receive each need. Specific examples of this can be found in the music classroom's ability to provide students with a safe location to call "home" when so many students do not have such a secure living environment. This practice can be found in almost every high school band room throughout the school year. Students of these programs, on average, spend upwards of sixty hours a week in the band room (Abril, 2013). This is time spent practicing, getting ready for a trip, or just socializing before events. In addition to providing a sense of homeostasis, high school band programs also provide other basic needs such as food and water. While all this is normally accomplished while waiting for a game or competition, many programs provide additional physiological needs for students outside of the normal operating hours of the band (Cumberledge, 2016).

In addition to providing physiological needs and safety, instrumental music programs can provide each student with a sense of belonging that cannot be found in any other classroom (Dagaz, 2012). For someone who has never been a part of an instrumental band program, it is hard to understand how the group dynamic works. Starting as early as seventh grade, students are immersed into a microcosm that, by nature, requires students to develop relationships with each other. Forged over working on drill through the hot summer and refined through the frigid temperatures of winter marching parades, students of instrumental music programs are placed in a unique situation where they work with each other year-round. This close proximity and desire to reach common goals creates a situation where the students develop a sense of comradery that lasts throughout their school career.

As the goal of every music class from kindergarten through college, self-actualization represents the ultimate goal of what every music teacher desires for their students. By creating a learning environment in which the student can display their talents on a regular basis, instrumental music classes provide students with ready access to the top of Maslow's Hierarchy of Needs (Piragasam, Majid, & Jelas, 2013). While it is true that each student will have different levels of potential, by participating in an instrumental music class, the student is placed in the ideal situation where they can realize their desires, or goals, and strive to reach them.

Music and quality of life. The quality of one's life is something that is unmeasurable by anyone except the individual in question. This is because each individual holds specific ideas on what makes life good. Accordingly, each individual seeks their own path toward happiness. However, participation in a music class has been linked with two factors that are associated with the high quality of a student's life: social life and academic achievement. In a study conducted by P. Eerola and T. Eerola (2013), researchers identified that students who participated in an

extended music education possessed a higher level of social satisfaction when compared to the control group. In other words, students who participated in a music class were more pleased with the quality of their social interactions than their peers who were not included in the program. As a result of the higher quality of school life, students in the extended music group, on average, scored higher than the non-extended music group. Researchers have identified that the cause of this phenomenon is linked with the level of confidence that is associated with a positive outlook on the quality of the individual's school life (P. Eerola & T. Eerola, 2013).

One factor that contributes to this phenomenon is the environment that is associated with instrumental music programs. As instrumental music classes require students to spend a large portion of time together, when compared to other courses, the students develop a social network that follows them well after they have graduated from the program (Mizener, 2015). These relationships are unique to these programs because of the required rehearsals, trips, and events that are not typical in other types of classes. In many cases, students are provided with an environment that encourages the development of several positive social characteristics that can be linked to lowered levels of depression and anxiety later in life (Hars, Hermann, Gold, Rizzoli, & Trombetti, 2014). As a result, the positive influence that instrumental music classes have on its students encourages success in all areas of "school life." This can be achieved through the support system found within these programs.

Music and social development. The social advantages of participating in an instrumental music ensemble are cultivated through increased interaction between the student and their peer group (Jellison, Brown, & Draper, 2015). This increased interaction occurs because the students have to spend a considerable amount of time together during classes, small group rehearsals, large ensemble work, and performances. In many cases, it is not uncommon

for a high school marching band student to spend approximately 30 hours in contact with their peers during a typical week (Dagaz, 2012). As a result of the increased exposure to time with their peers, students learn how to interact with each other in multiple social environments. These students are taught how to deal with large groups, situations of conflict, and small groups all within the same organization. As a result, many students who are involved in similar programs are prepared to work in organizations that require the social finesse that the students acquired within their instrumental music program (Matthews, 2017).

Music and focus. It is no secret that maintaining the attention of the modern-day student has become an issue in all areas of academia. Teachers are forced to combat the students' lack of discipline, which was not an issue found with the populations of previous generations (R. Allen, D. Allen, Karl, & White, 2015). For example, students today come to school equipped with video games, movies, music, and the internet at their fingertips. As a result of these factors, students are being diagnosed with attention deficit hyperactivity disorder (ADHD) at a rate that has increased substantially over the last decade. In a study conducted by Visser, Danielson, Bitsko, Holdbrook, Kogan, Ghandour, Perou, and Blumberg (2014), researchers identified that from 2003 through 2011 there was an increase in ADHD diagnoses, bringing the total to approximately 2 million spanning the ages of four to seventeen.

To combat this, many child therapists encourage participation in music-related therapy to help students who have been diagnosed with ADHD. In a study conducted by Rickson (2006), the researcher reported that students who participate in some form of music display a significant reduction in the range of ADHD symptoms. As a result of this study, it is apparent that students who participate in instrumental music programs are more likely to be able to control their ADHD tendencies than students from the general population.

Music classes and attendance. In their 2003 study “A Home away from Home,” Adderley, Kennedy, and Berz provided evidence that high school music programs give students access to a unique environment that evokes a desire from all students to participate on a daily basis. According to Adderley et al. (2003), students found within high school music programs have a desire to participate in all aspects of the ensemble. This desire to be a member of the organization requires all students to be active participants in all available parts of the program. For example, a typical high school band program may consist of a concert band, marching band, jazz band, winter guard, small ensembles, and a variety of other groups. As a result, students are required to attend school to have the ability to participate in the music ensemble activities. This factor was found evident within a study conducted by The National Association for Music Education (NAfME) in 2007. Reported in the music educator’s publication “Teaching Music,” NAfME (“Music makes the grade,” 2007) provided evidence that schools featuring active music programs have significantly higher attendance rates than those without music programs. Specifically, schools that have music programs enjoy a 93.3% attendance rate, while those that do not have active music programs have an attendance rate of 84.9%. This desire to “be a part of the group” drives many students to attend on a more regular basis than a student who does not have a contributing factor to do so.

In addition to the desire to participate, school music programs provide students with the stability that they may be lacking at home. In a study conducted by Dagaz (2012), the researcher highlighted the reasons that many students find a “home” within the band program. Specifically, she discussed how the level of trust, acceptance, and self-confidence found within band programs provide students with stability that they may not have at home. As our students are

being forced to care for themselves at a more alarming rate, having a stable organization in their lives provides them with the ability to plant roots in something that they can call home.

Music's Effect on Low-Socioeconomic Status Students

In a report issued by the National Endowment for the Arts, researchers identified that students coming from lower-socioeconomic status (SES) greatly benefit from music courses due to the structure and stability that it provides their lives (Catterall, Dumais, & Hampden-Thompson, 2012). This factor was highlighted in the research study conducted by Jennifer Doyle. According to Doyle, students from urban areas are being provided with a more well-rounded education through the incorporation of music education into the curriculum (Doyle, 2014). In the schools observed, music education courses have impacted the culture in a way that makes all aspects of the curriculum relevant to the students. This positive influence encourages the students to see all subjects as important to their overall development (Kinney, 2008).

