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# Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessment performance?

David Jabs
*Shawnee State University*

**SHAWNEE STATE UNIVERSITY**

# Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessment performance?

A Thesis

By

**David P. Jabs**

Department of Mathematical Sciences

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The thesis entitled '**Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessment performance?**' presented by **David P. Jabs**, a candidate for the degree of **Master of Science in Mathematics,** has been approved and is worthy of acceptance.

7/22/24
Date

Graduate Director

7/22/2024
Date

David P. Jabs
Student

# ABSTRACT

This research study examined if prior academic achievement, attendance, athletic participation and demographics were significant factors of IOWA State Assessment scores. The findings indicated that there were three significant factors. The three factors that were significant were prior IOWA State Assessment Scores, the number of tardies and the current GPA. This research study took place at a small private school in Cleveland Heights, OH. The analysis was completed by three different approaches. The first was a multiple regression analysis which determined the three factors already mentioned. A correlation study and an independent sample t-test were also performed. This research is important to the school and hopefully other schools to show that previous testing is a significant factor in predicting future testing. The study also shows that if the number of tardies can be minimized, standardized testing scores should improve based on this model. The most interesting aspect of this study was that the number of absences did not have a significant effect on the testing scores. This study had a couple of limitations. The sample size was not very big and the small quantity proved to be an issue when performing the correlation study and the independent t-test analysis. There were also issues with normality in the multiple regression analysis. This study only contained data from 10th and 11th graders. In the future it would be good to expand it to more grades and a wider range of other demographics including socioeconomic status and race. Through this study it was learned that showing an effort in one's learning is essential as shown by tardies and GPA. The results imply that if there is a solution to help tardies go down and grade point averages go up, better scores should be attained.

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# Chapter One

## Beginning paragraph

The Iowa State Test Assessment is given to the students at Lutheran High School East twice a year. This study will examine what factors may affect the scores of the Iowa State Assessment. The factors that will be looked at are prior academic achievement level (previous Iowa State Assessment scores), attendance (both absences and tardies), athletic participation, gender, and grade point average [GPA]. This study will determine if these factors benefit or hinder the test takers, or if the factor does not have any effect at all.

## Introduction

The Iowa State Assessment is given to freshman, sophomores, juniors, and seniors (if necessary). Students need to attain a certain score (Algebra-255, ELA- 249) to qualify for graduation. There is hopefully improvement made with each individual student throughout the course of the six tests that are taken their first three years of high school (as long as they are Lutheran East Students that whole time). What factors help to make improvements? What factors deter from those improvements being made? In this study, determining the effects of significant predictors will hopefully help Lutheran East to come up with solutions to continually improve Iowa State Testing Scores.

## Background of the Problem

Lutheran East has a big challenge with attendance. This problem is twofold: actual attendance to school and tardies. First, attendance will be addressed. Students may miss a large number of days for an assortment of reasons. One of the main goals for this

study is to determine if these absences play a role in the results of the Iowa State Assessment scores. The second issue is tardies. Once again there are two issues to deal with here: tardies to school, which results in missed time during the first period, and tardies throughout the day. Being tardy to school can even lead to students being absent for all of first period and even parts of second or third.

An article by Ishita Dey speaks very well on this topic. In her article she discusses how attendance is very important, and that when class is attended, test results tend to be better (Dey, 2018). Dey also mentions that when class is not well attended, the opposite effect occurs and test results tend not to be as good (Dey, 2018). Roby looked into attendance with performance on the Ohio proficiency tests and found that there was a correlation between the two (Roby, 2003). Gottfried also had similar results and noticed that there was a relationship between attendance and performance (Gottfried, 2010).

Athletics at Lutheran East, like in most high schools throughout the nation, are really popular. Student athletes spend a lot of time at practices. These practices can drain students physically, which may result in schoolwork being less of a priority while at home. Some of the sports teams at Lutheran East, especially the men's basketball team, are exceptional but have a large time commitment. The teams will practice before lifting weights and watching film. Will the amount of time for practices cause an effect on the Iowa State Assessment scores, or does being a part of a team give students a sense of belonging that may help them to test and perform better?

An article by Grimit shows that athletics can do a couple of things. This article shows that athletes tend to do a little worse in school than their peers, but that they tend to have more of a sense of belonging (Grimit, 2014). In this study, the academic part is

the only consideration with no foray into the sense of belonging. In White's study, it was noticed that the opposite is true, that athletes tend to perform better academically (White, 2005). McCarthy shows that the longer students participate in athletics their academics will slightly decrease (McCarthy, 2019).

Gender has been known to play a role in testing. Is this the case at Lutheran East? The student body of Lutheran East is made up of more females than males. In general, the females work harder and overall have better grades. Ghazvini article states this as well, but just because the girls work harder than the guys do, there is not much difference in the testing (Ghazvini, 2011).

Grade point average is another area that might have significance on test scores. Based on the research, there is a lot of data on how students will do in college based on GPA and standardized test scores but not a lot of data on how high school GPA affects high school standardized test scores.

The last thing that will be looked at is how their previous Iowa State Assessment scores compare and if those test scores help to predict how students will do on future Iowa State Assessment. There is currently not much data or research on this topic.

To summarize the background of the problem, this study will examine how attendance affects the Iowa state testing scores. Studies and articles by Dey, Roby, and Gottfried have shown that attendance tends to have an effect on academic performance and testing. Athletics could have one of two effects, good, or bad, as noted in articles by Grimit, White, and McCarthy. Ghazvini states that females tend to have better work ethic than males, but this does not necessarily mean that they will perform better on tests.

## Statement of the Problem and Significance of the Study

Attendance is a concern at many schools across the nation. Lutheran East also has concerns about attendance. This concern includes daily attendance and tardies, especially tardies to the first period of the day. The school also has many athletes competing in sports, both females and males take part in these activities. GPA, gender and previous Iowa State Assessment scores will also be examined. Based on these issues the problem statement is "Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessment performance?" The aim of this study will be to determine if any of these factors play a role in the Iowa State Assessment that are given to every student.

## Purpose of the Study

The broader significance of this study will be to examine the variables that could affect a student's test results, to look individually at each factor, and to see if it is a strong predictor. Based on the results that are determined, the school may then take a look at ways that they may improve those areas that are significant predictors. What will need to be done to improve attendance if that is a significant factor? What will need to be done if participating in sports causes a lower test score? What steps need to be taken to prepare student athletes for testing? Therefore the main purpose of the study is to determine the predictors but then identify ways to improve those areas so that they do not affect negatively on the test scores, or if it does affect positively to make sure that will continue to be the case.

Primary Research Question

The primary research question is "Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessments performance?" The secondary research questions will be the following: Is there a difference in Iowa State Assessments results between males and females? Is there a difference in Iowa State Assessments results between athletes and non-athletes? What effect does attendance have on the Iowa State Assessments results? Does prior GPA have an effect on Iowa State Assessments results? The variables in this study will be attendance, gender, athlete or non-athlete, GPA, prior IOWA state test results, and current Iowa State Assessments results.

Hypotheses (optional)

Based on the literature and Lutheran High School East student behaviors, in answer to "Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessments performance?" the results will probably reveal that attendance and gender have an effect on the Iowa State Assessments scores. When comparing all of them, these results could be interesting. As for the secondary research questions, the expected results will be that females and non-athletes will perform better on the Iowa State Assessments. It is also expected that the number of absences will have a major effect on the results. GPA will probably also be shown to have an effect on the results.

