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Examining the Relationship Between Participating in Clubs or Sports and Academic Success

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Examining the Relationship Between Participation in Clubs or Sports and Academic Success

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By

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The thesis entitled 'Examining the Relationship Between Participation in Clubs or Sports and Academic Success' presented by Adam Laskos, a candidate for the degree of Master of Science in Mathematical Sciences, has been approved and is worthy of acceptance.

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ABSTRACT

Student academic success is of great importance in our country. We desire our children to succeed and reach their potential at all levels of academics. So investigation has been made into what would help us fuel their success. One area of interest is participation in extracurricular activities. Is this an area that will help propel our students to succeed? Studies have linked extracurricular activity participation to academic success. It is the desire of this study to explore this relationship at Black River Local Schools so as to help inform potential policy decisions. Is there a significant relationship to participation in clubs or sports and academic success? Are Gender, SES, attendance, and participation in extracurricular activities significant predictors of academic success? This study considers data collected by the Black River Local Schools. It was found that a significant relationship does exists between participation in extracurricular activities and academic success and that we can distinguish students who will have a 3.0 GPA or above from students who are below a 3.0 with a logistic regression model. The development of a second model was also considered for determining those students who would pass the ELA OST, but the model was not a good fit. The results imply that extracurricular activities seem to be a piece of the academic success puzzle and if boards of education want to implement policies concerning involvement in extracurricular activities they need to consider studies such as this.

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CHAPTER I: Introduction

Educational institutions seem to be more and more focused on academic success and how to promote and develop this within their respective students. There is a growing body of literature that relates to academic success. It was of particular interest to determine if there is a relationship between clubs or sports and academic success at the high school level. Do students who are involved in these extracurricular activities notice a boost in their academics (e.g. GPA, standardized test scores, and attendance)? Would it be beneficial for boards of education to consider implementing policy changes regarding clubs or sports to help promote academic success? The development of two models were also considered in order to predict academic success at the high school level. Overall, it was hoped that potential policy discussions at Black River Local Schools are informed by this study.

Background of the Problem

Black River Local School's mission/vision statement states that their desire is to develop "world class citizens." Academic success is part of this statement. In seeking to reach this goal, the board of education has within its power to implement new programs that will help its students grow academically. It is of interest to know whether high school students' participation in clubs or sports have a relationship to their academic success. Would implementing a graduation requirement for involvement in a club or sport help boost academic achievement in the high school student population? Examination of this relationship will be made while considering various factors within the student population such as gender, socio-economic status, and involvement in clubs or sports. Academic success will involve a consideration of GPA, Ohio State Test (OST) scores, ACT scores, and attendance. Are any of the above factors significant predictors for

academic success? Is there a significant relationship between clubs or sports and academic success? Those questions will be considered and an attempt is made to answer them.

Boosting student achievement is of great interest in the education world (Craft, 2012). The literature contains studies that seek to demonstrate practices in education that help grow academic achievement in students. The desire to see our youth grow and develop so that our country can grow and develop is evident in our culture. The body of literature shows evidence of student extracurricular involvement and its relationship to student commitment towards an institution and completion of degree programs at the college level (Tinto, 2006). We also see that extracurriculars are predictive of academic success (Fredricks & Eccles, 2006). Fredricks and Eccles do note that a lot of studies are simply putting yes or no on participation in extracurriculars and seeing if that has a statistical significant relationship to academic success without controlling for other factors (2006). Other aspects such as socio-economic status (SES) and gender will be examined to see how those contribute to club or sport participation when considering academic success.

A limiting factor, in this study, is that it does not adequately answer the question of whether academically successful students are more prone to join clubs or sports or if it is the clubs or sports that are contributing to the academic success of the student. The relationship between clubs or sports and academic success will be explored with various factors and it is hoped that there will at least be a little added to the literature in its consideration of some of those factors (e.g. SES, gender, etc.). Another area of concern will be the generalizability of the study to other schools. Although there should not be a problem with the ability to generalize to Black River Local Schools.

Educational institutions are interested in ways to help their students graduate, and academic success is of great importance at all levels. There is a lot of literature focused on the retention and persistence of students at the college level. Other literature does focus on high school and the

influence of extracurriculars. The study of the relationship between extracurricular activities and academic success is an area of interest in the United States and even overseas (Bakoban & Aljarallah, 2015). Studies have shown a statistically significant relationship with extracurriculars and academic success (Fredricks & Eccles, 2006; Craft, 2012). Of the studies considered here many seem to have similar ideas of what constitutes academic success. In the studies I came across, GPA seemed to be the main variable for classifying academic success. Attendance and standardized tests scores were also associated with academic success and, from my experience in the secondary education system, this seems to be normal conversation. Many studies also include participation in extracurriculars as one of the main factors/predictors of academic success. It seems that extracurriculars have been studied quite a bit and these studies have shown that there is now a push to understand more of why there is a relationship between academic success and participation. Studies are now turning to adjust for covariates and consider more of the student's background and perspective rather than just saying that extracurriculars are the main factor/predictor in students who are academically successful (Tinto, 2017; Demetriou & Schmitz-Sciborski, 2011).

There have also been studies that have sought to investigate the contrary. Is it possible for extracurriculars to hinder academic success? Marsh considered this and looked at the potential of negative effects on academic achievement (1992). It seems that the concern around the negative effect of extracurriculars on academic achievement is too much involvement in extracurriculars. Some studies have also considered whether involvement in certain extracurriculars might promote undesirable social behaviors (Fredricks & Eccles, 2006). It is also possible that certain clubs or sports could negatively influence a student depending on the other students or adult leaders that are in that club or sport. Some research has evidenced these concerns as well.

Before beginning this study, I expected to see some similar results to the studies I came across. I suspected that I would see a statistically significant relationship between participation in clubs or sports and academic success. I did not think that gender would have any association with academic success nor have any relationship with club or sport involvement. What I was interested to see was if any of the other factors like SES would yield any significant results when coupled with participation in clubs or sports. Some of the literature has referenced other studies that show low SES and extracurricular participation have yielded statistically significant results when it comes to academic success (Fredricks & Eccles, 2006).

With schools making budget cuts and considering whether to support extracurriculars, remove them or restrict them in some way, it is important for school boards to be informed and know if there exists a relationship between clubs or sports and academic success. This study and ones like it have the potential to guide and help inform the decisions of school boards. It is my hope that this study will be of value to Black River Local Schools.

This study used existing data that has been gathered on our students at Black River Local Schools. Our school uses EMIS to store data on its students and to report that data to the state of Ohio. Data was collected from the EMIS database and placed into a spreadsheet and imported into R for statistical analysis. There was no random sampling of data. As much of the data as possible has been utilized and grouped to develop comparisons between students who participate in clubs or sports and those students that do not participate in clubs or sports over various factors while looking at academic success. This study employed t-tests, ANOVA, non-parametric tests, and logistic regression. The study explored the relationship between clubs or sports and academic success. With logistic regression, two models were developed to predict academic success for Black River High School students, one for GPAs above a 3.0 and one for passing the English

Language Arts Ohio State Test (ELA OST). Assumptions were considered for each technique. Interpretations were made by considering statistical and practical significance.

Statement of the Problem

Would high school students' academic achievement benefit from the implementation of policy changes that include requirements for participation in clubs or sports?

Purpose/Significance of the Study

This is a quantitative study that was conducted to help inform potential future academic policy decisions for the Black River Local Schools, specifically the high school. The study looked at student data that was gathered by the school system. The variables were the students' age, gender, SES status, involvement in clubs or sports, GPA, attendance, and OST/ACT scores. Most of these variables are common variables in the literature review, briefly discussed above.

The data was taken and analyzed with appropriate statistical techniques to help answer the question of whether participation in clubs or sports has a relationship to academic success and to determine if gender, attendance, SES and involvement in clubs or sports was predictive of academic success?

Primary Research Questions

Question 1: Is there a significant relationship between involvement in clubs or sports and academic success?

Question 2: Are gender, attendance, socioeconomic status and involvement in clubs or sports predictive of academic success?

Hypotheses

Hypothesis 1: The first hypothesis is that there is not a significant relationship between involvement in clubs or sports and academic success.

Hypothesis 2: The second hypothesis is that the factors of gender, attendance, socioeconomic status and involvement in clubs or sports are not significant predictors of GPA, and OST ELA scores.

Research Design

The participants in this study were the students of Black River High School from the 2018-2019 academic year. Specific data pertaining to these students is collected each year from the school and reported to the state. Since the data is collected by the school I only analyzed the available data and did not have to implement a collection plan. The data was organized into a spreadsheet and analyzed using χ^2 tests, t-tests, ANOVA, Wilcoxson rank-sums, Kruskal-Wallis tests and logistic regression. The independent and dependent variables mentioned above were used in these tests and with the logistic regressions.

Theoretical Framework

As mentioned above, prior studies have indicated that there is a significant relationship between academic success and participation in clubs or sports. While studying the relationship, researchers have considered several variables that were also used in this study. Fredricks (2012) and Craft (2012) included GPA and SAT. Covay and Carbonero (2010) looked at SES. Broh (2002) included gender and math/English grades and standardized test scores; Fredricks (2012) also looked at math scores. Marsh (1992) and Eccles, Barber, Stone, and Hunt (2003) also

involved attendance in their study. Within these studies the researchers have sought to further explain the relationship between extracurricular activities and academic success using these variables along with others. Attention has been given to some of the same variables within Black River High School with a view to see how our school's data lines up with some of these studies and to inform possible policy discussions.

Assumptions, Limitations, and Scope

This study was limited in that it did not be adequately answer the question of whether academically successful students are more prone to join clubs or sports or if it is the clubs or sports that are contributing to the academic success of the student. The relationship between clubs or sports and academic success was explored with various factors and it is hoped that the study will at least add to the literature in its consideration of some of those factors (e.g. SES, gender, etc.) within a rural school setting. Since data was only collected from Black River Local Schools another area of concern is the generalizability of the study to other schools. Although there should not be a problem with the ability to generalize to Black River Local Schools.

Definition of Terms

ACT- American College Testing. Scores can range from 1 to 36.

Academic Success- measured by GPA (Grade Point Average, 0.0 to 5.0), OST scores (Ohio State Test), ACT scores, and attendance (given as a percent of the year that a student was present).

Clubs- each student will have recorded what clubs they were in. The study will consider a Yes or No in this category. (clubs include: FCCLA, FFA, Choir, Band, Student Council, NHS,etc…)

Gender- Male or Female students

ELA- English Language Arts

EMIS- Education Management Information System

OST- Ohio State Test. A score of 700 is considered passing.

R- A statistical program used to analyze data and conduct statistical tests.

SES- Socio-economic Status. This will be defined as high or low. Low would be those students who qualify for free or reduced lunches (standard is set by the government), high would be all others).

