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Effects of Participation in Athletics and Music Ensembles by Socioeconomic Status on Arkansas Academic Achievement

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EFFECTS OF PARTICIPATION IN ATHLETICS AND MUSIC ENSEMBLES BY SOCIOECONOMIC STATUS ON ARKANSAS ACADEMIC ACHIEVEMENT

by

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ABSTRACT

by
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Title: Effects of Participation in Athletics and Music Ensembles by Socioeconomic Status on Arkansas Academic Achievement (Under the direction of Dr. Michael Brooks)

Schools are held accountable by mandated standardized testing measuring academic achievement. Due to limited budgets, administrators have to decide how to balance funding for athletic teams and school music ensembles versus additional programs and positions that directly support academic achievement in tested subjects. The purposes of this study were to determine, after controlling for previous achievement, the effects by socioeconomic status between students who participate in athletics only versus school music ensembles only versus both versus neither on mathematics, English, reading, and science achievement measured by ACT Aspire Summative Assessments in mathematics, English, reading, and science for eighth-grade students in five Arkansas public schools. Bronfenbrenner's ecological systems theory was used to explain possible academic benefits from participation in these school activities. Random stratified sampling was used to collect data on 360 students. A 4 x 2 factorial between-groups analysis of covariance was conducted to address the four hypotheses.

No statistical interaction was found between the type of participation and socioeconomic status, meaning group achievement by students from less privileged

backgrounds was similar to students from wealthier families. Similarly, no statistically significant main effect for group participation was found, meaning that students in athletics, music ensembles, both, or neither had statistically similar achievement scores. In contrast, a statistically significant main effect for socioeconomic status was found for all four hypotheses, with students on paid lunch scoring significantly higher than students on free and reduced-price lunch. Administrators can use the results of this study to better inform decisions regarding middle school athletics and music ensembles in relation to academic achievement.

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CHAPTER I

INTRODUCTION

School athletics and school music ensembles create a lasting influence on many American students. About half of all students participate in school athletics (Lumpkin & Achen, 2015; National Federation of State High School Associations, 2019), and almost a quarter of all students participate in school music ensembles (Elpus & Abril, 2019). The types of relationships students have with coaches, directors, and other students affect student growth in multiple ways. Bronfenbrenner (1981) explained that activities, like sports and music ensembles, influence the development of a person. This unique development may alter a student's academic trajectory. With this high percentage of participation in these activities, understanding whether extracurricular activities significantly influence academic achievement is important.

Significant funding is required to support school athletics and music ensembles. No Child Left Behind ushered in a new era of school accountability that increased pressure on students to perform academically. Promoting academic performance for accountability began to raise questions about continuing to fund extracurricular activities (Major, 2013; Marchetti et al., 2016). If the developmental influence of school athletics and music ensembles does not assist the school in improving academic accountability goals, their existence may no longer be guaranteed as budget issues escalate. However, if

school athletics and music ensembles are associated with better student academic outcomes, their continued funding is more assured.

Participants in school athletics and music ensembles are usually excellent students with above-average grades. Students who engage in extracurricular activities achieve higher academically than students who do not (Broh, 2002; Hsu et al., 2019; Im et al., 2016; Knifsend & Graham, 2012; Shaffer, 2019). These findings indicate that the developmental influence of these activities does not take away from academic success and may even improve academic outcomes. Extracurricular activities may develop academically successful, well-rounded students, which is the ultimate goal of education.

Understanding the influence of extracurricular activities is complicated by the variable of socioeconomic status (SES). SES is one of the strongest predictors of academic achievement (Albert et al., 2020). The demographics of school athletics and music ensembles may have a higher percentage of economically-advantaged students than the general student population (Elpus, 2013; Shifrer et al., 2015). School athletics and music ensembles may be comprised of students who were high achieving before they ever joined the team or group rather than participation significantly influencing academic outcomes. Evidence indicates a difference may (Broh, 2002; Hsu et al., 2019) or may not (Elpus, 2013) exist between groups after controlling for SES, prior academic achievement, and other similar variables. Extracurricular activities may mediate differences between those from low SES backgrounds and those from high SES backgrounds (Bodenberg, 2016; Marchetti et al., 2016). A mediating effect of participation would be closing the achievement gap between those living in poverty from those in higher-income households. The role of SES should be understood to draw

accurate conclusions about the influence of extracurricular activities on student academic success.

Statement of the Problem

The purposes of this study were four-fold. First, after controlling for previous mathematics achievement, the purpose was to determine the effects by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on mathematics achievement measured by ACT Aspire Summative Mathematics Assessment for eighth-grade students in five Arkansas public schools. Second, after controlling for previous English achievement, the purpose was to determine the effects by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on English achievement measured by ACT Aspire Summative English Assessment for eighth-grade students in five Arkansas public schools. Third, after controlling for previous reading achievement, the purpose was to determine the effects by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on reading achievement measured by ACT Aspire Summative Reading Assessment for eighth-grade students in five Arkansas public schools. Fourth, after controlling for previous science achievement, the purpose was to determine the effects by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on science achievement measured by ACT Aspire Summative Science Assessment for eighth-grade students in five Arkansas public schools.

Background

Theoretical Framework: Ecological Systems Theory

Ecological systems theory by Bronfenbrenner provides a framework that explains why school athletics and music ensembles may influence student academic achievement. Bronfenbrenner (1981) suggested that people are products of the different systems that directly and indirectly engage them. Microsystems are the people, activities, and events with which the person directly engages. The mesosystem represents the interaction of these separate microsystems on the individual. The exosystem is composed of the interactions that happen directly to others with whom the individual has a direct connection, such as a parent's workplace or an older sibling's class at school, but not directly to the individual. The macrosystem includes forces that shape the entire society in which the person lives, such as economics, culture, and politics. Bronfenbrenner's theory suggests that as people engage with different systems, they mentally develop. Students who engage in athletics or music ensembles have different interacting systems of influence on their academic achievements than those who do not and thus develop characteristics different from those who did not participate.

Participation in Extracurricular Activities

All extracurricular activities are not equally associated with academic achievement. While school athletes and music ensemble participants generally have positive academic outcome associations, other activities may have the opposite effect (Broh, 2002). Intramural sports, as opposed to interscholastic sports, had negative associations with academic outcomes (Broh, 2002), as did video games (Malik & Chohan, 2020). The developmental influence of each microsystem is different due to the

way the microsystem interacts with the other microsystem of school classes, thus leading to different student outcomes. Choosing the most beneficial type of activity for student participation is vital.

Activities associations have helped connect the goals of school sports and music ensembles with students' academic success. School-sponsored sports are not the norm worldwide, with youth sports in Europe taking place outside the school day (Ripley, 2013). Having sports connected with schools produces unique opportunities. One advantage of schools choosing to sponsor athletics is that schools can encourage students to develop their academic excellence by requiring specific academic proficiencies to participate in interscholastic events (Bowen & Hitt, 2016). Eligibility is an example of the microsystem of general education having a shared goal with the microsystem of structured extracurricular activities. For instance, the Arkansas Activities Association (2021) specifies that second-semester eighth-grade students must pass at least four academic classes to be eligible to participate in interscholastic athletic or music ensemble events. The requirement ensures that students do not ignore school while engaging in their activity of choice. Connecting education and structured extracurricular activities may help develop student success.

The amount of time that students engage in extracurricular activities could determine participation's influence on students. Hsu et al. (2019) found that at least 6 hours of participation were needed weekly to create a statistical difference in academic performance. Fredricks (2012) concluded that more than 14 hours per week hurt student academic outcomes, while Mahoney and Vest (2012) did not find these negative associations with higher participation levels. If students do not participate much in these

activities, the potential for developmental power is small, but some argue that too much may not be good either. Quantity of participation may make a difference in academic outcomes.

Participation in School Athletics

School athletics in the United States are deeply embedded within secondary public education. School-sponsored athletics were rarely integrated into American schools prior to the turn of the 20th century but were ushered in to help physically and mentally prepare young men for the possibility of the United States entering into World War I (O'Hanlon, 1982). Athletic participation helped people solve problems and follow directions, which were skills essential for war. Athletics also engaged students with education as mandatory education movements became more common (Bowen & Hitt, 2016). As of 2019, about half of high school students across the country participated in athletics (Lumpkin & Achen, 2015; National Federation of State High School Associations, 2019). Since most American students participate in athletic programs, understanding how sports influence academic achievement, the central role of education, is essential. School sports went from nearly nonexistent to almost universally present within schools in just over a century.

School athletes are frequently students who excel in their studies. Athletes academically outperform their nonathletic peers (Broh, 2002; Eccles et al., 2003; Fredricks, 2012; Guest & Schneider, 2003; Lumpkin & Achen, 2015; Lumpkin & Favor, 2012). Lumpkin and Favor (2012) compared the grade point averages, graduation rates, and state testing scores of more than 139,000 student-athletes in Kansas versus nonathletes in the state and found that athletes attained superior academic outcomes.

Based upon data that compare athletes to nonathletes and did not factor in demographic differences or prior academic achievement, athletes, as a group, had superior academic qualifications. Broh (2002) controlled for demographics such as race and SES and concluded that athletes had higher grades than nonathletes. Controlling for demographic differences and still finding a difference suggests that participating in athletics positively affects academic success as these interactions are significant microsystems in which the student engages and interacts with others on the mesosystem level. Shurluf (2011) conducted a meta-analysis and found a positive relationship between extracurricular activities and academics; however, the design of the studies included in this meta-analysis did not meet the criteria to demonstrate a causal relationship. Eccles et al. (2003) noted that the specific mechanism for why extracurricular programs make a difference in students is unknown. Debate exists as to how athletics influence students to perform better academically. One possible explanation is that athletics, a microsystem, has an interaction with the microsystem of student classes within the mesosystem that positively influences the development of students. This positive interaction within the mesosystem may be strengthened by the requirement from different state activities associations that require students to maintain academic requirements to compete at interscholastic games. Ultimately, in most instances, student-athletes have academically outperformed their nonathlete peers.

Not all sports are associated with comparable academic outcomes. Veliz (2019) found that, in general, athletes have better grade point averages than nonathletes. Furthermore, Veliz noted that three out of four students participating in tennis came from the highest-income homes and separately found that tennis players have the second-best

grade point averages out of 15 different sports. Shifrer et al. (2015) also noted that much of the academic advantage in athletes might come from their more privileged backgrounds. Whether the academic development associated with sports comes from its interaction with the students' academic classes or if demographic differences may affect results. SES differences may explain variances among different sports and their academic associations.

Participation in School Music Ensembles

School music ensembles are not as popular as athletics but still influence students. Elpus and Abril (2019) found that approximately 24% of the Class of 2013 participated in school performing music classes, representing about half the number of students who participated in school athletics. Performing music classes represent a microsystem with which a portion of students engages. Vocal music became a standard part of public education following the volunteer efforts of Lowell Mason within Boston Public Schools in 1837 to demonstrate that music could be learned by anyone (Birge, 1937). His efforts expanded from Boston across the country as his success in integrating music classes into schools became known. School bands and orchestras became popular in the early 20th century following professional traveling wind bands and city orchestras (Humphreys, 1989). Humphreys (1989) also noted that the development of class instruction, as opposed to individual instruction, of instruments and the advent of interscholastic music competitions aided the growth of these school instrumental ensembles. Though today's popular music is vastly different from that time due to technological innovation, these ensembles are still an influential component of American secondary education.

Determining if and how music ensemble participation influences students regarding the rest of the school's larger mission is vital given the percentage of participating students.

Participating in school music ensembles may help students achieve the core mission of schools: academic excellence. School musicians attain better academic results than their peers who do not participate in school music ensembles (Broh, 2002; Courson, 2018; Eason & Johnson, 2013; Eccles et al., 2003; Im et al., 2016). The question is not usually whether musicians score higher than nonmusicians but whether they score higher because of how school music ensembles influence students or because school music ensembles attract academically-able students, thus leading to better test results. Elpus (2013) affirmed that positive associations between music ensemble participation and academics existed. However, Elpus criticized the tactic of justifying school music ensembles as academic intervention since the causal-comparative nature of nearly all such studies cannot attribute causation to participation. Elpus controlled for SES, prior academic achievement, and special education status with a national dataset and concluded that no difference existed between those students who participated in school music ensembles and those who did not. Broh (2002) and Hsu et al. (2019) concluded that extracurricular activities, including music ensembles, led to better academic outcomes even after controlling for background differences with large datasets. The microsystem of school music ensembles may interact with the microsystem of school classes to influence student academic outcomes. The differing views signify the importance of continued research on this topic.

Instrumental and vocal music ensembles are associated with different academic outcomes. The economic demographics of choir are more representative of the general

student population (Elpus & Abril, 2019; Kinney, 2019). Reading and mathematics scores were higher for instrumentalists than for students in choir (Kinney, 2019). The demographics rather than the intervention of music ensembles may explain the perceived differences between music and nonmusic students. Positive academic outcomes are more associated with instrumental groups when compared with choir groups.

Socioeconomic Status, Academic Achievement, and Extracurricular Activities

SES has traditionally been regarded as one of the most significant predictors of academic achievement. Destin et al. (2019) noted that student mindsets are distinct in different classes of SES and that students from higher SES backgrounds outperform students from low SES backgrounds even after controlling for previous academic achievement. Albert et al. (2020) found that executive functioning explained 17% of the variance in reading scores and 37% of the difference in mathematics scores between students from lower- and higher-income households. Kocak et al. (2021) determined the effect sizes of different factors relating to academic achievement and concluded that SES alone did not have the large effect size expected. The reasons why SES predicts academic achievement are subject to debate, and factors associated with low SES may result in lower scores. No matter the reason that explains the differences in achievement predicted by SES, recognizing the implications of SES in comparisons of groups is essential for better understanding any discovered differences. Elpus and Abril (2019) concluded that students from poverty were less likely to enroll in school music ensembles than those from more affluent homes. Disproportionate percentages of SES groups within extracurricular activities should be accounted for in comparing students' academic

achievement relative to participation. Students from different SES backgrounds are likely to perform differently and self-select into extracurricular activities at different rates.

Identifying ways to improve students' academic achievement, especially those from low-income homes, can help them attain better futures than is generally predicted. Since the educational reform efforts of No Child Left Behind came into effect in 2002, closing the academic achievement gap for lower-achieving students has been a priority of schools (Marchetti et al., 2016). Marchetti et al. (2016) found that students who qualified for free or reduced-price lunches and met state benchmarks were more likely to have participated in extracurricular activities. The microsystem of extracurricular activities and the microsystem of academic classes had an interaction within the mesosystem that influenced the development of those students. Guest and Schneider (2003) concluded in general that athletics and extracurricular activities were associated with better academic achievement and perceived ambition; however, they found this association especially at schools with more students from lower SES backgrounds than at schools with a student population from primarily higher SES backgrounds. Extracurricular participation may have a more pronounced influence on students from low SES backgrounds. Therefore, considering whether or not SES has an interaction effect with academic achievement is essential to better understand the influence of extracurricular activity participation.

Hypotheses

The researcher generated all of the following null hypotheses.

1. After controlling for previous mathematics achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on

mathematics achievement measured by ACT Aspire Summative Mathematics Assessment for eighth-grade students in five Arkansas public schools.

2. After controlling for previous English achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on English achievement measured by ACT Aspire Summative English Assessment for eighth-grade students in five Arkansas public schools.
3. After controlling for previous reading achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on reading achievement measured by ACT Aspire Summative Reading Assessment for eighth-grade students in five Arkansas public schools.
4. After controlling for previous science achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on science achievement measured by ACT Aspire Summative Science Assessment for eighth-grade students in five Arkansas public schools.

Description of Terms

ACT Aspire Summative Assessments. Arkansas law requires that public-school students in Grades 3 through 10 take the ACT Aspire Summative Assessments to evaluate learning unless they qualify for an alternate assessment. These assessments consist of five subsections in mathematics, English, reading, science, and writing and take 4.5 hours to administer (Arkansas Division of Elementary and Secondary Education,

2021a). The ACT Aspire Summative Assessments will be used to measure the dependent variable of academic achievement. The use of these assessments allows for a standard measurement across different schools.

School athletics. School athletics are represented by student-athletes who compete against other schools in interscholastic competition and are funded by the school district (Bowen & Greene, 2012). Schools were selected for this study that had the majority of interscholastic sports practice time built into the regular school schedule. Students who participated in these class periods were identified as student-athletes. Interscholastic sports offered at the eighth-grade level included football, basketball, volleyball, track, cross country, cheerleading/pom, and dance.

School music ensembles. School music ensembles are performing musical groups, including wind bands, string orchestras, and choirs, in which students perform music (Kinney, 2019). Schools in this study had most school music ensembles practice time during the school day. Students who participated in these class periods were identified as student-musicians.

Socioeconomic status. Students are categorized into groups based on whether or not they qualify for a free and reduced-price lunch, with those qualifying coded as low SES. According to the United States Department of Agriculture, Food, and Nutrition Services Child Nutrition Programs (2017), families earning less than 130% of the federal poverty level are eligible for free lunches, and families who earn less than 185% of the federal poverty level are eligible for reduced-price lunches. Students who qualified for free and reduced-price lunches were identified as students from lower-income families, while students who did not qualify were identified as from higher-income families.

Structured extracurricular activity. A structured extracurricular activity is one in which students focus on building a skill under the direction of a nonparental adult. Structured extracurricular activities include interscholastic athletics and school music ensembles. Structured extracurricular activities stand in contrast to unstructured extracurricular activities such as playing video games at home, viewing social media, or watching television (Gilman et al., 2004).

Significance

Research Gaps

A research gap exists in determining whether athletics and music ensembles affect academic achievement. An examination of the literature revealed that typically students who participated in athletics and music ensembles in school academically outperformed their peers who did not participate in these activities (Eason & Johnson, 2013; Lumpkin & Achen, 2015). However, students who participate in the groups with the best academic outcomes are often from families with different income levels than the general student body (Kinney, 2019; Shifrer et al., 2015; Veliz, 2019). If not considered, demographic differences could lead to erroneous conclusions from dataset comparisons. Interpretation of any differences between groups will help inform the literature.

Extracurricular activities with different demographics compared to the school have three possible influences on the results. The first possibility is that extracurricular activities might only appear to boost academic performance, while the higher academic achievement typically found among participants is better explained by a disproportionate number of academically high achieving students who decide to participate in extracurricular activities (Elpus, 2013). The second possibility is that participation in

these extracurricular activities may primarily benefit the academic achievement of students from poverty since participation may mediate differences between students with different levels of family income (Bodenberg, 2016; Marchetti et al., 2016). The third possibility is that participating in these extracurricular activities could help all students achieve higher academically even after controlling for prior academic achievement and other differences (Broh, 2002; Hsu et al., 2019). The current study examined the extracurricular participation status of students in relation to their academic achievement to add to the literature about whether students who participate in these extracurricular activities academically outperform nonparticipants after interacting with the microsystems associated with extracurricular activities. This study contributes to the literature because the design controls for previous academic achievement and examines whether an interaction between SES and extracurricular participation exists. If students from low-income homes benefit more academically than those from high-income homes, participating in extracurricular activities may help mediate some academic disparities between students from different socioeconomic backgrounds.