In building on the topic that students benefit from participation in music education, researchers have now provided evidence that participation in an instrumental music class can help predict the participating student's academic achievement. In a study conducted by Young, Cordes, and Winner (2013), researchers revealed that students who were identified as having a lower socioeconomic status and who were provided access to a musical instrument exhibited increased academic achievement when compared to their non-instrumental music participant peers. In a similar study conducted by Dosman (2017), the researcher revealed that the parents of these lower socioeconomic status students believe that music classes in schools provide students with the ability to participate in a "full" curriculum. In the case of Dosman (2017), parents of students attending Celia Cruz High School, in New York City, stated that they believe

that participating in music classes is a factor that encourages their children to become more active participants in all areas of their academic career.

End-of-Course Exams

As part of the course requirements for high school students, end-of-course exams have become a benchmark for students as they seek to advance to the next level of study. In addition to the student requirements, end-of-course exams provide empirical data for administrators that reflect the teacher's ability to educate their students on a year-to-year basis. This data is a contributing factor in teacher retention and contract renewal regardless of district or school prestige. Accordingly, both teachers and students have a desire to perform well in these examinations. As a result, both parties are constantly seeking ways to supplement their learning and teaching in a way that encourages higher success levels in the exams.

One approach that has been explored is to have a testing environment that features pleasant music playing while the students are completing their exams. In a study conducted by Perlovsky, A. Cabanac, Bonniot-Cabanac, and M. Cabanac (2013), researchers identified that students exposed to pleasant music performed significantly higher than their peers who were exposed to unpleasant music or no music. By using music in the testing environment, teachers are able to provide their students with the ability to block "cognitive dissonance" in a way that creates a more positive testing experience (2013). Similar to the Mozart effect, this practice of active exposure calms the students down to reduce the effects of anxiety, stress, and discomfort (Linnemann, Ditzan, Strahler, Doerr, & Nater, 2015).

Math end-of-course (EOC) exams. Due to the use of patterns and fractions, many researchers have sought to identify a relationship between participation in music and success in math courses. In a study conducted by Catherine Olson (2008), the researcher was able to

identify that participation in music classes has the ability to affect the success level of students in the area of mathematics. Students who were involved in exemplary music classes achieved significantly higher marks on subject-based testing than their non-musical peers; however, students who were in a deficient choral class actually scored lower than their non-musical peers (2008). Accordingly, instrumental music courses provide the students with the ability to supplement their math classes on a higher level than their choral counterparts.

Science end-of-course (EOC) exams. In a similar fashion to music's effect on standardized math testing, research has shown that music plays a beneficial role in the success of students within the discipline of science. In a study conducted by McNealy (2013), the researcher identified that utilizing music in the science classroom led to a greater understanding of the topics being addressed within the lessons. In one particular instance, the researcher highlighted the use of songs as a mnemonic device to help memorize both simple and complex facts. The utilization of this device was encouraged while the students completed required examinations (2013).

Foreign language exams. As most music advocates would tell you, an education in music is an education in a foreign language. As a universal language, music encourages the use of Romanic languages (e.g., French, Spanish, and Italian), as well as German. This encouragement is found through the use of each of these languages in various pieces of music. In many cases, the composer may utilize multiple languages in order to ensure that the performer understands the approach they desire for their piece. Common examples of these terms include *adagio* (Italian: in a slow tempo), *amour* (French: love), *schwach* (German: weak), and *un poco* (Spanish: a little). In addition to the utilization of these languages, music itself has been identified as a language. Oliver Urbain's "Music and Conflict Transformation: Harmonies and

Dissonances in Geopolitics,” asserts that music is identified as a language because of its ability to provide insight on topics through expression and approach (2007, p. 26-27). Music has also been identified as a foreign language because in order to read it, one must understand the rules and semantics that accompany the reading of a piece of music (Ludden, 2015).

As a result of this close relationship to other languages, music education components have the ability to supplement the instruction provided in other foreign language courses (Larrouy-Maestri, Leybaert, & Kolinsky, 2013). This practice can be seen regularly as foreign language instructors attempt to utilize song lyrics in their classes. Kao and Oxford (2014) discuss how teachers have found success in utilizing a multistep process developed around hip-hop song lyrics. To introduce new topics, these instructors choose an enjoyable song that the class can relate to, describe the lyrics in familiar terms, and dive deeper by incorporating the culture being studied (Kao & Oxford, 2014).

In addition to the utilization of lyrics to help students understand the language and culture they are studying, many foreign language instructors have found that having the students sing songs in the foreign language being studied plays a major role in helping the students to pronounce vowels and phrases. In a study by Good, Russo, and Sullivan (2014), researchers discovered that students learning English through incorporating singing greatly outperformed their peers who approached the song as an oral poem. With the increased ability to recall words and phrases at a higher level, these students were able to perform at a higher level in their exams.

Music and Additional Standardized Testing

With the creation of No Child Left Behind (NCLB) came the increased focus on utilizing standardized tests to assess the achievement levels of students (Duckworth, Quinn, & Tsukayama, 2012). As government funding became attached to these test results, educational

administrators and reformers began seeking programs that positively supplement the subjects being assessed. As music is one of the few subjects that possesses connections with each topic being addressed with the realm of standardized testing, the effects of music education on standardized testing has become one of the most debated subjects in education (West, 2012).

The focus on the use of standardized tests in our schools has increased dramatically since the mid-nineties. With each new academic year comes a new concept or requirement that students must demonstrate an understanding of in order to meet the required benchmark. As a subject that fosters the development and health of the brain, music is a commonly discussed educational supplement that can be used to benefit students from all backgrounds. The benefits of an education in music are often overlooked when high-stakes testing requires so much focus on the part of the administration. Administrators are asked to divert time and resources away from instrumental music classes in hopes of raising the test scores of their students. In a study conducted by Richard Baker (2012), the researcher identified that students who studied music scored significantly higher ($p < .001$) than students who have no music education. This study also revealed that music students outperform their non-music peers regardless of socioeconomic status.

Scholastic Aptitude Test (SAT). When it comes to standardized tests, the SAT is recognized as one of the standard examples. As a requirement for many colleges and universities across the country, the SAT is designed to provide prospective colleges with a snapshot of their student applicant's academic ability. In a study conducted by Kenneth Elpus (2013), the researcher suggests that students involved in music-related courses will have a 15.3-point gain in SAT scores for each year they were involved in said program. In addition to providing information regarding the advantages music courses bring to the SAT, the researcher provided

information illustrating that 36.38% of all high school graduates have accrued at least one credit in music.

Intelligence Quotient (IQ). As one of the premier advocates of music education, Schellenberg (2011) has provided music educators with access to many studies that highlight the benefits of music education. In his 2011 study on how music lessons affect emotional intelligence and IQ, Schellenberg provided insight on how an education in music can provide students with an opportunity to expand both their verbal and nonverbal IQ. To complete his study, Schellenberg utilized a group of 106 undergraduates (52 women, 54 men) who either completed a minimum of eight years of private music lessons or no music lessons. Schellenberg (2011) discovered that the IQ scores of music students were higher than the United States norms for the [IQ] composite score ($M = 104$, $SD = 10$), $t(105) = 4.64$, $p < .001$, and for the nonverbal subtest ($M = 108$, $SD = 10$), $t(105) = 7.89$, $p < .001$. In an additional study conducted by Kaviani, Mirbaha, Pournaseh, and Sagan (2014), researchers identified that preschool students who participated in music lessons displayed a significant increase in IQ when compared to their peers who did not have the same treatment. The study by Kaviani et al. also revealed that preschool students who participated in a music class displayed increased brain function while the researchers were conducting neuroimaging observations.