Sports- This will be look at as YES or NO. The study will also seek to consider each sport individually as well. Low numbers and students in multiple sports may pose a problem.

Summary

As educational institutions seek to promote academic success within their student bodies, they are looking to find the key elements to that success. Black River Local Schools is seeking to develop academically successful students and would be interested in ways to further promote success. This study explored the relationship between clubs or sports and academic success at the high school level over various factors in order to help frame potential discussions around

extracurricular participation and academic success. Do students who are involved in these extracurricular activities notice a boost in their academics (e.g. GPA, standardized test scores, and attendance)? Would it be beneficial for our board of education to consider implementing policy changes regarding clubs or sports to help promote academic success? These are some of the questions that this study considered and attempts to answer. It is hoped that the Black River Local Schools will be informed and helped in future policy discussions.

CHAPTER II: Background and Literature Review

Educational institutions are interested in ways to help their students graduate. So academic success is of great importance at all levels. When seeking to promote academic success, schools will try to support programs that they believe will contribute towards their students' success. Extracurricular activities are generally viewed to support the school system and its students in their educational careers (Eccles et al., 2003). The following literature review will provide an overview of the landscape of extracurricular activities and how they have been studied, specifically looking at their relationship to academic achievement/success. You will see that extracurricular activities have been studied in regards to social issues like bullying or alcohol and drug use. The interest in extracurricular activities is seen at all levels and even internationally. As studies approach this topic they often have various definitions of what constitutes an extracurricular activity. Various independent and dependent variables are considered as well as many factors and cofactors. Overall the studies considered below are trying to explain what the relationships are between extracurricular activities and academic/social outcomes. The literature is replete with studies conducted on extracurricular activities and their influence in a students' academic and social interactions. You will see that studies not only show a relationship between extracurricular activities and academic success but they want to know why such a relationship exists. So various factors begin to be developed to explore the relationship. Studies will control for cofactors and things along these lines. They will try to explore mediating mechanisms and the connections to academic success. As you will see below the relationship between extracurricular activities and academics exists and is explored in various ways.

When investing the literature around extracurricular activities you begin to see connections not only to academic success but also to other social issues. There is concern generated around

students and their social development. Educators are concerned that their students develop into citizens that contribute to the world around them. Black River High School's missions statement contains the phrase "world-class citizens." It seems to be the case that our educational institutions desire to know what influences our students and how can we get them to not only perform better (i.e. academics) but to be stronger people.

So studies have been considering ideas like do students participating in extracurricular activities notice a decline in things considered to harm them both physically and socially. Fredricks and Eccles (2006) considered participation in school clubs and sports and their impact on student alcohol and marijuana use; they found that "participation in both school clubs and sports predicted lower alcohol and marijuana use for boys only". Eccles in partnership with other researchers considered drugs and alcohol and their relationship to extracurricular activities, while also considering other prosocial activities (e.g. church attendance, volunteering) and their influence on drug and alcohol use (Eccles et al., 2003). Other studies have looked at extracurricular activities and their influence on fighting/bullying (Matjasko, Holland, Holt, Espelage, & Koenig, 2019). They investigated extracurricular activity participation intensity and its relationship to bullying and fighting while considering factors such as socio-economic status. They found a negative relationship between the two at threshold of 3 to 4 hours a week (Matjasko, et al.,2019). So the interest in extracurricular activities and their influence upon areas other than academics has been documented but as we will see academics is a big area of consideration when studying extracurricular activities.

The influence that extracurricular activities have on academics is of interest in the education world. Studies have been conducted at various levels such as elementary schools, high schools, colleges and educational institutions around the world (Tinto, 2006; Craft, 2012; Bakoban

& Aljarallah, 2015). At the elementary school level, there have been studies that have shown relationship between extracurricular activities and academic achievement (Covay & Carbonaro, 2010). Other literature does focus on high school and the influence of extracurricular activities on academic success yielding statistically significant relationships (Fredricks & Eccles, 2006; Craft, 2012). Craft's (2012) study is one example among many that considered the participation in clubs or sports and the relationship between GPA and SAT scores at the high school level. There is a lot of literature focused on the retention and persistence of students at the college level; the body of literature considers student extracurricular involvement and its relationship to student commitment towards an institution and completion of degree programs (Wang & Shiveley, 2009; Tinto 2006). Overseas we find that the study of the relationship between extracurricular activities and academic success is still an area of interest as one study that was conducted at a university in Saudi Arabia showed that those involved in extracurricular activities showed higher GPAs (Bakoban & Aljarallah, 2015). This interest in academic achievement seems to pervade the literature. Those that are conducting studies are seeking to find explanations for what contributes to this achievement. So as we will see below, one of the main areas being considered in the area of achievement is extracurricular activities and the role they play.

The studies considered in this paper seem to have similar ideas of what constitutes academic achievement (or success). GPA seemed to be the main variable for classifying academic success (Fredricks, 2012; Eccles et al., 2003). Math grades and English grades as well as standardized test scores from the subjects have been considered (Broh, 2002). Attendance and standardized tests scores were also associated with academic success and, from my experience in the secondary education system, this seems to be normal conversation (Eccles et al., 2003; Covay & Carbonaro, 2010). Some studied looked to see if participation in extracurricular activities

predicted future academic results like Marsh (1992) showed that TEAP (total extracurricular activity participation) was significantly related to college attendance. This paper did not have as much access to data as some of these studies and is limited in that it does not use longitudinal data. Nevertheless, this study does seek to incorporate GPA, state test scores, and attendance into the definition of academic success. It seems that extracurricular activities have been studied quite a bit in the literature and there is now a push to understand more of why there is a relationship between academic success and participation. Studies have turned to adjust for covariates and consider more of the student's background and perspective rather than just saying that extracurricular activities are the main factor/predictor in students who are academically successful (Tinto, 2017; Demetriou & Schmitz-Sciborski, 2011).

Studies have found that extracurricular activities are predictive of academic success (Fredricks & Eccles, 2006). Fredricks and Eccles do note that a lot of studies are simply putting yes or no on participation in extracurricular activities and seeing if that has a statistical significant relationship to academic success without controlling for other factors (2006). Broh (2002) considered gender, nationality, family income, two-parent household, type of school and size of school in his study. Fredricks (2012) considered student expectations, GPA, math test scores, and some others. She also controlled for other factors when considering whether or not the intensity (hours per week) with which as student was involved had a relationship to their academic performance (Fredricks, 2012). Other studies have considered factors such as the mom and dad's occupational "prestige", minutes reading per week, approaches to learning, number of siblings (Covay & Carbonaro, 2010). Studies moving forward in research will need to consider various factors since it has already been generally shown that participation does influence academics. This study seeks to look at the aspects of socio-economic status (SES), gender, and other factors to see

how those interact with club or sport participation when considering academic success. It seems like the consideration of other factors leads researchers to ask the question of what is causing academic success. Leading to the consideration of cofactors.

One of the things that the literature tries to wrestle with is the question of whether or not extracurricular activities are the ones that are promoting the academic success or if the students joining the activities are already academically successful (Broh, 2002). So studies have tried to control for various factors like parents' education level and prior test scores in hopes that they will be able to determine which is influencing the other; are the extracurricular activities influencing the student for academic success or are the academically successful students merely joining particular extracurricular activities (Broh, 2002; Fredricks & Eccles, 2006)? When controlling for various factors studies have found that participation in extracurricular activities has still been associated with positive academic outcomes (Fredricks, 2012; Fredricks & Eccles, 2006). Broh (2002) himself even found that, "A substantial portion of this effect is attributed to the selection of higher-performing students into sports; however, a significant, positive effect persists even after these background characteristics are taken into account." So Broh found that even when students that are academically successful are found to participate in sports, if that is accounted for you still see a positive effect remaining. If a study is to be conducted based off of the findings in the literature then covariates for the data seem to be a critical area of consideration (Matjasko, et al., 2019; Broh, 2002; Fredricks & Eccles, 2006).

When discussing covariates there seems to be a discussion surrounding mediating mechanisms (Broh, 2002; Eccles et al., 2003). Studies are trying to understand why extracurricular activities actually do produce academic success or various other outcomes. Eccles (2003) considered the peer groups with which students associate in their extracurricular activities and the

students' own identity formation. Broh (2002) focused on self-esteem, locus of control (i.e. sense of control), homework, if the peer group of the activity was academically oriented, and communication between parents, teachers, students and school. Covay and Carbonaro (2010) studied the link between SES and non-cognitive skills and found extracurricular activites mediates part of the relationship between the two, but found that student and school characteristic explained more of the relationship. They overall argued, "noncognitive skills mediate the influence of SES and extracurricular activities on academic skills" (Covay & Carbonaro, 2010). The study of these and other mediating mechanisms seems to be crucial in developing a more complete picture of the relationship between extracurricular activities and academic success. It seems that peer group would play a huge role as a mediating mechanism, this is based on experience as I have observed students be negatively or positively influenced by those around them. Controlling for peer group by considering the GPA for the peer group as a control variable seems like a good idea. The consideration of these mediating variables also feeds into the discussion of possible negative effects of extracurricular activities.

Is it possible for extracurricular activities to hinder academic success? Marsh (1992) considered this and looked at the potential of negative effects on academic achievement. Some studies have also considered whether involvement in certain extracurricular activities might promote undesirable social behaviors (Fredricks & Eccles, 2006). More recently, an area within the study of extracurricular activities and their effects upon academic success or other social issues is something called threshold effects (Matjasko, et al., 2019). The basic idea is the question of whether or not too much participation (e.g. hours per week) or the amount of activities a student is involved in negatively impact that students' academic performance or have a negative influence on them socially. Given my personal experience with high school students, this does seem to be

a legitimate area of concern as I have observed students stress levels rise amidst what could be considered a commitment to too many things. Fredricks (2012) explored this idea and considered breadth (number of activities) and intensity (hours per week) and looked at their effects on academics. She found that the breadth and intensity resulted in positive academic results (math achievement test scores, GPA, educational expectations and educational status at 2 years post high school), however at higher levels of breadth and intensity she noted a decline in academics (Fredricks, 2012). Morris (2015) also found that increased intensity especially among youth with low socio-economic status (SES) resulted in not as many gains, although he did admit that this was not as clear and depended on "modeling approach and class identification strategy." The amount that a student invests in extracurricular activities is a logical step in going deeper into understanding the relationship between extracurricular activities and academic success. Who those students share their time with within the activity would also seem to be of importance and studies have looked into this idea as well (Eccles et al., 2003).