Possible Implications for Practice

This study could help school administrators budget and advocate for athletics and music ensembles within their schools. School administrators inherently face one significant concern with extracurricular programs across the country, their associated costs, putting these programs at risk of being cut (Major, 2013; Shaffer, 2019; Snellman et al., 2015). Since No Child Left Behind was passed into law, schools are evaluated primarily on student achievement in specific academic subjects (Major 2013). Administrators are often pressured to put all possible funds into programs targeting tested

academic subjects rather than extracurricular activities with increasingly limited budgets. The idea that the more money a school allocates to extracurricular activities, the worse the school's academic programs will be is a common and concerning idea (Bowen & Greene, 2012). In essence, some hold to a zero-sum theory where a belief exists that everything given to extracurriculars, whether time, attention, or money, will mean much less for academic efforts (Seow & Pan, 2014). Therefore, if the results indicate that athletics and music ensembles support students' academic growth after considering their prior academic achievement, the research could help school administrators justify allocating time and money toward these programs. Conversely, if the only reason students in extracurricular activities perform higher academically than other students is because higher achieving students self-select into these groups, then the justification for their existence should come from elsewhere. In that case, school administrators will have to rely on valuing extracurricular programs for reasons other than helping them perform better academically.

The outcomes of this study can also influence course selection for students. Each year many students are unsure of which classes to take, and the results of this study could help guide this decision-making process. If all students, especially those from low SES backgrounds, are academically developed significantly from these activities, then participation in school athletics or music ensembles over other elective options may be encouraged. This study could help inform the debate surrounding extracurricular program funding and justification and direct students in their course selections.

Process to Accomplish

Design

A quantitative, causal-comparative strategy was used for this study. Each hypothesis used a 4 x 2 factorial between-groups design with a covariate. The independent variables for each hypothesis were whether the student participated in athletics only versus school music ensembles only versus both versus neither and SES status defined by whether the students qualified for free and reduced-price lunches. The dependent variables included student achievement measured by the ACT Aspire Summative Assessment for mathematics, English, reading, and science for eighth-grade students from five Arkansas public schools.

Sample

The sample was scores from the 2018-2019 administration of the ACT Aspire Summative Assessments for mathematics, English, reading, and science from eighth-grade students in five Arkansas public schools. The sample for each covariate was corresponding scores from the 2015-2016 administration of the ACT Aspire Summative Assessments for mathematics, English, reading, and science for the same eighth-grade students. Data were requested from the Arkansas Division of Elementary and Secondary Education. Class rosters for the schools in the study were collected for performing music ensembles and athletic teams that were included within the school day, including band, orchestra, choir, football, basketball, volleyball, track, cross country, cheerleading/pom, and dance as defined by the course codes provided by each school. Stratified random sampling was used to select 45 students in each of eight groups based on participation (athletics only versus school music ensembles only versus both) and free and reduced-

lunch status. This sampling process ensured each subcategory had 45 participants, resulting in 360 participants.

The student demographic composition of each school varied. According to the Arkansas Division of Elementary and Secondary Education (2021b), the first school in this study during the 2018-2019 school year had 848 students across the sixth, seventh, and eighth grades. The school consisted of African American (2%), European American (48%), Hispanic-Latino (43%), Asian (1%), two or more races (4%), American Indian (1%), and Hawaiian-Pacific Islander (2%). The school consisted of a free and reduced-price lunch population of 44%.

During the 2018-2019 school year, the second school had 988 students across the sixth, seventh and eighth grades. The school consisted of African American (1%), European American (42%), Hispanic-Latino (51%), Asian (2%), Two or more races (2%), American Indian (1%), and Hawaiian-Pacific Islander (2%). The second school consisted of a free and reduced-price lunch population of 55%.

During the 2018-2019 school year, the third school had 873 students across the sixth, seventh, and eighth grades. The school consisted of African American (1%), European American (49%), Hispanic-Latino (46%), Asian (< 1%), two or more races (2%), American Indian (1%), and Hawaiian-Pacific Islander (2%). The third school consisted of a free and reduced-price lunch population of 63%.

During the 2018-2019 school year, the fourth school had 714 students across the sixth, seventh, and eighth grades. The school consisted of African American (47%), European American (40%), Hispanic-Latino (7%), Asian (4%), two or more races (1%),

American Indian (< 1%), and Hawaiian-Pacific Islander (0%). The fourth school consisted of a free and reduced-price lunch population of 47%.

During the 2018-2019 school year, the fifth school had 1,140 students across the sixth, seventh, and eighth grades. The school consisted of African American (46%), European American (43%), Hispanic-Latino (6%), Asian (< 1%), two or more races (4%), American Indian (< 1%), and Hawaiian-Pacific Islander (< 1%). The fifth school consisted of a free and reduced-price lunch population of 50%.

Instrumentation

The ACT Aspire Summative Assessments have been developed to determine student academic achievement. Since 2015, ACT Aspire Summative Assessments have been the required state summative assessment for Arkansas public schools for Grades 3-10 (Arkansas Division of Elementary and Secondary Education, 2021a). This assessment determines whether students are progressing adequately to be ready for career and college by measuring student achievement in English, reading, mathematics, science, and writing. Separate testing sections measure academic progress in mathematics, English, reading, and science.

The ACT Aspire Summative Mathematics Assessment for eighth-grade has 43-46 questions, with 29-30 questions being multiple-choice, 3 or 4 technology-enhanced, and 5 constructed-response items that assess levels one through three of the depth of knowledge framework. The ACT Aspire Mathematics Assessment for Grade 8 has questions about number systems, expressions and equations, ratio and proportional reasoning, geometry, and statistics and probability (ACT Aspire, 2020). This assessment's scores measure the dependent variable of mathematics achievement.

The ACT Aspire Summative English Assessment for eighth grade has 44-47 questions, with 33-35 of these multiple-choice and 0 to 2 technology-enhanced that assess levels one through three of the depth of knowledge framework. The ACT Aspire Summative English Assessment for Grade 8 has questions about writing production, language knowledge, and conventions of standard English (ACT Aspire, 2020). This assessment's scores measure the dependent variable of English achievement.

The ACT Aspire Summative Reading Assessment for eighth grade has 30-32 questions, with 20-21 of these multiple-choice, 0 to 1 technology-enhanced, and 3 constructed-response items that assess levels one through three of the depth of knowledge framework. The ACT Aspire Summative Reading Assessment for Grade 8 has questions about key ideas and details, craft and structure, and integration of knowledge and ideas (ACT Aspire, 2020). This assessment's scores measure the dependent variable of reading achievement.

The ACT Aspire Summative Science Assessment for eighth grade has 38-40 questions, with 23-24 of these multiple-choice, 3 or 4 technology-enhanced, and 5 constructed-response items that assess levels one through three of the depth of knowledge framework. The ACT Aspire Summative Science Assessment for Grade 8 has questions about the interpretation of data, scientific investigation, and evaluation of models, inferences, and experimental results (ACT Aspire, 2020). This assessment's scores measure the dependent variable of science achievement. The varied test questions from the four subject areas comprehensively assess student academic achievement.

Data Analysis

A 4 x 2 factorial between-groups analysis of covariance (ANCOVA) was conducted to address the four hypotheses. Hypothesis 1 was analyzed using a 4 x 2 factorial between-groups ANCOVA. The type of participation (participate in athletics only versus school music ensembles only versus both versus neither) and SES (free and reduced-price lunch or paid lunch) were the independent variables, and student academic mathematics achievement was measured by the ACT Aspire Summative Mathematics Assessment was the dependent variable. The covariate was the previous student academic mathematics achievement measured by a previous ACT Aspire Summative Mathematics Assessment.

Hypothesis 2 was analyzed using a 4 x 2 factorial between-groups ANCOVA. The type of participation (participating in athletics, music ensembles, both or neither) and SES (free and reduced-price lunch or paid lunch) were the independent variables, and student English achievement as measured by the ACT Aspire Summative English Assessment was the dependent variable. The covariate was the previous student academic English achievement measured by a previous ACT Aspire Summative English Assessment.

Hypothesis 3 was analyzed using a 4 x 2 factorial between-groups ANCOVA. The type of participation (participating in athletics, music ensembles, both, or neither) and SES (free and reduced-price lunch or paid lunch) were the independent variables. The ACT Aspire Summative Reading Assessment measured student academic reading achievement as the dependent variable. The covariate was the previous student academic

reading achievement measured by a previous ACT Aspire Summative Reading Assessment.

Hypothesis 4 was analyzed using a 4 x 2 factorial between-groups ANCOVA. The type of participation (participating in athletics, music ensembles, both, or neither) and SES (free and reduced-price lunch or paid lunch) were the independent variables, and student academic science achievement as measured by the ACT Aspire Summative Science Assessment was the dependent variable. The covariate was the previous student academic science achievement measured by a previous ACT Aspire Summative Science Assessment.

Summary

Better understanding the influence of extracurricular activities on academic achievement is crucial since these activities are a part of the American educational experience for most students. Students who participate in athletics and music ensembles are typically more successful overall than nonparticipants (Broh, 2002; Hsu et al., 2019; Im et al., 2016; Knifsend & Graham, 2012; Shaffer, 2019). However, debate exists as to whether participating in these ensembles develops young people toward success in school or whether more advantaged students self-select into these activities (Elpus, 2013). Better understanding of whether participation develops students academically beyond existing demographic differences is essential in correctly explaining the differences that may be found between the groups. Evidence exists that students from low SES backgrounds may be more academically developed by participating in these activities (Bodenberg, 2016; Marchetti et al., 2016). Bronfenbrenner's theory may explain the differences since these extracurricular activities have similar people and goals with students' academic classes.

The answers to these questions can influence activity funding and justification and student course selections. Chapter II uses ecological systems theory as a lens to view the relevant literature on extracurricular activities, school athletics, music ensembles, and SES concerning student academic success.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Human beings change physically over time; however, they develop psychologically, socially, and emotionally from interactions with other people, activities, and environments. Bronfenbrenner (1981) described how not only does each person, place, or activity influence a person but that those influences interact with each other to affect a person. Though school athletics and music ensembles may seem unrelated to school academic outcomes, these activities interact with academic influences such as the classes students take to affect the student's development uniquely. Students exposed to different systems change them into better informed, more well-rounded people.

The integration of athletics and music ensembles into American schools seems to aid students' academic excellence. Student-athletes and musicians perform better on average compared to their nonparticipating peers when comparing grade point averages, attendance, graduation rates, and test scores (Eason & Johnson, 2013; Lumpkin & Achen, 2015). Ecological systems theory indicates that two microsystems with overlapping people and goals can profoundly influence a person, as Eason and Johnson (2013) and Lumpkin and Achen (2015) suggested. Some studies have attempted to control for extraneous variables such as SES and have suggested that SES and the better academic achievement associated with high SES backgrounds may (Elpus, 2013) or may not (Broh, 2002) explain the differences typically found in comparisons of students who do and do

not participate in extracurricular activities. Students who self-select into extracurricular activities may be more academically adept students. As school athletics and music ensembles seem to correlate with higher achievement, school athletics and music ensembles may be able to defend their position within schools due to this association.

This chapter reviewed the literature concerning school athletics and music ensembles with a theoretical framework of ecological systems theory. Bronfenbrenner's ecological systems theory was introduced and then connected to extracurricular activities. This chapter included an overview of extracurricular activities, including school athletics and music ensembles, in connection with academics, as well as SES and how that factor influences the interpretation of the connection between extracurricular activities and academic outcomes.

Theoretical Framework: Ecological Systems Theory

Bronfenbrenner's ecological systems theory explains how interacting systems are the forces that influence people's development. Urie Bronfenbrenner was a psychologist by training and a professor of human development at Cornell University for much of his career (Zhou & Brown, 2015). Bronfenbrenner was known for his ecological human development model that people interact with other people, events, and societal forces to develop unique characters. People are shaped by settings, including family, school, peers, and forces that are more removed, such as the current state of the economy. Zhou and Brown (2015) stated, "Age is not the cause of development; it is just a frame of reference. More specifically, human development comprises interactions among various levels of functioning, from the genetic, physiological, and neurological to the behavioral, social, and environmental" (p. 60). The interactions people experience are not peripheral but

central to their development. Therefore, the types of interactions children have are fundamental in shaping them into whom they become.

Ecological systems theory is built upon different levels of interaction between the individual, such as a student, and everyone and everything else. Bronfenbrenner (1981) described how a person has different life domains—physical, mental, social-emotional, and spiritual—influenced by a complex series of interactions at different levels. The ecological model has four basic levels (see Figure 1): the microsystem, the mesosystem, the exosystem, and the macrosystem (Bronfenbrenner, 1981). The microsystem represents the different environmental influences that directly affect the student, such as that child's family, school, church, neighborhood, peers, and other people or institutions that regularly interact with that person. A student learning mathematics in school would have a microsystem with the teacher and students for that class.

The mesosystem is how the various microsystems influence a student's interactions with others. If those microsystems support one another, a different mesosystem exists than if the microsystems are at odds. A more positive mesosystem is created if similarities exist between microsystems, such as the same processes or people. If a student's mathematics teacher was also the student's basketball coach, the mesosystem would have more developmental potential since each of the two microsystems shared a significant figure, the teacher. Conversely, the more different and isolated various systems are, the more challenging the mesosystem is for that student. An exosystem influences the development of a student through events that do not come directly into contact with the student but influence people or institutions within the student's microsystems. If a family member gets in trouble at school or work, that

member may be devastated, upset, or angry, affecting the student who did not directly get into trouble, thus exemplifying a development through the exosystem. The macrosystem represents the larger sphere that influences a student, including cultural heritage, national and global economics, wars, and the age's zeitgeist. For example, the student's family may choose different outings should currency inflation rates be higher than normal and thus limit financial resources. Though students may not even be aware of these national or global events, their influence trickles down into more direct systems and shapes students into whom they will become. These interacting systems summarize Bronfenbrenner's theory.

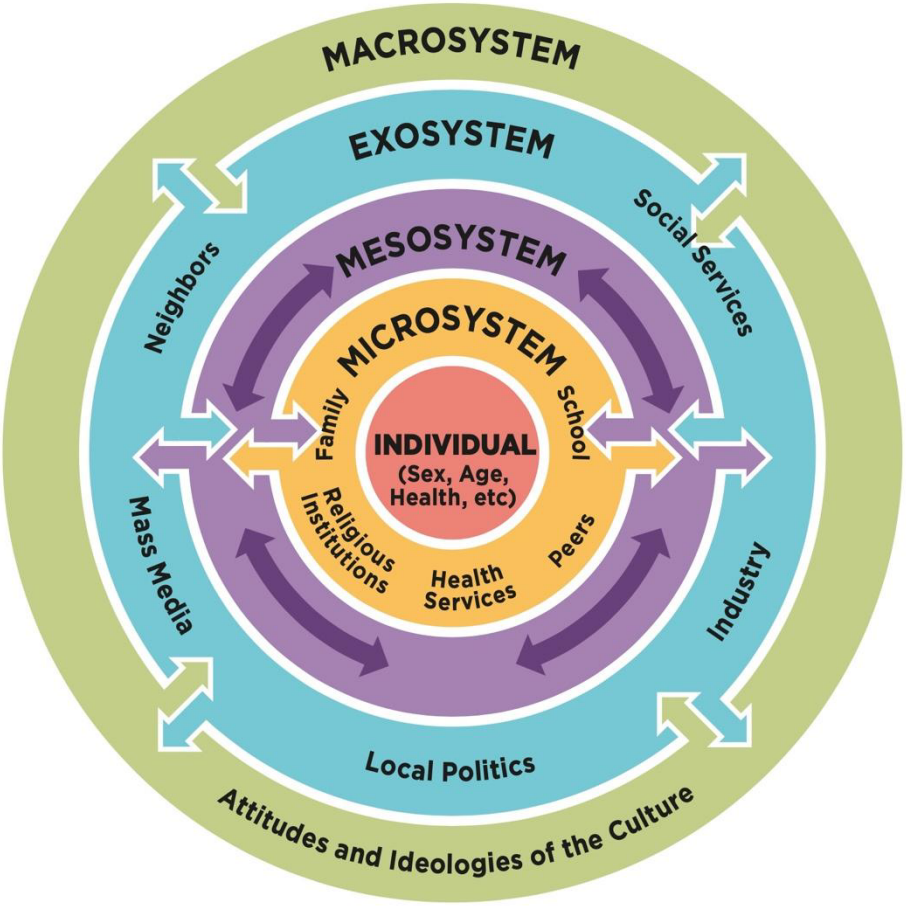


Figure 1. Ecological systems diagram republished with permission of The National Academies Press, from *Preventing bullying through science, policy, and practice,* Le Menestrel, 2016, p. 73; permission conveyed through the Copyright Clearance Center, Inc.

The connection between different microsystems can be significant. The interconnections between settings can be as influential to a student as events that happen directly to that student (Bronfenbrenner, 1981). Activities that are connected create a different developmental influence on a student than unrelated activities. A person who participates in multiple microsystems for a developing student is labeled by Bronfenbrenner (1981) as a *supplemental link* in the mesosystem. *Multiply linked* within

the mesosystem is a term that describes more than one person directly involved in multiple microsystems for a developing student. One catalyst for human development is sharing relationships across activities. Bronfenbrenner explained that developmental power is more significant in the mesosystem if the two settings agree on goals and mutual trust, which creates an additional supplemental link.

Further, the more supplemental links connecting the microsystems, the more the developmental potential of the student. For example, if a student is in the school band, the participants may also be in the student's academic classes, and the band the student's other classes also share a similar location. These links influence the student differently than if the student were participating in a community music group without the shared links. The combined power of two microsystems encouraging development towards similar directions sways a student more strongly than one system. Bronfenbrenner also described how at-risk groups benefit most from supplemental links since the difference in life experience is likely greater between these people and the microsystems in which they function compared to students from more privileged backgrounds, thus leading to more development. Students from less privileged backgrounds who have multiple microsystems with overlapping people and goals may improve their chances of success. Therefore, careful consideration should be given to the microsystems with which students engage and what and how systems interact.

Ecological Systems Theory and Extracurricular Activity Participation

Ecological systems theory applies to athletics and music ensembles in school because participation in these activities directly influences the students. Structured extracurricular activities help students create a sense of belonging at school. Participation

in extracurricular activities is linked to improved academic achievement (Broh, 2002; Catterall, 2012; Knifsend & Graham, 2012; Long, 2020). The microsystem of the extracurricular activity influences academic achievement through the interaction at the mesosystem level. This interaction may explain why students who participate in these activities often have higher academic achievement and other positive traits than students who do not participate. Structured extracurricular activities improve academic outcomes since students have positive interactions with adults and peers within an academic context, strengthening their alignment at the mesosystem level with the school's academic aims.

Extracurricular participation changes traditional expectations of student outcomes. Sedlacek and Adams-Gaston (1992) suggested considering college athletes as a nontraditional student group. Their research revealed that traditional predictors of success, such as the Scholastic Aptitude Test, did not have any predictive ability among specific subpopulations of athletes. In contrast, other factors, such as having strong supporters (who would be in their microsystems), predicted student athletes' academic success. More recently, Mackin and Walther (2012) found that students from disadvantaged backgrounds who participate in sports are significantly more likely to earn a college degree than those who do not participate, indicating that traditional expectations can be superseded. Students participating in sports with the type of support provided by team athletics exceeded expectations due to how the microsystems of their lives interacted at the mesosystem level. Possessing robust supportive systems may help those who succeed to succeed.

Agreement does not exist that the microsystems created by participation in extracurricular activities make a significant difference. Cheng Chuan et al. (2012) concluded that meaningful relationships with coaches and teammates are not statistically supported factors for the academic achievement of student collegiate athletes, while Chen and Harklau (2017) found that these relationships can even have adverse effects on academic achievement in certain instances. Cheng Chuan et al. (2012) determined that the learning environment and the support systems athletes had made a difference and that parent support was positively correlated with academic achievement. Eason and Johnson (2013) used qualitative methods to determine that students who participated in music were motivated to come to school and felt that skills learned in music transferred to other classes students had. This transfer of skills would be an example of one microsystem positively influencing another microsystem. Not all microsystems are equally influential to students who participate in extracurricular activities as evidenced by the varied findings. Therefore, caution should be taken not to assume that adding a microsystem will always make a significant difference in other microsystems in a person's life.