Research Design

Data collection will be done at Lutheran High School East. It will be collected and given to the researcher anonymously, protecting all of the students at the school. The data collected will be from the population of sophomores and juniors. This is so that the previous year Iowa State Assessments may be the guideline for previous academic achievement. The sophomore class has 96 students (42 males, 54 females). The junior class has 69 students (27 males, 42 females). The majority of the population at Lutheran East is African American so race will not be considered. The variables mentioned above will be collected: attendance (number of absences and number of tardies), gender (male or female), athlete or non-athlete, grade point average [GPA] will be collected on a 4.0 scale (though honors classes are based on a 5.0 scale which is why some may be higher than 4.0), prior Iowa State Assessment scores (including math, science, social studies and English). The attendance, GPA, gender will be done with the help of the gradebook program that Lutheran High School East uses. The Iowa State Assessment results will be from the results that are returned after the tests are graded. Athlete and non-athlete status will be reviewed by the Lutheran High School East athletic director and determined if the students participated in a particular sport.

The nationally recognized assessment that will be used is the Iowa State Assessment. The Iowa State Assessment statement for validity states, “Assessment information is not considered valid or invalid in any absolute sense. Rather, the information is considered valid for a particular use or interpretation and invalid for another” (Iowa Assessments Research and Development Guide , n.d). Therefore the

validity of the test is determined by what results are being studied and how those results are looked at along with other factors.

The Iowa State Assessment statement for reliability states, “Data presented in this part of the guide address the means, standard deviations (SD), and standard errors of measurement (SEM) for raw scores (RS) and National Standard Scores (NSS)” (Iowa Assessments Research and Development Guide , n.d). These are the measures of reliability that the Iowa test has. In the guide it also discusses how students may have an effect on the reliability of the test based on their actions and feelings that day. The article does not go into detail about how gender or race may play into the reliability or validity of the tests.

The data analysis will be done by multiple different methods. The major research question will be conducted by running a multiple regression model. As for the secondary research questions, there will be two variations of tests run. There will be some correlation studies as well as independent sample t-tests.

The statistical analysis software that will be used will be R 4.3.0 and G Power 3.1.9.7. These are the two programs through which all of the statistical analysis will be performed.

## Ethical Considerations

Confidentiality will be performed by the way that the data is collected. The researcher will have access to the data after it has been collected and has been anonymized. This way the researcher does not know the students that are represented by each data set. Therefore confidentiality will not be a concern.

The IRB application was done through Shawnee State University. Dr. Richards, the chair of the IRB committee at Shawnee State, approved on November 2, 2024 (See Appendix A). Appendix B includes PHRP certification completion. The researcher submitted an application, which was looked at, returned, a couple of changes were made and then it was accepted. Therefore the process to complete the study was approved.

## Theoretical Framework

There are two big theories that are in play. The first is the Solow Effect Theory for attendance. This theory assumes that school attendance is one of the biggest factors determining academic achievement (Romer, 2012). It also shows a relationship between attendance, how students do in school, as well as how they behave (Romer, 2012). Two other studies that have used this theoretical framework are Sekiwu and Ancheta's articles. The connection between this theory and the study is that attendance and achievement is what is being studied. Therefore the theory that describes the relationship between the two will play a big role in the study. This will go along with the hypothesis that if school is missed, then the scores for the Iowa State Assessment scores will decrease.

A theory to go with the athletic part of the study is the Zero-Sum Theory. The Zero-Sum Theory shows that there is so much more of an emphasis on extra-curriculars, including sports, that it takes away from education (Coleman, 1961). This is used by Buckley and Lee, and Erdmann. The relationship between this theory and the study is that with the amount of time that is spent at sports practices, this might take away from academic achievement and testing scores. There are also later nights for games both

home and away that will take time away from academics. Therefore this is a good theory to relate to this study.

Assumptions, Limitations, and Scope

The assumptions that will be made for study are that all of the data for every variable will be collected for every student. This assumes that each student will be present or make up any missed Iowa State Assessment, that the student's GPA will be in the system, that there will be access to former Iowa State Assessment scores. Another assumption is that teachers correctly input data with regards to attendance, including whether a student is absent or tardy to class. The last assumption is that all students will correctly be labeled as an athlete or as a non-athlete. There should be no assumptions with gender as that is provided by the families.

The assumptions made in regards to student involvement are that the students actually give one hundred percent effort when taking the Iowa State Assessments. This also assumes that the student will be ready and prepared for the test both mentally and physically. With high school students, this is a challenge due to uncontrollable variables such as the student's homelife, quality of sleep, nutrition, and general wellbeing.

The limitations to this study are that there will not be a baseline Iowa State Assessment scores for students who have transferred into Lutheran East. Not every school in Ohio utilizes the Iowa State Assessment, so there is not a baseline test for every student transferring in. The opposite is also true, if a student transfers out throughout the year, there will not be a final test. Therefore the study will be limited to students who are

sophomores and juniors who attended Lutheran East the previous year. This way the GPA, attendance and previous test scores will be known.

## Definition of Terms

The Iowa State Assessment is a standardized test given to students to determine what academic level the student is at, it will show the grade equivalent, the national percentile rank, and the standard score (80-400).

In regards to attendance, absences are when a student completely misses the class or the entire school day. A tardy is when a student shows up late to that class for the day. Therefore a student could be tardy multiple times in a day as Lutheran East has eight periods in a day.

Prior academic achievement will be how well the student performed on the Iowa State Assessment the year before as well as grade point average [GPA] which is the grade point average.

Student athletes are any student who participates in extracurricular sporting events sponsored by the school such as football, basketball, volleyball, and track and field.

## Summary

In this chapter the study was described in depth. The major question is "Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on IOWA state test performance?" The reason that this study is being performed was discussed in the background of the problem and includes the fact that

attendance and athletics look to be detrimental towards testing scores at Lutheran East. Other factors like GPA and gender are also going to be considered.

There was a brief look into some of the literature that will be reviewed even more in Chapter 2 that will help frame the study. It was shown that others have already studied parts of the study that will be performed and some of their results, which will probably be very similar to the results of this study.

The primary research question and the secondary research questions were stated as well as the hypothesis to these statements. The study will show whether the hypotheses will be shown to be true or false.

The research design was then shown in length, how the data will be collected and how reliable and valid the Iowa State Assessment is were also mentioned. The way that the data will then be analyzed was stated as well. The confidentiality of the students was also discussed to make sure that the students are all protected.

The last things that were discussed were the theoretical framework. What is the root of the problem and how does it affect the study? There were many assumptions and limitations that might affect the study, these were described at length. The last thing that was brought to the reader's attention were defining terms that will be used throughout this study.

# Chapter Two

## Introduction

In this chapter there are going to be five big topics that are covered. These topics are based on the research questions that were addressed in chapter one. In this chapter, the literature that has been written about the following topics will be discussed: How does attendance affect testing results? How does participation in sports affect testing results? How do gender, GPA, and baseline scores affect testing results? What are the validity and reliability of standardized assessments? What are some solutions to the issues mentioned above?

The literature will give background information on what the results of the research question may be and also provide options for topics that may need to be focused on moving forward based on previous research.

## Attendance

Douglas Roby discusses school attendance and the results on the Ohio Proficiency Tests in an article. Roby had a couple of key questions that he studied. Those questions included how the best and worst schools in Ohio fared on the Ohio Proficiency Tests, how the top 10 and bottom 10 percent did on the tests, and how attendance played a role in all of the above (Roby, 2003). This research fits well with the topics in this study as both will look at attendance and testing. One minor difference is that Roby looked at Ohio Proficiency Tests, whereas this study will be focused on the Iowa State Assessment. Both are acceptable options for the requirements needed to graduate.

Roby does well at looking at the whole school attendance. This will be different from the current research question because it examines the school as a whole instead of at individuals in the school. Roby also looked exclusively at the top 10% and bottom 10% of the scores of the school. He does not look at the whole school. This could miss students who are intelligent even though they are missing significant time in school.

Roby found a correlation between attendance and Ohio Proficiency Tests and that this correlation was especially noticeable at the 9th grade level. It was not as noticeable in the 6th and 12th grades (Roby, 2003). This is interesting because this study will mainly focus on 10th and 11th graders. The question that comes to mind: Will the absences create more of a correlation or less of a correlation?