Empirical evidence. Additional empirical evidence that supports the idea that music classes provide students with academic advantages can be found in an article published by the National Association for Music Education. In the article, researcher Linda Thornton (2013) provides evidence that students who are involved in music courses outperform non-music students on state assessment scores. In her research, Thornton observed the state assessment scores of music and non-music students for the fifth, eighth, and 11th grades. Within her study,

Thornton discovered that the music students' scores were significantly higher than the scores of the non-music students ($p < 0.000001$) (2013). In a similar study conducted by Sala and Gobet (2017), in which the researcher tested students ages three through sixteen who had displayed no learning disabilities, researchers identified that that adolescent-age students who participate in music-related activities displayed increased intelligence ($d = 0.35$) and memory-related outcomes ($d = 0.34$) when compared to their non-music peers.

Advantage of extracurricular nature. As many instrumental music classes feature events that require after-school participation, many administrators hold the view that music classes prevent students from using their time in an academically productive manner. In the study conducted by Linda Thornton (2013), the researcher provided evidence that students who are involved in music education courses will outperform non-music students in both math and reading assessments. In addition to providing valuable information regarding the results of state standardized tests, the researcher also highlights the fact that students involved in this study were active participants in the extracurricular activities associated with instrumental music classes. In an additional study conducted by Marchetti, Wilson, and Dunham (2016), researchers revealed that participants in school-sponsored extracurricular activities were more likely to perform better academically than students who did not participate in a similar program. As a result of these studies, we see additional support for the implementation of music as a supplement for preparing for standardized tests.

In addition to providing an academic advantage, instrumental music classes teach students to manage their time in a way that displays a more efficient time management when compared to their peers (Hatfield, Halvari, & Lemyre, 2016). In a similar fashion to athletes, student musicians must be able to complete all their necessary duties (e.g., chores, homework,

work, and social responsibilities) while maintaining passing grades and high attendance. As a result of having to balance such a heavy schedule, student musicians grasp the understanding of scheduling at a quicker pace than their peers. This increased ability to manage their time contributes to the level of success that these students have in other areas of education (Degé, Wehrum, Stark, & Schwarzer 2014).

Advanced Placement Courses

Following World War II, educators began to develop a pilot program that was designed to shorten the gap between secondary education programs and higher education universities and colleges (College Board – About Us, 2014). These programs were designed to institute college-level standards within the confines of secondary schools. Accordingly, should a student pass these courses, which contained the same level of standards as a comparable college course, the student would be awarded a college course credit. When the program was launched in 1952, the secondary students were provided the opportunity to participate in 11 courses that offered the same level of rigor that could be found at the collegiate level (2014). Currently, the College Board, an organization that oversees the development and examinations of Advanced Placement Programs, offers students 39 college-level courses to choose from while in high school (College Board, 2017). In addition to offering students the unique opportunity to gain a college credit while enrolled in secondary school, most schools provide students with the incentive to be awarded a higher weighted grade point average for the Advanced Placement course they are involved in (Klopfenstein & Lively, 2016). This practice encourages the participation in Advanced Placement classes because students do not have to pass the Advanced Placement exam to receive a boost in their grade point average.

Who takes Advanced Placement classes? In a study completed by Scafidi, Clark, and Swinton (2015), researchers identified that African American, Hispanic, and Asian students, who are considered below the poverty line, were more likely to participate in Advanced Placement courses when compared to Caucasian students who possess the same socioeconomic status. In addition to this finding, researchers presented evidence that stated females are more likely to participate in Advanced Placement than their male counterparts. Within this sample of the school population, students who participate in Advanced Placement courses are generally those who can be predicted to perform well at the collegiate level. Shaw, Marini, and Mattern (2013) identified that, out of the total school population, students who participated in Advanced Placement courses were more likely to perform at a higher level in college than their counterparts. This performance revelation is supported with student demographics and school history taken into consideration (Chajewski et al., 2011; Mattern et al., 2009; Scott, Tolson , & Lee, 2010).

Outside of the realm of demographics and academic achievement, a variety of other factors influence students' enrollment on Advanced Placement programs. In a study conducted by Philip Veliz and Sohaila Shakib (2014), researchers reference that students who participate in school-sponsored extracurricular activities are more likely to enroll on Advanced Placement courses than their counterparts. In addition to this finding, the researchers revealed that more females who participate in extracurricular activities enroll in Advanced Placement courses than their male counterparts.

Advanced Placement exams. In a similar fashion to high school end-of-course exams, each Advanced Placement course is accompanied by an examination upon the conclusion of the course. The difference between these courses, however, is that a college credit is not likely to be

granted to those students who score poorly in this exam (College Board-About AP Scores, 2017). Unlike a typical exam, the Advanced Placement Exam is scored using a weighted combination of scores from multiple sections of the exam. This weighted total is then reported on a five-point scale: 5 = *extremely well qualified*, 4 = *well qualified*, 3 = *qualified*, 2 = *possibly qualified*, and 1 = *no recommendation* (2017). From the point of receiving the student's Advanced Placement exam score, each college may implement their own policy on awarding a course credit to the applicant (College Board- AP Credit Policy Search, 2017). In most cases, students who score a three, four, or five on their Advanced Placement exam are awarded a credit for the course they are attempting to exempt in college (College Board-About AP Scores, 2017).

Summary

The benefits of music education are undeniable. Participants in these types of programs exhibit increased cognitive ability, increased outlook on their social life, and a greater appreciation for the arts in society. While studies regarding the positive effects of music education on academic achievement are mainly focused on the achievement of students in math and science courses, the fact remains that the benefits are prevalent in all areas of the whole curriculum. In this study, the researcher will identify a relationship between instrumental music classes and Advanced Placement English Language and Composition exam scores. This study will offer insight on the ability for music education courses to have an effect on courses within the realm of English language arts. Should a positive relationship exist between instrumental music classes and English courses, music education advocates will be provided with additional support for the implementation of music classes in the curriculum for all students. This will be accomplished through synthesizing the data found within this study to the already prevalent data, which focus on music's effect on math and science courses.

CHAPTER THREE: METHODS

Overview

In this chapter, the researcher will provide information regarding the methodology used throughout the research. Beginning with design, evidence is presented that provides insight on why a causal-comparative research design was most efficient for this type of study. Following the design, the research question and null hypothesis are discussed. After providing this information, the researcher discusses the practices used to identify the participants for the study and the setting in which the study will take place. To conclude this chapter, the researcher provided the instrumentation, procedures, and data analysis practices that were used to complete this research study. As a result of a sound research methodology, the researcher is able to support the data that is yielded from the study.

Design

A causal-comparative research design was utilized for this study, in particular a design that focuses on the exploration of causes that may occur between specified variables. According to M. Gall, J. Gall, and Borg (2007), this design was ideal because the researcher is attempting to provide evidence of a cause-and-effect relationship between variables. Specifically, this design was utilized to identify the difference in Advanced Placement (AP) English Literature and Composition exam scores when comparing Instrumental Music Participants to Non-Instrumental Music Participants. This study used archived data that was collected from the 2015–2017 school year. By using archived data to complete this research study, the research design will allow the researcher to utilize *ex post facto* components within the study (Gall et al., 2007).