Some microsystems are foundational to academic success. Clark et al. (2020) found that when students perceive social support from peers and parents, they achieve higher academically and have traits consistent with grit, including perseverance and consistency. Finding the right supports for students can help them succeed. Ozaki et al. (2020) examined different microsystems within college students and stated that the support or lack of support perceived through these systems made significant differences in degree completion. Having positive connections may make the difference between a student persevering or giving up. Through qualitative interviews, Worthington (2019)

identified perceptions of what middle school students considered valuable in improving their academic success, and music ensembles and sports were two such supports identified in the study. Students understood that participation in these activities helped them achieve academically indirectly. Sports and music ensembles appear to be foundational microsystems that may help students succeed in all classes through their interactions in the mesosystem.

Youth feel connected to the school through extracurricular participation, preventing students from dropping out. Lumpkin and Favor (2012) ascertained that students who participated in athletics were less likely to drop out of school, with male athletes 12 times less likely to drop out. Therefore, extracurricular activities such as athletics and music ensembles may positively contribute to the overall purpose of public education by helping keep students in school and engaged. Students were observed by Long (2020) to have more opportunities to build social capital, a network of social connections, and a sense of belonging when participating in extracurricular activities, and the highest levels were noted among those in athletics. Opportunities for connections abound when students engage in extracurricular activities. Athletics and music ensembles create systems of interaction with students that positively change their academic trajectory.

Participation in Extracurricular Activities

Structured extracurricular activities are a hallmark of secondary student life in the United States. The National Federation of State High School Associations (2019) reported that 7,937,491 students in the United States participated in high school athletics. Approximately 15,400,000 high school students in the United States are in high school

(National Center for Educational Statistics, 2020), meaning that sports, not counting music ensembles, are a part of the life of more than half of high school students. Students find these activities valuable, as evidenced by such high participation rates. The National Federation of State High School Associations (2019) gathered participant data from more than 60 types of school-sponsored sports, with football, track and field, and basketball having the largest number of participants. Other sports had very few school-sponsored participants, such as cycling, rock climbing, and martial arts. Not all sports are equally influential to students due to varied participant numbers. Understanding the effect of these activities on the school's more central purpose of learning reading, writing, and mathematics is essential to informing school policy on extracurricular activities.

Structured extracurricular activities have been examined regarding various student ages and include music ensembles and sports participation. Students who participate in these activities achieve higher academically than students who do not (Broh, 2002; Hsu et al., 2019; Im et al., 2016; Knifsend & Graham, 2012; Shaffer, 2019). Abruzzo et al. (2016) found a positive correlation between participation in school extracurricular activities and academic self-concept through structural equation modeling. Participation in extracurricular activities is generally associated with better grades, likely due to this microsystem having an overlap of goals and people with the microsystem of school. Structured extracurricular activities include music ensembles, sports participation, and more.

Interscholastic sport and music ensemble participation are generally linked with higher academic performance, but other extracurricular activities are not necessarily associated with better academic performance. Broh (2002) reported that participants in

interscholastic sports and music ensembles achieved higher academically. However, cheerleading participant achievement levels were comparable to the general school population, and participating in intramural sports was associated with academic harm compared to nonparticipants. Therefore, the type of extracurricular activity that students participate in matters. Malik and Chohan (2020) studied newer types of less-structured, nonschool-based activities. They noticed that students who frequently played video games felt sleepy at school and had a feeling they would not perform well. Adverse academic outcomes from video games could originate from the lack of interaction in these microsystems' mesosystems with the microsystems associated with the school environment. Sports and music ensembles seem to build more robust support systems centered on school than other activities. Therefore, students participating in certain extracurricular activities, such as music ensembles or athletics, may be associated with positive outcomes, but other extracurricular activities may have adverse academic outcomes.

The comparison of sports to music is the subject of discussion. While both are good, sports are more strongly associated with positive academic outcomes than music ensemble participation (Broh, 2002; Long, 2020). The interactions within the mesosystem could be more robust for sports than music ensembles due to the frequently more significant time investments students make in athletics. Conversely, Abizada et al. (2020) and Im et al. (2016) concluded that fine art performing groups had higher academic achievement than sports participants. Empirical findings are inconsistent. Long (2020) suggested that more studies exist on sports participation since more students participate in sports than music or other extracurricular activities. Long found that educational attainment was higher among students participating in nonsport

extracurricular activities than those who participated in sports but that social capital was more strongly gained through sports participation. Neither sports nor nonsports are universally better. While disagreement persists about whether sports or music participation is better for academic performance, evidence suggests that engagement in one of these activities is associated with being stronger academically than not participating.

Using data from longitudinal studies is one way of examining relationships between extracurricular activities and academics. Shurluf (2011) conducted a meta-analysis on the 29 quantitative studies concerning extracurricular activities. Shurluf noted concern that some of the studies included in the meta-analysis had used the same longitudinal datasets to study extracurricular activities. These datasets may have biased results since little effort has been placed into interpreting missing data, and data from school transfers was disregarded. Thus, the results may be favorable for students who participated in extracurricular activities. Longitudinal datasets referenced in this dissertation were used by Broh (2002), Catterall (2012), Eccles et al. (2003), Elpus and Abril (2019), Fredricks (2012), Guest and Schneider (2003), Hsu et al. (2019), Long (2020), and Mahoney and Vest (2012) among others. These large datasets were valued in these instances since conclusions were more generalizable than examining a simple comparison. Elpus and Abril (2019) noted that using longitudinal data was necessary given that this type of data allows for the ability to control for previous academic achievement. Without access to these large datasets, conclusions may be drawn from simple comparisons that may result in incorrect conclusions. Since extracurricular activities are not easily studied through experimental and quasi-experimental methods, causal-comparative methods are typically used to study topics related to extracurricular activities, including longitudinal datasets, but whether this data accurately answers research questions is debated.

Extracurricular activities may have minimal influence on the academic success of students. Shurluf's (2011) meta-analysis found that middle school athletics affected retention, but other activities did not in middle school. Eighth-grade students might be more connected to the school through athletic participation than other extracurricular activities. Shurluf also concluded that sports were the most investigated form of extracurricular activity within the meta-analysis and suggested sports were associated with increased school retention, thus keeping students in school. However, the effect size (Cohen's $d = 0.31$) was low, while performing arts had no association with retention. Music ensemble participation may be less effective than sports participation, which may be less substantial than others have believed. Shurluf noted that though sports were associated with retention, causal evidence was not found due to methodological limitations of the meta-analysis studies. Jaschke et al. (2013) also noted similar methodological issues that plague research in music education. Extracurricular activities and academic achievement have a distinct lack of experimental and quasi-experimental studies that would provide the type of support needed for causal inferences. Though quantitative studies exist on extracurricular activity participation, their analysis shows weak results that may be biased from longitudinal studies.

Eligibility for Extracurricular Participation

Activities associations govern eligibility for participation in extracurricular activities. Bowen and Hitt (2016) believed that requiring basic academic proficiency for participation in interscholastic events helps athletics be a transformative force for students in encouraging them to be successful in their academic classes. Bronfenbrenner (1981) noted that when two microsystems share a common goal, the developmental power within the mesosystem is more substantial. By having athletics and school music

ensembles work towards higher academic achievement alongside the desires of the students' classroom teachers, students may achieve higher than they would have without this influence. Having guidelines set by a state organization helps shift the focus of directors, coaches, and students.

Eligibility guidelines clearly define basic academic proficiency for both musicians and athletes. The Arkansas Choral Directors Association (2019) stated that its members follow the guidelines of the Arkansas Activities Association. The Arkansas Activities Association (2021) and the Arkansas School Band and Orchestra Association (2021) require a student in the sixth, seventh, or the first half of eighth grade to have been promoted to the next grade for academic eligibility. Most students would be eligible to participate based on being promoted to the next grade level. Students in the spring semester of eighth grade and the fall semester of ninth grade must pass at least four academic classes (Arkansas Activities Association, 2021; Arkansas School Band and Orchestra Association, 2021). Beginning in the spring semester of ninth grade and continuing through graduation, students must keep a 2.0 grade point average and pass at least four academic classes to maintain academic eligibility (Arkansas Activities Association, 2021; Arkansas School Band and Orchestra Association, 2021). As students progress through each phase, academic expectations increase. During the last phase, students who pass four classes but do not maintain the 2.0 grade point average may be enrolled in up to two semesters of 100 minutes of weekly supplemental instruction program to help return the grade point average to a 2.0 (Arkansas Activities Association, 2021). This type of structured intervention helps refocus student participants on academic success. Ultimately, if students do not obtain a basic academic proficiency, they can still

participate in athletics or school music ensemble classes in most settings, but they cannot participate in interscholastic competitions.

Eligibility guidelines do include requirements beyond basic academic proficiency. The Arkansas Activities Association (2021) requires that junior high students be under 16 years old, requires that high school students be under 19 years old to participate, regulates the participation of students who transfer schools during the school year, prohibits students from receiving monetary compensations, prohibits teams from playing off-season games, and imposes other rules. These rules promote fair play. Through regulation, students are reminded of the necessity of academic success and are protected from excessive activities involvement.

Imposing academic eligibility requirements onto students seems to encourage athletes to be better students. Vidal-Fernández (2011) used the National Longitudinal Survey of Youth of 1979 and sought to determine if increasing the rigor of pass to play influenced the graduation rate. The graduation rate could conceivably lower with added academic eligibility requirements. If sports were the only reason a marginal student was still in school, not meeting the academic eligibility requirements could contribute to the student dropping out of school, thus reducing the graduation rate. Vidal-Fernández found that for every added subject needed to pass to play, male graduation rates rose 2%. Increasing academic eligibility requirements seemed to encourage student-athletes to try harder in school; however, eligibility requirements for high school students have remained similar for decades. Gard (2017) compared high school eligibility requirements between 1995 and 2014 and discovered that 74% were comparable, with seven schools relaxing the requirements and six increasing requirements. Efforts to promote the

academic success of student-athletes were supported by schools and legislatures but not pushed beyond the initial rate. By contrast, Gard described that during that same timeframe, the NCAA changed requirements from 11 specified core classes to 16. Increased NCAA requirements have led to increased academic success of collegiate athletes, with a notable increase among African American males (Brown & Williams, 2019). The NCAA increased academic requirements to ensure athlete success in college. High schools have not increased academic eligibility requirements as the NCAA has, even though higher requirements may help athletes be better students.

Quantity of Extracurricular Activity

The question of how much extracurricular participation is needed to achieve positive academic outcomes has been a topic of debate. Adolescents spend more than half of their waking hours in leisure, mostly watching television or spending unstructured time with friends (Eccles et al., 2003). Using a large, longitudinal dataset, Hsu et al. (2019) determined that 6-15 hours per week led to statistically better academic outcomes for students, and 1-5 hours per week was statistically similar to the rest of the student population. Participating was not enough as students had a minimum number of hours to meet. This minimum time requirement could relate to Bronfenbrenner's ecological systems theory, suggesting that activity with minimal time requirements does not significantly influence the student. Therefore, more participation may be better. Students' minimum hours to participate to get the educational benefits from extracurricular activities may be at least 6 hours per week.

The upper limit of participation in extracurricular activities for positive academic benefit is also debated. Fredricks (2012) concluded that the more activities and the more

hours a student participated, the better their academic outcomes would be until a student participated in seven or more activities with a combined number of 14 hours or more weekly, past which academic performance declined. Fredricks reported that this extreme level of participation only pertained to 7.2% of students in his national dataset; however, 21% did not participate in any extracurricular activity. While some students may participate in activities so much that this intense involvement harms their academic performance, perhaps more students would benefit from engaging in a moderate level of extracurricular activities. The concept of some participation being helpful but too much participation being harmful is known as a threshold framework (Seow & Pan, 2014). Mahoney and Vest (2012) ascertained that only 6% of students weekly participated in 20 or more hours of extracurricular activities. Mahoney and Vest (2012) and Manuel (2018) contended, unlike Fredricks (2012), that participating in this large number of hours per week did not result in adverse academic effects for these students. Mahoney and Vest (2012) said the results also suggested that participation in extracurricular activities in high school was associated with positive adult indicators such as psychological flourishing, volunteering, and educational attainment. More participation may be positive or negative. Evidence is divided on whether an upper limit to the benefits of participating in extracurricular activities exists.

Perhaps the number of activities is important. Rather than looking at the number of hours per week as Fredricks (2012), Mahoney and Vest (2012), and Manuel (2018) did, Knifsend and Graham (2012) examined the curvilinear relationship of extracurricular activities to different qualities. They determined that two different activities are the optimal level of extracurricular participation. They determined that too many activities

may confuse students' sense of identity and take away from time students could study, and too few activities may not give them a sense of belonging. The number of microsystems students engage with varies by the number of extracurricular activities. Two activities may be the optimal number for interacting with academic studies at school. As students participate in more activities, academic success ensues until participation increases and diminishes results.

Limited results indicated that a small percentage of students take sports to an extremely high level of participation, resulting in academic harm. Chen and Harklau (2017) followed an academically and athletically promising Latino male named Ricardo for over 5 years. Ricardo possessed a consistent career vision to become an engineer like his grandfather and proved his potential by winning local competitions related to engineering and being a part of the architecture club. However, Ricardo was also a talented soccer player, ranked sixth in his state his senior year, which ultimately kept him from being an engineer. He, alongside his coaches, prioritized community colleges where he might get a soccer scholarship but not be able to study engineering. Ricardo also missed opportunities to earn a competitive grade point average, such as asking the teacher questions after class or tutoring since he was expected to be at practice immediately after school. Ricardo ultimately received no soccer scholarship and no opportunity to study engineering, thus losing both dreams. This finding that extreme participation can hurt academic outcomes agrees with Fredricks' (2012) findings. Therefore, as seen with Ricardo, participating in extracurricular activities to an extremely high level can potentially lead to detrimental academic outcomes in contrast to the positive outcomes

reported with more moderate participation. This academic harm seems to come from genuinely having inadequate time for academic studies and shifting priorities.

Funding of Extracurricular Activities

School budgets are often publicly debated since needs in education are more significant than the available resources can adequately meet. School districts have smaller budgets due to reductions in state funding in parts of the country, such as Kansas, and have to justify athletics expenditures (Lumpkin & Favor, 2012). Music programs are among the first to lose funding when money issues arise (Slaton, 2012). As time has progressed, budget constraints have grown even higher, and these program directors must advocate for themselves to remain funded. Major (2013) noted that music programs had been cut from school budgets, especially in elementary schools in several states, due to government entities' focus on standardized testing. Major also described how one school preserved music despite funding limitations due to the school leaders' vision of a well-rounded child. Learning music shapes children in significant ways beyond possible academic associations. Bowen and Greene (2012) determined that schools with successful athletic programs also have successful academic achievement from students not involved in athletics. Furthermore, limited resources are split between athletics and academics in most school districts. They found that more successful athletic programs required more money from the academic budgets, but the loss of funding in academic departments to successful sports programs did not harm the academic reputation of schools (Bowen & Greene, 2012). Therefore, including sports and activities in the school budget does not necessarily harm academic outcomes for students not associated with sports. This information may suggest that budget concerns should not limit sports

offerings as academic programs can thrive alongside successful, funded athletic programs.

While cutting extracurricular programs might seem to be a way to save money, the reality is more complex. Music ensembles and school athletics within the school day potentially save school districts money as the class sizes are traditionally much larger than other elective classes meaning more staff would need to be hired if these programs were dissolved (Earnhart, 2015; Major, 2013). Therefore, though costs exist associated with the programs, hiring additional staff to teach other elective courses where class sizes are limited could lead to more significant budget problems. Cutting athletics or music ensembles might affect staffing in potentially costly ways.

Funding extracurricular activities from money that could otherwise be spent directly on mathematics or reading instruction has become a debated topic. Shaffer (2019) said that funding is the most frequent reason extracurricular programs are cut in American schools. If sports, music, and other activities do not contribute to the school's central mission, schools may not allocate money towards these programs. The National Federation of State High School Associations (2021) reported that during the 2019-2020 school year, the second-, third-, and fourth-largest school districts had an activities budget that was millions of dollars; however, in these districts, the total amount of money spent on activities totaled less than 1% of the operating budget. While some districts spending millions of dollars on athletics may sound egregious, this amount of money may be relatively small compared to the overall budget, and the potential benefits may outweigh the costs. The unique interactions created by athletics influence students in

significant ways. Therefore, potential benefits are harder to argue against, considering the small overall budget percentage.

Benefits of Extracurricular Activity Beyond Secondary Academic Achievement

After students graduate from high school, the benefits of having participated in structured extracurricular activities continue. These students are positively associated with desired adult indicators such as psychological flourishing, volunteering, and educational attainment (Catterall, 2012; Mahoney & Vest, 2012). Adults with these qualities are the types of healthy adults communities desire, thus providing more reasons to support extracurricular activities. Cost-benefit analysis of extracurricular activities should consider the positive implications years after students complete secondary education.

Soft skills learned in extracurricular activities have benefits for students. Students recognize that participating in extracurricular activities benefits them on resumes for competitive jobs; employers recognize that participants may have specific soft skills such as teamwork, collaboration, and the ability to deal with stress that are valuable in the workplace (Roulin & Bangerter, 2013). Evidence suggests participants are indeed employed more often as adults (Gorry, 2016; Lechner & Downward, 2017). These students are advantaged because extracurricular microsystems align with goals important to the microsystem of work, thus exerting more power in the mesosystem on their development. Extracurricular activities may help students get better jobs compared to students who do not participate in these activities.

College music ensembles might seem to detract from academic success due to time requirements; however, college classes and music ensemble participation seem to

positively influence academic outcomes. Student participation in collegiate extracurricular activities is associated with success in college, as evidenced by higher grade point averages (Bakoban & Aljarallah, 2015), student self-perception of learning better (Yildiz, 2015), and reports of reduced depressive symptoms from instances of racism among minority groups (Billingsley & Hurd, 2019). Though the exact mechanisms may not be understood, participating in these activities helps academically and emotionally. The resulting interaction of microsystems, as proposed by Bronfenbrenner, somehow changes the child. Though not explicitly focused on music ensembles and athletics, Urlings-Strop et al. (2017) examined the connection between the academic success of medical school students and whether, before admission or during medical school, they participated in a broad range of extracurricular activities. Urlings-Strop et al. concluded that participation in extracurricular activities was a strong predictor of success in medical school, especially the clinical phase, and could even better predict success than traditional admissions criteria. Having the opportunity to contribute to a productive activity helps students be better in unrelated areas. Therefore, university students should consider participating in extracurricular activities to maximize their university experience academically and beyond.

Participation in School Athletics

A History of American School Athletics

Athletics in public schools were rare until the early 20th century. The challenges associated with compulsory education and fears of global war spurred a national interest in student fitness. Bowen and Hitt (2016) noted that before founding the Public School's Athletic League in New York City in 1903, most sports were not formally organized by schools outside

of boarding schools. Compulsory education, combined with the extra leisure time now afforded to students from working-class families, led to the rise of athletics as a wholesome way to spend time and keep students connected with school (Bowen & Hitt, 2016). School leaders were trying to find ways to engage youth who previously would have dropped out of school. Luther Gulick, a founder of the athletic league in New York Public Schools, advocated athletics as helping students learn high corporate morality and group consciousness that were not taught in traditional academic classes (O'Hanlon, 1982). Gulick had a vision for school athletics to solve other societal problems, such as gang issues and truancy, through values learned (Ladd & Lumpkin, 1979). Compulsory education and school sports combined to help connect Americans to opportunities and each other in a way that neither one could accomplish independently. Sports became a part of the American education system to address societal concerns and keep students engaged.