Ancheta, Daniel, and Ahmad wrote an article on how class attendance affects performance in the classroom. This article fits well with this study because of the attendance piece. These authors noted that many studies say that academic achievement and attendance will be related but that it does not always mean that these two factors will be related (Ancheta, 2021). The authors state that teachers can be more interactive and also provide more learning experiences when students are in class, including clarification through questions being asked and answered (Ancheta, 2021). The two other big items that were noted in their literature review was the lack of solid definition for chronic absenteeism. People will define this differently. The gap between low to middle achieving students is much larger than the gap between middle to high achieving students (Ancheta, 2021). They found that being absent does have an effect on attendance (Ancheta, 2021).

In the article previously discussed, the weakness with this research study is that they were dealing with college data and could set a number of classes students had to attend. In college, students can choose whether or not to go to class; they are adults making their own decisions. In high school, when students are in the building, they will pretty much be in class, especially at the school being studied. This is the big difference between the study being reviewed and this research study.

In an article written by Gottfried, he mentions that people who miss a lot of school have lower test scores than those who miss an average amount (Gottfried, 2019). He also mentions that teachers will teach differently when major absence problems return, because those students will ask questions that have already been answered in previous classes (Gottfried, 2019). Gottfried's study looks more at how one student who is absent a lot will affect the other students in the class. This also has a negative effect (Gottfried, 2019). This is a factor that this research had not really thought about. The big thing about this study which will not match up with this research question is that Gottfried looks at elementary school students and not high school students. Gottfried does a great job at looking at the teacher and the whole classroom dynamics.

The giant in this study is David Romer. He wrote an article in 1993 called "Do Students Go to Class? Should They?" Romer determined that attendance has a huge impact on performance in the classroom for students (Romer, 1993). He stated that attendance played a bigger role than homework and the feedback on it, and that it also plays a bigger role than previous GPA (Romer, 1993).

Sports

McCarthy did a longitudinal study on athletes and non-athletes in Massachusetts. His literature review provided some great insight into results that may be observed in this study. McCarthy stated that there are two big ideas when it comes to sports and academic achievement. Those two ideas are that it will either negatively impact academic performance because of less time spent on homework and other studying, or that it will help with academic performance because the students will feel better about themselves (McCarthy, 2019). His research relates to this research because both of the studies are dealing with how athletes will perform. His study was in the classroom in regards to GPA, and this study will be compared to the Iowa State Assessment. His research showed that GPA is positively related to participation in sports(McCarthy, 2019). Especially in the first year that he studied, the longer it went the smaller the gap became. McCarthy noted in his literature review that if some of the intensity that is focused on sports would be changed to academics that grades would start to improve (McCarthy, 2019). He noted a study by Bowen and Green that showed that in Ohio over a period of five years at multiple schools that sports positively affected the academics (Bowen, 2012).

One of the weaknesses found in McCarthy's studies is that he just looked at the same number of athletes and non-athletes. Were some of the non-athletes also in other clubs or groups involved in the school? This would be an interesting topic to discuss in a later study.

Maloney and McCormick did a study at Clemson University to see whether athletes perform as well as non-athletes. This relates to the research question and topic being addressed in this paper as their conclusion was that in high school the now college

athletes performed worse on the SAT and had lower high school rank (Maloney, 1993). This study is included to show that the athletes had lower standardized test scores as a lot of studies will mention academic performance but not standardized test scores. This data disagrees with the data that was shown in McCarthy's study, showing that athletics may help or harm academic performance.

White did a study on the effects of participation in athletics with academic performance as well. His results showed that participation in athletics is the reason why students may be successful in the classroom (White, 2005). White also found that males tended to not be affected by athletics as much as females are, and that for females it tends to be more positive (White, 2005). White's research was mainly focused on asking teachers about how the students were doing in different areas inside and outside of class. He did not look at all at the actual GPA or grades in individual classes. This is a major gap in a research study. He solely focused on what the teachers thought compared to what the data from the actual classwork may have stated. This will be addressed in this research study as the data will be looked at with the scores on the Iowa State Assessment. This motivates this study to make sure that it is looking at the numbers and not just an opinion of teachers not based on quantitative data.

The two titans of this field are Coleman and Bandura. They have opposing opinions on the topic. Coleman came up with one of the theoretical frameworks for this study. His opinion was that extra curricular activities will detract from the academic performance and goals that students will have (Coleman, 1961). On the other hand, Bandura states that athletic participation will improve academic performance as it will make the student athlete feel better about themselves, be higher-motivated and become

better leaders (Bandura, 1997). This study will show based on the data which one of them will be correct at the high school in question.

Gender

Parajuli and Thapa state that several other studies have shown that females tend to do better than males academically. This also goes into brain function and not just performance in the classroom (Parajuli,2017). Other studies that Parjuli and Thapa looked at showed that males tend to do better academically, or that they perform about the same (Parajuli,2017). Their study took a look at how males compared to females academically in both private and public schools and how the schools compared to each other (Parajuli,2017). This relates well to the study being conducted because we will compare both genders, but this study will only be looking at a private school. The results of their study were interesting: in one part, the females did better academically, in a different setting boys did better, but overall it was shown that females did better in the classroom than males did (Parajuli,2017). Even within one article, the data can point one way or another. It will be interesting to see what the data shows in this research. Parajuli and Thapa did not look at any standardized testing which is a weakness to the research that will be done here.

Ghazvini and Khajehpour literature shows that females try harder whereas males just rely on their knowledge and do not work as hard (Ghazvini, 2011). They also noticed in their study that females use better strategies compared to the males who concentrate and use the main ideas more (Ghazvini, 2011). Their study showed that even though all of the above was taken into account, that there is not a noticeable difference in the results

between males and female students (Ghazvini, 2011). Their study relates well to the research study being done here as it looks at how males and females do academically. They make some really awesome points for both why males may do better and why females may do better academically. Which way will this study turn out?

Grade Point Average [GPA]

Looking at how GPA is related to testing scores provided some really interesting results as the literature was being studied. StatCrunch stated that as the GPA of a student increases so should the ACT score (StatCrunch, n.d.). Zhang creates a unique table based on GPA and ACT score (Zhang, n.d.). These two sites show what the overall data will likely show. This research question finds it peculiar that if a student has an 18, they should have a 2.85 GPA. This is very interesting. I do not think that the research being done in this paper will match up well with the data shown. There are giant gaps that should be shown including different school districts, gender, and race which the research done here will hopefully look at more in depth.

Noble and Sawyer look in depth on how GPA and ACT scores predict college GPA's (Noble, 2002). The reason that this study is being examined is that it is going to look at both high school GPA and ACT scores. That is going to correlate well with looking at high school GPA and Iowa State Assessment Scores in this study. Their study shows that a higher GPA shows more about how hard a student tries and their motivation to learn (Noble, 2002). The ACT score reveals what their achievement would be in classes at the college level (Noble, 2002). Based on the last two statements, GPA and ACT will not always be correlated as sometimes the effort will be very high but they will

not have the knowledge necessary and sometimes the knowledge will be very high but there will not be effort put in (Noble, 2002).

Baseline Factors

Lanier looked at what happens when someone takes the ACT for the first time and then takes it again a second time (Lanier, 1994). This study is going to correlate with the research that is going to be done here because there is going to be a baseline Iowa State Assessment score from the prior year and also one from earlier this school year. So looking at how scores improve on other standardized tests will probably have a good correlation with how the scores will improve over the course of a year. Through other research, Lanier realized that most people will improve their score the more often they take the test, but that some will not do as well the second time taking the assessment (Lanier, 1994). He noticed that several different factors could help with improvement including more time in school and realization that students need to do better (Lanier, 1994). In his study, Lanier noticed that males tended to improve more than females (Lanier, 1994). This correlates well with this research study as gender is also being looked at in the study. He also noticed that higher GPA helped with higher ACT scores (Lanier, 1994). This also goes along with the last section where GPA was discussed.