Mentioned in the studies above, there is a desire to understand what is going on within the activity itself and what is going on within the student's life. It seems like researchers have been trying to get at these areas and understand them more fully by using various factors and cofactors to help find and explain just why academic/social success or academic/social decline is happening. Identifying the various factors that lead to academic success is important. With schools making budget cuts they are often faced with the decision of whether to support extracurricular activities, cut them or restrict them in some way. It is important for school boards to be informed and know if there does exist a relationship between clubs or sports and academic success. As mentioned above in the literature, prior studies have indicated that there is a significant relationship between academic success and participation in clubs or sports. Building off of these studies researchers

have sought to further explain the relationship between the two. At the collegiate level, this looks like academic persistence and retention and factors that contribute to these (Demetriou & Schmitz-Sciborski, 2011). At the high school level, the literature seems to focus on extracurricular activities, factors associated with them and potential mediating mechanisms. Studies now seem to be focused on explaining the relationship and try to figure out what it is about extracurricular activities that actually feed into student academic success. They also start to consider threshold effects and other possible negative consequences of extracurricular activities. Some studies have since sought to control for some predisposition of the students to be involved in extracurricular activities such as parents' education level, parent's perception of student's achievement-related motivation and prior-level of the outcome variable (Fredricks & Eccles, 2006). It is important that future studies continue to add to the exploration of the relationship between extracurricular activities and academic success. This study will continue to look at some of the same factors and seek to add to the research by considering what this relationship looks like at Black River High School. Even though the access to data is not as extensive as the above studies, the relationship between the two will still be pursued and developed as fully as possible.

CHAPTER III: METHODOLOGY

Since this study is particularly interested in the relationship between clubs or sports and academic success at the high school level. It is of interest to look for a boost in academic performance for those who participate in extracurricular activities (e.g. GPA and standardized test scores). Would it be beneficial for boards of education to consider implementing policy changes regarding clubs or sports to help promote academic success? This study investigates the relationship between academic success and participation in extracurricular activities using various statistical techniques. This study also considers the development of a model to predict academic success (GPA and ELA OST scores) at the high school level. Overall, it would be beneficial if this study could inform potential policy decisions at Black River Local Schools.

Settings and Participants

This study was conducted in Northeast Ohio in a rural high school, Black River High School. The student population of the high school is around 400 students. The community contains country roads, farms as well as an Amish population; the Amish have their own schools and do not attend Black River Schools. The study considers students from Black River High School during the 2018-2019 school year and seeks to generalize the results to the students of our community. An attempt was made to include as many of the approximately 400 students as possible. Some students were removed since they did not attend the high school during the year and some students did not attend the full year and were removed; this is discussed in more detail in chapter four below. The development of two logistic regression models was pursued.

Procedure

This study used data collected by the Black River Local Schools that was reported to the state of Ohio. The high school students were focused on and data was downloaded from the EMIS (Education Management Information System). I worked with one of our administrative secretaries who works with this data base. Multiple spreadsheets were produced and data match to students and or their student ID numbers. Once all data was gathered, all identifying information for individual students was removed and combined into one spreadsheet of data. Permission was given from the high school administration to conduct the study as well as IRB exempted status granted by Shawnee State University (See Appendix B). All students identifying information was removed and the only information that is shared are summaries and statistical tests on the data. Confidentiality of recovered data was maintained at all times, and identification of participants is not available.

Data Processing and Analysis

Summaries of the data are presented below in chapter four. Sample size as well as descriptives are also given. The descriptives include means and standard deviations of GPA, attendance, standardized test scores, as well as counts of gender, club involvement, students with or without free/reduced lunch status. Academic success was measured by GPA, attendance, and standardized test scores. Many studies have utilized these as measures for academic success in some form (Fredricks, 2012; Bakoban & Aljarallah, 2015; Craft, 2012; Broh, 2002).

Is there a significant relationship between involvement in clubs or sports and academic success at Black River High School? This is the first research question and to answer this question chi-squared analysis was conducted along with an odds ratio and inference for odds ratio. These

chi-squared tests were conducted with each academic success variable (GPA, Attendance, and Standardized test scores) over the different levels of extracurricular activity participation. Follow up t-tests and ANOVAs were considered, where assumptions were met, for GPA, attendance, and standardized tests scores over clubs, gender, and over free/reduced lunch status, all conducted separately. Otherwise, if assumptions were not met then non-parametric Wilcoxson rank-sums or Kruskal-Wallis tests were used.

Is gender, socioeconomic status and involvement in clubs or sports predictive of academic success? This is the second research question and to answer this question two logistic regression models were developed. Four categorical predictor variables and one dichotomously coded dependent variable was considered for the models. The four predictors were Gender (M or F), SES (Free/Reduced Lunch or None), ECA (Sports, Clubs, Both Clubs and sports, or None). The first model included the dichotomously coded dependent variable as GPA, being divide as 3.0 or above and below a 3.0. The second model had the dichotomously coded dependent variable of ELA OST scores which were divided by 700 and above or below a 700. G*Power and the statistical program R were used to analyze the data for this study.

Conclusion

In the next chapter we will consider the results of our statistical analysis. The first research question will be investigated using a chi-squared approach with follow up analysis of the measures of center for the groups considered. The second research question will be evaluated using logistic regression looking to predict academic success within Black River Local Schools.

CHAPTER IV: RESULTS

In this chapter analysis of the data collected will be made. The focus of this study centered on examining extracurricular activities and academic achievement. Would high school students' academic achievement benefit from the implementation of policy changes that include requirements for participation in clubs or sports? In order to investigate this question two main research questions for this study were developed. The first question was, "Is there a significant relationship between involvement in clubs or sports and academic success?" The second question was, "Are gender, attendance, socioeconomic status and involvement in clubs or sports predictive of academic success?

In this chapter, various statistical tests were used to explore the relationship between clubs or sports and academic success; also, two models were developed in an attempt to predict academic success. To investigate the relationships, χ^2 tests were used. These tests were followed up by tests used for measures of center (t-tests, ANOVA, non-parametric tests). In order to look at prediction, logistic regression was used.

The sample for this study was taken from students who attended Black River High School during the 2018-2019 school year. An attempt was made to use as many of the students as possible. The original sample size was 388 (N=388), 78 students were removed from the data for several reasons. A student was removed if they attended our career center since the focus of the study was on students involved at our high school and their academic performance at that particular building. Next, a student was removed if they came into the school year later than the first quarter. A student was also removed if they left school with a quarter or more to go in the school year. After the removals the sample size was 310 (N=310).

Table 1 below gives general descriptives of the categorical variables from the sample. The Lunch variable is a socioeconomic status variable that was dichotomous coded: Low (a student on free or reduced lunch) or High (a student not on free or reduced lunch). The ECA variable consisted of four levels. The first level is those who were not involved in any extracurricular activity (None). The second level are those students who were only involved in a club (C) consisting of music activities, National Honor Society, yearbook, school newspaper, flight club, Academic Challenge, anime club, FFA, student council, or FCCLA. The third level are those students who were only involved in a sport (S) which included cross country, golf, football, volleyball, basketball, wrestling, cheerleading, track and field, softball or baseball. The fourth level were those students who were involved in both a club and a sport. The ExcessiveAbs variable was based on hours absent; the state of Ohio under House Bill 410 defines excessive absence as 65 or more hours absent regardless of whether or not those absences are excused or unexcused (House Bill 410 Requirements, 2017). A score of 700 or above is considered passing on Ohio State Tests, so you will notice dichotomously coded variables based on that number. Other variables not mentioned above are described in Table 1.

Table 1: *Descriptives of Categorical Variables*

Variable	**Count**	**Percentage**
Gender	146 Females 164 Males	47.1% 52.9%
Grade	96 Freshman 88 Sophomores 55 Juniors 71 Seniors	31% 28.4% 17.7% 22.9%
Lunch (Socioeconomic Status)	87 Low (Free or Reduced Lunch) 223 High (Not on Free or Reduced Lunch)	28.1% 71.9%

ECA (Extracurricular Activities)	56 None 95 C (Clubs Only) 82 S (Sports Only) 77 CS (Clubs and Sports)	18.1% 30.6% 26.5% 24.8%
NonAthECA (Those students in Clubs)	172 in Clubs (coded as 1) 138 not in Clubs (coded as 0)	55.5% 44.5%
Sports (Those students in Sports)	159 in Sports (coded as 1) 151 not in Sports (coded as 0)	51.3% 48.7%
ECAinvolved (students involved in at least 1 extracurricular)	254 involved in something (coded as 1) 56 not involved in anything (coded as 0)	81.9% 18.1%
GPAabove3	192 GPA above 3.0 118 GPA below 3.0	61.9% 38.1%
ExcessiveAbs	121 Missed 65 hours of school or more 189 Missed less than 65 hours of school	39% 61%
passMath (if a freshman or sophomore scored 700 or above on the Math State Test)	80 Students passed the Math OST 55 Students did not pass the Math OST	59.3% 40.7%
passELA (if a freshman or sophomore scored 700 or above on the ELA State Test)	137 Students passed the ELA OST 42 Students did not pass the ELA OST	76.5% 23.5%
RemediationFree (only Juniors required to take the ACT and a score 22 or above on Math and 18 or above on English)	7 Students were remediation free in math and English 39 Students were not remediation free in math and English	15.2% 84.8%

Table 2 below gives the means and standard deviations of the continuous variables from the sample. The GPA variable represents the average of the student's GPA over the four quarters of the school year. The HoursAbsent variable records the hours a student was absent from school.

A normal school day at Black River High School includes 6.21 hours. The Math variable records those freshman or sophomore students who took the Ohio State Test in Mathematics which is given for Algebra 1 and Geometry. The ELA variable records those freshman and sophomore students who are in ELA 1 and ELA 2 and took the Ohio State Test in English and Language Arts. There were four freshmen who took the ELA 1 and ELA 2 test, all four passed both tests, their ELA 1 score was used in the data. The state of Ohio requires districts and community schools to administer the ACT or SAT to their Junior students. Students may be exempted for several reasons, two examples are: they have already received a "remediation free" score (18 subscore in English, 22 subscore in Math) or have "significant cognitive disabilities and is administered an alternate assessment in accordance with the student's individual education program" (IEP) (College and Career Readiness Test, 2017).

Table 2: *Descriptives of Continuous Variables*

Variable	**N**	**Mean**	**Standard Deviation**	**Median**	**Range**
GPA	310	3.13	.82	3.29	[0.60, 4.51]
HoursAbsent	310	64.7	51.1	55.1	[0, 416.7]
Math (Ohio State Test Score in Mathematics)	135 (Freshman and Sophomores only)	706.8 See note b below	26.3	705	[638, 781]
ELA (Ohio State Test Score in ELA)	179 (Freshman and Sophomores only)	720.7	28.3	720	[653, 808]
ACT	46 (Juniors Only)	17.5 composite 15.5 English 17.8 Math	4.3 5.2 3.4	16 13 16	[11, 30] [8, 30] [14, 26]

b: note that there is a 44 student difference between Math and ELA, each year about half of the sophomore class is advanced in Math and would be in Algebra 2 which is a non-tested area for Ohio

Research Question 1: Is there a significant relationship between involvement in clubs or sports and academic success?