The causal-comparative design is most appropriate for this study because the researcher is using groups to determine whether they differ on the dependent variable (Gall et al., 2007). The

variables for the study are as follows: the independent variable (IV) will be identified as enrollment within instrumental music programs and the dependent variable (DV) is the Advanced Placement English Language and Composition exam score. To satisfy the specification of the independent variable, enrollment within instrumental music programs, the researcher will pull their sample of Advanced Placement English Language and Composition participants from students who participate band, strings, guitar, and piano classes and test their relationship to students who do not participate in instrumental music classes. Using these groups, the researcher will be able to answer the research question and determine whether the null hypothesis is rejected or not.

Research Question

The study was based on the following research question:

RQ1: Is there a statistically significant difference in the Advanced Placement English Language and Composition exam scores among high school students who are involved in instrumental music classes and those who are not involved in instrumental music classes?

Null Hypotheses

The study utilized the following null hypothesis:

H₀1: There will be no statistically significant difference between the Advanced Placement English Language and Composition exam scores between high school students who are enrolled in instrumental music courses and those who are not.

H₀2: There will be no statistically significant difference between the Advanced Placement English Literature and Composition exam scores between high school males who are enrolled in instrumental courses and those males who are not.

H₀₃: There will be no statistically significant difference between the Advanced Placement English Literature and Composition exam scores between high school females who are enrolled in instrumental courses and those females who are not.

Participants and Setting

The participants for this study were drawn from a convenience sample of high school students located in the upstate of South Carolina during the 2015–2017 school year. Located between the two major cities of Atlanta, GA, and Charlotte, NC, Parkwood County is home to the largest school district in South Carolina. The design of the county results in Parkwood having a diverse population that spans all levels of socioeconomic status. Additional demographics include the following data: 78.8% Caucasian, 15.9% African American, 2.29% Hispanic, and 2% other (Parkwood County, 2016). Each school district features comparable demographics to the county, and will provide the researcher with the ability to pull a sample that is representative of the population.

The number of participants sampled for this research study was 529. This number of participants exceeded the required minimum for a medium effect size. According to Gall et al. (2007), a sample size of 100 students is the minimum required for a medium effect size with a statistical power of 0.7 at the 0.05 alpha level. These participants will come from the eight different high schools within the five Parkwood County school districts. Specifically, the sample will include students who participated in an Advanced Placement (AP) English Literature and Composition course during the 2015–2017 school year. This group of students, the AP English Language and Composition participants, will be known as the sample from which the researcher will separate the students into two groups: Instrumental Music Participants and Non-Instrumental Music Participants. To complete this process, the researcher utilized the students' class

schedules and separated the students who are involved in an instrumental music class (e.g., band, strings, guitar, percussion, etc.) during the time they are also enrolled in AP English Language and Composition, from those who are not. In addition to separating the groups by their schedules, the researcher identified the demographics of each group, Instrumental Music Participants and Non-Instrumental Music Participants, by reporting their age, ethnicity, and gender. This information will be provided by the school's guidance department. Once these two groups were identified, the researcher utilized all data provided by the school district to complete the research study.

Instrumentation

The instrumentation used to complete this causal-comparative research study is the Advanced Placement (AP) English Literature and Composition course exam. The College Board considers this exam valid and reliable and conducts an annual analysis on each AP exam to ensure these factors remain true (Patterson & Ewing, 2013). The first AP English Language and Composition exam was administered during the 1980 school year. The exam was created by a team of AP teachers and professors in the area of English Language Arts whose goal was to develop an examination that tested the student's comprehension of rhetoric (Puhr, 2007). The AP English Language and Composition exam consists of two sections: multiple choice and free response. The multiple-choice portion of the exam consists of 55 questions that focus on various excerpts from literary sources. The free response section consists of three prompts where the student must conduct an analysis of various literary examples. In a report on AP testing, Bridgeman, Morgan, & Wang (1996) provided a reliability coefficient variable for each portion of the exam: multiple choice (0.91), free response (0.49), and composite (0.84). Like most nationally-administered standardized tests, the AP English Language and Composition exam was

developed by AP teachers and college faculty members within the field of English Language Arts (Patterson & Ewing, 2013). As the exam is broken up into three different sections, the scoring varies between each group. The multiple-choice questions are scored by a computer, while the other sections are scored by trained experts in the field of English while at the annual AP reading. These experts are trained in a manner that keeps them up to date with testing protocols. Additionally, their work is observed throughout the grading process to ensure consistency. In addition to each section being scored by an expert reader, every subject has a chief reader who is a highly respected collegiate professor in their respective field. These individuals assist the readers throughout the process to ensure the accuracy of the scores. The free-response questions are weighted and combined with the results of the multiple-choice questions. The combination of these scores is what is referred to as the composite AP score. Composite scores in this section are provided with the numerical values 5, 4, 3, 2, or 1. The highest score, 5, reveals that the student has fully achieved comprehension of the subject on the same level as a college freshman. The lowest score, 1, reveals that the student has failed to grasp the concept on the same level as a college freshman (Puhr, 2007).

In addition to being a key component in the assessment of students involved within the AP English Language and Composition course, this instrument has also been used in additional studies that require the use of exam scores to validate their results (e.g., Jeong, 2009; Klopfenstein & Thomas, 2009).

Procedures

This study was completed once approval had been granted from the Institutional Review Board (IRB) and the Dissertation Committee at Liberty University. After receiving permission (See Appendix), the researcher requested a sample of students who have participated in

Advanced Placement (AP) English Literature and Composition between the 2012 and 2017 school years. The researcher gathered this information from the five school districts within Parkwood County. After receiving permission to collect data from Liberty University and each district representative, the researcher contacted the testing and accountability department for each respective district and requested the following information: an anonymous list of the students who participated in AP English Literature during the 2015 – 2016 school year, their score on the final AP exam, and their class schedule for the same year. Upon collecting this data from the five districts, the researcher separated the students into two subpopulations: Instrumental Music Participants and Non-Instrumental Music Participants. From these samples, the researcher entered each student's respective AP English Language and Composition exam scores into SPSS while accounting for the two separate groups. Once all the data from the samples had been entered correctly, the researcher conducted a data analysis. While the research was being conducted, the researcher secured the data through a de-identification process in which the researcher did not have ready access to the students' information.

Data Analysis

The data analysis that was used for this causal-comparative study was three independent *t*-tests. According to Gall et al. (2007), the independent *t*-test is used to determine if a significant difference exists between the mean scores of an independent variable on a single dependent variable. To complete the *t*-tests, the researcher chose a sample size assuming the following: a medium effect size, power of .7, and alpha level = .05. The school district provided data for 529 students which exceed the minimum sample size of 100 for a *t*-test assuming a medium effect size, power of .7, and alpha level of .05. In order to utilize this type of data analysis, the researcher ensured that the data has been properly screened. To accomplish this task, the

researcher verified the accuracy of the data file and screened for inconsistency by closely comparing the entries to the data provided by the districts, accounting for missing data, and identifying any outliers using a Box-and-Whisker plot. In addition to data screening, the researcher verified that certain assumptions were met prior to data analysis. To complete this task, the researcher ensured that the dependent variable is measured at a continuous level, identified that the independent variable consists of two categorical groups, checked to make sure that each participant is only counted in one sample group, tested the assumption of homogeneity of variance using Levene's Test of Equality of Error Variance, and tested the assumption of normality using a histogram. Levene's test of Equality of Error Variance provided the researcher with the ability to test the assumption of homogeneity of variance. The histogram was utilized to provide the researcher with a way to ensure that the dependent variable is normally distributed for each category of the independent variable. After these assumptions were met, the researcher was able to continue with the *t*-tests. The researcher conducted analysis to derive both descriptive and inferential statistics. These findings presented in Chapter Four include: descriptive statistics (*M*, *SD*), number (*N*), number per cell (*n*), degrees of freedom (df within / df between), observed *F* value (*F*), significance level (*p*), and effect size and power.