Fear of global war also contributed to the adoption of school athletics as a better alternative than requiring American students to undergo military training. When World War I began in Europe, a debate took place between sports and military training in schools as to which would be best for American youth, knowing that the United States could become entangled in the war. O'Hanlon (1982) noted that legislation was passed to promote military training in the early stages of this debate. In 1916, the New York State legislature passed the Slater Bill that required men from ages 16 to 19 to participate in up to 3 hours of required military training, and the Wyoming Plan created a similar but gamified version of required military training that involved training units who would compete against each other (O'Hanlon, 1982). Legislators across the country wanted to ensure that American youth were prepared should war involvement become a reality. While the military training advocates possessed these early legislative

victories, a committee on military training from the National Education Association made a recommendation in 1917 that schools adopt physical education. However, this committee directly opposed physical education taking the form of military training (O'Hanlon, 1982). Captain Koehler of West Point supported the concept that athletics would naturally lead to students being ready to become soldiers (O'Hanlon, 1982). Sports seemed a better solution than military training and would accomplish similar physical exertion, cooperation, social connection, and following directions as well as help unify students behind a productive unit rather than a destructive gang. Attempts at requiring school-aged children to participate in weekly military training unexpectedly helped accelerate the adoption of athletics in schools.

Interscholastic sports quickly became more organized and more competitive. Some student athletic teams were initiated and managed by students at the beginning of the 20th century, but schools began to take control of these teams as interscholastic competition became more formalized, with all but three states having a state athletics association by 1924 (O'Hanlon, 1924). The National Federation of High School Athletics Association was formed in 1923 to help standardize rules and organize sports (Ladd & Lumpkin, 1979). Students and schools embraced sports and the competitive excitement. The formalization of sports and physical education in schools laid the foundation for the current school athletic reality.

Early school sports were predominantly opportunities for male students. Vidal-Fernández (2011) found that while boys' participation rates in athletics were 50% throughout the 1970s, girls' participation rose from 5% to 25% due to the passage of Title IX. The significant, rapid increase in female sports participation determined that their lower participation rates were not from lack of desire. Coleman (1961), a critic of school athletics, found among 1960s Chicago suburban youth that students would rather be star athletes than students with good grades and

noted that schools would host a pep rally for athletics but not academics. Whether sports ultimately help or hurt academic success has been a concern since student bodies, parents, and educators often focus on sports. Title IX provided an opportunity to examine the effect of sports on academic outcomes and contributed to a significant increase in the number of female students who went to college and joined the workforce (Bowen & Hitt, 2016). This sudden change in educational practice by creating equity between genders helped provide evidence of the benefits of athletic participation. Regulating gender equality worked and continued to empower females to participate in school sports.

School-sponsored athletics is not a global practice. European youth sports happen entirely outside of school, and Ripley (2013) noted that Finland and Singapore did not have school sports and had higher academic performance than American schools. Even though schools in the United States almost universally sponsor athletics, the distinct lack of this practice in other parts of the world can cause debate about whether school sports should or should not continue. One advantage to having school-sponsored sports in the United States is that schools can require students to meet minimum grade point average in order to play sports, which was a movement that began in the 1970s, compared to nations in which sports leagues have no affiliation with schools (Bowen & Hitt, 2016). American school sports provide academic motivation now, similar to how schools in the early 1900s engaged students through sports to help increase high school graduation rates. Though school sports may not be practiced in other parts of the developed world, Americans have fully embraced sports as part of secondary school life over the past century.

School Athletics and Academic Achievement

Participation in school athletics is associated with higher academic achievement. Students participating in athletics achieve higher academically than students from the general student population (Bodenberg, 2016; Broh, 2002; Eccles et al., 2003; Fredricks, 2012; Guest & Schneider, 2003; Lumpkin & Achen, 2015; Lumpkin & Favor, 2012). As Bronfenbrenner predicted, having a robust and positive microsystem in students' lives, such as athletics, means students are more likely to succeed in school, as noted by their class grades and standardized achievement scores. Additionally, the effects of athletic participation include students possessing high levels of social capital (Long, 2020) and having higher levels of leadership, control of time, student emotion, and goal-setting (Düz & Aslan, 2020). Schools with higher athletic participation rates also had fewer major crimes or suspensions (Veliz & Shakib, 2012). However, athletes were more likely to drink alcohol than peers (Eccles et al., 2003). Primarily positive, but some negative associations with athletic participation exist. Higher academic achievement is a foundational goal of schools, and athletics may help schools fulfill that mission.

Sports, representing different athletic groups, are common activities among students. Lumpkin and Achen (2015) and Veliz (2019) noted that athletes outnumber the number of nonathletes among teenagers. Students continue to demonstrate the value sports have in their lives by choosing to participate. Veliz (2019) examined the 15 most popular sports and found that basketball had the most participants nationwide for male and female teenage athletes between 2011 and 2016. Furthermore, football and baseball were second and third in popularity for males, and volleyball and soccer occupied second and third place for females (Veliz, 2019). Males and females have different sports preferences. The variety offered by sports may contribute to its popularity as an extracurricular activity.

Comparing athletes to nonathletes using different academic metrics leads to the conclusions that athletics could positively affect student achievement. Bodenberg (2016), Lumpkin and Achen (2015), Lumpkin and Favor (2012), and Veliz (2019) compared athletes versus nonathletes and concluded that athletes have higher grades without controlling for prior academic achievement. If no covariates are used to control other essential variables such as prior academic achievement or SES, athletes commonly outperform their nonathlete peers. Lumpkin and Favor (2012) compared athletes and nonathletes from across the state of Kansas using reports on more than 139,000 athletes. They found that 80.5% of athletes had a grade point average of over 3.0 versus 69.5% of nonathletes, and the mean graduation rate of athletes was 98% compared to 88% for nonathletes. Results also indicated that Black athletes had a graduation rate of 97% compared to Black nonathletes' graduation rate of 69.5%, and male athletes were 12 times less likely to fail to complete school than nonathlete males. Lumpkin and Favor suggested that athletics could be a powerful intervention for traditionally underperforming populations.

While the academic excellence of athletes is robust in most measures of academic success, some studies have been found athletes to fall short of their peers who do not participate in athletics in some specific comparisons. Lumpkin and Favor (2012) revealed that athletes in Kansas scored higher than nonathletes on ACT mathematics and science assessments, but the reverse was true for the reading assessment. Similarly, Broh (2002) found that athletes compared to their nonathletic peers scored higher in English and mathematics classes and mathematics standardized testing but not better on reading standardized testing. Athletes scored higher on the Kansas state assessment in all academic areas tested. These findings support athletes being excellent students. Lumpkin and Achen (2015) replicated the findings from Lumpkin and Favor

(2012) using more comprehensive data from the Kansas Department of Education and found that athletes compared to nonathletes had higher attendance rates, graduation rates, better test scores, and other positive results. The replication from 2015 reinforced what was found in 2012. Overall, athletes seem to outperform their nonathlete peers on average.

The demographic composition of athletic teams may be responsible for much of the difference found between athletes and nonathletes. Shifrer et al. (2015) supposed that most of the benefit of sports is accounted for by more advantaged students participating in athletics. Veliz (2019) similarly found tennis to have among the top achieving students and also to be among the highest SES classifications. However, after controlling for these demographic differences with propensity modeling techniques, Shifrer et al. (2015) discovered an advantage for college attendance rates after participation remains for all populations except Black females. Demographic differences explain part of the difference, but a developmental difference still occurs from participating in these activities. Demographics should be a consideration when examining any outcomes related to athletes versus nonathletes.

Nuances in School Athletics Participation and Academic Achievement

Student-athletes and academics have different associations depending on subpopulations. Guest and Schneider (2003) observed that athletes had improved academic performance and noted that academic expectations were higher for student-athletes than the regular school population in schools situated in impoverished settings. This difference did not exist in schools in more affluent areas, perhaps due to higher academic expectations for students in general. Athletics in schools with students predominantly from low-income households may encourage higher grade point averages differently than athletics in a school with predominantly students from higher-income families. Kedzior (2016) examined the effect of extracurricular activities on

special education student reading scores and, contrary to expectations, found no difference between the students in special education who participated in extracurricular activities and those who did not. The achievement of students with special education needs may not be affected in the same way as other students due to the accommodations and modifications required for students with special needs. Shoval et al. (2021) compared athletes by gender and determined that sports participation helped females but hurt males regarding academic achievement. Benefits from sports may vary by gender, with males not benefitting in the same way females do. Therefore, statistical interactions are possible in different subpopulations such as SES, special education status, and gender.

Athletes from different types of sports have different academic outcomes. Veliz (2019) used a national dataset comprising 114,996 athletes and compared 15 popular sports to each other and against nonathletes. Though not on the top third of the list for sports popularity, cross country, tennis, and lacrosse players had the highest grade point averages, the highest desire to enroll in college, and the highest percentage of athletes volunteering in volunteer work of the 15 sports (Veliz, 2019). Gorry (2016) found team sports, regardless of the school poverty level, superior to individual sports, often associated with more affluent schools. Gorry determined that while team and individual athletes have better grade point averages than nonathlete students, only team sports players are more likely to graduate, have employment after graduation, avoid being on welfare, and earn higher salaries. Perhaps the direct influences from the microsystem of team sports more powerfully develop a person into someone who can find academic and vocational success. Lechner and Downward (2017) found that community athletics are also associated with higher earnings and are negatively linked to unemployment. Athletes are more likely than nonathletes to have better grades, have an average grade of A, be more likely to plan

on attending and graduating from college, and study more than 10 hours per week outside of school hours (Veliz, 2019). However, male nonathletes were less likely to get suspended or sent to the office for misbehavior than their male athlete peers, but female athletes, compared to female nonathletes, were less likely to get suspended or sent to the office for misbehavior (Veliz, 2019). Academic metrics for athletes are favorable but not necessarily for behavior metrics. Athletes who rank highest on some of the measures of academic success may participate in less popular, individual sports, often associated with schools in affluent settings; however, team sports also seem beneficial.

Athletes may not be different from nonathlete students in all subject areas. Abizada et al. (2020) concluded that among ninth-grade students in Azerbaijan, mathematics scores were the same for athletics and performing fine arts and the general student body; however, Abizada et al. tabulated that in language, athletics participants scored lower than the general student body, and the performing fine arts participants scored higher. Athletes performed worse in language but not in mathematics. These findings are consistent with Lumpkin and Favor (2012), who found that athletes scored lower than the general student body in reading on the ACT. Some fluctuation in outcomes may be from different subject measures being used to determine academic proficiency and achievement.

Participation in School Music Ensembles

A History of American School Music Ensembles

Music education in the United States is known for producing sophisticated bands, choirs, and orchestras, but the origins of music education began before the founding of America. American schools' music training dates back to 1709; however, school training in music was not typical. When music instruction was in schools, this instruction was in

private schools (Humphreys, 2015). The opportunity to learn music was reserved for those of wealth. Birge (1937) described how singing schools began to spread throughout the United States during the 1700s, one of the first types of musical training in America and the primary mode of instructing people in music for a century. Music was taught in the evening rather than in school. Singing schools introduced the public to music education.

Vocal music ensembles were the first type of music ensemble to spread among public schools. Birge (1937) described how people in the early 19th century believed that musical training was only possible for a select group of people who demonstrated an aptitude for music. However, Lowell Mason, who is often known as the father of American music education, believed that all students could learn music. In 1837, Mason volunteered to teach in a school in Boston to prove that public school students could learn to read music and sing; the success of his efforts led to Boston schools formally adopting vocal music into the school system's curriculum (Birge, 1937). Vocal music instruction thus began to spread throughout school districts across the United States as other educators were in contact with Mason and wanted to raise the issue of music within their districts (Birge, 1937). Humphreys (2015) noted that while Mason was undoubtedly influential in starting music education within schools, he would not have been able to have the same influence without the common school movement in Boston. The common school movement brought education to students who had not traditionally received education and expanded the curriculum offerings of the schools. Mason’s efforts to add music came as other significant curriculum changes were considered. Though Birge is the guru in early American music education, Birge’s narrative of music education has rarely

been challenged and perhaps should be challenged (Humphreys, 2015). Mason's accomplishments, while significant, were part of a more extensive system of changes happening in Boston schools at that time. Nevertheless, Boston schools and Lowell Mason pioneered the opportunity for all students to access vocal music in public schools, which helped accelerate the adoption of music in schools across the country.

Orchestras were widely adopted by schools before the wind bands that later became more popular. The New York Philharmonic Orchestra was founded in 1942, and orchestras from Europe also began touring the United States (Humphreys, 1989). These orchestras entertained people and created a following for orchestral music. Schools began organizing orchestras, with a Richmond, Indiana school being the first on record to award academic credit for orchestra participation in 1905. Orchestras remained more prevalent in schools than wind bands before 1920, with a survey from that year indicating that 278 of 359 cities had school orchestras. However, only 88 cities had school bands (Humphreys, 1989). Schools began to differentiate programs from only offering vocal music that had been dominant since the introduction of music into public schools in 1837. The 1920 Music Supervisors National Conference included a demonstration of the effectiveness of class instruction on the violin that popularized instrumental music education even more as class instruction allowed a teacher to instruct an entire group in the initial stages of learning an instrument, which was more efficient compared to the individual lessons that were common before this time (Humphreys, 1989). Improving the efficiency of instruction allowed for the scaling of programs that were once constrained by the amount of time music teachers could provide individual lessons. As orchestras in schools and their methods matured, a foundation for teaching band in school was created.

Bands in schools quickly grew in number due to the prominence of professional touring wind bands of the late 19th and early 20th centuries. Military bands were the original wind band in America and were present in the Revolutionary War with six to eight musicians, primarily on woodwind instruments (Humphreys, 1989). By the time of the Civil War, brass instruments had displaced the woodwind instruments in military bands following the invention of valves that allowed brass instruments to play the full chromatic scale (Humphreys, 1989). Integrating bands into the military throughout major conflicts has always been part of the American war experience. At the turn of the 20th century, professional wind bands toured the country being led by famous bandmasters such as Patrick Gilmore and Philip Sousa, and many towns had bands; however, wind bands began to lose popularity as the radio and other forms of technological entertainment became more widespread in the 1920s (Humphreys, 1989). Entertainment choices evolved with technological innovation. Though the professional groups lessened, they did not disappear before changing school music offerings.

School bands were initially created as a response to the popularity of wind bands during this time in history. Band instrument manufacturers, concerned about declining sales due to the lessening in popularity of town bands, hosted a national school band contest in Chicago in 1923 that generated enthusiasm for band, and annual competitions soon became a core part of American school bands that continues (Humphreys, 1989). School bands have become a standard part of American schools by adding a competitive element to music performance. Elpus and Abril (2019) found that 11% of all high school students participated in band, 2% in orchestra, and 13% in choir. These numbers suggest that music ensembles in schools are still popular and influence students' lives. Though

initially created as a response to the popular music of the early 20th century, these music ensembles persist. Understanding the influence of these music ensembles on academic achievement within modern education can help better understand their value beyond creating music.

School Music Ensembles and Academic Achievement

Participation in music ensembles at school is linked with higher academic achievement compared with students who do not participate. James (2021) suggested music was a better school intervention than teaching the basics of computer programming, a trending requirement in secondary education. Participating in music ensembles is associated with excellent academic outcomes (Broh, 2002; Courson, 2018; Eason & Johnson, 2013; Eccles et al., 2003; Im et al., 2016). Since students have music ensembles as a positive influence on their lives, students in music groups had higher standardized achievement scores or grade point averages than those who did not participate. Direct comparisons between school music participants and nonparticipants yield seemingly excellent results, with the music students having better test scores (Eason & Johnson, 2013; Thornton, 2013), better attendance, better graduation rates, better grade point averages, and fewer office referrals (Eason & Johnson, 2013). Student musicians possess attributes desired by schools. The documented benefits of music ensemble participation extend beyond secondary academic performance and are also associated with higher educational aspirations and attainment (Long, 2020). Students who participate in these ensembles will likely attend and complete college at higher rates than those who do not participate. These benefits from academic achievement to postsecondary success may justify maintaining and advancing performing music groups within schools.

Research related to music and academic achievement suffers from the flaws inherent in using existing groups as opposed to randomly assigning participants. While experimental research designs are robust in determining effects from an intervention apart from covariates, most music and academic achievement studies are causal-comparative in research design strategies, such as Elpus (2013) and Broh (2003), since experimental designs are logistically challenging. Costa-Giomi (2004) conducted one of the only experimental design studies with music and academic achievement. Costa-Giomi randomly assigned 117 families with children who had not had music instruction, had no piano, and had a total annual family income of less than $30,000 to an experimental group with piano instruction or a control group for 3 years. After the second year, results among the musicians were of statistical significance for improved cognitive abilities and spatial scores; however, these results had a small effect size and disappeared by the third year. Costa-Giomi argued that benefits from music instruction were much smaller than previous research has suggested. Thus, Costa-Giomi concluded by recommending caution from the music education community on touting the cognitive benefits of music. Other factors, such as the unique interactions among microsystems in music ensembles instead of private music lessons, may cause the increased academic performance observed by others. This research on music and academic achievement with authentic experimental design suggests different results than many causal-comparative studies.

Perceived gains in academic performance from participation in music ensembles may come from preexisting differences before embarking on music studies or from the intervention of participating in music. Courson (2018) found that students who participated in band or choir for 12 continuous semesters scored significantly higher on their composite ACT scores than the regular student body. Courson also concluded that participation in music ensembles was

associated with improvements to brain development in verbal memory, visuospatial abilities, cognitive development, and overall intelligence. Music ensemble participation aided academic success. Eccles et al. (2003) noted that the students' grade point averages in performing arts were statistically similar to nonparticipants in 10th grade, but students in performing arts had statistically better grade point averages by their 12th-grade years. Measurements in later grades might be needed to reveal statistical differences. Conversely, Elpus (2013) determined that students entering into music groups do not perform better than nonparticipants after controlling for previous academic achievement, SES, and receipt of special services. Music ensembles are composed of demographics different from the larger student body, leading to higher scores from existing differences rather than participation in the ensemble. Elpus and Abril (2019) determined that band students and orchestra students were significantly different from nonparticipating peers in academic achievement. As test scores increased, the likelihood of that student enrolling in a music ensemble also increased for all ethnicities except for Black students who were inversely related. Kinney (2008) further indicated that students in instrumental ensembles scored higher on standardized testing before entering an instrumental ensemble. Students continued to score even higher, suggesting that better students choose band and not that band makes students better. The intervention of music ensembles on academic achievement may be inconsequential. Music ensembles may attract a specific subset of the population that would score higher academically regardless of whether music ensembles were an option or not.

Instrumental Ensembles Versus Vocal Ensembles in Schools

Resource availability can be an influential factor in the quality of some music ensembles but not others. Frey-Clark (2015) concluded that schools with high state achievement test scores also had bands and choirs that achieved higher musical achievement. However, when Frey-Clark

(2015) disaggregated the data between choirs and bands, no statistical difference was found in choir musical achievement between different school-wide SES levels, similar to what was found by Kinney (2019) and Elpus and Abril (2019). However, bands performed better as the school-wide SES level improved. Perhaps choir performance is not influenced by the availability of school resources, but band may be highly dependent on the school having adequate resources due to the associated costs of instruments and other equipment. School demographics predict school music ensemble quality. Schools with students predominately from affluent backgrounds outperform schools primarily serving students of poverty, likely due to a disparity of resources.