Validity and Reliability of Standardized Tests

According to the Iowa State Assessments Handbook, the Iowa test will look for several things. These include how well the student knows the content, if they can look at a text or a graph and apply that knowledge to determine answers, their understanding of

math and science, and their ability to find solutions (Iowa Univ, 1998). The Iowa State Assessment uses five big standards: it needs to be consistent, the knowledge in science needs to be tested, based on information students should be able to look and read and make decisions with the information, the assessment needs to be an assessment that does not have bias, the information taken from the results needs to be used (Iowa Univ, 1998).

The Iowa State Assessment uses multiple choice questions. The reason that they do this is because it is easy to give and for students to take. The test can easily compare students. The test can ask more questions from a variety of different topics quickly (Iowa Univ, 1998). The disadvantages that the handbook states are that the students cannot defend their answers or go in depth as to why they answered that way, teachers will take a look at the test and know what they need to teach to make sure students are successful, and that it will not give periodic updates as these tests are not given that often (Iowa Univ, 1998).

The validity of the tests is going to be determined by how the reader of the test scores interprets them (Iowa, n.d.). What the test can be used for is tough for the test makers to decide because it is going to look at who and what interprets those results (Iowa, n.d.). The document also states that "No standardized test, no matter how carefully planned and constructed, can ever be equally suited for use in all schools." (Iowa, n.d., p. 5). Based on how each school district does things, places students in classes, order of sequence, teachers, students. All of these factors will be different for different schools so not everyone should look at the test the exact same way (Iowa, n.d.).

The Iowa test has done some research on how GPA, college GPA, ACT and SAT scores are related and have noticed that there was a relationship between Iowa State

Assessment Scores and ACT scores (Iowa, n.d.). It also states that it shows whether or not the student is ready by their knowledge for college (Iowa, n.d.). As for the design of the Iowa test, it has a design that makes sure that no one has an advantage over someone else (Iowa, n.d.).

As for the reliability of the Iowa State Assessment, they use multiple measures to check and be reliable (Iowa, n.d.). “Data presented in this part of the guide address the means, standard deviations (SD), and standard errors of measurement (SEM) for raw scores (RS) and National Standard Scores (NSS). Data presented in this part of the guide address the means, standard deviations (SD), and standard errors of measurement (SEM) for raw scores (RS) and National Standard Scores (NSS).”.

The Iowa State Assessment has reliability and validity statements, but it has been noted that a lot of the reading of the information is in the eye of the one interpreting the data (Iowa, n.d.). The biggest weakness seen is that the Iowa State Assessment does not take into account how hard a student may work inside and outside of the classroom. The validity and reliability document stated that like the ACT it looks at how ready a student is for college (Iowa, n.d.). But how ready a student is for college does not just depend on the knowledge that they have but also their work ethic and how much they want to be successful.

## Possible Ways to Improve Results

In this chapter the different factors that may contribute to Iowa State Assessment scores and the test itself have been examined. What are some ways that those factors may favor the test scores moving forward?

In attendance, different ways that attendance could be improved is by first analyzing what causes a student to be absent (Roby, 2003). Roby mentioned that family issues, such as being sick or having deaths in the family, are not nearly as big of concern as other items such as family vacations, just having nice weather outside, or friends causing individuals to make bad decisions (Roby, 2003). Ancheta gave a four-step process to get this started. The four steps were to check how often students are absent, to be a support system for them, to evaluate the resources that could help, and then to extend service to help them (Ancheta, 2021). Therefore based on the literature the first thing that must happen is to identify why students are not coming to school and then come up with a plan after the issue is known.

Athletics can take up a lot of time, practices before school, after school, long bus rides, games, and just recovery can all take up time that takes away from studying. How can this become better for student athletes? McCarthy states that long hours mean there is less time for studying so reducing the practice time during the year and especially outside of the season would be a great first step (McCarthy, 2019). He also states that injuries can cause a major issue (McCarthy, 2019). In the school that is being researched, just this year there have been two students who have had major knee surgeries both due to injuries playing basketball. They missed significant time, one who has a better work ethic just missed one week, another missed a month of school which may have damaged this individual's academic and testing growth. What needs to be done to make sure that these students are successful?

McCarthy also states that playing less sports, going from three to two or even to one per year would also be beneficial (McCarthy, 2019). McCormick and Maloney state

that the practice time really needs to be limited (Maloney, 1993). There are multiple ways that athletics can hopefully improve so that it will not affect testing scores.

Parjuli says that the teachers tend to focus on the needs of the females (Parjuli, 2016). But one could argue that there could be disruptions by males or females that teachers focus more on one positively or negatively. Negative attention could also hurt how the male or female behaves and participates in the classroom.

## Recap

In this chapter, a literature review was conducted on the research question. The big topics looked at were attendance in relation with academic performance and testing scores, athletic participation in relation with academic performance and testing scores, how GPA, gender and previous test scores will relate to assessment scores. The Iowa State Assessment was then looked at and discussed and possible solutions to issues were discussed.

In regards to attendance, it was determined that positive attendance normally has a positive correlation with academic performance and test scores. Whereas if there are a big number of absences, that performance tends to be lower. This could also be a moot point as the students level of intelligence and knowledge could mean they would perform well on the test even if they have a large number of absences. Solutions to this issue would be to determine the cause of the absences and then come up with a plan to support the student.

Athletics information was shown to have two options. The first is that athletics could take more time for sports with less for academic concerns. This will normally cause

lower test scores and academic achievement. On the other hand, sports can cause a sense of belonging, and bring more self-worth and motivation to the table. This would cause the student to perform better because they feel better. If the effect is negative, some solutions were to try and come up with a plan on how to support injured student athletes who may not be able to attend school, to limit practice times so that the student will have more time for academic work, and to limit the number of sports that a student is participating in.

GPA shows a number of different things. One is how much the student understands and knows the information, but it also can depend on the effort of the student. Therefore GPA and test scores are not always correlated. Some students will work very hard but not have the knowledge, whereas some students will not try to get the best grades but will perform very well on exams.

Gender is another factor that is up in the air. Females tend to work harder and put more time and effort into studying habits than males sometimes leading to better results. Males tend to rely on their general knowledge and problem solving skills to get the answer, and this may lead to better results for males. Solutions are to make sure that teachers are spending the same amount of time on male and female students and making sure that the attention is positive and not negative in nature.

If a student has taken a test before he or she has been shown, normally they will improve the next time that they take that assessment. They know what the assessment will look like and what they need to do to prepare for that assessment. There is also always a chance that the student will not improve, but in most of the studies the results showed that the students will improve.

The Iowa Test is made for everyone, but its validity was shown to be in the eyes of the person interpreting the results. It was seen that the results will be different for a lot of schools based on school population and different structures that the schools have in place. This is a conclusion of what was discussed in this chapter.

# Chapter Three

## Introduction

The primary research question is "Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessments performance?" The secondary research questions will be the following: Is there a statistically significant difference in mean Iowa State assessment scores across athletes and non-athletes? Is there a statistically significant difference in mean Iowa State assessment scores across males and females? Is there a statistically significant correlation between attendance and the Iowa State Assessments results? Is there a statistically significant correlation between GPA and Iowa State Assessments results?

Based on the research found in the Literature from Chapter 2, there will be no hypotheses stated at this time. The research seems to show that the result could go either way in most of the research questions. This is why there will be no hypothesis given at this time.

There are multiple topics that will be covered in this chapter. These topics include: the setting of the study and the participants, the instruments that were used to collect the data for the study. Other contents of this chapter detail the procedure for how data will be collected, how that data will be processed and analyzed. . The actual data analysis will be completed in Chapter 4, but this chapter will state how that data will be analyzed.