In order to help answer this question two way tables were constructed for various categorical variables and a chi-squared analysis was conducted. Academic success was considered for GPA, attendance, OST scores, and ACT scores. The variable GPA was dichotomously coded as 3.0 or above (1) and below 3.0 (0). This was done since academic honors start at the 3.0 level. HoursAbsent was dichotomous coded as 65 or above hours absent (1) and below 65 hours absent (0) and stored as the variable ExcessiveAbs (Explained above). Math and ELA were dichotomously coded as 700 or above (1) and below 700 (0), since 700 is the passing mark for OSTs, new variables were formed labeled passMath and passELA. ACT scores were broken down into their math and English subscores. A math subscore of 22 was considered as "remediation free" and an English subscore of 18 was considered "remediation free" (College and Career Readiness Test, 2017). A new variable was created, called RemediationFree, which coded students who were "remediation free" in both subject areas as a one and those students who were not as a zero. The choice for this division was based on our school administrator's interest in students being remediation free. GPA is considered first, descriptives of GPA are listed first in Table 3 below. Then Table 4 presents the Chi-Squared analysis of GPAs of 3.0 or above compared against the various extracurricular participation categories and discussed afterward.

Table 3: *Descriptives of GPA*

Variable	Categories	N	Mean	SD	Median	Range
ECAinvolved	Involved	254	3.26	0.75	3.41	0.78, 4.51
	Not	56	2.52	0.87	2.59	0.60, 3.91

Sports	Involved	159	3.24	0.78	3.39	0.78, 4.43
	Not	151	3.01	0.85	3.19	0.60, 4.51
Clubs	Involved	172	3.41	0.66	3.54	0.88, 4.51
	Not	138	2.77	0.86	2.88	0.60, 4.29
ECA	None	56	2.52	0.87	2.59	0.60, 3.91
	Only Clubs	95	3.30	0.69	3.43	0.88, 4.51
	Only Sports	82	2.94	0.81	3.08	0.78, 4.29
	Both C and S	77	3.55	0.60	3.77	1.84, 4.43

Table 4: *Chi-Squared Analysis of Given Variable with GPAabove3 (levels: 1, 0)*

Chi-Squared Test	χ^2 **(df)**	**p-value**	**Odds Ratio**	**95% Confidence Interval Odds Ratio**
ECAinvolved (levels: 1, 0)	30.57 (1)	p<.001	5.61	(2.87, 11.41)
Sports (levels: 1, 0)	3.52 (1)	p=.06	1.60	(.98, 2.60)
NonAthECA (levels: 1, 0)	37.37 (1)	p<.001	4.54	(2.72, 7.70)
ECA (levels: None, C, S, SC)	48.84 (3)	p<.001	-see table 5	-see table 5

There was a statistically significant association between extracurricular involvement (ECAinvolved) and having a GPA above a 3.0 (GPAabove3) $\chi^2(1) = 30.57$, $p < .001$. The standardized residual for the cell containing students who were not involved in an extracurricular activity and had a GPA below a 3.0 was significant (4.05) as well as students not involved and above a 3.0 (-3.17) (Field, Miles & Field, 2012). Considering the odds ratio, students who were involved in an extracurricular activity were 5.61 (2.87, 11.41) times more likely to have a GPA above a 3.0 than students who were not involved. Using the Shapiro-Wilk test it was found that the normality assumption for a t-test was violated for GPA, $W = .94, p < .001$. So a Wilcoxon

test was conducted. The GPA between those who were involved in an extracurricular activity (Med=3.41) and those who were not (Med=2.59) was found to be significantly higher $W = 3571.5, p < .001$, with a medium effect size of $r = .33$.

Considering those students involved in sports and those not involved in sports yielded a non-statistically significant result $\chi^2(1) = 3.52, p = .06$. Although, comparing students involved in clubs (NonAthECA) against students not involved in clubs did give a significant result $\chi^2(1) = 37.37, p < .001$. It does seem like clubs have some influential role within the extracurricular arena as further noted below.

The next categorical variable considered with GPA was ECA. This variable was a breakdown of extracurricular involvement into four levels (no participation, sports only, clubs only, and only those students in both clubs and sports, there were no shared students in these categories). There was a statistically significant association between ECA and having a GPA above a 3.0, $\chi^2(3) = 48.84, p < .001$. There were four significant cells indicated by their standardized residuals: Students not involved (None) with GPA less than 3.0 was 4.05, None with GPA 3.0 or above was -3.17, those in both clubs and sports with GPA less than 3.0 was -3.01, and those in both clubs and sports with GPA 3.0 or above was 2.36 (Field et al.,2012). Considering involvement in nothing, only sports, only clubs, and those students who were involved in both resulted in significant associations and odds ratios, see Table 4 and 5 below. Of interest in these tables is that students involved in both clubs and sports were 12.01 (4.99, 30.89) times more likely to have a GPA of 3.0 or above than those students who were not involved in an extracurricular. It seems like being involved in a club has significance to it as its odds ratio is always larger than every other level except students involved in both clubs and sports (SC), and when students in

clubs only (C) are tested against those in both clubs and sports (SC) it is not significant, see Table 5 below.

Table 5: *Chi-Squared Analysis of ECA levels against GPA of a 3.0 or above*

df =1 for all chi sq	GPA N=310	
ECA level comparisons	**χ^2 (df)**	**Odds R.**
None - C	26.04 ***	6.54 ***
None - S	6.80 **	2.74 **
None - SC	38.00 ***	12.01 ***
C - S	6.87 **	0.42 **
C - SC	2.10	1.85
S - CS	15.62 ***	4.42 ***

p<.05 *, p<.01 **, p<.001 ***, Otherwise not significant

A Shapiro-Wilk normality test was conducted for GPA over ECA and it was found that the normality assumption for ANOVA was violated for three of the four categories (Clubs: W=.94, p<.001, None: W=.97, p=.13, S: W=.95, p<.01, SC: W=.92, p<.001). So a Kruskal-Wallis test was conducted and the results were significant, Kruskal-Wallis $\chi^2(3) = 60.08, p < .001, r = .41$. This demonstrates evidence that GPA was significantly related to extracurricular involvement, specifically over these four levels. Post hoc Pairwise Wilcoxon tests with a Holm adjustment were conducted and the results are shown in Table 6. All pairwise comparisons were significant (Medians: C=3.43, None=2.59, S=3.08, SC=3.77). Again, when students who have no participation in extracurricular activities are compared against students in both clubs and sports the results are significant and the effect size is large, as shown in Table 6 (Field et al.,2012). It

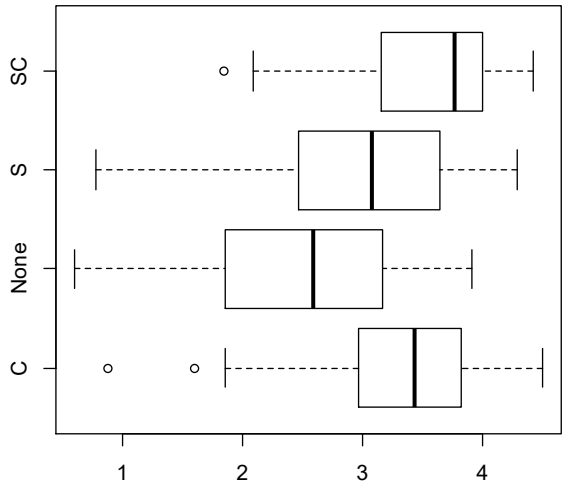
also seems to be the case that clubs are carrying more of the weight in the significance because when those students in clubs only are compared against those students in both clubs and sports the significance and effect size are weaker ($p < .05$, r = .20) than when those students in sports only are compared against those students in both clubs and sports ($p < .001$, r = .37).

Table 6: *Post hoc Pairwise Wilcoxon Tests*

Group GPA compared	p-value	Effect size
None – C	$p < .001$	r = .42
None – S	$p < .01$	r = .22
None - SC	$p < .001$	r = .56
C - S	$p < .01$	r = .20
S - SC	$p < .001$	r = .37
C - SC	$p < .01$	r = .20

Effect Sizes: small .1, medium .3, large .5

Figure 1*: Boxplot of ECA vs GPA*



Overall, involvement in any extracurricular activity consistently demonstrates higher academic performance in the area of GPA than those students not involved. Next, attendance was considered, descriptive statistics are given in Table 7 below.

Table 7: *Descriptives of Attendance (Hours Absent)*

Variable	Categories	N	Mean	SD	Median	Range
ECAinvolved	Involved	254	61.1	46.6	54.0	0, 358.7
	Not	56	80.9	65.9	65.8	0.75, 416.7
Sports	Involved	159	60.0	48.0	51.1	0, 292.4
	Not	151	69.6	53.8	63.3	0.75, 416.7

Clubs	Involved	172	58.5	42.6	54.31	0, 358.7
	Not	138	72.3	59.2	60.26	0.75, 416.7
ECA	None	56	80.9	65.9	65.8	0.75, 416.7
	Only Clubs	95	62.9	44.2	58.9	6.2, 358.7
	Only Sports	82	66.4	53.8	52.2	3.1, 292.4
	Both C and S	77	53.2	40.1	51.0	0, 275.0

A Chi-squared analysis of the levels used above to analyze GPA were used against the dichotomously coded variable ExcessiveAbs (1: yes, 0: no). Students were considered "excessively absent" as defined by Ohio House Bill 410 if they were absent 65 or more hours (excused or unexcused). Results are shown in Table 8. All results were statistically significant except when comparing students in clubs against students not in clubs $\chi^2(1) = 3.20, p = 0.07$. Students involved in an extracurricular activity were .53 (0.283, 0.99) times as likely to be excessively absent as those not involved in an extracurricular. Or reciprocally students not involved were about 2 times more likely to be excessively absent as students who were involved.

Table 8: *Chi-Squared Analysis of Given Variable with ExcessiveAbs (levels: 1, 0)*

Chi-Squared Test	**χ^2 (df)**	**p-value**	**Odds Ratio**	**95% Confidence Interval Odds Ratio**
ECAinvolved (levels: 1, 0)	4.04 (1)	p<.05	0.53	(0.28, 0.99)
Sports (levels: 1, 0)	4.96 (1)	p<.05	0.58	(0.36, 0.94)
Clubs (levels: 1, 0)	3.20 (1)	P=0.07	0.64	(0.39, 1.04)
ECA (levels: None, C, S, SC)	10.92 (3)	p<.05	--	--

Measures of center were also considered for attendance over the levels in Table 8. Violations to the normality and equal variance assumptions occurred so a Wilcoxson rank-sum test was used as well as a Kruskal-Wallis test for ECA over ExcessiveAbs. Results were significant in all levels (see Table 12) except when considering students involved in clubs or not, $W = 13223, p = 0.08$. Again, the categories that gave significant results are the same ones that had significance in the chi-squared analysis conducted above.