CHAPTER FOUR: FINDINGS

Overview

In this chapter, the researcher will provide information regarding the findings acquired throughout the study. Beginning by presenting the research question and null hypotheses, evidence will be provided for the study through presenting a statistical analysis and a discussion of the results.

Research Question

RQ1: Is there a statistically significant difference in the Advanced Placement English Language and Composition exam scores among high school students who are involved in instrumental music classes and those who are not involved in instrumental music classes?

Null Hypotheses

H₀₁: There will be no statistically significant difference between the Advanced Placement English Language and Composition exam scores between high school students who are enrolled in instrumental music courses and those who are not.

H₀₂: There will be no statistically significant difference between the Advanced Placement English Literature and Composition exam scores between high school males who are enrolled in instrumental courses and those males who are not.

H₀₃: There will be no statistically significant difference between the Advanced Placement English Literature and Composition exam scores between high school females who are enrolled in instrumental courses and those females who are not.

Descriptive Statistics

There were 529 Advance Placement (AP) English Language and Composition participants in this study ($N=529$). The AP English Language and Composition scores ranged

from 1 to 5 in both groups. The table below provides the number of participants mean scores, and standard deviations for both groups and their accompanying subgroups.

Table 1

Descriptive Statistics

Status	Gender	Mean	Std. Deviation	N
Non Instrumental	F	2.65	1.075	264
	M	2.64	1.065	169
	Total	2.65	1.070	433
Instrumental	F	2.73	1.133	51
	M	2.69	1.104	45
	Total	2.71	1.114	96
Total	F	2.66	1.083	315
	M	2.65	1.071	214
	Total	2.66	1.077	529

Results

Data were analyzed using three independent *t*-tests to examine the effects of instrumental music courses and gender on AP English Language and Composition exam scores. The following section includes the results of the assumption testing and results of the three *t*-tests.

Data Screening and Assumption Tests:

The dependent variable for this study was the AP English Language and Composition exam score. The exam is scored using an interval scale on a range from 1-5, where 1 represents the lowest score possible and 5 represents the highest score possible. This study featured two independent variables: participation in an instrumental music course and gender.

The researcher utilized a box-and-whisker plot to determine if the data contained any extreme outliers. As a result of the box-and-whisker plot, the researcher was able to identify that there were no extreme outliers found that could have an effect on the results of the study.

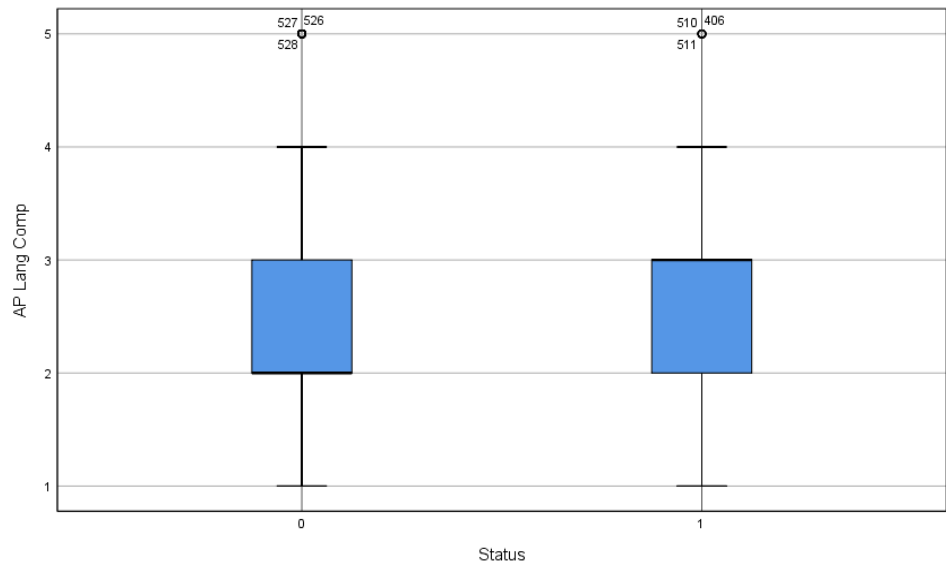


Figure 1. Box-and-whisker plot of AP English Language and Composition Exam Scores (participation in instrumental music courses)

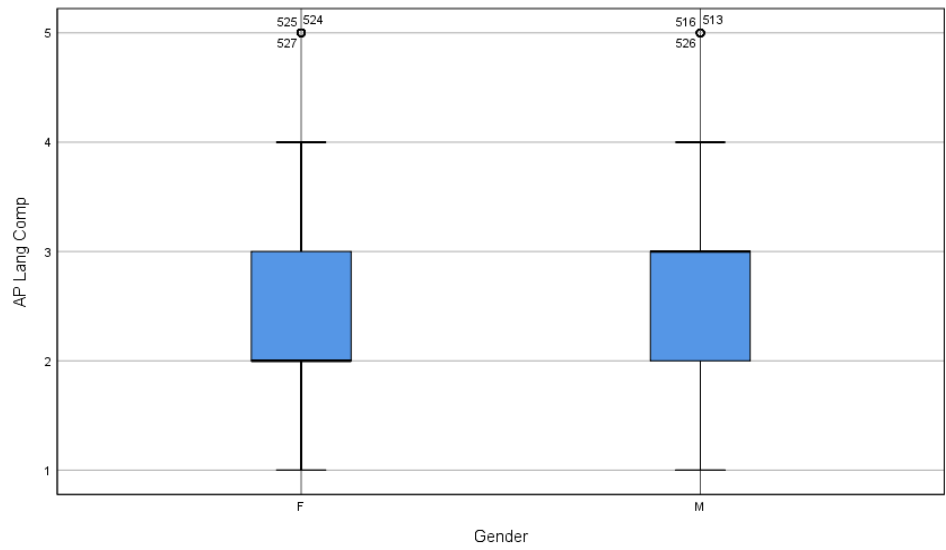


Figure 2. Box-and-whisker plot of AP English Language and Composition Exam Scores (gender)

Histograms were used to evaluate the assumption of normality. The results show nearly normal curves and the assumption of normality is deemed tenable (see Figures 3 and 4).