Setting and Participants

The geographic location of this study is in Northeast Ohio in the greater Cleveland area. The study is taking place at a smaller private school in this region. The participants of this study will be students at Lutheran High School East. The sample will be students from the sophomore (95 students- 50 females and 45 males) and junior (69 students- 43 females and 26 males) classes. The reason that these classes will be focused on is that Iowa State Assessment Scores from the previous year will be assessed. As a school, we do not have the results of that test for all of our 9th graders coming into the school. Seniors, for the most part, do not need to take the test so there will not be data on the majority of the seniors which is why the sophomores and juniors will be the students that will be looked at.

In this study, there is a threat to generalizability as only one school will be looked at. Inside of that school, only two grades will be looked at. Therefore a pretty specific sample is being used, and it will not be able to generalize the greater Cleveland area, Ohio or expand even further nationally. It will be very specific to the one school to see what factors may affect the Iowa State Assessment Scores.

Doing a power analysis using G*Power 3.1.9.7. The desired sample size for this study should be 98 students. The way that this sample size was determined was by using an alpha level of .05, using a population effect size $f^2$ of .15, to strive for a power of .8. The following predictors will be used: a prior Iowa State Assessment score, attendance (this will be done two ways, tardies and absences), whether or not the student participates in athletics, the gender of the student and their current GPA. Therefore there are 6 predictors. Using all of the information stated above the sample size of 98 would give a

power of .8035. So the sample size that is being looked at should be sufficient to obtain the power that this study will be striving for.

Instrumentation

The instrumentation used to collect the data for this study will come from multiple sources. The instrument that will be used in data collection is the gradebook program used at the school. The gradebook program is FACTS-Renweb.

The test that will be used is the Iowa State Assessment. That test is taken in person on an all-school testing day. It is then sent in for it to be graded and then the results will be returned to the school. The Iowa State Assessment is a standardized test. This test consists of 272 questions. There are 40 reading questions, 54 written expression questions, 40 math questions, 48 Science questions, 48 Social Studies questions, and 40 vocabulary questions. The time for the test is 3 hours and 30 minutes. The validity and the reliability of the tests were discussed in depth in Chapter 2 of this study.

The Iowa State Assessment uses five big standards: it needs to be consistent, the knowledge in science needs to be tested, based on information students should be able to look and read and make decisions with the information, the assessment needs to be an assessment that does not have bias, the information taken from the results needs to be used (Iowa Univ, 1998). The validity of the tests is going to be determined by how the reader of the test scores interprets them (Iowa, n.d.). As for the reliability of the Iowa State Assessment, they use multiple measures to check and be reliable (Iowa, n.d.). “Data presented in this part of the guide address the means, standard deviations (SD), and standard errors of measurement (SEM) for raw scores (RS) and National Standard Scores

(NSS). Data presented in this part of the guide address the means, standard deviations (SD), and standard errors of measurement (SEM) for raw scores (RS) and National Standard Scores (NSS).”.

Procedure

It was encouraged to go to the administration of the school to determine what the study should be. It was suggested that to look at if attendance affects the Iowa State Assessment scores. The study then blossomed into a bigger study. But in the original discussions approval from the superintendent of the school, the principal, the 3 assistant principals, and the two guidance counselors that data could be used for this study. The data that will be collected through the school will be the previous Iowa State Assessment score, the number of absences (the times that the student has not been in school) and tardies (the number of times the student is late to a class) for the student, whether the student participates in athletics, the gender of the student, the current GPA (4.0 scale, but Honors classes are based on a 5.0 scale, so over a 4.0 is possible) of the student and lastly the current Iowa State Assessment score which will be used to determine if the previous elements are factors.

The tardies are the most subjective of the variables. As not every teacher will mark every student present or tardy the same, there is not a school-wide policy on this. Some teachers will mark students tardy if they are not yet in their seat, as others will mark them tardy if they are not yet in the room. Teachers can also sometimes forget to mark students tardy, as they sometimes get busy teaching and get into the flow of the lecture. Gender is the actual genetic make-up at birth.

The data will be collected and put together by a combination of the administrators mentioned above. Permission to use the data is given in Appendix C. Most of the data will be found using the gradebook program, FACTS-Renweb. But the Iowa State Assessment scores will not come from the gradebook program but from the results sent back by the Iowa State Assessment after it has been graded.

The other place that approval for this study has happened has been through Shawnee State University. The study was approved by the professor. The Protecting Human Research Participants Online Training (PHRP) was completed in August. The study was IRB approved in November of 2023. It received approval on an exempt review application, because the data will be anonymous and will not have any identification.

The data for this study will be collected throughout the 2023-2024 school year. There will be minimal risk to the students at Lutheran High School East. The data that will be used will not have any identification of any sort. It will come without names or identity of the participants. There will not be any questions asked by the researcher about who the participants are. The steps that have been taken to make sure that the participants are confidential is that the data will be prepared by the administrators and not by the researcher. Therefore there is no harm greater than that encountered every day to any of the participants.

## Data Processing and Analysis

The primary research question is "Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessments performance?" The prior academic achievement will be shown by a previous Iowa State

Assessment score and by the student's current GPA. The relationship will be measured using multiple regression techniques. The multiple regression will examine prior Iowa State Assessment score, tardies, absences, gender, athletics, current GPA and analyze to see if they have an effect on the current Iowa State Assessment score. There will be six variables that will be examined, two of those variables will be categorical. . There are four assumptions that will be looked at this will be independence using the Durbin Watson test, multicollinearity, normality using Shapiro and ggqq plots, and equal variances using a residual plot. Ancheta used a multiple regression test to test multiple variables to see if there is an effect on a final behavior (Ancheta, 2021). The rest of the variables will be discussed in how they have been used in other studies in the next couple of paragraphs.

The secondary research questions will now be discussed. Is there a statistically significant difference in mean Iowa State assessment scores across athletes and non-athletes? This question will be analyzed by an independent sample t-test. Whether or not a student participates in athletics will be examined and compared to the current Iowa State Assessment score. The means and standard deviations will be assessed in both athletes and non-athletes. The assumptions of equal variance and normality will be tested. McCarthy's study looked at athletes and GPA (McCarthy, 2019). He used an independent t-test to check this and also used the Shapiro and Levene test to check assumptions (McCarthy, 2019). This question will be a lead-in question to the main research question.

The third question being addressed will be, "Is there a statistically significant difference in mean Iowa State assessment scores across males and females?" This question will be analyzed by an independent sample t-test. A categorical variable (male,

female) will be examined and compared to the current Iowa State Assessment score. The means and standard deviations will be assessed in both males and females. The assumptions for an independent sample t-test are normality which will be checked with the Shapiro test and equal variations which will be checked with a Levene test. Ghazvini examined how gender affects academic performance, so this gender is a variable that has been studied before (Gahzvini, 2011). This question will be a lead-in question to the main research question.

Now the 4th question will be examined. ?Is there a statistically significant correlation between attendance and the Iowa State Assessments results? In this question a simple correlation test will be done. This will be done twice, once for absences and once for tardies. Absences will tell the amount of time missed from school. Tardies will be shown the number of times that the student was marked late to the class. These will be looked at individually to see if they are significant factors in determining the current Iowa State Assessment score. The assumptions that will be checked will be independence and multicollinearity. The tests to check independence will be the Durban Watson Test.

The last question to be examined is "Is there a statistically significant correlation between GPA and the Iowa State Assessments results? In this question, correlation techniques will be used to examine the data. The variable here will be GPA. The GPA is based on a 4.0 scale, but Honors classes are on a 5.0 scale, so some GPA's may be higher than 4.0. This GPA will be tested to see if it is significant in predicting the current Iowa State Assessment score. The assumptions that will be tested will be independence and multicollinearity. The tests to check independence will be the Durban Watson Test. Noble examined GPA and ACT results (Noble, 2002). Therefore both GPA and Iowa

State Assessments are variables that can certainly be tested as the Iowa State Assessment is a standardized test similar to the ACT as they have been studied before.