In comparing the various levels of ECA against each other with respect to attendance only, two significant results came out. A significant relationship between those students involved in both clubs and sports and attendance was found when compared to those students not involved, $\chi^2(1) = 9.19, p < 0.01$, and when compared against those students in clubs only, $\chi^2(1) = 4.99$, $p < 0.05$. It seems like sports may be playing more of a roll in attendance than clubs when considering the category of students involved in both clubs and sports. Students not involved were over 3 (1.47, 7.35) times more likely to be excessively absent as opposed to students involved in both clubs and sports; and those involved in only clubs were over 2 (1.10, 4.57) times more likely to be excessively absent as opposed to students involved in both clubs and sports. A Kruskal-Wallis test was conducted over ECA and ExcessiveAbs and it was significant, $\chi^2(3) = 9.81,\ p < 0.05$. Follow-up Wilcoxson rank-sum tests were performed and the only significant result came from those students' attendance who were involved in both clubs and sports (Med=51.00) when compared to those who were involved in nothing (Med=65.80), $p < 0.01$.

Overall, there is evidence that involvement in some form of extracurricular activity does seem to benefit attendance. Below we will see if there is evidence for a relationship between involvement in extracurricular activities and passing the Ohio State Tests in math and ELA and

being "remediation free" on ACT math and English. In Table 9, Table 10, and Table 11 descriptives of OST math, OST ELA, and ACT are given respectively.

Table 9: *Descriptives of OST Math*

Variable	Categories	N	Mean	SD	Median	Range
ECAinvolved	Involved	102	709.0	24.6	711.5	658, 781
	Not	33	699.7	30.2	700	638, 756
Sports	Involved	66	709.7	25.8	705	658, 781
	Not	69	703.9	26.6	708	638, 756
Clubs	Involved	64	712.5	23.6	715	667, 781
	Not	71	701.6	27.6	700	638, 756
ECA	None	33	699.7	30.2	700	638, 756
	Only Clubs	36	707.8	22.5	713	667, 752
	Only Sports	38	703.2	25.4	701	658, 749
	Both C and S	28	718.5	24.1	720	682, 781

Table 10: *Descriptives of OST ELA*

Variable	Categories	N	Mean	SD	Median	Range
ECAinvolved	Involved	143	723.9	28.0	725	657, 800
	Not	36	708.1	25.9	707	653, 803
Sports	Involved	92	722.3	27.7	724.5	657, 800
	Not	87	719.0	28.9	718	653, 808
Clubs	Involved	87	728.6	26.7	729	653, 808
	Not	92	713.2	27.7	714	653, 800
ECA	None	36	708.1	25.9	707	653, 782
	Only Clubs	51	726.7	28.7	727	653, 808
	Only Sports	56	716.5	28.5	720	657, 800
	Both C and S	36	731.4	24.2	734	679, 774

Table 11: *Descriptives of ACT*

Variable	Categories	N	Mean	SD	Median	Range
ECAinvolved	Involved	40	18.1	4.3	17	11, 30
	Not	6	13.7	2.0	14	11, 16
Sports	Involved	27	18.2	4.3	17	11, 30
	Not	19	6.5	4.3	15	11, 28
Clubs	Involved	27	19.1	4.5	18	13, 30
	Not	19	15.2	2.9	15	11, 22
ECA	None	6	13.7	2.0	14	11, 16
	Only Clubs	13	17.8	4.5	16	13, 28
	Only Sports	13	15.9	3.0	15	11, 22
	Both C and S	14	20.3	4.3	20.5	14, 30

It is of importance to note that OST math and OST ELA consider both freshman and sophomore students. However, OST math's sample size is 44 students less. These 44 students have already taken the Algebra and Geometry state test in previous years since they were advanced in math or had no math state score for some other reason unknown to myself. Of these 44, 3 were involved in nothing and 41 were involved in an extracurricular.

It is shown in Table 12 through Table 15 that OST math had no statistically significant results from the chi-squared analysis. The only statistically significant results came from an investigation of the means of ECA's categories over OST math scores using ANOVA, $F(3, 131) = 3.06, p < .05,$ with an effect size of $\omega = .21$. Post-hoc t-tests were conducted to investigate difference between the pairs of categories and statistical significance was found in comparing the mean OST math scores of those students involved in both clubs and sports versus those students involved in nothing (Table 15).

Turning our consideration towards ELA OST scores (see Table 12 and 13) we note that statistically significant relationships were found between passing the ELA test and being involved in something, $\chi^2(1) = 4.95,\ p < 0.05$, being involved in a club, $\chi^2(1) = 5.69,\ p < 0.05$, and within the 4 levels of ECA, $\chi^2(3) = 8.67,\ p < 0.05$. The only category that did not yield a significant result was involvement in a sport, $\chi^2(1) = 0.15,\ p = .70$. A student was 2.60 (1.09, 6.11) times more likely to pass the ELA OST if they were involved in something. Considering comparisons between each level of ECA two statistically significant results showed up: students involved in a club only versus those in nothing, $\chi^2(1) = 4.85,\ p < 0.05$, and students involved in both a club and a sport versus those in nothing, $\chi^2(1) = 4.58,\ p < 0.05$. The follow up t-tests and ANOVAs yielded significant results in the same categories. There was only one addition, students in sports only (mean=716.5) when compared with students involved in both clubs and sports (mean=731.4) was significant, $p < 0.05$.

The following tables (Tables 12 to 15) are a summary of all the statistical tests over the various categories of extracurricular involvement and areas of academic success that were considered. The only variable the was not considered was ACT. In the chi-squared analysis portion the variable ACT was coded (described in detail above) as remediation free (1) or not (0). Low cell counts were encountered in all areas. Results are reported in the table but they may not be accurate due to the low cell counts. More data needs to be collected in order for this particular analysis to be considered. Wilcoxson rank-sums and Kruskal-Wallis tests were conducted over the various levels of extracurricular involvement and ACT composite score and the results are reported in Tables 14 and 15 below.

Table 12: *Chi-Squared Analysis of ECA and GPA, ExcessiveAbs, OSTmath, OSTela, and ACT*

	GPA N=310		Excessive Abs. N=310		OST Math N=135		OST ELA N=179		ACT N=46	
Variables	χ^2 **(df)**	**Odds R.**	χ^2 **(df)**	**Odds R.**	χ^2 **(df)**	**Odds R.**	χ^2 **(df)**	**Odds R.**	χ^2 **(df)**	**Odds R.**
ECAinvolved (levels: 1, 0)	30.57 (1)***	5.61 ***	4.04 (1)*	0.53 *	0.70 (1)	1.52	4.94 (1)*	2.60 *	0.25 (1)	--
Sports (levels: 1, 0)	3.52 (1)	1.60	4.96 (1)*	0.58 *	0.24 (1)	1.26	0.15	1.22	1.35 (1)	5
Clubs (levels: 1, 0)	37.37 (1)***	4.54 ***	3.20 (1)	0.64	2.57 (1)	1.87	5.69 (1)*	2.61 *	3.97 (1)*	--
ECA (levels: None, C, S, SC)	48.84 (3)***	--	10.92 (3)*	--	4.44 (3)	--	8.67 (3)*	--	12.27 (3)**	

p<.05 *, p<.01 **, p<.001 ***, Otherwise not significant,
expected cell count < 5 for at least one cell if highlighted in yellow above

Table 13: *2x2 Comparisons of ECA levels against Academic Measures*

df =1 for all chi sq	GPA N=310		Excessive Abs. N=310		OST Math N=135		OST ELA N=179		ACT N=46	
ECA level comparisons	χ^2	**Odds R.**	χ^2	**Odds R.**	χ^2	**Odds R.**	χ^2	**Odds R.**	χ^2	**Odds R.**
None - C	26.04 ***	6.54 ***	0.97	0.68	0.31	1.47	4.85 *	3.37 *	0.00	--
None - S	6.80 **	2.74 **	1.36	0.63	0.00	1.05	0.97	1.73	N/A	N/A
None - SC	38.00 ***	12.01 ***	9.19 **	0.31 **	2.63	2.77	4.58 *	3.87 *	1.92	--
C - S	6.87 **	0.42 **	0.01	0.93	0.25	0.71	1.35	0.51	0.00	--
C - SC	2.10	1.85	4.99 *	0.45 *	0.82	1.89	0.00	1.15	2.70	8.31
S - CS	15.62 ***	4.42 ***	3.69	0.49	2.54	2.66	1.45	2.25	4.90*	--

p<.05 *, p<.01 **, p<.001 ***, Otherwise not significant,
expected cell count < 5 for at least one cell if highlighted in yellow above

Table 14: *Comparisons of Measures of Center for Extracurricular Activities*

	GPA N=310		Excessive Abs. N=310		OST Math N=135		OST ELA N=179		ACT N=46	
Wilcoxson / t test	***W***	**effect size r**	***W***	**effect size r**	**t (df)**	**effect size r**	**t (df)**	**effect size r**	***W***	**effect size r**
ECAinvolved (levels: 1, 0)	3571 ***	.33''	8601 *	.14'	-1.61 (46.52)	.23'	-3.21 (57.5) **	.39'''	41 *	.15'
Sports (levels: 1, 0)	10054 *	.14'	13843 *	.13'	-1.29 (132.97)	.11'	-0.78 (175.34)	.06	191	.08'
Clubs (levels: 1, 0)	6457 ***	.39''	13223	.1'	-2.47 (132.67)	.21'	-3.78 (176.88) ***	.27''	116.5 **	.18'
Kruskal-Wallis / ANOVA	χ^2 **(df)**	**effect size r**	χ^2 **(df)**	**effect size r**	**F (df1,df2)**	**effect size ω**	**F (df1,df2)**	**effect size ω**	χ^2 **(df)**	**effect size r**
ECA (levels: None, C, S, SC)	60.08 (3) ***	.41''	9.81 (3) *	.13'	3.06 (3,131) *	.21'''	5.69 (3,175) ***	.27'''	13.93 (3) **	.17'

p<.05 * p<.01 ** p<.001 *** Otherwise not significant,
r effect sizes .1 small', .3 medium'', .5 large'''
ω effect sizes similar to r (Field et al., 2012)

Table 15: *Post Hoc Analysis of Measures of Center for ECA (Wilcoxson Rank Sum or t-test)*

Post hoc analysis	GPA N=310		Excessive Abs. N=310		OST Math N=135		OST ELA N=179		ACT N=46	
ECA level comparisons	***W*** **p-value**	**effect size r**	***W*** **p-value**	**effect size r**	**t p-value Holm**	**effect size r**	**t p-value Holm**	**effect size r**	***W*** **p-value**	**effect size r**
None - C	0.0000 ***	.41''	0.34	.08'	0.58	--	0.01 *	--	0.11	.37''
None - S	0.008 **	.22'	0.34	.08'	0.89	--	0.30	--	0.29	.24'
None - SC	0.0000 ***	.56'''	0.014 **	.21'	0.03 **	--	0.002 **	--	0.02 *	.53'''
C - S	0.007 **	.20'	0.77	.02	0.89	--	0.16	--	0.29	.21'
C - SC	0.008 **	.20'	0.19	.10'	0.40	--	0.43	--	0.29	.21'
S - CS	0.0000 ***	.37''	0.42	.06	0.09	--	0.046 *	--	0.04 *	.40''

p<.05 *, p<.01 **, p<.001 ***, Otherwise not significant,
r effect sizes .1 small', .3 medium'', .5 large'''

In conclusion for research question 1, there does seem to be a significant relationship between involvement in clubs or sports and academic success. GPA, attendance, and ELA OST scores all showed a significant relationship to involvement. The only area that did not seem to show much of a relationship was OST math scores with involvement, however statistical significance did come up within an ANOVA conducted with OST math scores over ECA. Within both the chi-squared tests and the tests of the measures of center (t-tests, ANOVA, Wilcoxson, Kruskal-Wallis) the ECA category was the one area that seemed to show the most consistent significance. It seems that within this category the comparison of those students involved in both clubs and sports to those students involved in nothing was consistently significant (see Tables 12 to 15 above).