Students participating in instrumental music ensembles may academically outperform students in vocal music ensembles. Kinney (2019) determined that reading and mathematics achievement was higher for students who participated in instrumental ensembles than those in the choir. Kinney (2019) and Elpus and Abril (2019) ascertained that the demographics of choir regarding SES were more representative of the general student body than band and orchestra, which may explain the difference in achievement. Students studying instrumental music may possess attributes different from the typical student population, whereas vocal music student attributes appear to be more representative of the student population. Elpus and Abril (2019) suspected that vocal music students are more like the general student population since the entrance requirements do not typically require previous experience or a financial commitment. However, bands and orchestras frequently require previous experience, financial commitment, and typically have a less culturally responsive music selection. Since choir students reflect the overall school population better than band or orchestra, choir students reflect the overall school achievement better than band or orchestra, which requires commitment over the years.

Therefore, the differences between music student achievement and the regular student population may be better explained by the higher achievement held by instrumental music students.

Socioeconomic Status, Academic Achievement, and Extracurricular Activities

One covariate that confounds research into extracurricular activities is SES. SES is one of the strongest predictors of educational success though the specifics of why are often debated (Albert et al., 2020). Children from lower SES backgrounds have less educational attainment when compared to peers from groups of higher SES homes. Using Bronfenbrenner's ecological systems theory as a lens, a family's economic status is a microsystem that has significant interactions with the student. Students from homes of poverty are more likely to be subjected to significant life stressors and have less mental stimulation, contributing to the abovementioned gap. Verbal ability and executive functioning are strong predictors of achievement independent of SES. Neurocognitive functioning may explain some of the achievement gaps between SES levels. Albert et al. (2020) determined that executive functioning differences between different SES groups explained 17% of the variance in reading and 37% of the difference in mathematics, suggesting that better understanding the neurocognitive challenges of students from low-income homes can help educators better close the achievement gap. The brain develops differently in the different types of lives experienced by those in different economic environments. Cognitive differences could explain why SES is one of the strongest predictors of academic achievement.

Mindset is another way students from different economic backgrounds may vary, thus explaining academic achievement disparities. Destin et al. (2019) found students who did not qualify for free or reduced-price lunch possessed more of a growth mindset

when compared to students who received lunch assistance. The difference in mindset accounts for 7% of the variance in academic achievement. Believing that effort will make a difference leads to students trying harder and thus achieving higher. Since SES is strongly associated with student academic achievement, the confounding influence of low SES should be acknowledged when studying other topics related to academic achievement. Therefore, this topic is critical to examining the effects of extracurricular activities on academic achievement.

Disagreement exists about the influence of family income on academic achievement. Kocak et al. (2021) conducted a systematic review of meta-analyses related to academic achievement factors. Kocak et al. surmised that household income levels do not have as strong an effect as educators traditionally believe and that, surprisingly, classroom physical activity created the most significant positive effect on academic achievement of any category or intervention. SES not being strongly represented in this study suggests that other factors may be making students of poverty appear to achieve lower than students coming from homes of better financial means; however, something else is behind this lower achievement. This study may also suggest a mechanism for why activities that involve movements such as sports and music ensembles may have higher academic achievement. Wong and Wong (2018) stated,

> The achievement gap facing poor and minority students is not due to poverty or to family conditions but to systematic differences in teacher quality. These differences produce long-term consequences. A student who is taught by an ineffective teacher for two years in a row, for example, can never recover the learning lost during those years. (p. 331)

Wong and Wong suggested that the difference in academic achievement has more to do with the fact that schools with greater levels of school-wide poverty cannot recruit and retain high-quality teachers compared to schools serving more affluent areas; lower teacher quality undermines the student's ability to be academically successful. If quality educators were consistently present in a school with students from a low SES background, then these students may not present with the concerns typically associated with their demographic. Therefore, while SES can predict academic achievement, a student's assigned SES is likely not the cause of lower academic achievement. The school-wide poverty level is perhaps the more important variable.

Socioeconomic Status and Extracurricular Interaction

Student athletes may outperform nonathletes due to the higher percentage of student athletes who come from high SES backgrounds. Veliz (2019) compared athletes with nonathletes and tennis players with other sports players and found that athletes outperform nonathletes and that tennis players outperform most other sports. Veliz noted that approximately three out of four tennis players come from the highest SES backgrounds. The number of players from this disproportionately high SES may explain why tennis players have higher grade point averages compared to most other sports. According to data from the University of Memphis sports teams, football and men's basketball occupied the lowest two SES groups of the 18 sports (Lingerfelt, 2018). Veliz (2019) also found men's basketball and football to rank in the bottom third academically of the 15 sports analyzed. SES background seems to correlate with the way different sports compare academically. Shifrer et al. (2015) determined that most of the benefit of sports is accounted for by more advantaged students participating in athletics but that

sports still make a positive difference. Similar disproportionate rates among sports and other extracurricular activities may explain the difference in achievement between participants and nonparticipants. SES may explain much of the differences between sports and between athletes and nonathletes.

Extracurricular participation may mediate the adverse academic outcomes associated with low SES. Marchetti et al. (2016) found that students receiving free or reduced-price lunches who met the state benchmarks participated in extracurricular activities. Bodenberg (2016) also found that students from low-income families scored higher if they participated in athletics. According to ecological systems theory, extracurricular participation may mediate the effects of childhood poverty, meaning that participation could be a significant, positive interaction. Lumpkin and Achen (2015) proposed that this mediating influence could come from increased time in class due to sports requiring minimum attendance and grades to participate. Furthermore, Catterall (2012) found with four longitudinal datasets that among at-risk youth, students who participated in the arts had better grades, test scores, attendance, graduation rates, and more. Gorry (2016) found that athletics helped level the playing field and increased grade point averages and graduation rates more among students from low-income homes than others. Such a mediating influence would be an example of two microsystems having a consensus of goals and mutual trust, thus leading to more developmental power in the mesosystem. Therefore, extracurricular participation may be a mediating factor for academic achievement to aid students of poverty. Students from financially secure homes may be more likely to perform well academically regardless of extracurricular participation.

School athletics may contribute to social mobility among traditionally disadvantaged groups. Mackin and Walther (2012) determined that Black males who participated in athletics more than five times weekly were 67% more likely to complete a college degree than Black males who did not participate. Hispanic males who participated in athletics only once or twice per week were 74% more likely to complete a college degree than Hispanic males who did not participate. Mackin and Walther also noted that a favorable effect from participating in sports is associated with Black and Hispanic males compared to the increases in White males due to previous, documented higher college attendance rates among White males. Athletic participation may help students developmentally align themselves with long-term academic outcomes due to the way athletics interacts in the mesosystem. Professional sports are different. Spaaij et al. (2015) stated that social mobility from students playing athletics, especially professionally, may be exaggerated since existing research focuses on those who have become professional athletes and ignores the thousands who failed to achieve success. Additionally, they found that White players are perceived as working hard to develop talent and are better suited for sports management positions than Black athletes, who are often stereotyped as being naturally talented. Students being developmentally changed through athletic participation may be able to graduate college at higher rates but may not be more professionally successful due to cultural bias. School athletic participation may help close the academic success gap.

Schools serving predominantly students from poverty may have weaker extracurricular activity programs. Bailey (2018) found that schools with high levels of school-wide poverty have fewer music students selected to participate in Texas All-State music ensembles than schools

with fewer students receiving lunch assistance. Frey-Clark (2015) noted that schools with higher standardized testing results had higher musical achievement in Texas state competitions. Frey-Clark theorized that band programs require substantial financial resources, which could be easier to attain at academically high-performing schools that presumably have more resources. Bowen and Greene (2012) observed similar results among high school athletic programs in Ohio, with higher-achieving athletic schools also having higher academic achievement, suggesting that these schools may serve students from predominantly high-income households. These examples are evidence that schools with high poverty rates face challenges that extend beyond academics and into extracurricular activities.

Summary

School athletics and music ensembles seem to make a positive difference in students' academic success. Broh (2002) controlled for many variables and concluded that these activities help students positively develop in academics. These activities serve as an academic intervention. However, this conclusion is not universally accepted as Elpus (2013) adamantly asserted that students who select into music ensembles were better before they ever joined these groups due to their higher SES backgrounds and lower special education rates. This conclusion would necessitate school athletics and music ensembles' existence relying on factors other than improving academics. Bodenberg (2016) and Marchetti et al. (2016) advocated yet another view: extracurricular activities help close the gap for students from low SES backgrounds. Their conclusion means that extracurricular activities can serve as a targeted intervention. Continued examination is needed to determine the influence of these activities on academic development.

This research was designed to understand further how SES may interact with participation in extracurricular activities to help students develop academically. By examining test scores regarding SES designations and prior academic achievement, this study was able to determine whether students who participate in these activities all become higher-achieving students, whether students from low SES backgrounds benefit more from participation, or if the activity does not contribute to academic development but rather that better students choose to participate in these activities. Chapter III examines the research design, sample, instrumentation, analytical methods, and the study's limitations.

CHAPTER III

METHODOLOGY

Extracurricular activities are an essential part of the American educational system, but their associations with academic achievement are complex. As school budgets become more constrained and as accountability has consistently focused on student achievement in English, reading, mathematics, and science, stakeholders have to make hard decisions about whether to continue to allocate resources to these activities or shift focus more wholly toward academic support (Major, 2013; Marchetti et al., 2016). Previous research has supported students participating in extracurricular activities as having higher academic achievement (Broh, 2002; Hsu et al., 2019; Im et al., 2016; Knifsend & Graham, 2012; Shaffer, 2019). However, critics note that experimental studies are rarely found and that some studies that controlled for extraneous factors, including previous academic achievement, found minimal or negligible differences between participants and nonparticipants (Elpus, 2013; Shifrer et al., 2015). Students from low SES backgrounds may also benefit more from participation in extracurricular activities than students from more privileged backgrounds (Bodenberg, 2016; Marchetti et al., 2016). Uncertainty exists as to the academic associations of students participating in extracurricular activities. This quantitative study sought to provide more information on how students may or may not benefit academically from participation in extracurricular activities.

The researcher generated the following null hypotheses.

1. After controlling for previous mathematics achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on mathematics achievement measured by ACT Aspire Summative Mathematics Assessment for eighth-grade students in five Arkansas public schools.
2. After controlling for previous English achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on English achievement measured by ACT Aspire Summative English Assessment for eighth-grade students in five Arkansas public schools.
3. After controlling for previous reading achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on reading achievement measured by ACT Aspire Summative Reading Assessment for eighth-grade students in five Arkansas public schools.
4. After controlling for previous science achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on science achievement measured by ACT Aspire Summative Science Assessment for eighth-grade students in five Arkansas public schools.

This chapter will examine the research design, sample, instrumentation, data collection procedures, analytical methods, and the study's limitations.

Research Design

This study used a quantitative, causal-comparative strategy to examine existing test scores, free and reduced-price lunch information, and enrollment in athletic and music ensemble class periods to determine academic associations by SES of students participating in athletics or music ensembles compared to nonparticipants. Each hypothesis used a 4 x 2 factorial ANCOVA between-groups design to compare scores by group and SES after controlling for previous scores. For all four hypotheses, the first independent variable was athletic or music ensemble participation as determined by student enrollment in an athletic or music ensemble class period. The second independent variable was the student SES, determined by whether each student qualified for free and reduced-price lunch. The dependent variable for each hypothesis was academic achievement in mathematics, English, reading, or science as measured by the 2019 ACT Aspire Summative Assessments. The covariate variable for each hypothesis was academic achievement in mathematics, English, reading, or science as measured by the 2016 ACT Aspire Summative Assessments.

Sample

Schools selected for this study were of similar size and percentage of free and reduced-price lunch students, had Grades 6 through 8 as the school grade configuration, responded to course code inquiries by the researcher, and had athletics and music ensembles within a class period during the school day. Class code information was then used to create a request from the Arkansas Department of Elementary and Secondary Education for student-level information with test scores, free and reduced-price lunch information, and whether the students participated in athletic or music ensemble class

periods. Music ensemble classes included different band, orchestra, and choir classes. Class titles included Advanced Band, Jazz Band, Band, Choir, Symphonic Band, Concert Choir Boys, Concert Choir Girls, Choir, Vocal Music Intermediate Boys, and Vocal Music Intermediate Girls. All schools had variations of band and choir, and 3 of the 5 schools had orchestra as an option. Athletic classes included football, basketball, volleyball, cheerleading/pom, track, dance, and cross country. Class titles included the name of the sport in three of the schools. The other two schools coded all athletic types together into Athletics Boys or Athletics Girls.

ACT Aspire Summative Assessment scores were collected for the 2016 and 2019 years for all students for whom data were available. Lunch status was determined from the 2018-2019 year. The year 2019 was selected for measuring the dependent variables, given that 2019 was the last year of testing prior to the COVID-19 global pandemic. The goal of this study was not to measure the effects of a pandemic, which has historically happened about once per century, but rather the effects of athletics and music ensembles on academic achievement. Additionally, 2019 was selected as all public-school students in Arkansas have received free lunch since the 2020-2021 school year, thus removing the ability to determine students' family income level for the second independent variable as free and reduced-lunch forms have not been collected with diligence since that time. The 2016 scores were used as the covariate to control for participants' level of academic achievement prior to most students joining school music ensembles or athletic teams. This control was implemented to determine if differences between groups may have been partly or wholly explained by higher-achieving students self-selecting into these groups.

The demographics of each school varied as indicated. The first school had 267 eighth-grade students, with 104 qualifying for free and reduced-price lunch according to the provided datasets. The second school had 296 eighth-grade students, with 165 qualifying for free and reduced-price lunch. The third school had 295 eighth-grade students, with 176 qualifying for free and reduced-price lunch. The fourth school had 230 eighth-grade students, with 109 qualifying for free and reduced-price lunch. The fifth school had 379 eighth-grade students, with 170 qualifying for free and reduced-price lunch. One hundred ninety-nine students were removed from the dataset for not having 2016 scores to use as a covariate. An additional 23 students who did not have 2019 scores were removed to use as the dependent variable. Prior to stratified random sampling, 1,245 complete rows of data were present after removing the incomplete data. Student activity participation by lunch status is detailed in Table 1 for students with complete test score data.

Table 1

Number of Students Participating in Athletics and Music Ensembles by Lunch Status

Activity	Lunch Status	Sch 1	Sch 2	Sch 3	Sch 4	Sch 5	Total
Ath Only	Paid Lunch	52	32	30	28	39	181
	Free/Reduced Lunch	15	31	32	19	35	132
Mus Ens Only	Paid Lunch	32	38	35	34	46	185
	Free/Reduced Lunch	25	48	65	18	40	196
Both	Paid Lunch	24	29	14	12	15	94
	Free/Reduced Lunch	13	23	21	9	15	81
Neither	Paid Lunch	26	18	27	29	63	163
	Free/Reduced Lunch	25	46	42	41	58	212

Note. Sch = School; Ath Only = Participation in Athletics Only; Mus Ens Only = Participation in Music Ensembles Only; Both = Participation in Athletics and Music Ensembles; Neither = No Participation in Athletics or Music Ensembles.

Stratified random sampling selected 45 students' scores in each of eight groups based upon participation (athletics only versus school music ensembles only versus both versus neither) and free and reduced-lunch status. This sampling process ensured each subcategory had 45 participants, with 9 participants represented from each of the 5 schools. The eight groups of scores consisted of the following: athletics with free and reduced-price lunch, athletics with paid lunch, music ensembles with free and reduced-price lunch, music ensembles with paid lunch, both athletics and music ensembles with free and reduced-price lunch, both athletics and music ensembles with paid lunch, neither athletics nor music ensembles with free and reduced-price lunch, and neither athletics nor music ensembles with paid lunch. One row within two the stratified random sampling

groups had one missing value, so the next random row of that group was selected to complete the dataset. In total, data from 360 participants were used for statistical analysis. All five schools had adequate representation in each subcategory to use the planned stratified random sampling.

Instrumentation

The ACT Aspire Summative Assessments provided data sources for this study's dependent and covariate variables. This test has been developed to determine student academic achievement. Since 2015, ACT Aspire Summative Assessments have been the required state summative assessment for Arkansas public schools for Grades 3-10 (Arkansas Division of Elementary and Secondary Education, 2021a). This assessment determines whether students are progressing adequately to be career and college ready by measuring student achievement in English, reading, mathematics, science, and writing. The scale score ranges are 400-456 for mathematics, 400-452 for English, 400-440 for reading, and 400-446 for science. ACT built the ACT Aspire Summative Assessment after conducting a national survey of curricula for each of these subject areas to determine what is being taught by schools and also surveying teachers, professors, and businesses about what readiness would be like for students in their respective fields to determine appropriate learning targets for the test (ACT Aspire, 2020). This intentional and varied feedback has allowed the ACT Aspire Summative Assessments to represent student ability concerning vital readiness benchmarks. This assessment provides Arkansas educators with a measure of how their students compare to national readiness; however, this assessment was not constructed around Arkansas education frameworks and thus may not be the best representation of Arkansas student achievement.

Separate testing sections measure academic progress in mathematics, English, reading, and science. The ACT Aspire Summative Mathematics Assessment for eighth grade has 43-46 questions, with 29-30 questions being multiple-choice, 3 or 4 technology-enhanced, and 5 constructed-response items that assess levels one through three of the depth of knowledge framework. Webb (2007) defined level 1 of the depth of knowledge framework as recall that requires a rote response. Level 2 was defined as a skill or concept that requires the ability to organize, compare, or interpret information. Level 3 was defined as strategic thinking that requires the use of abstract thinking to plan or reason. The ACT Aspire Mathematics Assessment for Grade 8 has questions about number systems, expressions and equations, ratio and proportional reasoning, geometry, and statistics and probability (ACT Aspire, 2020). This assessment's scores measure the dependent variable of mathematics achievement for Hypothesis 1.

The ACT Aspire Summative English Assessment for eighth grade has 44-47 questions, with 33-35 of these multiple-choice and 0 to 2 technology-enhanced that assess levels one through three of the depth of knowledge framework. The ACT Aspire Summative English Assessment for Grade 8 has questions about writing production, language knowledge, and conventions of standard English (ACT Aspire, 2020). This assessment's scores measure the dependent variable of English achievement for Hypothesis 2.

The ACT Aspire Summative Reading Assessment for eighth grade has 30-32 questions, with 20-21 of these multiple-choice, 0 to 1 technology-enhanced, and 3 constructed-response items that assess levels one through three of the depth of knowledge framework. The ACT Aspire Summative Reading Assessment for Grade 8 has questions

about key ideas and details, craft and structure, and integration of knowledge and ideas (ACT Aspire, 2020). This assessment's scores measure the dependent variable of reading achievement for Hypothesis 3.

The ACT Aspire Summative Science Assessment for eighth grade has 38-40 questions, with 23-24 of these multiple-choice, 3 to 4 technology-enhanced, and 5 constructed-response items that assess levels one through three of the depth of knowledge framework. The ACT Aspire Summative Science Assessment for Grade 8 has questions about the interpretation of data, scientific investigation, and evaluation of models, inferences, and experimental results (ACT Aspire, 2020). This assessment's scores measure the dependent variable of science achievement for Hypothesis 4. The varied test questions from the four subject areas comprehensively assess student academic achievement.

Data Collection Procedures

Athletic and music class code information from the 2018-2019 school year was obtained from each of the five schools through central office personnel within each school district. After obtaining Institutional Review Board approval, the researcher requested the use of data from the Arkansas Department of Elementary and Secondary Education to include deidentified individual student data from five Arkansas public middle schools. The researcher signed a data-sharing agreement with the Arkansas Department of Elementary and Secondary Education. Four datasets were provided with matching research IDs for individual students. The first dataset included the eighth-grade cohort for each of the five middle schools, with each student's 2018-2019 free and reduced-lunch status. The second dataset included this cohort's 2015-2016 ACT Aspire

Summative Assessments scores. The third dataset included this cohort's 2019 ACT Aspire Summative Assessments scores. The fourth dataset included which students participated in each of the class codes each school used for athletic and music ensemble periods. Microsoft Excel was then used to combine all of the different datasets. The data were stored in a secure location.