## Summary

Chapter 3 explained the research design. The five big topics that were discussed were setting and participants. In this section, it was discussed that the population are sophomores and juniors in a small private school in Northeast Ohio. It was noted that this will be very specific to a certain population and will not be able to generalize a large population. A power analysis was also completed, it was seen using alpha as .05 and to strive for a power of .8 that the ideal sample size would be 98. There will be a sample of 164 so the sample size should be proficient.

The next topic was instrumentation. The test that will be used is the Iowa State Assessment. This test was discussed in detail in this section of the chapter. The other big piece that is going to be used to collect data is going to be FACTS-Renweb, the gradebook program for the school.

Thirdly, the procedure was discussed. It was noted that the study was approved and given consent by the administration of Lutheran High School East. It was also noted that there was IRB approval for the study. Confidentiality of the participants is not a concern as there is no unusual risk to the sophomores and juniors in high school. There will not be any information that identifies who the students are. Therefore the researcher will not be able to identify any of the students in the study and their identities will continue to be confidential.

Next, data processing and analysis were discussed. The major research question, all of the secondary questions and the statistical methods that will be used to conduct the studies were discussed. The studies that will be done will be a multiple regression model for the primary research question as to what factors will affect the Iowa State Assessment scores. In discussion whether or not a student is an athlete as well as whether or not a student is a male or female has an effect, both of these studies will be performed with an independent t-test. For the questions, "How does GPA affect test scores?" and "How does attendance affect the score?" a simple correlation study will be used. It was also shown that all of these variables, or ones similar have been used in other studies and that the tests performed have been used in other studies as well.

All of these topics were discussed to lead into Chapter 4. Chapter 4 will be the analysis of the data. There is now a background of who participated in the study, the variables that are being collected, and how they are being collected. There is also an introduction into how the questions asked will be tested by different statistical methods so that in Chapter 4 the results of those statistical methods may be shown.

# Chapter Four

## Introduction

The main focus of this chapter will be the data analysis in regards to the research questions. The chapter will start with discussing the variables, including how they were collected and the descriptives of the variables. The next part of the chapter will be the data analysis results, going in depth into what statistical methods were used and the results obtained based on that data.

The primary research question is: "Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessments performance?" This question will be analyzed using a multiple regression model. The secondary research questions will be the following: Is there a statistically significant difference in mean Iowa State assessment scores across athletes and non-athletes? Is there a statistically significant difference in mean Iowa State assessment scores across males and females? These two questions will be analyzed by independent sample t-tests. The last two secondary questions are: "Is there a statistically significant correlation between attendance and the Iowa State Assessments results? Is there a statistically significant correlation between GPA and Iowa State Assessments results?" which will be examined and analyzed by correlation techniques.

To conclude the chapter there will be a summary of the results of every research question. Following that will be a preview as to what will be discussed in chapter five.

Material and Methods

94 students were included in this study. The data set originally had 164 students. There was missing data for 70 of those students. Therefore 70 cases were deleted, leaving the study with n=94. This included 36 10th graders and 58 11th graders. The independent variables are gender , athlete or non-athlete, GPA, based on a 4.0 scale, but Honors classes are on a 5.0 scale, absences (how many times the student missed school), tardies (how many times a student was late to class), and IOWA State Assessment 2023 score, on a scale of 0-400. The dependent variable is the IOWA State Assessment 2024 score, on the same scale as the 2023 score. Table 1 shows the frequency and percentages for gender. Table 2 shows the frequency and percentages for athlete or non-athlete. Table 3 shows the quantitative descriptives for the other 4 independent variable and the dependent variable.

Table 1- Frequency and Percentages of Gender

| | Males | Females |
|---|---|---|
| Frequency | 33 | 61 |
| Percentage | 35.1% | 64.9% |

Table 2- Frequency and Percentages of Athlete-Non-Athlete

| | Athlete | Non-Athlete |
|---|---|---|
| Frequency | 56 | 38 |
| Percentage | 59.6% | 40.4% |

Table 3- Quantitative Descriptives of quantitative variables

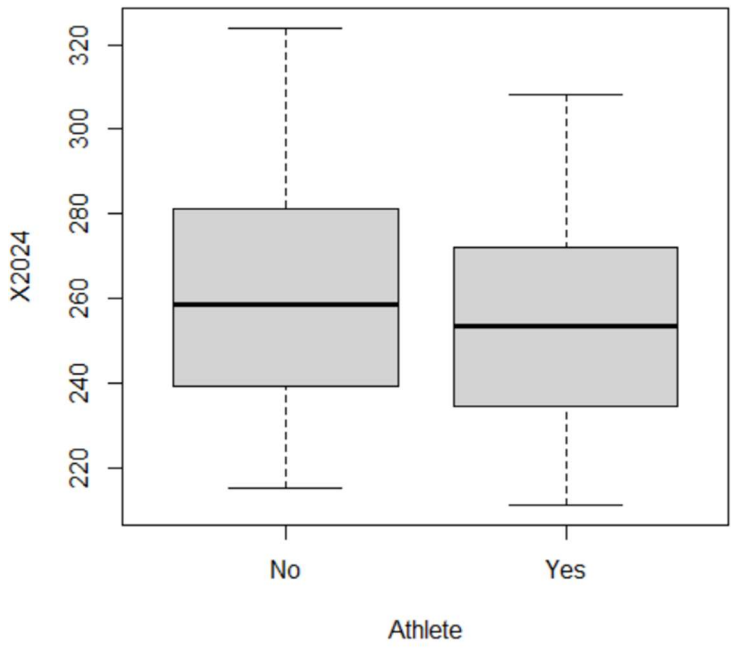
| | GPA | Absences | Tardies | 2023 IOWA | 2024 IOWA |
|---|---|---|---|---|---|
| Mean | 3.00 | 12.88 | 49.74 | 248.37 | 256.73 |
| St. Dev | 0.79 | 9.19 | 33.91 | 25.00 | 26.60 |

Evaluating the Secondary Research Questions

The first question that will be examined is: "Is there a statistically significant difference in mean Iowa State assessment scores across athletes and non-athletes?"

A two-sample t-test examined the mean difference in IOWA State Assessment 2024 score across athlete (yes or no). A priori power analysis was conducted using G*Power 3.1. The results indicate that to achieve the desired power of .80, that a sample size of 340 subjects is needed; therefore adequate power is a concern since the sample size is 94 subjects. A boxplot of 2024 IOWA State Assessment scores over athlete is presented in Figure 1.

Figure 1.




The results from the Shapiro-Wilk test indicated no possible threats to the normality assumption (Accepted:W=.97, p=.06). The results from Levene's test indicated no concern with the equal variance assumption, t(92)=3.11, p=.08.

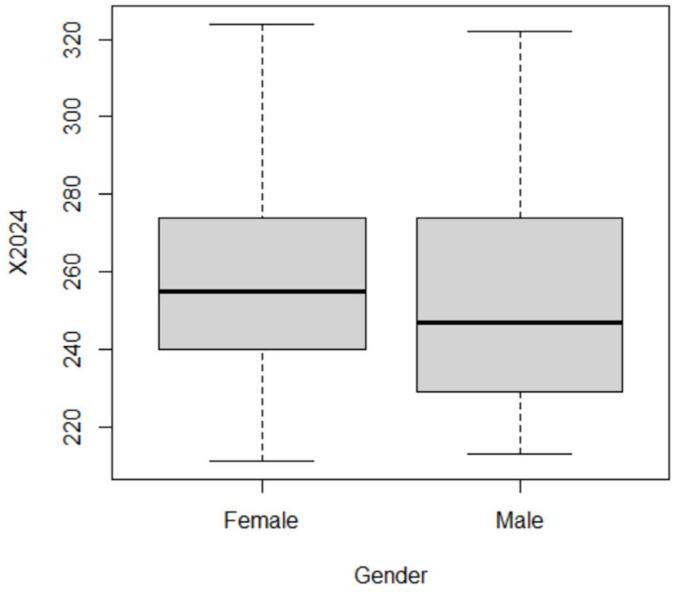
On average, 2024 IOWA State Assessment scores for athletes (M=253.41,SD=23.60) were not significantly lower than non-athletes (M=261.63,SD=30.14), t(66.457)=1.41, p=.16, with a 95% confidence interval (-3.40,19.84). A small effect size was represented, d=.311.