Research Question 2: Are gender, attendance, socioeconomic status and involvement in clubs or sports predictive of academic success?

Logistic regression was used to help answer this question. GPA and ELA OST scores were used separately as the measures of academic success. In the first part of the answer to this question, a logistic regression model was developed for predicting a GPA of a 3.0 or above. Then in the second part logistic regression was explored to see if a model could be developed in order to predict a passing score on the ELA OST.

GPA Model

For the logistic regression model using GPA N=310 students were used to construct the model and of those 310, 192 (62%) had a GPA of a 3.0 or above, 118 (38%) were below a 3.0

GPA. GPA was dichotomously coded as 3.0 and above and below a 3.0, it was then used as the dependent variable. The independent variables for this model were gender, attendance (whether or not the student was excessively absent as defined earlier), socioeconomic status (whether or not the student was on free or reduced lunch), and involvement in extracurricular activities (ECA which was a four level categorical predictor that was defined earlier). With ECA three dummy variables were created with no extracurricular involvement (None) as the reference category.

The full model was compared against the constant only model and it was found to be statistically reliable with a large effect size, $\chi^2(6) = 96.15, p < .001$, McFadden's rho = .23. All predictors were statistically reliable and the removal of any predictor resulted in higher residual deviance statistics and higher AIC values. A backward elimination process was also conducted using R and the same model resulted. Percentage of accurately classified cases with a .5 threshold was good with 75.2% classified accurately (sensitivity=.85, specificity=.58). Variance inflation factors ranged from ExcessiveAbs (1.06) to Gender (1.23) indicating that multicolinearity was not an issue. Field cites Myers that values at 10 are where we should start to be concerned (as cited in Field et al., 2012).

Table 8 below shows the regression coefficients (B), Wald statistics, odds ratios, and 95% confidence intervals for the odds ratios of the predictors. All predictors were statistically significant. ECAboth was the variable with the highest odds ratio of 7.23 (3.01, 18.36) meaning that when all other predictors are held constant then moving a student from not participating to participating in both a club and a sport would result in them being over 7 times more likely to have a 3.0 or above GPA than if they were to remain not participating. Another variable of interest is Gender which was statistically significant z= -5.06, p<.001. Gender had an odds ratio of .20 (.11,

.37) meaning that a male was .20 times as likely to have a 3.0 or above GPA as a female. Or reciprocally a female was 5 (2.70, 9.09) times more likely to have a 3.0 or above GPA as a male.

Table 16: *Logistic Regression Results with GPA (3.0 and above, below 3.0) as the DV*

Variables	B	Wald (z-ratio)	p-value	Odds Ratio	95% Odds Ratio Confidence Invterval
Gender (M)	-1.61	-5.06	p < .001	.20	(.11, .37)
ExcessAbs	-1.05	-3.66	p < .001	.35	(.20, .61)
Lunch (none)	0.74	2.27	p < .05	2.09	(1.11, 3.99)
ECAclubs (none)	1.52	3.70	p < .001	4.59	(2.06, 10.39)
ECAsports	1.12	2.74	p <.01	3.08	(1.40, 7.02)
ECAboth	1.98	4.31	p < .001	7.23	(3.01, 18.36)
(constant)	0.13	0.303	P=.762	1.14	(.49, 2.63)

A Receiver Operating Characteristic (ROC) curve is show below (see Figure 2). This curve is a help in visualizing how effective a model is at distinguishing between two categories, in this case it would be how well could we distinguish between a student with a GPA at 3.0 or above and a student that has a GPA below a 3.0 (Tape, n.d.). The area under the black curve is .81, an area of 1 would be perfect, so the model described above is good at distinguishing between the two groups (Tape, n.d.).

In Figure 3 there is a graph of the sensitivity and specificity values at various thresholds. Setting the threshold at .5 was mentioned above and that resulted in 75% classified accurately (sensitivity=.85, specificity=.58). Figure 3 shows the minimized difference threshold between

sensitivity and specificity which was .62 resulting in 73% classified accurately (sensitivity=.72, specificity=.74).

Figure 2: *ROC curve for model with GPA 3.0 or above and below 3.0*

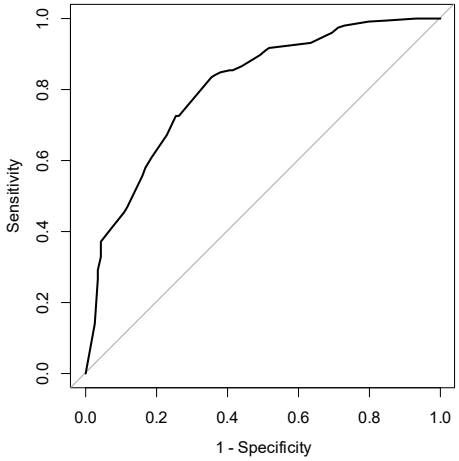
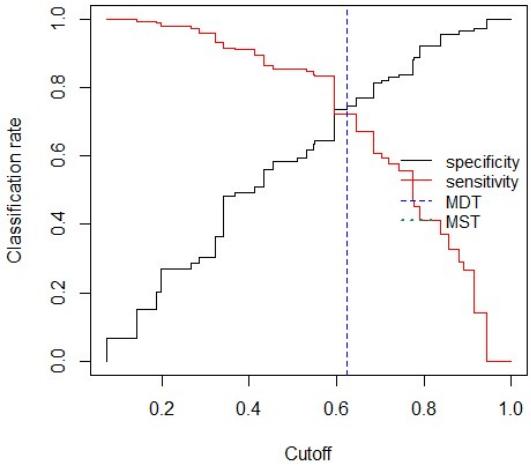


Figure 3*: Graphs of Sensitivity vs. Specificity for various cutoffs*



ELA Model

For the logistic regression model using ELA OST scores, N=179 students were used to construct the model and of those 179, 137 (77%) had a passing score (700 or above), 42 (23%) did not pass. ELA scores were dichotomously coded as 700 and above and below a 700, it was then used at the dependent variable. As used the previous logistic regression model for GPA, the independent variables considered for this model were gender, attendance, socioeconomic status. and involvement in extracurricular activities (ECA). With ECA three dummy variables were created with no extracurricular involvement (None) as the reference category.

The full model was compared against the constant only model and it was found to be statistically significant with a small effect size, $\chi^2(6) = 13.58, p < .05$, McFadden's rho = .07, AIC of 195.47 and residual deviance (-2LL) of 181.47 (df=172). So the full model was found to be a better model than the null model. However, none of the predictors were statistically

significant. Removal of several predictors resulted in a slightly higher residual deviance and lower AIC values. The predictors for this model, generated using R's backward function, were statistically significant and included only Gender, $z = -2.46, p < .05,$ and Lunch $z = 2.10, p < .05$. This two-predictor model had the lowest AIC of 191.29, but a higher residual deviance of 185.29 (df=176), resulting in non-significant difference, $\chi^2(4) = 3.82, p = 0.43$. The ROC curve for the two-predictor model is shown below (see Figure 4). The area under the black curve is .64, so the model described above does not completely fail but is poor at distinguishing between the two groups (Tape, n.d.). Percentage of accurately classified cases with a .57 threshold was ok with 73% classified accurately (sensitivity=.88, specificity=.24). Figure 5 shows the minimized difference threshold between sensitivity and specificity which was .77 resulting in 55% classified accurately (sensitivity=.51, specificity=.69). Variance inflation factors were 1.03 for both variables indicating that multicolinearity was not an issue (as cited in Field et al., 2012).

Figure 4: *ROC curve for the two-predictor model*

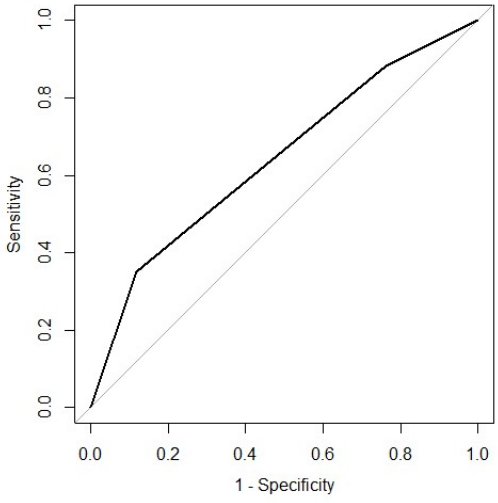


Figure 5: *Graphs of Sensitivity vs. Specificity for various cutoffs*

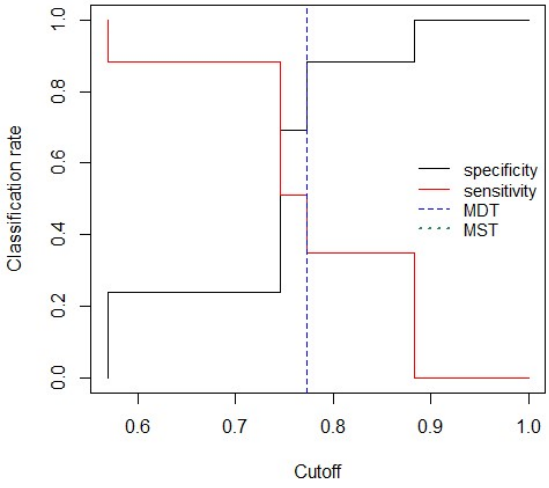


Table 17 below shows the regression coefficients (B), Wald statistics, odds ratios, and 95% confidence intervals for the odds ratios of the predictors. All predictors are statistically significant. Lunch was the variable with the highest odds ratio of 2.22 (1.05, 4.67) implying that when all other predictors are held constant then moving a student from on free or reduced lunch to not being on free or reduced lunch would result in them being over 2 times more likely to have a passing score on the OST ELA test than if they were to remain on free or reduced lunch. Another variable of interest was Gender which was statistically significant $z= -2.46$, $p<.05$. Gender had an odds ratio of .39 (.18, .81) meaning that a male was .39 times as likely to pass the OST ELA test as a female. Or reciprocally a female was 2.56 times as likely to pass their OST ELA test. Both Gender and Lunch showed up as statistically significant predictors in the GPA model and ELA model. Although the later model was a poor fitting model. It is interesting to note that gender shows up as statistically significant in the model for GPA and for ELA and there appears to be a gap between males and females in the area of academics, see Appendix A for a breakdown of the data over gender.