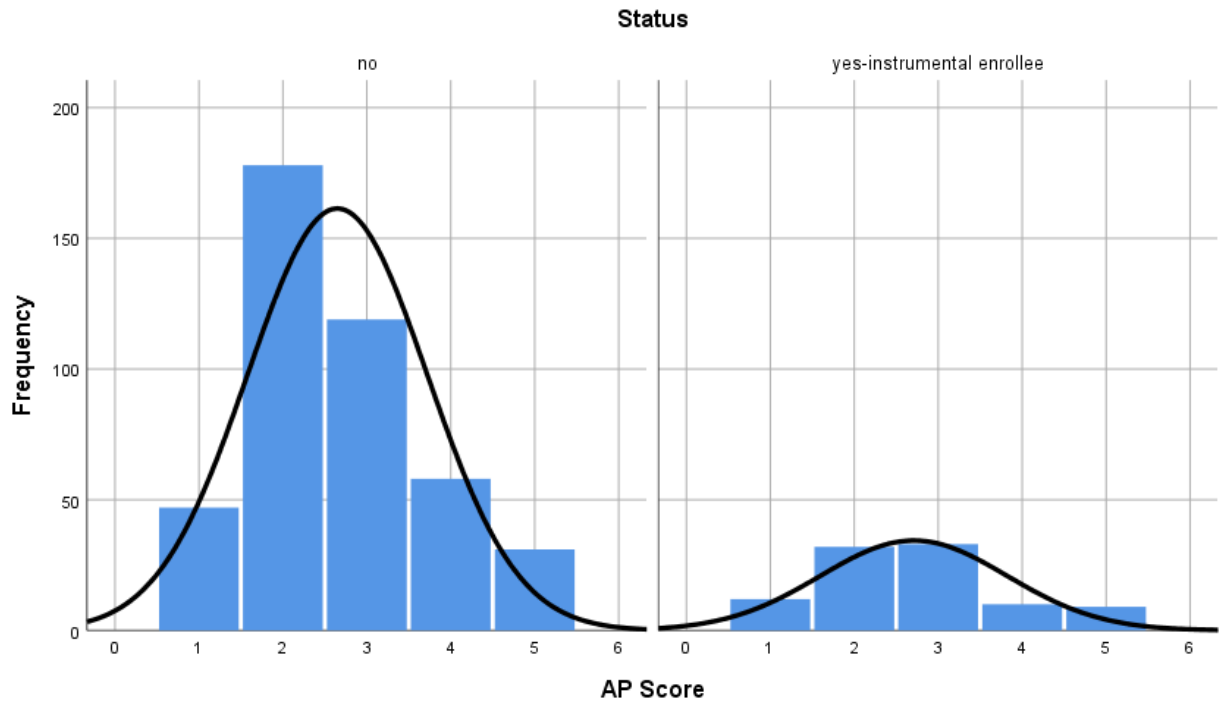


Figure 3. Histogram displaying Assumption of Normality of Dependent Variable

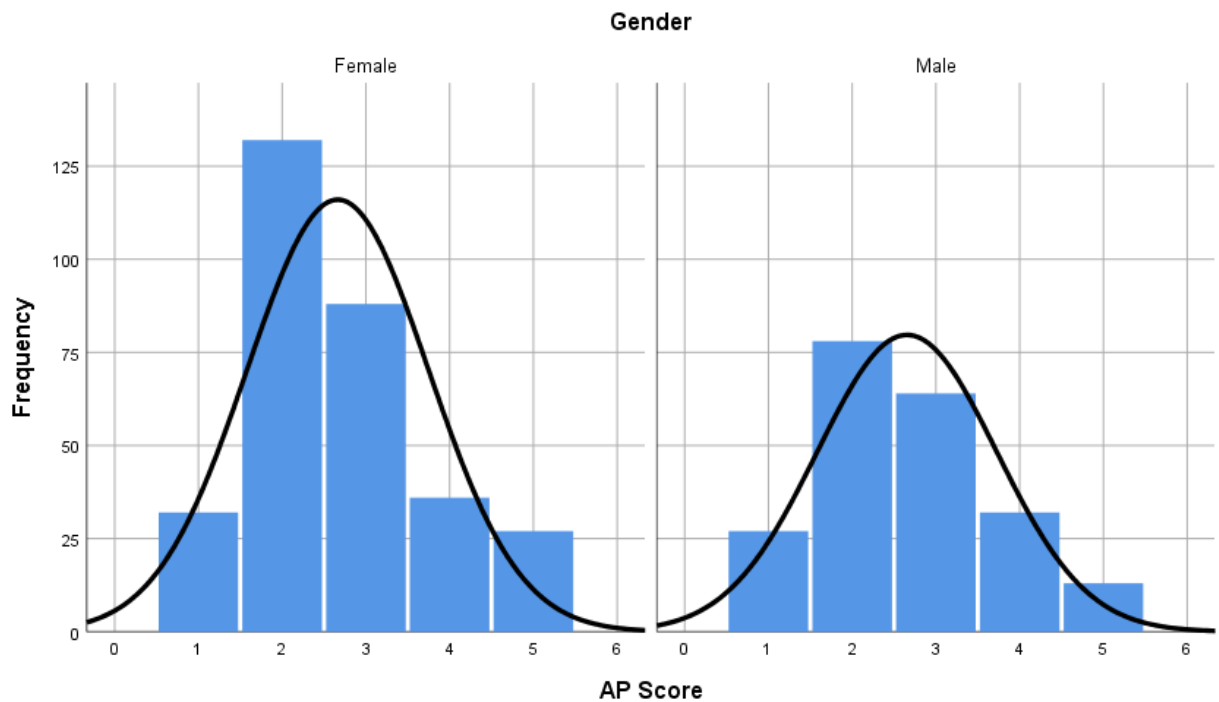


Figure 4. Histogram displaying assumption of normality of Dependent Variable

The assumption of homogeneity was examined using Levene's test of Equality of Error Variance (see Tables 2, 3, and 4). The assumption of homogeneity of variance is tenable for all null hypotheses.

Hypotheses

Results for Null Hypothesis One. H₀1: There will be no statistically significant difference between the Advanced Placement English Language and Composition exam scores between high school students who are enrolled in instrumental music courses and those who are not.

An independent samples *t*-test was conducted to evaluate null hypothesis one. The results were not significant, as shown in Table 2, $p = .626$. The descriptive statistics for students not enrolled in an instrumental music class ($M = 2.65$, $SD = 1.070$) and students enrolled in an instrumental music class ($M = 2.71$, $SD = 1.114$) reveal means that are not significantly different. The *t*-test results are: $t(527) = -.488$, $p = .626$. Therefore, the researcher failed to reject null hypothesis one.

Table 2

Independent Sample t-Test and Levene's test of Equality of Error Variance

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
AP Score	Equal variances assumed	.013	.909	-.488	527	.626	-.059	.122	-.298	.180
	Equal variances not assumed			-.476	136.608	.635	-.059	.125	-.306	.187

Results for Null Hypothesis Two. H_02 : There will be no statistically significant difference between the Advanced Placement English Language and Composition exam scores between high school males who took instrumental music class and males who did not.

An independent samples *t*-test was conducted to evaluate null hypothesis two. The results were not significant, as shown in Table 3, $p = .962$. The descriptive statistics for males not enrolled in an instrumental music class ($M = 2.64$, $SD = 1.065$) and males enrolled in an instrumental music class ($M = 2.64$, $SD = 1.059$) reveal equivalent means. The *t*-test results are: $t(211) = .048$, $p = .962$. Therefore, the researcher failed to reject null hypothesis two.

Table 3

Independent Sample t-Test Results and Levene's test of Equality of Error Variance

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
AP Score	Equal variances assumed	.067	.797	.048	211	.962	.009	.180	-.346	.364
	Equal variances not assumed			.048	67.47	.962	.009	.179	-.349	.367

Results for Null Hypothesis Three. H₀₃: There will be no statistically significant difference between the Advanced Placement English Literature and Composition exam scores between high school females who were enrolled in instrumental courses and females who are not.