"Is there a statistically significant difference in mean Iowa State assessment scores across males and females?" This will be the next question examined.

A two-sample t-test examined the mean difference in IOWA State Assessment 2024 score across Gender (male or female). A priori power analysis was conducted using G*Power 3.1. The results indicate that to achieve the desired power of .80 that a sample size of 978 subjects is needed; therefore adequate power is a concern since the sample

size is 94 subjects. A boxplot of 2024 IOWA State Assessment scores over Gender is presented in Figure 2.

Figure 2.




Since the samples were collected randomly from each population, independence may be assumed; the results from the Shapiro-Wilk test indicated no possible threats to the normality assumption (Accepted:W=.97, p=.06). The results from Levene's test indicated no concern with the equal variance assumption, t(92)=.25, p=.62.

On average, 2024 IOWA State Assessment scores for males (M=253.48,SD=27.14) were not significantly lower than females (M=258.49,SD=26.36), t(64.09)=0.86, p=.39, with a 95% confidence interval (-6.59,16.61). A small effect size was represented, d=.188.

Evaluation of the secondary research question, "Is there a statistically significant correlation between attendance and the Iowa State Assessments results?" will be completed using correlation techniques. Using a correlation test between Absences and

2024 IOWA State Assessment Score it was determined that there is not a linear relationship between absences and 2024 IOWA State assessment scores. t(92)=-0.66,p=.51. The 95% confidence interval is (-0.27,0.14) and the correlation was -0.07. Using a correlation test between tardies and 2024 IOWA State Assessment Score, it was determined that there is not a linear relationship between tardies and 2024 IOWA State assessment scores. t(92)=0.56, p=.57. The 95% confidence interval is (-0.15,0.26) and the correlation was 0.06.

Evaluation of the secondary research question: "Is there a statistically significant correlation between GPA and the Iowa State Assessments results?" will be completed using correlation techniques. Using a correlation test between GPA and 2024 IOWA State Assessment Score it was determined that there is a linear relationship between GPA and 2024 IOWA State assessment scores. t(92)=5.56, p<.001. The 95% confidence interval is (0.33,0.64) and the correlation was 0.50.

Evaluating the Primary Research Question

Evaluation of the main research question: are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessments performance?

A standard multiple regression was performed between IOWA State Assessment 2024 scores(M=256.73, SD=26.6) as the dependent variable and gender (male or female), athlete (yes or no), GPA (4.0 scale, but Honors classes are graded on a 5.0 scale), Absences(in full and half days), tardies, and IOWA State assessment 2023 scores as the independent variables. The full sample data, n=164. There were 70 students with missing

data, so those cases were not included in this study. Therefore there are 94 students in the study. n=94.Since the number of cases per predictor exceeds 15 (Field, 2012), there is no concern with adequate sample size. Analysis was performed using R (R version 4.2.0, 2023)

Results of the evaluation of the assumptions indicated no concerns with independence, equal error variances, or multicollinearity. Independence was verified with the Durbin-Watson test, D-W Statistic=1.856, p=.364. Additional plots that were used to check the normality and equal variance assumptions are presented in Figure 3. Multicollinearity was examined using Variance Inflation Factors, which ranged from 1.04 (Athlete) to 1.56 (GPA). Normality is a concern, Shapiro's test for normality revealed a concern; W=.962, p<..01.

Figure 3. Plots for Normality and Equal Variance Assumptions

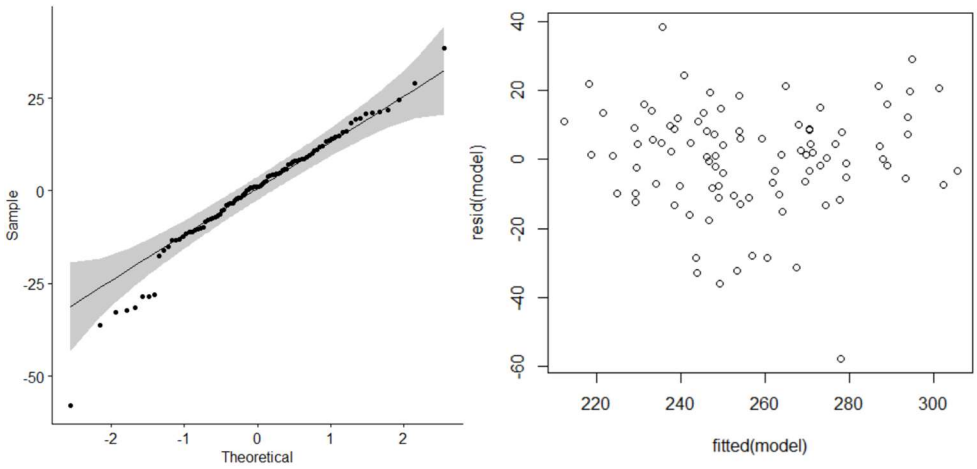



Table 4 displays the correlations between the variables, unstandardized regression coefficients, and the adjusted $R^2$. A test of the full model against the intercept only model was significant; F(6,87)=29.2, p<.001. The set of predictors in combination contributed to 65% of the variance in IOWA State Assessment 2024 score. The regression model

showed that 3 of the regression coefficients are significant, so test-statistic values, p-values, and confidence intervals are presented for each of these 3: GPA; $t(87)=2.504$, $p<.05$, (1.35,11.74), Tardies; $t(87)=2.38$, $p<.05$, (.02,.22) and 2023 IOWA State Assessment score; $t(87)=9.71$, $p<.001$ (.57,.87)).

Using a backward trace to see if there is a better formula removing some of the variables it was determined that the model could be utilized by using GPA, tardies and 2023 IOWA State Assessment score to determine 2024 IOWA State Assessment score. The AIC dropped from 526.09 to 520.73. When comparing these two models there was not a significant difference. $F(3,90)=0.19$, $p=.89$. Therefore the original model is retained.

## Conclusion

In this chapter, the main research question and the secondary research questions were evaluated. In the secondary research questions, it was determined that there was not a significant difference between mean 2024 IOWA State Assessment Scores for athletes and non-athletes, this was determined using an independent sample t-test. Also, using an independent sample t-test it was determined that there was not a significant difference between mean 2024 IOWA State Assessment Scores for athletes and gender.

Continuing with the secondary research questions it was determined that there was not a statistically significant correlation between absences and 2024 IOWA State Assessment scores. There was also not a statistically significant correlation between tardies and 2024 IOWA State Assessment scores, and the last evaluated secondary

research question determined that there was a statistically significant correlation between GPA and 2024 IOWA State Assessment scores.

Chapter 5 will contain the following information. There will be an introduction reviewing the research questions and results. Then the results will be discussed in length, this will include: summarizing results, providing the applications of the results in the real world, the results will also be compared with the information found in the literature review to compare and contrast this study's results with other studies. After this, ways that the study could be improved will be discussed, including questions that may have come up from the analysis of the data. Then the conclusion of the paper will happen. These are the topics that will be entertained in the upcoming chapter.

Table 4. Correlations, Regression Coefficients, Adjusted $R^2$

| Variables | GPA | Absences | Tardies | 2023 IOWA State Score | B | SE |
|---|---|---|---|---|---|---|
| 2024 IOWA State Score | 0.50 | -0.07 | 0.06 | .79 | | |
| Gender | | | | | -0.81 | 3.596 |
| Athlete | | | | | -2.122 | 3.400 |
| GPA | | | | | 6.55* | 2.614 |
| Absences | -0.18 | | | | 0.06 | 0.184 |
| Tardies | -0.25 | 0.098 | | | 0.120* | 0.184 |
| 2023 IOWA State Score | 0.49 | -0.07 | -0.07 | | 0.72*** | 0.074 |
| Intercept | | | | | 53.35 | 17.429 |
| | | | | | | |
| Means | 3.00 | 12.88 | 49.74 | 248.37 | | |
| St. dev. | 0.79 | 9.19 | 33.91 | 25.00 | | |

Table 4 cont.

| |
|---|
| Adjusted $R^2$=64.53% |
| F(6,87)=29.2, p<.001 |

Note:*, significant at the .05 level; **, significant at the .01 level; ***, significant at the .001 level.