Table 17: *Logistic Regression Results for Two-Predictor Model ELA Test Scores as the DV*

Variables	B	Wald (z-ratio)	p-value	Odds Ratio	95% Odds Ratio Confidence Invterval
Gender (male)	-0.95	-2.46	p < .05	.39	(0.18, .81)
Lunch (Not on Free or Reduced)	0.80	2.10	p < .05	2.22	(1.05, 4.67)
(constant)	1.23	3.40	P<.001	3.41	(1.73, 7.20)

Removing the ECA variable from the full model mentioned above for ELA scores seemed to be a drastic cut. It was desirable to see if only a portion of the variable could be removed in order to see if clubs or sports would come out as significant predictors or if just removing a portion

would help develop a better fitting model. So new variables were considered in place of ECA. The first was Sports, which was anyone who participated in a sport or not (coded as 1, 0 if not). The second was clubs and was labeled NonAthECA (Non-Athletic Extracurricular), students were coded as 1 if invovled and 0 if not. The process was started over and included all variables mentioned in the ELA model above, excluding ECA of course, but including Sports, NonAthECA, and the interaction between Sports and NonAthECA. The full model was better than the null model, $\chi^2(6) = 13.58, p < .05$, McFadden's rho = .07. Using R's backward function as well as removing variables manually and observing, it was determined that the model with the lowest AIC (AIC=190.58) was a three-predictor model with predictors of Gender, Lunch and NonAthECA. This model did not have a statistically significant difference from the full model, $\chi^2(3) = 1.1, p = .77$, and similar effect size with McFadden's rho = .06. None of the predictors were statistically significant (see Table 18), although the model did seem to be a slight improvement as the area under the ROC curve was .67 (see Figure 6). Figure 7 shows the minimized difference threshold between sensitivity and specificity which was .81 resulting in 63% classified accurately (sensitivity=.61, specificity=.67). Variance inflation factors ranged from 1.02 to 1.24 so multicolinearity was not an issue (as cited in Field et al., 2012). Even with this different approach a poor fitting model still resulted.

***Table 18**: Logistic Regression Results for Three-Predictor Model ELA Test Scores as the DV*

Variables	B	Wald (z-ratio)	p-value	Odds Ratio	95% Odds Ratio Confidence Invterval
Gender (male)	-0.64	-1.51	p =.13	0.53	(0.22, 1.20)
Lunch (Not on Free or Reduced)	0.74	1.95	p = .05	2.10	(0.99, 4.46)

NonAthECA	0.68	1.63	P=.10	1.98	(0.88, 4.60)
(constant)	0.79	1.77	P=.08	2.20	(0.94, 5.43)

***Figure 6**: ROC curve for the thee-predictor model*

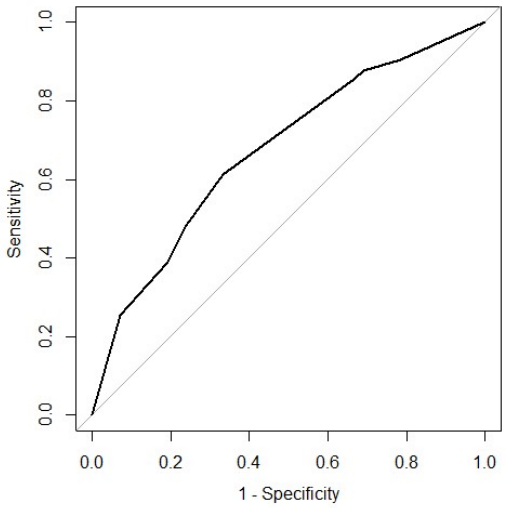
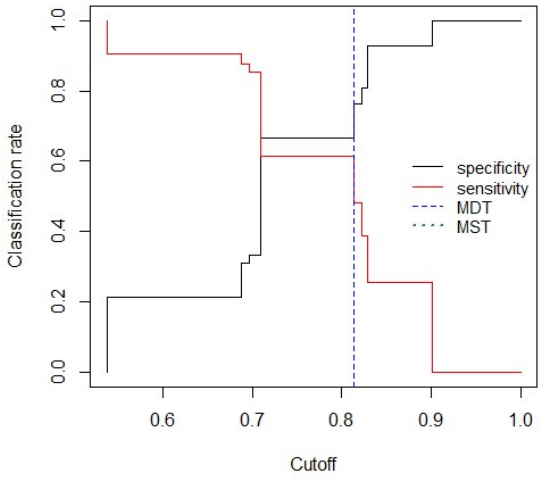


***Figure 7:** Graphs of Sensitivity vs. Specificity for various cutoffs*



Conclusion

It was observed that a statistically significant relationship existed between participation in clubs or sports and academic success. Students who were involved in any extracurricular activity were over five times more likely to have a GPA of 3.0 or above than students who participated in nothing. And students who were involved in both clubs and sports were about 12 times more likely to have a GPA of a 3.0 or above than students who were not involved in anything. Attendance also showed a statistically significant relationship to participation in extracurricular activities. Students not involved were about two times more likely to be excessively absent than students who were involved. Students not involved when compared to students involved in both clubs and sports were over 3 times more likely to be excessively absent. OST math had no significant relationship to extracurricular participation, however a comparison of means using ANOVA revealed a significant difference over ECA's four categories and OST math scores. It

was found with post hoc t-tests that the significant difference lay between those involved in both clubs and sports and those involved in nothing. Participation in extracurricular activities demonstrated a significant relationship to passing the ELA OST. ACT had problems with low expected cell counts during χ^2 analysis so the results were questionable. Although ACT did show some significance when comparing measures of center, notably those involved in both clubs and sports when compared against those involved in nothing.

A good logistic regression model for predicting students with a GPA of 3.0 or above and students below a 3.0 was created with the predictors of Gender, Lunch, ExcessiveAbs and ECA. Each predictor was significant and the model's ROC curve gave an area of .81, which was classified as good. A .62 threshold resulted in 73% being classified accurately (sensitivity=.72, specificity=.74). Two attempts were made to find a model that predicted students who would pass the ELA OST. It was found that both were poor fitting as both ROC curves were below .7. Gender and Lunch ended up being significant predictors with the GPA model and in our first ELA model mentioned above.

Overall, there was statistical evidence for a relationship between participation in clubs or sports and academic success. The predictors of Gender, SES, attendance, and participation in clubs or sports came out significant for out GPA model, while only Gender and SES were significant in our first ELA model. So there is evidence for participation in extracurricular activities carrying a relationship to academic success and some of that academic success can be predicted a good level.

CHAPTER V: SUMMARY

This study started with the interest of helping Black River High School start the process of analyzing data in order to help with future policy decisions of the school. The pursuit to make educational institutions stronger and academic success realized in the lives of students is ever present, as many a person has experienced. The study is one of many that seeks to inform and build up an institution so that it may help other students see academic success. Would a policy change that would require students to be involved in an extracurricular activity be beneficial at Black River High School? This question is one from which this study was developed. Black River High School's principal is interested in getting students more involved and had mentioned this potential policy decision to me. The policy did not seem to be gaining momentum around the time this study was finished. Hopefully, this study can be referenced as a foundation for the leaders of Black River and that the information from this particular study can be a stepping stone for any related policy discussion or future research conducted by the school.

Trying to answer the question of whether or not a policy of this nature would be beneficial led to thinking about whether or not clubs or sports were actually beneficial to students' academic performance. Considering the research, it has been shown that a significant relationship exists between students' participation in extracurricular activities and academic success. Studies seemingly try to move on from there and try to look at what that relationship is and try to explain it. Covariates seemed to be explored and considered in relation to academic success. The studies looked at in the literature considered the variables GPA, SES, gender, math and English grades and standardized scores, as well as others. So going into this study the variables that were going to be considered had been considered before and had some backing. In the studies mentioned in chapter two, regression models and chi-squared analyses were conducted as well as the other tests

for group means (t tests and ANOVA). So some groundwork was laid for this study as it moved forward.

This study considered the variables mentioned above as well as ACT. So the variables to be collected were GPA, attendance, gender, grade, SES, ACT scores, OST math scores, OST ELA scores, and involvement in extracurricular activities. Attendance was considered on the basis of how the State of Ohio defined excessive absence in HB 410. SES was considered on a high or low level based on student participation in the free/reduced lunch program. Involvement in extracurricular activities recorded what clubs or sports a student was in.

An attempt was made to use all of our high school students as the sample. It was of interest to look at only the students that were on campus at our high school. So students that went to our county's career center were removed as well as students who attended other institutions and were not located on our campus. The reasoning behind this was because those students would not have the same readily available access to our school's extracurricular activities. Students were also removed if they did not attend the fully year. This brought the sample size down to N=310. Data at Black River High School is collected throughout the year but finalized in the weeks after graduation. So the data set for this study was not ready until about two weeks after seniors had graduated.

Multiple reports were run by one of our administrative secretaries who had access to EMIS. The reports were in an Excel sheet with student identifiers. The reports had to be matched with extraneous information removed and student identifiers also deleted. This data cleansing was a challenging process and involved a lot of manipulation with Excel formulas to match the data from multiple sheets correctly.

Data analysis then began and the first research question was explored. The research question investigated the relationship between clubs or sports and academic success so Chi-squared tests were conducted over the clubs or sports and GPA, attendance, math Ohio state test score (OST), ELA OST, and junior year ACT. The Chi-squared tests were followed up by t tests and ANOVAs or their non-parametric counterparts (Wilcoxson and Kruskal-Wallis tests).

GPA being 3.0 or above or GPA below a 3.0 yielded statistically significant results when compared against involvement in any extracurricular or not and when compared against involvement in any non-sport extracurricular or not. When extracurricular involvement was broken down into only sports, only clubs, and both clubs and sports (the ECA variable) the results were significant. Post hoc comparisons between those who were involved in both clubs and sports and those involved in nothing were significant where those involved in both were about 12 times more likely to have a GPA of a 3.0 or above. Violations of the normality and variance assumptions led to conducting non-parametric measures of center which also confirmed that these results were significant. So based on the evidence, involvement in extracurricular activities has a significant relationship to GPA of a 3.0 or above.