An independent samples *t*-test was conducted to evaluate null hypothesis three. The results were not significant, as shown in Table 4, $p = .656$. The descriptive statistics for females not enrolled in an instrumental music class ($M = 2.65$, $SD = 1.075$) and females enrolled in an instrumental music class ($M = 2.73$, $SD = 1.133$) show that females enrolled have a slightly higher mean score on the AP exam, but the mean scores are not significantly different. The *t*-test results are: $t(313) = -.446$, $p = .656$. Therefore, the researcher failed to reject null hypothesis three.

Table 4

Independent Sample t-Test results and Levene's test of Equality of Error Variance

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
AP Score	Equal variances assumed	.032	.858	-.446	313	.656	-.074	.166	-.400	.252
	Equal variances not assumed			-.430	68.5	.668	-.074	.172	-.417	.269

CHAPTER FIVE: CONCLUSIONS

Overview

Throughout the following chapter, the researcher will provide a review of purpose of this quantitative causal-comparative study. In further discussion, the researcher will present the evidence gathered for each null hypothesis and discuss the ramifications of the findings. To conclude this chapter, the researcher will discuss the various limitations and recommendations that were either present or derived from this study.

Discussion

The goal of the research was to identify if there is a statistically significant difference in the Advanced Placement English Language and Composition exam scores among high school students who are involved in instrumental music classes and those who are not involved in instrumental music classes. This topic was chosen due to the limited data and in hopes of justifying the advocacy for instrumental music classes in each student's curriculum. As a result of this study, the researcher is able to identify that no significant relationship exists between these two groups. In addition to identifying the lack of a relationship existing between these two groups, the researcher was also able to identify that there was no significant relationship between the gender of the students in these groups and their achievement on the Advanced Placement English Language and Composition exam. By identifying that there is no significant relationship between instrumental music class participation and performance on the Advanced Placement English Language and Composition exam, the researcher was able to address the gap in the research literature on this topic.

The results of this study shed new light on the effect of instrumental music courses in relation to other core subjects. In many cases, participation in an instrumental music course

provides the students with a positive supplement to the content being studied (Cranmore & Tunks, 2015; Detournay, 2013; McNealy, 2013). While it is true that these studies mainly focus on the effect of instrumental music class on math and science courses, many additional studies provide insight on how these types of music courses would supplement language-based courses in a positive manner (Good, Russo & Sullivan, 2014; Koa & Oxford, 2014). Unfortunately, the researcher revealed that, in this particular field, instrumental music courses have no significant relationship with achievement on Advanced Placement English Language and Composition.

While this study failed to reveal any significant relationship between the testing groups, it opens the door for additional studies to explore the effect instrumental music courses have on other areas of academia. Despite the fact that this study features data gathered from a single school district, it provides a snapshot of a variety of demographics due to the size and location of the district.

Brain-based learning is a topic that is driving much of the modern research in the area of education. In music education research, the neurological effects of music continue to be at the forefront. Accordingly, Costa-Goimi (2014) provides evidence that participation in music classes leads to the development of stronger brain function and leads to advancement in the cognitive abilities of all students. While increased cognitive ability may be evident in music class participants, these abilities do not lead to increased performance levels on Advanced Placement English Language and Composition exam scores. This factor may exist because the increased cognitive ability is mainly isolated in the area of the brain responsible for spatial reasoning (Giannouli, Lytras, & Syrmos, 2012).

In his 2005 study, Schellenberg stated that participation in music courses would lead to increased cognitive abilities in all areas of academia. While Schellenberg (2004) boldly presents

a blanket statement, this study reveals that the cognitive processes affected do not share a significant relationship in the areas of Advanced Placement English courses. Similar to the beliefs of Schellenberg (2004), Scripp and Gilbert (2016) believed that music integration was vital to the success of students in all classes. This belief was centered on the idea that utilizing musical components increases the student's ability to process topics of varying subjects in a more efficient manner. This belief is on par with the new movement in education called S.T.E.A.M (Science, Technology, Engineering, Arts, and Mathematics). In S.T.E.A.M., educational reformists believe that the incorporation of arts into the curriculum of students will result in an increase in standardized testing scores in all subjects. In this research study, the researcher identifies that even while students were actively participating in music classes, their Advanced Placement English Language and Composition exam scores did not display any benefits from this participation. This result is in direct conflict with the research of Scripp and Gilbert (2016), and the entire S.T.E.A.M. movement, because it reveals an area in academia that does not benefit from the implementation of arts into the curriculum of all students.

While music education has always held a close relationship with Pragmatism and Constructivism, the results of this study reveal that the benefits of these theoretical frameworks fail to provide a positive influence on the success of music students in Advanced Placement English Language and Composition courses. While Dewey believed that actively involving your students in a lesson would lead to an increase in understanding and increased cognitive abilities in all subjects, the results of this study reveal that this influence does not extend to the area of Advanced Placement English Language and Composition (Tan, 2016). Similarly, Piaget's theory of Constructivism fails to yield any positive advantages to those music students taking Advanced Placement English courses. While Blackwell (2016), stated that the increased number

of cognitive connections developed through participation in music courses would benefit the student in all areas of the curriculum, this research study sheds light on the fact that Blackwell's study, founded in Piaget's theory of Constructivism, failed to identify if a relationship existed between instrumental music courses and Advanced Placement English.

In their seminal work, Raucher, Shaw, and Ky (1993), stated that exposure to music would lead to increased productivity and success in the classroom. This belief led to the movement known as "The Mozart Effect." While "The Mozart Effect" was a term linked to the short-term increase in the IQ of students exposed to classical music, it grew into a belief that exposure to classical music in any form would lead to a higher performance on academic tasks. In the study presented within this dissertation, the researcher presents data that directly contradicts the beliefs of Raucher, Shaw, and Ky (1993). Specifically, the data identifies that participation in an instrumental music class has no significant relationship on the scores of an Advanced Placement English Language and Composition exam. As a result of this study, the researcher has now identified a gap in "The Mozart Effect" study that may require additional research to address.

Perlovsky et al. (2013) presented the idea that exposure to pleasant music has the ability to increase the performance of students on End-of-Course exams. The belief is that the exposure to the music provides the students with the ability to block "cognitive dissonance" during the testing period (2013). In a similar study, Richard Baker (2012), identified that students who were exposed to music scored significantly higher ($p < .001$) than their peers who did not receive the same exposure. While both of these studies provide valuable insight into the relationship music has with standardized testing, the data provided within this dissertation

contradicts these beliefs in the areas of Advanced Placement English Language and Composition.

The positive effects of music on other core subjects have been scientifically documented through countless studies. One these studies, by R. Guillot and I. Guillot (2015), provides insight on how the participation in music classes leads to increased achievement in science classes due to the increased cognitive abilities of the students. This study was later backed up in an article by Stephane Detouray (2013) when the writer said music participation provided the extra spark that commonly leads to scientific breakthroughs. While it is evident that math and science are greatly influenced by participation in music courses, the same cannot be said about how music participation relates to success in Advanced Placement English Language and Composition. While these students possess the same exposure to music as their math and science peers, the researcher indicates that this type of participation in music classes yields no advantage.