Analytical Methods

Data were analyzed using a between-groups factorial ANCOVA in IBM Statistical Packages for the Social Sciences (SPSS) Version 28. Factorial ANCOVA was the inferential statistic chosen for this study since this analysis can identify differences between groups and determine if an interaction is present after controlling for another variable. This study revealed whether a difference exists or interaction between groups after accounting for preexisting academic achievement by controlling for previous academic achievement. Nominal data included student activity participation with the following codes: participated in athletics only = 1, participated in music ensembles only = 2, participated in both athletics and music ensembles = 3, and participated in neither athletics nor music ensembles = 4. Students qualifying for free and reduced-price lunch were coded 1, and students who did not qualify were coded 0. Scale data of unadjusted scores were entered for the dependent variable of ACT Aspire Summative Assessment scores and the covariate ACT Aspire Summative Assessment scores. Assumptions were checked before running each test, as described in the results section. The alpha level for statistical significance was set at $p = .05$.

Each hypothesis was investigated with a 4 x 2 factorial between-groups ANCOVA. All four hypotheses included the type of participation (participating in

athletics, music ensembles, both, or neither) and SES (free and reduced-price lunch or paid lunch) as the independent variables. Hypothesis 1 used the 2019 and 2016 ACT Aspire Summative Mathematics Assessment data to measure the dependent and covariate mathematics achievement data. Hypothesis 2 used the 2019 and 2016 ACT Aspire Summative English Assessment data to measure the dependent and covariate English achievement data. Hypothesis 3 used the 2019 and 2016 ACT Aspire Summative Reading Assessment data to measure the dependent and covariate reading achievement data. Hypothesis 4 used the 2019 and 2016 ACT Aspire Summative Science Assessment data to measure the dependent and covariate science achievement data.

Limitations

Limitations are a part of every study since no study can control every variable. The first limitation of this study was the use of causal-comparative data rather than experimental data, as the individuals and groups within this study were already in groups. The use of groups that are already formed may possess differences that could be explained by a covariate that cannot be accounted for in the study. A second limitation was that all types of athletic teams and music ensembles were grouped. Further disaggregation of the data may reveal that different types of athletics or music ensembles had similar or different associations with academic achievement. For example, orchestra, band, and choir were all grouped and may have had different academic associations compared to each other. Likewise, all sports were grouped, and this study did not examine further data disaggregation.

Third, the ACT Aspire was designed to measure academic progress nationally and was not constructed around the Arkansas educational frameworks. The ACT Aspire was

created based on a national investigation of school curriculums. This design means the ACT Aspire may not accurately reflect the learning that is or is not happening inside Arkansas classrooms. A fourth limitation is that free and reduced-lunch status is determined by an application that families submit to the school. Some student families may not have completed the application and thus are classified as being on paid lunch when their income levels would qualify the student for free and reduced-price lunch.

Fifth, this study determined participation in athletics and school music ensembles by student participation in a class period during the school day. While this method captured most student-athletes and musicians due to the method used to select the schools for this study, exceptions may have existed. A sixth limitation is that participation in athletics and school music ensembles is binary in this study, with students either participating or not participating. Students who participated for 3 years in a row may have different academic associations than students who only joined the team or ensemble during the eighth grade. Some teams and ensembles may spend more time weekly in practice than others, as some teams and ensembles may have additional practice time before or after school. More practice time weekly may have different associations with student academic outcomes.

Missing data points represents the seventh limitation. Some students did not have test scores from 1 or more years. The students who were missing test scores could have represented a specific subgroup of students, such as those students who are migratory due to economic or family challenges. Finally, this study examined five Arkansas schools that range from 230 to 379 eighth-grade students. In other parts of the nation or world, larger or smaller schools or demographically different in other significant ways may have

different results in a similar study. Despite the limitations, this study contributed to the literature about the academic associations of participation in athletics and music ensembles.

Summary

Factorial ANCOVA was used to examine data collected from the Arkansas Department of Elementary and Secondary Education. Stratified random samples were analyzed to determine the associations of participation in athletics and music ensembles by SES on Arkansas academic achievement in five public middle schools after controlling for prior academic achievement. The covariate of fifth-grade achievement data was selected to help control the possibility that athletics and music ensemble students may outperform nonparticipating peers in eighth grade due to high achieving students self-selecting into these groups. Chapter IV details the data analysis and results of each of the four hypotheses.

CHAPTER IV

RESULTS

The purposes of this study were to determine, after controlling for previous achievement, the effects by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on mathematics, English, reading, and science achievement measured by ACT Aspire Summative Assessments in mathematics, English, reading, and science for eighth-grade students in five Arkansas public schools. The independent variables in this study were activity participation (athletics only, music ensembles only, both, or neither) and SES status. The dependent variables were different academic achievement areas measured by the ACT Aspire mathematics, English, reading, and science summative scores from 2019 when students were in eighth grade. The covariate variables were different academic achievement areas measured by the ACT Aspire mathematics, English, reading, and science scores from 2016 when the students were in fifth grade, prior to joining these school activities.

Stratified random sampling was used to choose 45 scores for each of eight different groups for a total of 360 scores from a dataset provided by the Arkansas Department of Elementary and Secondary Education. ACT Aspire scores were entered unaltered as scale data. The eight groups were nominally classified. These groups were divided based on whether students received free and reduced-price lunch (no = 0, yes =

1) and whether students participated in athletics only (1), music ensembles only (2), both (3), or neither (4). Factorial ANCOVA was used to analyze each hypothesis in SPSS.

Hypothesis 1

Hypothesis 1 stated that after controlling for previous mathematics achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on mathematics achievement measured by ACT Aspire Summative Mathematics Assessment for eighth-grade students in five Arkansas public schools. Data were screened for entry errors and missing values, with none found. The assumptions for factorial ANCOVA were tested, including independent observations, normal distribution, linear relationship between the covariate and the dependent variable, homogeneity of variances, and homogeneity of regression slopes. Table 2 lists the descriptive statistics from the different participating groups.

Table 2

Unadjusted and Adjusted Activity Participation Means by SES for Mathematics Achievement, Using Previous Mathematics Achievement as a Covariate

Lunch	Activity	*M*	*SD*	*N*	*Adj M*	*SE*
Paid Lunch	Ath Only	428.58	7.69	45	426.85	0.79
	Mus Ens Only	426.44	7.76	45	426.00	0.78
	Both	429.58	9.16	45	427.21	0.79
	Neither	425.33	8.13	45	425.68	0.78
	Total	427.48	8.31	180		
FRP Lunch	Ath Only	422.98	6.76	45	423.75	0.78
	Mus Ens Only	422.56	7.75	45	423.35	0.78
	Both	423.31	6.14	45	423.68	0.78
	Neither	421.24	5.71	45	423.50	0.79
	Total	422.52	6.62	180		
Total	Ath Only	425.78	7.73	90		
	Mus Ens Only	424.50	7.96	90		
	Both	426.44	8.37	90		
	Neither	423.29	7.28	90		
	Total	425.00	7.91	360		

Note. FRP Lunch = Free and Reduced-Price Lunch; Ath Only = Participation in Athletics Only; Mus Ens Only = Participation in Music Ensembles Only; Both = Participation in Athletics and Music Ensembles; Neither = No Participation in Athletics or Music Ensembles.

Observations were independent based on the study's design, including mutually exclusive groups. Shapiro-Wilk was selected to determine normal distribution since each group had less than 100 participants. The data passed the test of normal distribution for Shapiro-Wilk for 6 of the 8 groups since they were not statistically significant: students on free and reduced-price lunch who participated in athletics, $W(45) = 0.98$, $p = .476$; students on free and reduced-price lunch who participated in music ensembles, $W(45) = 0.96$, $p = .091$; students on free and reduced-price lunch who participated in athletics and music ensembles, $W(45)= 0.97$, $p = .377$; students on paid lunch who participated in athletics, $W(45) = 0.98$, $p = .520$; students on paid lunch who participated in music ensembles, $W(45) = 0.98$, $p = .765$; and students on paid lunch who participated in athletics and music ensembles, $W(45) = 0.97$, $p = .190$. Two groups violated the normal distribution assumption: students on free and reduced-price lunch who participated in neither athletics or music ensembles, $W(45) = 0.94$, $p = .015$; and students on paid lunch who participated neither athletics or music ensembles, $W(45) = 0.95$ $p = .043$. ANCOVA was still used for the analysis since ANCOVA is robust to mild violations of normality (Leech et al., 2015). After examining the scatterplot of the dependent variable and the covariate, a linear relationship was detected. The homogeneity of regression slopes was checked with an ANOVA. No interaction was found between the student's meal status and the covariate mathematics scores, $F(1, 356) = 2.46$, $p = .118$. No interaction was found between the type of participation and the covariate mathematics scores, $F(3, 352) = 0.06$, $p = .983$. No interaction was found between the type of participation, the student's meal status, and the covariate mathematics scores, $F(7, 347) = 0.42$, $p = .888$. The assumption of the regression of slopes was met. Levene's test of homogeneity showed

that the variances of the groups were similar, $F(7, 352) = 0.88$, $p = .523$. Table 3 details the results of this ANCOVA.

Table 3

Factorial ANCOVA for Interaction of SES and Activity Type on Mathematics Achievement

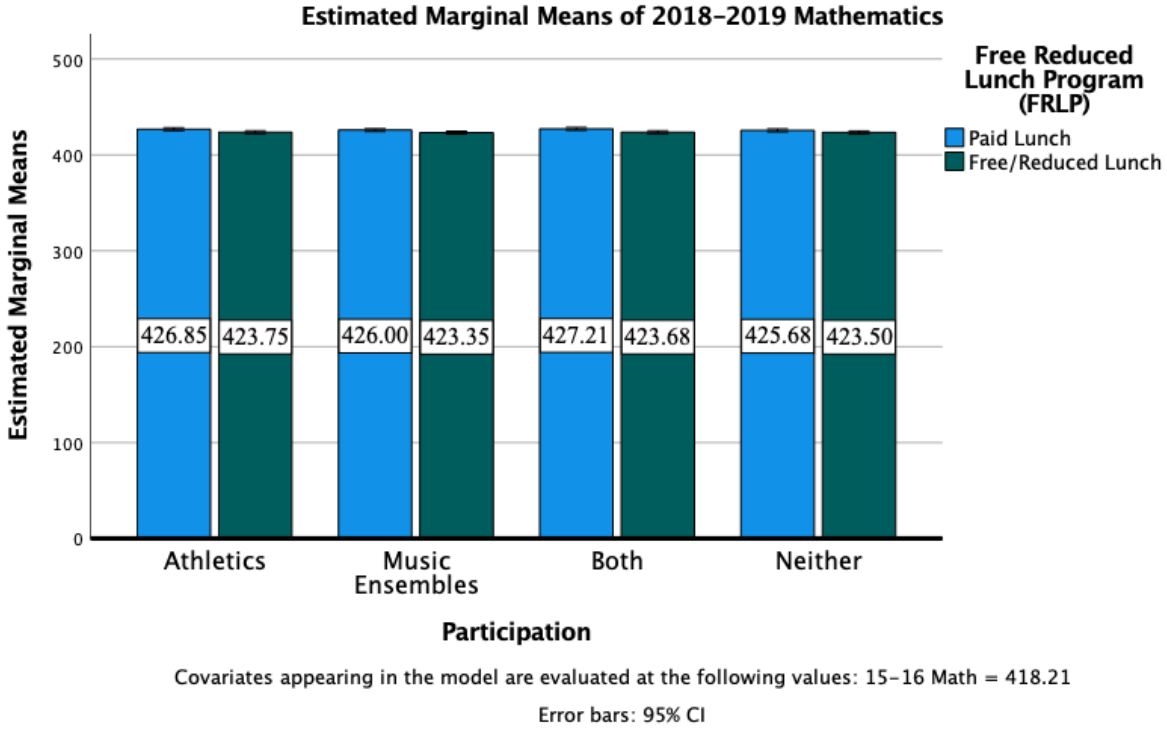
Source	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Aspire 2015	9923.85	1	9923.85	360.02	<.001	0.506
SES	709.36	1	709.36	25.73	<.001	0.068
Activity	49.24	3	16.41	0.60	.618	0.005
SES*Activity	22.53	3	7.51	0.27	.845	0.002
Error	9675.27	351	27.56			
Total	65048283.00	360				
Corrected Total	22433.00	359				

Mathematics achievement from 2015-2016 was a statistically significant covariate, $F(1, 351) = 360.02$, $p < .001$, $\eta^2 = 0.506$, representing a much larger than typical effect size (Morgan et al., 2020). Factorial ANCOVA results indicate that after controlling for previous academic achievement, no significant interaction existed regarding the mathematics scores of students by the type of activity students participated in and their SES, $F(3, 351) = 0.27$, $p = .845$, $\eta^2 = 0.002$. Therefore, SES did not combine with the type of participation to significantly affect student mathematics achievement after controlling for previous mathematics achievement. Since there was no interaction

effect, each main effect was separately examined. Figure 1 plots the mathematics scores by SES and activity.

Figure 1

Adjusted Means for SES and Activity on Mathematics Achievement



The main effect of SES, $F(1, 351) = 25.73$, $p < .001$, $\eta^2 = 0.068$, was significant, indicating that students on paid lunches scored statistically higher than students on free and reduced-price lunches, with a medium effect size (Morgan et al., 2020). After controlling for previous mathematics achievement, paid lunch students had a higher adjusted mean for achievement scores ($M = 426.43$, $SE = 0.40$) than students on free and

reduced-price lunch (M = 423.57, SE = 0.40). The type of activity participation, $F(3, 351) = 0.60$, $p = .618$, $\eta^2 = 0.005$, was not significant, meaning the groups were statistically similar. After controlling for previous mathematics achievement, student achievement by group was ranked in the following order from highest to lowest: students who participated in both athletics and music ensembles scored the highest (M = 425.44, SE = 0.56), students in athletics (M = 425.30, SE = 0.55), students in music ensembles (M = 424.68, SE = 0.55), students that participated in neither athletics nor music ensembles (M = 424.59, SE = 0.56.) However, the inferential statistics indicate that these patterns appeared by chance and were not statistically different.

In summary, no statistically significant interaction effect was present between SES and type of participation regarding students' associated mathematics achievement as measured by the ACT Aspire Summative Mathematics Assessment. Similarly, the type of activity participation was not statistically significant regarding students' associated mathematics achievement. Therefore, the interaction null hypothesis and the main effect hypothesis for activity participation were retained. In contrast, students on paid lunch statistically outperformed students on free and reduced-price lunch. Therefore, the main effect hypothesis for SES was rejected.

Hypothesis 2

Hypothesis 2 stated that after controlling for previous English achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on English achievement measured by ACT Aspire Summative English Assessment for eighth-grade students in five Arkansas public schools. Data were screened for entry errors and missing values,

with none found. The assumptions for factorial ANCOVA were tested, including independent observations, normal distribution, linear relationship between the covariate and the dependent variable, homogeneity of variances, and homogeneity of regression slopes. Table 4 lists the descriptive statistics from the different participating groups.

Table 4

Unadjusted and Adjusted Activity Participation Means by SES for English Achievement, Using Previous English Achievement as a Covariate

Lunch	Activity	*M*	*SD*	*N*	*Adj M*	*SE*
Paid Lunch	Ath Only	431.93	8.74	45	429.95	0.99
	Mus Ens Only	431.53	8.51	45	429.77	0.99
	Both	435.07	8.59	45	431.54	1.00
	Neither	428.62	9.53	45	430.00	0.99
	Total	431.79	9.07	180		
FRP Lunch	Ath Only	425.87	9.21	45	427.60	0.99
	Mus Ens Only	426.44	10.28	45	427.23	0.99
	Both	428.16	7.51	45	427.80	0.98
	Neither	423.36	10.35	45	427.11	1.01
	Total	425.96	9.49	180		
Total	Ath Only	428.90	9.43	90		
	Mus Ens Only	428.99	9.73	90		
	Both	431.61	8.75	90		
	Neither	425.99	10.24	90		
	Total	428.87	9.72	360		

Note. FRP Lunch = Free and Reduced-Price Lunch; Ath Only = Participation in Athletics Only; Mus Ens Only = Participation in Music Ensembles Only; Both = Participation in Athletics and Music Ensembles; Neither = No Participation in Athletics or Music Ensembles.

Observations were independent based on the study's design, including mutually exclusive groups. Shapiro-Wilk was selected to determine normal distribution since each group had less than 100 participants. The data passed the test of normal distribution for Shapiro-Wilk for 7 of the 8 groups since they were not statistically significant: students on free and reduced-price lunch who participated in athletics, $W(45) = 0.98$, $p = .665$; students on free and reduced-price lunch who participated in music ensembles, $W(45) = 0.98$, $p = .457$; students on free and reduced-price lunch who participated in neither athletics or music ensembles, $W(45) = 0.98$, $p = .649$; students on paid lunch who participated in athletics, $W(45) = 0.99$, $p = .945$; students on paid lunch who participated in music ensembles, $W(45) = 0.98$, $p = .458$; students on paid lunch who participated in neither athletics and music ensembles, $W(45) = 0.97$, $p = .278$; and students on paid lunch who participated both athletics or music ensembles, $W(45) = 0.98$, $p = .443$. One group's mean violated the normality assumption: students on free and reduced-price lunch who participated in athletics and music ensembles, $W(45)= 0.95$, $p = .034$. ANCOVA was still used for the analysis since ANCOVA remains valid when data fails the test of normality (Leech et al., 2015). After examining the scatterplot of the dependent variable and the covariate, a linear relationship was detected. The homogeneity of regression slopes was checked with an ANOVA. No interaction was found between the student's meal status and the covariate English scores, $F(1, 356) = 0.33$, $p = .568$. No interaction was found between the type of participation and the covariate English scores, $F(3, 352) = 0.84$, $p = .471$. No interaction was found between the type of participation, the student's meal status, and the covariate English scores, $F(7, 347) = 0.68$, $p = .687$. The assumption of the regression of slopes was met. Levene's test of homogeneity showed that the variances of

the groups were similar, $F(7, 352) = 1.55$, $p = .150$. Table 5 details the results of this ANCOVA.