A significant relationship between attendance and involvement was also observed. Being involved in a sport or not and involvement in any extracurricular or not showed significant relationships. When extracurricular involvement was broken down into the four levels of the ECA variable, ECA was found to be significant. Post hoc tests showed that those involved in clubs and sports compared against those not involved was significant; also those involved in clubs and sports had a significant result when compared against clubs. One of the more interesting odds ratios was that students involved in both clubs and sports were over 3 times more likely to have missed fewer than 65 hours of school than students involved in nothing.

When standardized tests scores were investigated, OST math scores did not have a significant relationship with involvement whereas ELA scores did. Again, those students involved in both clubs and sports showed significance when compared to those not involved. They were almost 4 times more likely to pass their ELA state test than those who were not involved.

The ACT data was small as it only considered our junior class. If a student had a remediation free score in Math (22) and in English (18) they were considered successful. So when extracurricular activity involvement was compared to those students who were remediation free or not the results from Chi-Squred tests showed that those students in clubs had a significant relationship with being remediation free, however 2 of 4 cells were below the expected count of 5 so that hurts our confidence in the result. Wilcoxson tests of cumulative ACT score yielded significance across the board except for those in sports or not. Involvement in something versus nothing, Sports versus nothing, and both clubs and sports versus nothing showed significance. When a Kruskal-Wallis test came out significant and follow up pairwise Wilcoxson tests conducted, it was observed that involvement in both clubs and sports were significant. So being remediation free on the ACT did have some relationship to involvement although the low sample size led to some questions regarding the results.

Next, direct logistic regression was conducted. A logistic regression model was found that ended up being a way of predicting student academic success in regards to GPA (3.0 or above). This model demonstrated that we know some significant predictors of student's success in regards to GPA at Black River High School. The significant predictors were gender, attendance, SES, and involvement in extracurricular activities. The model classified 75.2% of cases accurately with a threshold of .5 (.85 sensitivity and .58 specificity). An ROC curve was analyzed and found to have

an area of .806. So it turned out to have a good reliability at predicting those students with a GPA of a 3.0 or above and below a 3.0.

A second direct logistic regression model was pursued with the end of predicting academic success over ELA OST scores. The scores were separated into 700 and above or below a 700. The first attempt ended up with two predictor variables, Gender and Lunch, both of which ended up being significant. The overall model itself had a poor fit as the ROC curve yielded an area of .64. Since ECA ended up being dropped from the model, a second attempt at a model was made with ECA being replaced by Sports, Clubs (NonAthECA), and their interaction. The reason behind this was to try to see if a part of extracurricular participation would contribute to a better model. The ECA variable was a four level categorical variable and it was dropped entirely from the first model. The replacement of ECA with sports, clubs and their interaction allowed one at a time to be dropped and see if the results were significant. The process ended up with a three predictor model of which the predictor variables included Gender, Lunch, and NonAthECA (Clubs). None of the predictor variables were significant but the overall model was a slightly better fit with the ROC curve having an area of .67. In either case the model for predicting students passing the ELA OST was poor.

These results confirm to Black River that involvement does have a significant relationship to academic success and that involvement is a significant predictor of GPA but not of ELA OST scores. Any policy decisions would benefit from a look at this study and help provide some backing to decisions made to incorporate extracurricular involvement as part of the requirements. However, I feel more investigation would be needed to determine if a requirement for extracurricular participation would be beneficial. I would also like to know if the requirement to participate might perhaps counteract the benefit of voluntary involvement.

Generalizing these results to district outside of ours is limited as our sample is drawn from a rural area that is mostly white. We might be able to generalize our results to schools of similar makeup. There are other schools in the state that have similar populations to ours, like our neighboring districts. In order for this study to be generalized more broadly it would need to include a sampling of students from different areas and in different types of districts. It would be nice to include rural, city, and suburban school districts in the study as well as schools in different states.

One other threat to the generalizing of this study could be how our district measures grades. For instance, I am aware of districts that have a strict grading policy that involves 80% of a students' grade being based on assessments and 20% other work. At Black River High School class grade percentage breakdown is left to the teacher's decision. We are currently in the process of changing that and it would be interesting to see how it effects academic success.

Something else to consider with generalizing a study of this nature is how different districts have different size populations and extracurricular activity involvement might be more limited. At Black River High School, it would be theoretically possible for all of our students to be involved in something. Whereas larger districts might have cuts for clubs or sports and the opportunities might not be as prevalent. Students might not have equality of access to extracurricular activities. Along the same lines there are various other extracurricular activities a school could offer and some schools will probably be able to offer more to their students or less if they are going through financial issues and have had to cut funding to their sports programs.

The affluence of a district would also seem to effect the students. Our school seems to be in an area where there is not a lot of affluence, so trying to generalize this study to an area where

affluence is high would probably not be appropriate. This is another type of problem with the sample that this study uses.

Another weakness in this study includes the lack of other variables. It would be nice to include a covariate, some type of variable that the students had in common before any of them chose to be involved in an extracurricular or not. It would also be nice to investigate parents' education level and some other factors that came out in the literature. It would also be good to find a way to distinguish if academically successful kids are just participating or if it is the extracurricular activities themselves that are contributing to the academic success.

This study could have been improved by incorporating another method of data collection like a survey or something to gather data on the students' families. I believe the study could have also improved by investigating each club or sport more thoroughly to find out about the influence of that particular extracurricular activity on the student (e.g. student's relationship with the coach).

I believe future studies would include the investigation of relationships in the life of the student and investigate the motivations of the students. When I think about my own academic career and others I have observed it seems that two things stand out. The relationships in our lives are helping or hurting us in some way and I have a strong motivation to do well academically for various reasons. Involvement in clubs or sports involves relationships and those should be investigated. Motivations for students also should be considered. After reflecting on this study and what could be done in the future it seems to me that any study would need to consider seeking out the relationships in students' lives and investigate how those influence them in their academic pursuits.

Another study that Black River should consider if they implement a policy change would be a follow up study to see how the policy worked. If it works well the first year then they could

continue to monitor it for several years and conduct a longitudinal study. This would involve comparing academic success and involvement between successive years including things like graduation rates, GPA, student perceptions of the policy, and others.

This study has been a great launching point for me as a researcher and for my district as we consider what is best to help our students academically succeed. As the dialog continues regarding how to best help our students, this study will help lay out talking points concerning studies that we should read and studies we should conduct ourselves. It has been fun to investigate our own school's data and see where we fit in the larger picture of some of the other studies and data that is out there.

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Appendix A

Table 19 below shows a breakdown of extracurricular activities and academic measures (including SES) across gender. It was interesting to the researcher and his administrator that there was a gap noticed between the males and females and their academic performance. As a female you would be over 2 times more likely to be involved in any extracurricular activity than a male, a statistically significant result $\chi^2(1) = 5.42, p < .05$. Females were 5 times more likely to be involved in non-athletic clubs (Clubs) than males, a statistically significant relationship was evidenced here $\chi^2(1) = 42.56, p < .001$. As far as academic measures are concerned, Females showed significance in having almost 5 times more likelihood of having a 3.0 or above as a GPA than a male student and they were over 2 times more likely to pass the ELA OST; yet females were almost 2 times more likely to be on free or reduced lunch (see Table 19).

Table 19*: Chi-Squared Tests for Gender accross Other Variables*

	ECAinvolved		Sports		Clubs		ECA			
	Yes	No	Yes	No	Yes	No	None	Sports	Clubs	Both
F	128	18	66	80	110	36	18	18	62	48
M	126	38	93	71	62	102	38	64	33	29
Test	$\chi^2(1) = 5.42$ $p < .05$*		$\chi^2(1) = 3.64$ $p = .06$		$\chi^2(1) = 42.56$ $p < .001$***		$\chi^2(3) = 45.60$ $p < .001$ ***			
Odds Ratio	F to M 2.14 (1.12, 4.21)		M to F 1.59 (0.99, 2.55)		F to M 5.00 (2.99, 8.48)		---			

	Lunch		GPAabove3		ExcessAbs		passMath		passELA	
	Free/Red.	None	Yes	No	Yes	No	Yes	No	Yes	No
F	50	96	117	29	54	92	41	25	70	13
M	37	127	75	89	67	97	39	30	67	29
Test	$\chi^2(1) = 4.66$ $p < .05$*		$\chi^2(1) = 37.34$ $p < .001$ ***		$\chi^2(1) = 0.37$ $p = .56$		$\chi^2(1) = 0.24$ $p = 0.62$		$\chi^2(1) = 4.47$ $p < .05$*	
Odds Ratio	F to M 1.78 (1.05, 3.05)		F to M 4.76 (2.80, 8.27)		F to M 1.18 (0.73, 1.91)		F to M 1.26 (0.60, 2.66)		F to M 2.32 (1.06, 5.30)	

Numbers highlighted in green have a standardized residual $> \pm 1.96$

Appendix B

Below is a copy of the email received from Shawnee State University's IRB confirming approval for this study.

Laskos, Mr. <alaskos@blrv.org>

IRB application

Laskos, Mr. <alaskos@blrv.org> Thu, Dec 13, 2018 at 8:50 AM
To: irb@shawnee.edu
Cc: Doug Darbro <ddarbro@shawnee.edu>

No problem, thank you Dr. Kehres! Just want to make sure, am I approved and okay to begin data collection?

Thank you again!
adam

On Thu, Dec 13, 2018 at 1:54 AM IRB <irb@shawnee.edu> wrote:

> I apologize for the delay in your approval. The email got buried in my inbox. I hope this did not cause a delay in your data collection.
>
> ---
>
> **From:** Laskos, Mr. <alaskos@blrv.org>
> **Sent:** Monday, December 3, 2018 11:01 AM
> **To:** Ed Kehres; Douglas Darbro; IRB
> **Subject:** IRB application
>
> [Quoted text hidden]

[Quoted text hidden]

BIBLIOGRAPHY

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Master of Science Mathematical Sciences

Thesis: EXAMINING THE RELATIONSHIP BETWEEN PARTICIPATION IN CLUBS OR SPORTS AND ACADEMIC SUCCESS

Major Field: Mathematical Sciences

Education: Bachelors of the Arts with a double major in Bible Comprehensive and Mathematics from Cedarville University 2005, Masters of the Arts in Teaching from Kent State University 2006

Completed the requirements for the Master of Science in Mathematical Sciences, Portsmouth, Ohio in May 2020.

Doug D. Darbro 8/5/2019

ADVISER'S APPROVAL: Dr. Doug Darbro