Maslow's Hierarchy of Needs is a theory that is taught to all education students while they are studying for their undergraduate degree. As part of this theory, researchers believe that students who possess all levels of the hierarchy are more likely to succeed in their education. Accordingly, P. Eerola and T. Eerola (2013) stated that participation in an instrumental music class provides the students with access to all levels of Maslow's Hierarchy of Needs. As a result of assessing all of the levels of the Hierarchy of Needs, these students possess the increased ability to perform at a higher level in all areas of academics (2013). While it remains true that instrumental music course participants possess an increased social awareness when compared to their non-musical peers, there is no significant relationship between this fact and their Advanced Placement English Language and Composition exam scores.

Leon Lewis (1981) once stated that the utilization of music in English Language Arts courses provides all students with the ability to learn and utilize vocabulary words in a more effective manner when compared to classes who did not use this strategy. Using Lewis as a source, Cogo-Moreira et al. (2013) found that students who were involved in musical activities score six times higher on reading tests than their peers. While both of these studies provide evidence that participation in music classes have a relationship in certain areas of English Language Arts, the study presented in this dissertation identifies that these successes do not reach as far as Advanced Placement English Language and Composition.

The results of this research study contradicts many theories that have been circulating the halls of music educators for generations. While it is true that this particular study provides data that addresses a gap in the literature, it should be noted that participation in instrumental music education courses provides students with the ability to outperform their peers in many other areas of education outside of Advanced Placement English Language and Composition. Additionally, it should be noted that this study was limited to a small area of the country. Results yielded from data gathered in a different location may present contradictory information to this research study.

Implications

While this study was limited to a single school district in the upstate of South Carolina, the researcher is able to state that there is no significant relationship between instrumental music courses and Advanced Placement (AP) English Literature and Composition courses. Additionally, the researcher is able to articulate that the gender of the student within each population has no significant relationship with how the student with performing on the AP English Language and Composition exam. As a result of these findings, the researcher is able to present the following implications: educators should not expect to see a similar relationship

between academic performance and instrumental music participation in English Language Arts as they would in math and science courses, students should not assume that they will perform better than their peers due to the fact that they are involved in instrumental music courses, and curriculum advisors should not attempt to find a supplement for English Language Arts through incorporating instrumental music classes into the curriculum.

Contrary to the data that supports music's positive effect on math and science courses, this research study revealed that instrumental music courses do not have a significant relationship with AP English Language and Composition courses. As a result, educators should abandon the belief that participation in an instrumental music course provides the students with an advantage over their peers in the area of English Language Arts. By disregarding this credence, educators can seek to supplement their student's education with additional courses that may have a positive relationship with the achievement on English Language Arts courses.

One of the beliefs that all students have when they join an instrumental music program is that they will naturally become higher achieving student in their other classes. While this belief may hold true in a variety of content subjects, the data presented in this study reveals that these students should not expect to perform higher in Advanced Placement English Language and Composition courses due to their participation in instrumental music courses. As a result of this study, students should seek alternative means of study to assist in their goal of increased academic achievement in the area of Advanced Placement English Language and Composition.

One of the newest approaches to education is that of the STEAM (Science, Technology, Engineering, the Arts, and Mathematics) movement. In many cases, this approach has provided students with access to higher levels of thinking and processing skills that they would have not attained in previous educational designs. Unfortunately, this study presents data that negates this

type of positive effect of the musical arts on Advanced Placement English Language and Composition. Accordingly, those administrators who are tasked with developing the student's curriculum should seek to provide students with other courses that display a positive relationship with English Language Arts. By seeking an alternative pairing, the curriculum administrators may find a combination of courses that would be more beneficial to the students.

Limitations

Throughout this study, the researcher attempted to account for threats to both internal and external validity; however, limitations were identified and will be discussed in this section. The limitations that were identified within the study include: the use of convenience sampling to acquire the study's participants, the demographics and socioeconomic status of the student's involved in the courses being explored, the number of years of participation in an instrumental music class, and the possibility of the student taking additional instrumental music courses outside of the school.

The proximity of the researcher to the participants could be considered a limitation on the study. Due to the inability of the researcher to travel to obtain data, all of the data used in this study was limited to a school district found in the neighboring county of the researcher. In an attempt to limit the effects this may have had on the study, the researcher sought to identify the largest, local school district that offered both courses being explored that was also in driving distance to the researcher. In considering this limitation, it is important to note that the findings of this study cannot be generalized beyond the population being studied throughout this process.

Due to the nature of this study, the researcher only identified the gender and course load of each study participant. As a result, the research conceals the student's race, ethnicity, special needs, socioeconomic status (SES), or age. One way the researcher attempted to combat the

limitation of demographics and socioeconomic statuses was to use data gathered from a single school district. By utilizing data gathered from a similar location, the researcher was able to minimize the effect demographics and socioeconomic statuses would have on the study.

In a study conducted by Yang, Ma, Gong, Hu, and Yao (2015), researchers identified that the longer students participate in music the greater the chance they will perform higher on academic tasks when compared to their non-musical peers. As a result of this study, the limitation of musical experience has the potential to affect the results. To contend with this limitation, the researcher chose a course that is limited to 11th and 12th-grade students. As a result, most students will have approximately the same number of years of experience in their instrumental music class.

Similar to the limitation derived from the Yang et al. (2015) study, students who have additional exposure to instrumental music courses outside of the standard course time will have an academic advantage over those who do not have a similar exposure. This type of exposure could be anything from private lessons to participating in a community ensemble. In any case, the amount of time the student is exposed to the additional musical outlet has the potential to create a limitation on the study. To combat this in future studies, the researcher could incorporate the use of a survey that would provide the student to list the amount of time they participate in instrumental music groups outside of the typical school day.

Recommendations for Future Research

The focus of this research was designed around the relationship between instrumental music courses and AP English Language and Composition exam scores. More research is needed in this area of literature to fill the gaps of the relationships music has on the different aspects of education. The researcher's recommendations include:

1. Research on the topic of music's relationship on AP English Language and Composition exam scores should be expanded to include all aspects of music. This expansion should include: choral music, musical theatre, music appreciation, music production, etc.
2. Future research on this topic should include the amount of time, or semesters, that each participant has spent involved in a structured music course and its relationship to AP English Language and Composition exam scores.
3. Additional research on the relationship music courses have with English Language Arts should expand to focus on English I, II, III, IV End-of-Course exams. This would allow students who are not interested in participating in Advanced Placement courses to be included in the study.
4. Future research should focus on the relationship specific instrumental music courses have on AP English Language and Composition exam scores. These specifications would include: Band, Strings, Guitar, Percussion, Mariachi, etc.
5. Future research should include an exploration of the student's demographics, age, and special needs. These specifications would allow for an additional understanding of the relationship instrumental music classes have within a variety of student situations.

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APPENDIX A

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

July 24, 2018

Robert Pettigrew

IRB Application 3259: Marching into the Future: The Relationship Between Instrumental Music Class Participation and Advanced Placement English Language and Composition Test Results

Dear Robert Pettigrew,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Your study does not classify as human subjects research because it will not involve the collection of identifiable, private information.

Please note that this decision only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued non-human subjects research status. You may report these changes by submitting a new application to the IRB and referencing the above IRB Application number.

If you have any questions about this determination or need assistance in identifying whether possible changes to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,

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