Table 5

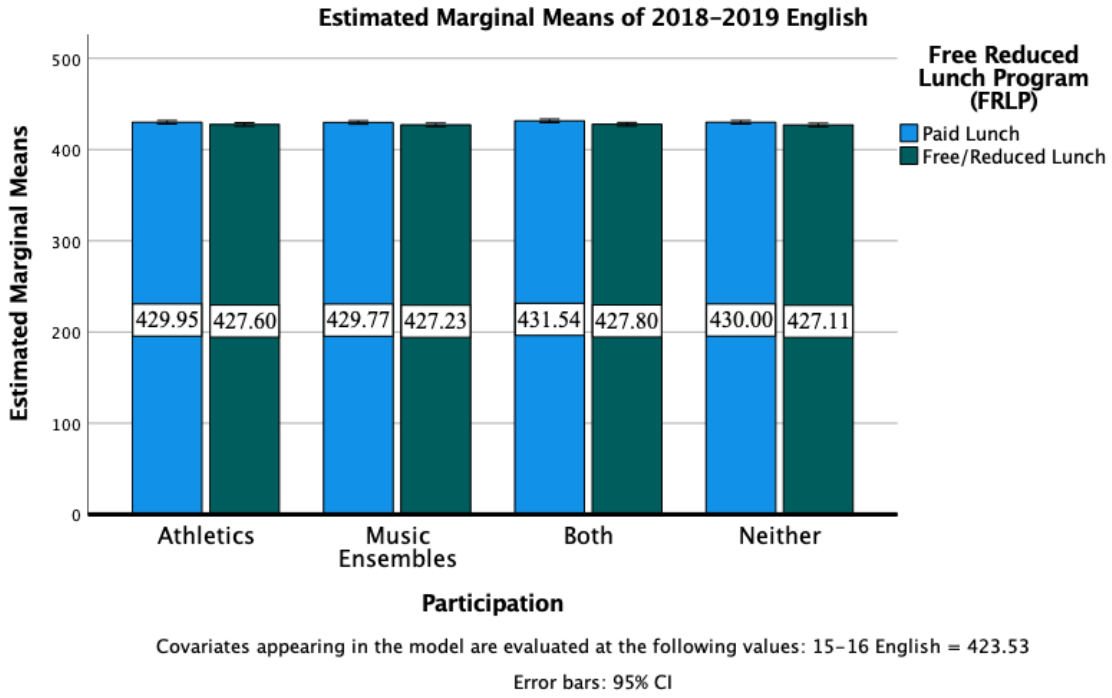
Factorial ANCOVA for Interaction of SES and Activity Type on English Achievement

Source	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Aspire 2015	14058.40	1	14058.40	322.36	<.001	0.479
SES	707.55	1	707.55	16.22	<.001	0.044
Activity	77.16	3	25.72	0.59	.622	0.005
SES*Activity	25.76	3	8.59	0.20	.898	0.002
Error	15307.51	351	43.61			
Total	66249198.00	360				
Corrected Total	33900.12	359				

English achievement from 2015-2016 was a statistically significant covariate, $F(1, 351) = 322.36$, $p < .001$, $\eta^2 = 0.479$, representing a much larger than typical effect size (Morgan et al., 2020). Factorial ANCOVA results indicate that after controlling for previous academic achievement, no significant interaction existed regarding the English scores of students by the type of activity students participated in and their SES, $F(3, 351) = 0.20$, $p = .898$, $\eta^2 = 0.002$. Therefore, SES did not combine with the type of participation to significantly affect students' English achievement after controlling for previous English achievement. Since there was no interaction effect, each main effect was separately examined. Figure 2 plots the English scores by SES and activity.

Figure 2

Adjusted Means for SES and Activity on English Achievement



The main effect of SES, $F(1, 351) = 16.22$, $p < .001$, $\eta^2 = 0.044$, was significant, indicating that students on paid lunches scored statistically higher than students on free and reduced-price lunches, with a small effect size (Morgan et al., 2020). After controlling for previous English achievement, paid lunch students had a higher adjusted mean for achievement scores ($M = 430.31$, $SE = 0.50$) than students on free and reduced-price lunch ($M = 427.43$, $SE = 0.50$). The type of activity participation, $F(3, 351) = 0.59$, $p = .622$, $\eta^2 = 0.005$, was not significant meaning the groups were statistically similar. After controlling for prior academic achievement, student achievement by participation was ranked in the following order from highest to lowest: students who participated in both athletics and music ensembles ($M = 429.67$, $SE = 0.70$), students who participated in athletics ($M = 428.77$, $SE = 0.70$), students who participated in neither ($M = 428.55$, $SE =$

0.71), students who participated in music ensembles (M = 428.50, SE = 0.70). However, the inferential statistics indicated that these patterns appeared by chance and were not statistically different.

In summary, no statistically significant interaction effect was present between SES and type of participation regarding students' associated English achievement as measured by the ACT Aspire Summative English Assessment. Similarly, the type of activity participation was not statistically significant regarding students' associated English achievement. Therefore, the interaction null hypothesis and the main effect hypothesis for activity participation were retained. In contrast, students on paid lunches statistically outperformed students on free and reduced-price lunches. Therefore, the main effect hypothesis for SES was rejected.

Hypothesis 3

Hypothesis 3 stated that after controlling for previous reading achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on reading achievement measured by ACT Aspire Summative Reading Assessment for eighth-grade students in five Arkansas public schools. Data were screened for entry errors and missing values, with none found. The assumptions for factorial ANCOVA were tested, including independent observations, normal distribution, linear relationship between the covariate and the dependent variable, homogeneity of variances, and homogeneity of regression slopes. Table 6 lists the descriptive statistics from the different participating groups.

Table 6

Unadjusted and Adjusted Activity Participation Means by SES for Reading Achievement, Using Previous Reading Achievement as a Covariate

Lunch	Activity	*M*	*SD*	*N*	*Adj M*	*SE*
Paid Lunch	Ath Only	426.04	6.58	45	424.84	0.81
	Mus Ens Only	425.64	6.59	45	425.33	0.80
	Both	427.49	6.23	45	424.98	0.82
	Neither	422.67	7.67	45	422.68	0.80
	Total	425.46	6.96	180		
FRP Lunch	Ath Only	421.27	7.80	45	422.24	0.81
	Mus Ens Only	422.44	7.43	45	423.95	0.81
	Both	423.13	6.25	45	422.67	0.80
	Neither	420.24	7.67	45	422.25	0.81
	Total	421.77	7.34	180		
Total	Ath Only	423.66	7.57	90		
	Mus Ens Only	424.04	7.17	90		
	Both	425.31	6.58	90		
	Neither	421.46	7.72	90		
	Total	423.62	7.37	360		

Note. FRP Lunch = Free and Reduced-Price Lunch; Ath Only = Participation in Athletics Only; Mus Ens Only = Participation in Music Ensembles Only; Both = Participation in Athletics and Music Ensembles; Neither = No Participation in Athletics or Music Ensembles.

Observations were independent based on the study's design, including mutually exclusive groups. Shapiro-Wilk was selected to determine normal distribution since each group had less than 100 participants. The data passed the test of normal distribution for Shapiro-Wilk for 6 of the 8 groups since they were not statistically significant: students on free and reduced-price lunch who participated in athletics, $W(45) = 0.97$, $p = .258$; students on free and reduced-price lunch who participated in athletics and music ensembles, $W(45)= 0.98$, $p = .449$; students on free and reduced-price lunch who participated in neither athletics or music ensembles, $W(45) = 0.96$, $p = .120$; students on paid lunch who participated in athletics, $W(45) = 0.98$, $p = .790$; students on paid lunch who participated in music ensembles, $W(45) = 0.95$, $p = .070$; and students on paid lunch who participated neither athletics or music ensembles, $W(45) = 0.98$ $p = .591$. Two groups violated the normal distribution assumption: students on free and reduced-price lunch who participated in music ensembles, $W(45) = 0.95$, $p = .043$; and students on paid lunch who participated in athletics and music ensembles, $W(45) = 0.95$, $p = .043$. ANCOVA was still used for the analysis since ANCOVA is robust to mild violations of normality (Leech et al., 2015). After examining the scatterplot of the dependent variable and the covariate, a linear relationship was detected. The homogeneity of regression slopes was checked with an ANOVA. No interaction was found between the student's meal status and the covariate reading scores, $F(1, 356) = 0.59$, $p = .443$. No interaction was found between the type of participation and the covariate reading scores, $F(3, 352) = 0.32$, $p = .815$. No interaction was found between the type of participation, the student's meal status, and the covariate reading scores, $F(7, 347) = 0.53$, $p = .813$. The assumption of the regression of slopes was met. Levene's test of homogeneity showed that the

variances of the groups were similar, $F(7, 352) = 1.08$, $p = .374$. Table 7 details the results of this ANCOVA.

Table 7

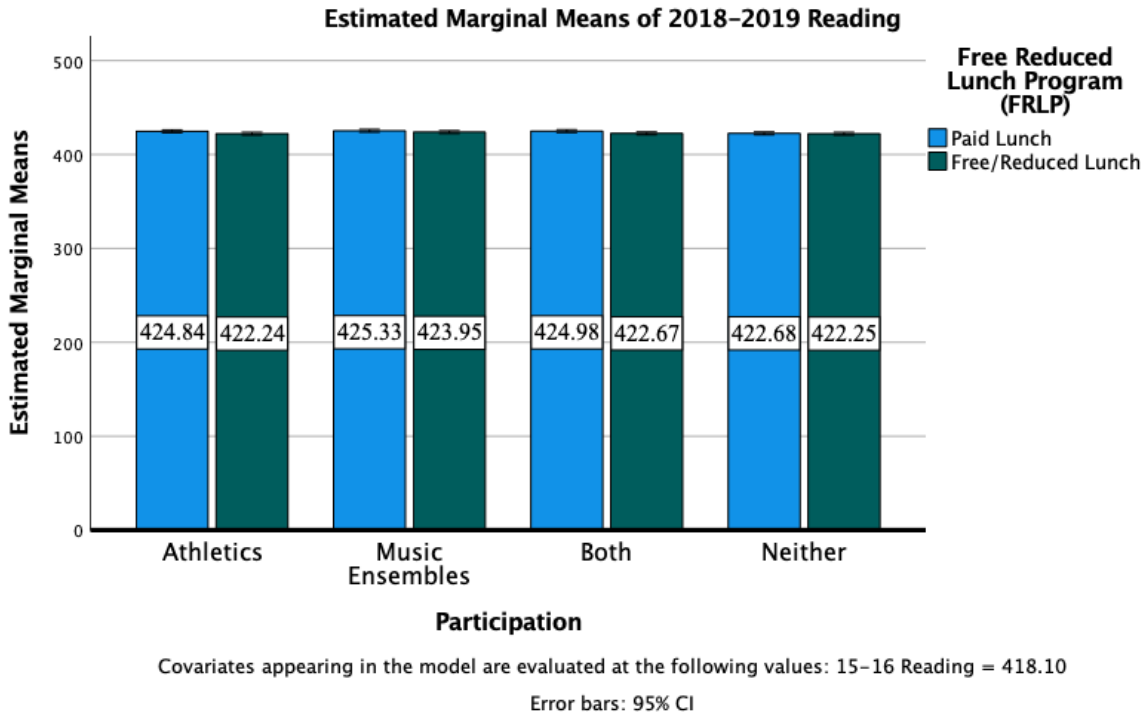
Factorial ANCOVA for Interaction of SES and Activity Type on Reading Achievement

Source	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Aspire 2015	7324.66	1	7324.66	252.10	<.001	0.418
SES	241.12	1	241.12	8.30	.004	0.023
Activity	216.96	3	72.32	2.49	.060	0.021
SES*Activity	65.00	3	21.67	0.75	.525	0.006
Error	10198.23	351	29.05			
Total	64621910.00	360				
Corrected Total	19521.10	359				

Reading achievement from 2015-2016 was a statistically significant covariate, $F(1, 351) = 252.10$, $p < .001$, $\eta^2 = 0.418$, representing a much larger than typical effect size (Morgan et al., 2020). Factorial ANCOVA results indicate that after controlling for previous academic achievement, no significant interaction existed regarding the reading scores of students by the type of activity students participated in and their SES, $F(3, 351) = 0.75$, $p = .525$, $\eta^2 = 0.006$. Therefore, SES did not combine with the type of participation to significantly affect student reading achievement after controlling for previous reading achievement. Since there was no interaction effect, each main effect was separately examined. Figure 3 plots the reading scores by SES and activity.

Figure 3

Adjusted Means for SES and Activity on Reading Achievement



The main effect of SES, $F(1, 351) = 8.30$, $p = .004$, $\eta^2 = 0.023$, was significant, indicating that students on paid lunches scored statistically higher than students on free and reduced-price lunches, with a small effect size (Morgan et al., 2020). After controlling for previous reading achievement, paid lunch students had a higher adjusted mean for achievement scores ($M = 424.46$, $SE = 0.41$) than students on free and reduced-price lunch ($M = 422.78$, $SE = 0.41$). The type of activity participation, $F(3, 351) = 2.49$, $p = .060$, $\eta^2 = 0.021$, was not significant meaning the groups were statistically similar. After controlling for prior academic achievement, student achievement by participation was ranked in the following order from highest to lowest: students who participated in music ensembles ($M = 424.64$, $SE = 0.57$), students who participated in both athletics and

music ensembles (M = 423.82, SE = 0.58), students who participated in athletics (M = 423.54, SE = 0.57), students who participated in neither (M = 422.47, SE = 0.57). However, the inferential statistics described indicate that these patterns appeared by chance and were not statistically different.

In summary, no statistically significant interaction effect was present between SES and type of participation regarding students' associated reading achievement as measured by the ACT Aspire Summative Reading Assessment. Similarly, the type of activity participation was not statistically significant regarding students' associated reading achievement. Therefore, the interaction null hypothesis and the main effect hypothesis for activity participation were retained. In contrast, students on paid lunches statistically outperformed students on free and reduced-price lunches. Therefore, the main effect hypothesis for SES was rejected.

Hypothesis 4

Hypothesis 4 stated that after controlling for previous science achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on science achievement measured by ACT Aspire Summative Science Assessment for eighth-grade students in five Arkansas public schools. Data were screened for entry errors and missing values, with none found. The assumptions for factorial ANCOVA were tested, including independent observations, normal distribution, linear relationship between the covariate and the dependent variable, homogeneity of variances, and homogeneity of regression slopes. Table 8 lists the descriptive statistics from the different participating groups.

Table 8

Unadjusted and Adjusted Activity Participation Means by SES for Science Achievement, Using Previous Science Achievement as a Covariate

Lunch	Activity	*M*	*SD*	*N*	*Adj M*	*SE*
Paid Lunch	Ath Only	427.60	7.77	45	426.15	0.83
	Mus Ens Only	427.51	8.32	45	426.32	0.83
	Both	430.98	8.05	45	428.37	0.84
	Neither	425.29	9.01	45	426.47	0.83
	Total	427.84	8.48	180		
FRP Lunch	Ath Only	422.96	7.56	45	423.79	0.83
	Mus Ens Only	423.76	8.22	45	424.44	0.83
	Both	423.29	6.68	45	423.01	0.83
	Neither	421.07	7.79	45	423.90	0.84
	Total	422.77	7.59	180		
Total	Ath Only	425.28	7.97	90		
	Mus Ens Only	425.63	8.44	90		
	Both	427.13	8.31	90		
	Neither	423.18	8.64	90		
	Total	425.31	8.43	360		

Note. FRP Lunch = Free and Reduced-Price Lunch; Ath Only = Participation in Athletics Only; Mus Ens Only = Participation in Music Ensembles Only; Both = Participation in Athletics and Music Ensembles; Neither = No Participation in Athletics or Music Ensembles.

Observations were independent based on the study's design, including mutually exclusive groups. Shapiro-Wilk was selected to determine normal distribution since each group had less than 100 participants. The data passed the test of normal distribution for Shapiro-Wilk for 7 of the 8 groups since they were not statistically significant: students on free and reduced-price lunch who participated in athletics, $W(45) = 0.96$, $p = .095$; students on free and reduced-price lunch who participated in music ensembles, $W(45) = 0.96$, $p = .186$; students on free and reduced-price lunch who participated in athletics and music ensembles, $W(45)= 0.96$, $p = .112$; students on free and reduced-price lunch who participated in neither athletics or music ensembles, $W(45) = 0.96$, $p = .125$; students on paid lunch who participated in athletics, $W(45) = 0.97$, $p = .404$; students on paid lunch who participated in music ensembles, $W(45) = 0.95$, $p = .065$; and students on paid lunch who participated both athletics or music ensembles, $W(45) = 0.99$ $p = .852$. One group's mean violated the normality assumption: students on paid lunch who participated in neither athletics and music ensembles, $W(45) = 0.94$, $p = .031$. ANCOVA was still used for the analysis since ANCOVA remains valid when data fails the test of normality (Leech et al., 2015). After examining the scatterplot of the dependent variable and the covariate, a linear relationship was detected. The homogeneity of regression slopes was checked with an ANOVA. No interaction was found between the student's meal status and the covariate science scores, $F(1, 356) = 0.26$, $p = .610$. No interaction was found between the type of participation and the covariate science scores, $F(3, 352) = 0.21$, $p = .892$. No interaction was found between the type of participation, the student's meal status, and the covariate science scores, $F(7, 347) = 1.02$, $p = .417$. The assumption of the regression of slopes was met. Levene's test of homogeneity showed that the variances of

the groups were similar, $F(7, 352) = 0.84$, $p = .554$. Table 9 details the results of this ANCOVA.

Table 9

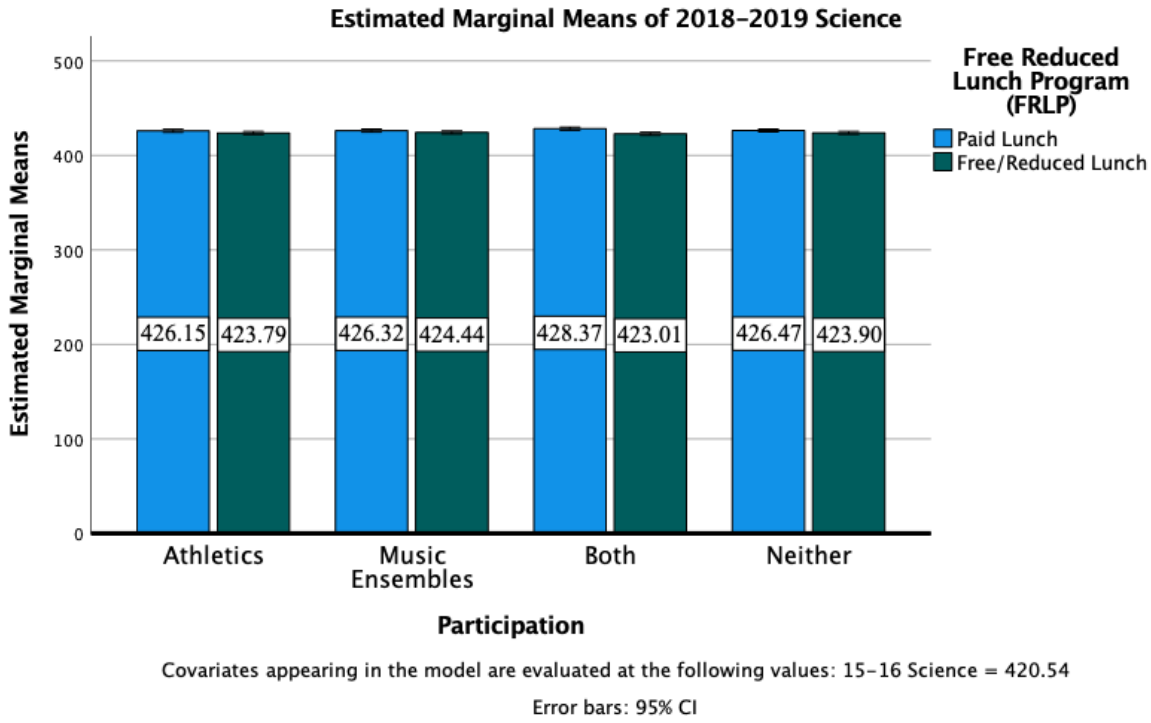
Factorial ANCOVA for Interaction of SES and Activity Type on Science Achievement

Source	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Aspire 2015	11387.67	1	11387.67	367.75	<.001	0.512
SES	806.16	1	806.16	26.03	<.001	0.069
Activity	25.02	3	8.34	0.27	.847	0.002
SES*Activity	166.57	3	55.52	1.79	.148	0.015
Error	10868.86	351	30.97			
Total	65144042.00	360				
Corrected Total	25508.39	359				

Science achievement from 2015-2016 was a statistically significant covariate, $F(1, 351) = 367.75$, $p < .001$, $\eta^2 = 0.512$, representing a much larger than typical effect size (Morgan et al., 2020). Factorial ANCOVA results indicate that after controlling for previous academic achievement, no significant interaction existed regarding the science scores of students by the type of activity students participated in and their SES, $F(3, 351) = 1.79$, $p = .148$, $\eta^2 = 0.015$. Therefore, SES did not combine with the type of participation to significantly affect student science achievement after controlling for previous science achievement. Since there was no interaction effect, each main effect was separately examined. Figure 4 plots the science scores by SES and activity.

Figure 4

Adjusted Means for SES and Activity on Science Achievement



The main effect of SES, $F(1, 351) = 26.03$, $p < .001$, $\eta^2 = 0.069$, was significant, indicating that students on paid lunches scored statistically higher than students on free and reduced-price lunches, with a medium effect size (Morgan et al., 2020). After controlling for previous science achievement, paid lunch students had a higher adjusted mean for achievement scores ($M = 426.83$, $SE = 0.42$) than students on free and reduced-price lunches ($M = 423.78$, $SE = 0.42$). The type of activity participation, $F(3, 351) = 0.27$, $p = .847$, $\eta^2 = 0.002$, was not significant meaning the groups were statistically similar. After controlling for prior academic achievement, student achievement by participation was ranked in the following order from highest to lowest: students who participated in both athletics and music ensembles ($M = 425.69$, $SE = 0.59$), students who

participated in music ensembles (M = 425.38, SE = 0.59), students who participated in neither (M = 425.19, SE = 0.60), students who participated in athletics (M = 424.97, SE = 0.59). However, the inferential statistics described indicate that these patterns appeared by chance and were not statistically different.

In summary, no statistically significant interaction effect was present between SES and type of participation regarding students' associated science achievement as measured by the ACT Aspire Summative Science Assessment. Similarly, the type of activity participation was not statistically significant regarding students' associated science achievement. Therefore, the interaction null hypothesis and the main effect hypothesis for activity participation were retained. In contrast, students on paid lunches statistically outperformed students on free and reduced-price lunches. Therefore, the main effect hypothesis for SES was rejected.

Summary

The purpose was to determine the effects by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on four areas of student achievement measured by ACT Aspire Summative Assessments for eighth-grade students in five Arkansas public schools after controlling for previous achievement. Table 10 summarizes the interaction and main effects of the four hypotheses.

Table 10

Summary of Statistically Significant Results for Hypotheses 1-4

Variables by H_0	H_1	H_2	H_3	H_4
Aspire 2015	< .001	< .001	< .001	< .001
SES	< .001	< .001	.004	< .001
Activity	.618	.622	.060	.847
SES*Activity	.845	.898	.525	.148

For Hypotheses 1-4, the covariate and the main effect of student SES as measured by meal status were statistically significant. The effect size of the covariate was much larger than typical for all four hypotheses. The effect size of SES was medium for Hypotheses 1 and 4 and small for Hypotheses 2 and 3. In each case, students on paid lunches scored statistically higher, on average, than students on free and reduced-price lunches. The interaction of student SES and activity participation type and the main effect of activity participation type were statistically similar on all four hypotheses. Chapter V will discuss the results, their implications, and provide recommendations for future research.

CHAPTER V

DISCUSSION

Athletics and music ensembles in school are important aspects of secondary public education in the United States. More than half of all high school students participate in athletics (Lumpkin & Achen, 2015; National Federation of State High School Associations, 2019), and almost a quarter of them participate in school music ensembles (Elpus & Abril, 2019). More students than not choose to integrate athletics or music ensembles into their educational experience. No Child Left Behind introduced an era of high-stakes school accountability focused on student academic achievement and has resulted in stakeholders questioning the funding assigned to these extracurricular activities (Major, 2013; Marchetti et al., 2016). Should athletics and music ensembles in schools be associated with higher academic achievement for participants, justification of continued funding could be more easily accomplished. Additionally, should athletics and music ensembles close the academic achievement gap often found between students of low SES backgrounds and students of more privilege, these programs would be more likely to maintain their existence in times of financial crisis.

The purposes of this study were to determine, after controlling for previous achievement, the effects by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on mathematics, English, reading, and science achievement measured by ACT Aspire Summative Assessments in

mathematics, English, reading, and science for eighth-grade students in five Arkansas public schools. This chapter will discuss the results and implications of the study as well as provide the potential for practice, policy, and future research considerations.

Findings and Implications

A 4 x 2 factorial ANCOVA was used to analyze Hypotheses 1-4. The dependent variable was mathematics, English, reading, or science achievement, respectively, as measured by the 2018-2019 ACT Aspire Summative Assessments when students were in the eighth grade. The covariate was mathematics, English, reading, or science achievement, respectively, as measured by the 2015-2016 ACT Aspire Summative Assessments when students were in the fifth grade. The first independent variable was student SES, measured by whether students qualified for free and reduced-price lunch. The second independent variable was whether students participated in athletics, music ensembles, both, or neither.

Hypothesis 1

Hypothesis 1 stated that after controlling for previous mathematics achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on mathematics achievement measured by ACT Aspire Summative Mathematics Assessment for eighth-grade students in five Arkansas public schools. The results of this analysis indicated that the covariate of prior academic achievement was statistically significant, with a very large effect size. The interaction effect of SES and student participation in athletics only, school music ensembles only, both, or neither indicated that all groups were statistically similar with variations in mathematics score as a result of chance. The interaction null

Hypothesis 1 was not rejected, and the alternative hypothesis was not supported. The main effect of SES was also statistically significant, with a medium effect size. Students classified as having paid lunch scored significantly higher in mathematics than those students who qualified for free and reduced-price lunch. The main effect null hypothesis concerning SES and student mathematics achievement was rejected, and the alternative hypothesis was supported. The main effect comparing students who participated in athletics only, school music ensembles only, both, or neither indicated that all groups were statistically similar with variations in mathematics achievement as a result of chance. The main effect hypothesis related to participation in athletics or music ensembles was not rejected, and the alternative hypothesis was not supported.

Hypothesis 2

Hypothesis 2 stated that after controlling for previous English achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on English achievement measured by ACT Aspire Summative English Assessment for eighth-grade students in five Arkansas public schools. The results of this analysis indicated that the covariate of prior academic achievement was statistically significant, with a very large effect size. The interaction effect of SES and student participation in athletics only, school music ensembles only, both, or neither indicated that all groups were statistically similar, with variations in English score as a result of chance. The interaction null Hypothesis 2 was not rejected, and the alternative hypothesis was not supported. The main effect of SES was also statistically significant, with a small effect size. Students classified as having paid lunch scored significantly higher in English than those students who qualified for

free and reduced-price lunch. The main effect null hypothesis concerning SES and student English achievement was rejected, and the alternative hypothesis was supported. The main effect comparing students who participated in athletics only, school music ensembles only, both, or neither indicated that all groups were statistically similar with variations in English achievement as a result of chance. The main effect null hypothesis related to participation in athletics or music ensembles was not rejected, and the alternative hypothesis was not supported.

Hypothesis 3

Hypothesis 3 stated that after controlling for previous reading achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on reading achievement measured by ACT Aspire Summative Reading Assessment for eighth-grade students in five Arkansas public schools. The results of this analysis indicated that the covariate of prior academic achievement was statistically significant, with a very large effect size. The interaction effect of SES and student participation in athletics only, school music ensembles only, both, or neither indicated that all groups were statistically similar, with variations in reading scores a result of chance. The interaction null Hypothesis 3 was not rejected, and the alternative hypothesis was not supported. The main effect of SES was also statistically significant, with a small effect size. Students classified as having paid lunch scored significantly higher in reading than those students who qualified for free and reduced-price lunch. The main effect null hypothesis concerning SES and student reading achievement was rejected, and the alternative hypothesis was supported. The main effect comparing students who participated in athletics only, school music ensembles only,

both, or neither indicated that all groups were statistically similar with variations in reading achievement as a result of chance. The main effect null hypothesis related to participation in athletics or music ensembles was not rejected, and the alternative hypothesis was not supported.

Hypothesis 4

Hypothesis 4 stated that after controlling for previous science achievement, no significant difference will exist by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on science achievement measured by ACT Aspire Summative Science Assessment for eighth-grade students in five Arkansas public schools. The results of this analysis indicated that the covariate of prior academic achievement was statistically significant, with a very large effect size. The interaction effect of SES and student participation in athletics only, school music ensembles only, both, or neither indicated that all groups were statistically similar, with variations in science scores a result of chance. The interaction null Hypothesis 4 was not rejected, and the alternative hypothesis was not supported. The main effect of SES was also statistically significant, with a medium effect size. Students classified as having paid lunch scored significantly higher in science than those students who qualified for free and reduced-price lunch. The main effect null hypothesis concerning SES and student science achievement was rejected, and the alternative hypothesis was supported. The main effect comparing students who participated in athletics only, school music ensembles only, both, or neither indicated that all groups were statistically similar with variations in science achievement as a result of chance. The main effect null hypothesis related to

participation in athletics or music ensembles was not rejected, and the alternative hypothesis was not supported.

Interaction of SES and Participation Type

Participation in athletics and school music ensembles may aid students from different SES backgrounds differently. Marchetti et al. (2016) found evidence to support extracurricular activities helping to bridge the achievement gap between students of low and high SES, while Bodenberg (2016) and Gorry (2016) both revealed similar findings among athletes. Those three studies suggested that students from low SES backgrounds may benefit more academically from participation in extracurricular activities than students from high SES backgrounds who would do well academically regardless of whether they participated in extracurricular activities. This current study did not find a significant interaction between the SES background of students and whether they participated in athletics, music ensembles, both, or neither after controlling for previous academic achievement. No interaction meant that this study did not support the hypothesis that participation in athletics or music ensembles may bridge the achievement gap in a statistically significant manner.

Participation in Athletics and Music Ensembles

Students are developed by the influences in their different life domains. Bronfenbrenner (1981) described how microsystems could have more developmental influence within the mesosystem in a person's life if that microsystem shared commonalities with another microsystem in that person's life. An example would be a student having one of their teachers also be the coach on their athletic team. The consensus in the literature suggests that students who participate in extracurricular

activities outperform their nonparticipating peers in academics (Broh, 2002; Hsu et al., 2019; Im et al., 2016; Knifsend & Graham, 2012; Shaffer, 2019). This study examined whether an association could be established between athletics and music ensembles and eighth-grade academic achievement as measured by the ACT Aspire Summative Assessments after controlling for student achievement before joining these school groups.

Student-athletes excel academically. Lumpkin and Achen (2015) found that athletes are associated with characteristics that define successful students, such as having excellent grade point averages, graduation rates, and attendance. Athletes have been found to academically outperform their nonathletic peers (Broh, 2002; Eccles et al., 2003; Fredricks, 2012; Guest & Schneider, 2003; Lumpkin & Achen, 2015; Lumpkin & Favor, 2012). The results of this study contrasted the expected findings from much of the literature since the results indicated that eighth-grade athletes were statistically similar to eighth-grade students who did not participate in athletics. Shifrer et al. (2015) determined that most of the academic achievement differences between athletes and nonathletes are explained by student-athletes, on average, coming from more privileged families. Since academic achievement is closely associated with SES (Albert et al., 2020) and this study controlled for prior academic achievement, perhaps the lack of difference is accounted for by more privileged students self-selecting into athletics and preexisting differences accounting for potential differences. Eighth-grade students within the five public Arkansas middle schools did not have an academic advantage from participating in athletics compared to nonparticipants according to their standardized test results after controlling for prior academic achievement.

Students in school music ensembles excel academically. Eason and Johnson (2013) determined that student musicians were associated with traits of academic excellence such as better test scores, grade point averages, attendance, and graduation rates. Participation in school music ensembles is associated with better academic outcomes than not participating (Broh, 2002; Courson, 2018; Eason & Johnson, 2013; Eccles et al., 2003; Im et al., 2016). The results of this current study contrasted this theme in the literature, as students in this study who participated in eighth-grade music ensembles were statistically similar to eighth-grade students who did not participate in music ensembles. Elpus (2013) also found, in contrast to much of the literature, that music ensemble students were not statistically different from nonmusic students. Elpus concluded that after controlling for the covariates of previous academic achievement, SES, and special education status, students in music ensembles did not perform differently academically after participating in these groups. This study, similar to Elpus, controlled for the academic achievement of eighth-grade students by using their fifth-grade scores before joining music ensembles. Eighth-grade students within the five public Arkansas middle schools did not have an academic advantage from participating in music ensembles compared to nonparticipants according to their standardized test results after controlling for prior academic achievement.

Additionally, this study examined whether students who participated in both athletics and music ensembles might be associated with better test scores compared to students who participated in school athletics only, school music ensembles only, or who participated in neither athletics nor music ensembles. The results of the main effect of participation in each category ranked the groups differently, with students who

participated in both music ensembles and athletics having the highest achievement test scores for three of the four hypotheses and students who participated in neither having the lowest achievement test scores in two of the four hypotheses. However, all four groups were statistically similar, meaning these differences can be explained by chance rather than by the independent variable of group participation. These results imply that for eighth-grade students in five Arkansas public schools, no academic advantage exists from participating in athletics or music ensembles since all students were statistically the same after controlling for the previous achievement.

Socioeconomic Status

Student SES background can influence the results of studies related to academic achievement. Students' expected academic outcomes differ depending on their background SES (Albert et al., 2020). This current study examined the main effect of student achievement measured by the ACT Aspire Summative Assessments by SES after controlling for prior academic achievement and indicated that students from more privileged backgrounds score statistically higher than those from less privileged backgrounds. These findings supported Albert et al. (2020) since SES meaningfully differentiated students based on academic achievement in mathematics, English, reading, and science. The effect size was medium for the mathematics and science tests explaining 6.8% and 6.9% of the difference in scores, respectively, between students of high SES and students of low SES. The effect size was small for the English and reading tests explaining 4.4% and 2.3% of the difference in scores, respectively, between students of high SES and students of low SES.

Though significant differences were found between students from high SES and low SES, the reason for these differences was not explained by the present study. Destin et al. (2019) indicated that students from high SES might outperform students from low SES due to differences in growth mindsets, while Albert et al. (2020) found that students from poverty may not develop as much executive functioning. Wong and Wong (2018) speculated that more effective teachers tended to work with students from higher-income backgrounds, which in this study could mean that the elementary schools in more affluent neighborhoods had better teachers than elementary schools in less affluent neighborhoods that fed students into the five middle schools. Any or all of these reasons could contribute to why students from more privileged backgrounds outperform academically students from low-income backgrounds. Kocak et al. (2021) suggested that SES is not as significant of a variable as educators frequently ascribe as other variables are more potent in influencing student achievement than SES. In this study, the effect size of SES was small to medium, explaining between 2.3% and 6.9% of the difference in scores between students of high SES and students of low SES. Therefore, as predicted by the literature, a significant difference between SES groups was found, with the effect size explaining a small to medium amount of the difference, but the present study did not explain the reasons for this difference.

Recommendations

Potential for Practice/Policy

This study examined the effect of participation in extracurricular activities by SES on eighth grade Arkansas academic achievement in five Arkansas public middle schools after controlling for previous academic achievement. These findings can help middle

school educational leaders make decisions concerning athletics and music ensembles regarding school academic accountability reports. Hsu et al. (2019) found that 6-15 hours per week of participation in activities was required for statistically different academic outcomes, while 1-5 hours per week resulted in no statistical difference between groups. On average, high school athletic and music ensemble groups spend more time together every week, which means the results of this current study may not be transferrable to the high school level. The eighth-grade students in this study could have different results if examined during their 12th-grade year since those in extracurricular activities would likely have invested more hours weekly into those activities during high school.

School budgets are limited. Music programs in some districts have been dismantled due to budget limitations (Major, 2013; Slaton, 2012), and athletic programs have been questioned since athletic programs absorb many financial resources that could otherwise be spent on direct academic support (Bowen & Greene, 2012; Lumpkin & Favor, 2012). This study did not find empirical support that middle school athletic and music ensemble leaders could use to defend continued program funding based on participation being associated with better academic achievement. Instead, these programs will need to seek other justifications, such as students learning about teamwork and leadership, the inherent aesthetic beauty of music or sports, or associations with student wellbeing.

School leaders, counselors, and teachers work with students to help provide guidance in selecting classes for each successive school year. This study did not find evidence to support a significant association with students earning better grades from participating in athletics, music ensembles, or both compared with students who did not

participate in these groups. Therefore, middle school staff helping students select classes should focus on helping students identify classes that align with their interests and future career goals, knowing that a student choosing a class other than an athletic team or music ensemble will not be associated with an academic disadvantage. Additionally, this study examined whether an interaction between SES and activity participation existed and found no statistical interaction. Therefore, students from different SES backgrounds need not give different considerations to joining athletics or music ensembles compared with students from other SES backgrounds.

Students from higher SES backgrounds were found to perform statistically better in all subject areas than their peers from lower SES backgrounds as measured by their free and reduced-price lunch status and the ACT Aspire Summative Assessments. This statistical difference indicated that school leaders should support students from low SES backgrounds more strategically. This study determined that middle school athletics and music ensembles do not constitute significant academic supports after controlling for previous academic achievement. School leaders will need to look to other literature for examples of different supports that may help close the achievement gap between students from low and high SES backgrounds.

Future Research Considerations

The outcomes of this study did not provide sufficient evidence to indicate that students who participate in school athletics only, school music ensembles only, or who participated in neither athletics nor music ensembles have statistically different outcomes than nonparticipants on the ACT Aspire Summative Assessments in eighth grade after

controlling for prior academic achievement in fifth grade. The following are recommendations for future research into this area of study:

1. This study was causal-comparative in research design. A future study could use a true experimental design where students are randomly assigned to athletic teams or music ensembles.
2. Additional research could disaggregate athletic teams and music ensembles to compare specific types of teams and ensembles such as football, basketball, band, choir, and others against each other rather than combining them into macro-level groups. Each activity type may have unique characteristics.
3. Future middle school research could use a different measure of academic achievement other than the ACT Aspire. Measuring grade point averages or attendance rates could yield a significant difference between groups. ACT Aspire not being aligned to Arkansas teaching standards could weaken the validity of the resulting scores.
4. Additional research could examine other areas athletic and music ensemble leaders might use to justify continued funding. Examples of these areas to study could include whether students in these groups demonstrate significantly stronger leadership or teamwork skills. Other associations may include determining if students in these extracurricular activities have better overall mental health or have fewer writeups for misbehavior at school than nonparticipants.
5. Future research could collect the amount of time students weekly engage in extracurricular activities. Spending more time weekly in an activity may

create a positive association between group participation and academic outcomes.

6. Additional research may also determine the number of years of participation in each student's activity. Eighth-grade students who have participated in athletics or music ensembles for 1 year may have different characteristics than students who have participated for 3 years.

Conclusion

The purposes of this study were to determine, after controlling for previous achievement, the effects by SES between students who participate in athletics only versus school music ensembles only versus both versus neither on mathematics, English, reading, and science achievement measured by ACT Aspire Summative Assessments in mathematics, English, reading, and science for eighth-grade students in five Arkansas public schools. First, no interaction was found between extracurricular participation and SES on academic achievement after controlling for previous academic achievement. Second, comparing students who participated in athletics, music ensembles, both, or neither resulted in no statistical difference regarding academic achievement after controlling for previous academic achievement. Therefore, eighth-grade students who participated in athletics, music ensembles, both athletics and music ensembles, or neither athletics nor music ensembles had statistically similar academic outcomes. Third, students from higher SES backgrounds achieved statistically higher than those from lower SES backgrounds with small to medium effect sizes depending on the subject area tested. Educational leaders can use these findings to help inform future policy and

practice regarding athletics, music ensembles, and SES differences to help create an effective learning environment that helps all students achieve their potential.

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