# Chapter Five

## Introduction

In this chapter the reader will be reminded of the research questions and the results. The implications of the study in the real world will be discussed. There will be recommendations for improving the study, with sample sizes and with different approaches, and then there will be a conclusion of the study.

Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessment performance? This study was completed by a multiple regression analysis. There were six independent variables; two of which were categorical. In analysis of the data, it was determined that three of the six factors that were tested were statistically significant. The three that were significant were GPA, tardies and 2023 IOWA State Assessment scores. The variables that were not statistically significant were gender, athlete or non-athlete, and absences.

Is there a statistically significant difference in mean Iowa State Assessment scores across athletes and non-athletes? This analysis was complete with an independent sample t-test. In analysis of this question, it was determined that there was no statistical significance in the mean IOWA State Assessment score between athletes and non athletes.

Is there a statistically significant difference in mean Iowa State Assessment scores across males and females? This analysis was complete with an independent sample t-test. Just like the previous question, there was determined to be no statistical significance between males and females.

Is there a statistically significant correlation between attendance and the Iowa State Assessments results? The analysis of this research question was completed using correlation tests. It was determined that absences and tardies did not have a statistically significant correlation with the 2024 IOWA State Assessment score.

Finally, is there a statistically significant correlation between GPA and Iowa State Assessments results? The analysis of this research question was completed using correlation tests. This was determined to have a  statistically significant correlation between GPA and 2024 IOWA State Assessment score.

## Implications

The main research question discussed what factors would be significant predictors in determining IOWA State Assessment scores. In examining the data, it was determined that gender was not a significant factor. This fits well with the literature in Chapter 2 based on an article by Ghazvini and Khajehpour who stated that there was not a noticeable difference in results between male and female students (Ghazvini, 2011). The question of whether the student was an athlete or a non-athlete also was not a factor. This hit a gap in the data. McCarthy stated that athletes tended to do better (McCarthy, 2019). Maloney and McCormick's data showed that athletes would do worse (Maloney, 1993). The data analysis in this research showed that there was no statistical significance toward doing better or doing worse. Absences were also determined not to be a factor which is in opposition to the literature.

The factors to the main research question that were significant were tardies, which also deals with attendance. Roby noticed that attendance did have a correlation (Roby,

2003). GPA also was statistically significant, this is against what the Noble stated as Noble noted that GPA is not significant (Noble, 2002). Noble did say that higher GPA does normally mean a higher effort (Noble, 2002). The last significant factor was the previous IOWA State Assessment score. Lanier's data coincides with this study as both studies show that previous assessments will be statistically significant with the next assessment (Lanier, 1994).

Coleman came up with one of the theoretical frameworks for this study. This said that extra curricular will detract from academic performance (Coleman, 1061). This theory opposed the results of the data analysis from this study. The other main theoretical framework was Romer who states that attendance has a huge impact on performance in the classroom (Romer, 1993). This conflicted some of the study but agreed with others as absences were not considered to have a statistical significance, but tardies did have a statistical significance.

The real-world application to the findings of this study are that if the IOWA State Assessment scores are going to be improved, there should be discussions on how to decrease the number of tardies that a student has. How to improve GPA and the baseline IOWA State Assessment Scores should also be discussed. These topics will be discussed at length in the next part of this chapter.

## Recommendations

The first thing to note is that in the multiple regression analysis, there were 94 participants. Since there were six predictors, the sample size was fine, but it would be helpful if there was a bigger sample size. In the independent sample t-tests, the sample

sizes were not determined to be big enough to obtain the desired power. This also shows that a larger sample size may be needed.

Here are some recommendations for how this study could be improved. The first thing that should be improved is the amount of data collected. There were a lot of cases that had to be deleted because of transferring students, both into and out of the school. It would be useful to use a baseline test when every student enters into the school so that there is one common test that allows every student's data to be used. This would also mean that freshmen have been able to be included in the study.

The second recommendation would be to increase the demographics. This study did not have all of the details on race and socio-economic status, but the majority of the participants were African American and have a low socio-economic status. Expanding this study to more schools who also take the IOWA test would give the study the ability to give a broader answer to the research questions.

The next recommendation would be to decrease the number of tardies in the school. At the end of the 2023-24 school year, the school implemented a new pass system. It would be very interesting to look at the number of tardies in the next school year per student and as a student body. This new pass system will hopefully lower the number of tardies which would then hopefully increase the IOWA State Assessment Scores.

There could also be a recommendation that asks students more qualitative questions rather than all quantitative questions. Questions that could be included are on the list below. There could be many more questions added to make it more qualitative than quantitative.. ,

1. Why did you miss school?
2. Why are you tardy to class?
3. Does participating in an extracurricular activity have an effect on your school work?
4. Are you fully participating in every class?
5. What things could you do to improve your GPA?

A related study that could be done after this study is to see what factors are statistically significant in raising GPA and raising standardized testing scores. As these were both statistically significant in this study, it would be good to do a deep dive into determining the factors that will make those rise, which would then in turn hopefully raise IOWA State Assessment scores.

Another study that could be based off of this study is to go more in depth into the individual parts of the IOWA State Assessment Scores. To analyze and determine if the factors in this study would be the same or different for the math, science, social studies, and English parts of the IOWA State Assessment test.

The last study that could be based off of this study is to look more at the interaction of the factors as well. For instance, determining if a male athlete would be a statistically significant factor. Another example would be if a female non-athlete's GPA is statistically significant. Studies could also be done to see if the factors have an effect on each other. Are males or females tardy more often? Is there a correlation between a male's GPA and the number of absences that they have? There are many questions that have come to mind as this study was being conducted that would be interesting to dive into the data in a new study.

## Conclusion

This study was completed as the administration at the school wanted to determine if attendance has an effect on IOWA State Assessment scores. The main research question then continued to get bigger and bigger until there ended up being six factors that were going to be determined if they were statistically significant or not. Four secondary questions were then discussed, including whether being an athlete or not is statistically significant. Whether or not the gender is statistically significant. Is there a statistically significant correlation between absences and IOWA State Assessment Scores, tardies and IOWA State Assessment Scores, GPA and IOWA State Assessment Scores.

After the questions were finalized, the literature review took place. The literature was shown to agree with parts of this study, and disagree with other parts. As many of the topics that were being covered had differing results based on the previous research and studies done and completed by others.

In Chapter 3, the demographics were discussed as well as the way that the analysis of the data was going to be completed. A multiple regression analysis was done for the main research question. Independent sample t-tests and correlation studies were done for the secondary research questions.

In the 4th chapter, the analysis of the data was completed. It was determined based on the data that out of gender, athlete or non-athlete, GPA, absences, tardies and 2023 IOWA State Assessment score that only three of these were statistically significant. GPA, tardies, and 2023 IOWA State Assessment Scores were the factors that were determined to be statistically significant.

This chapter connected all of the chapters together. The results of this study were compared to the results of the literature that was seen in Chapter 2. How the study was being conducted was discussed in Chapter 3. This chapter discussed ways that the study could be improved, starting with just collecting more data and a wider variety of data. The next thing that was discussed was how the study could be expanded.

One way to improve the results would be to determine what variables are statistically significant in the factors  to try to improve the IOWA State Assessment scores each and every year, as that is the main goal. The other big topic that could be discussed are the interactions between the factors. Are those interactions statistically significant?

There are so many future studies that can be based off of the study that was just completed. That is the great thing about research and studies, one study always builds off of the next.

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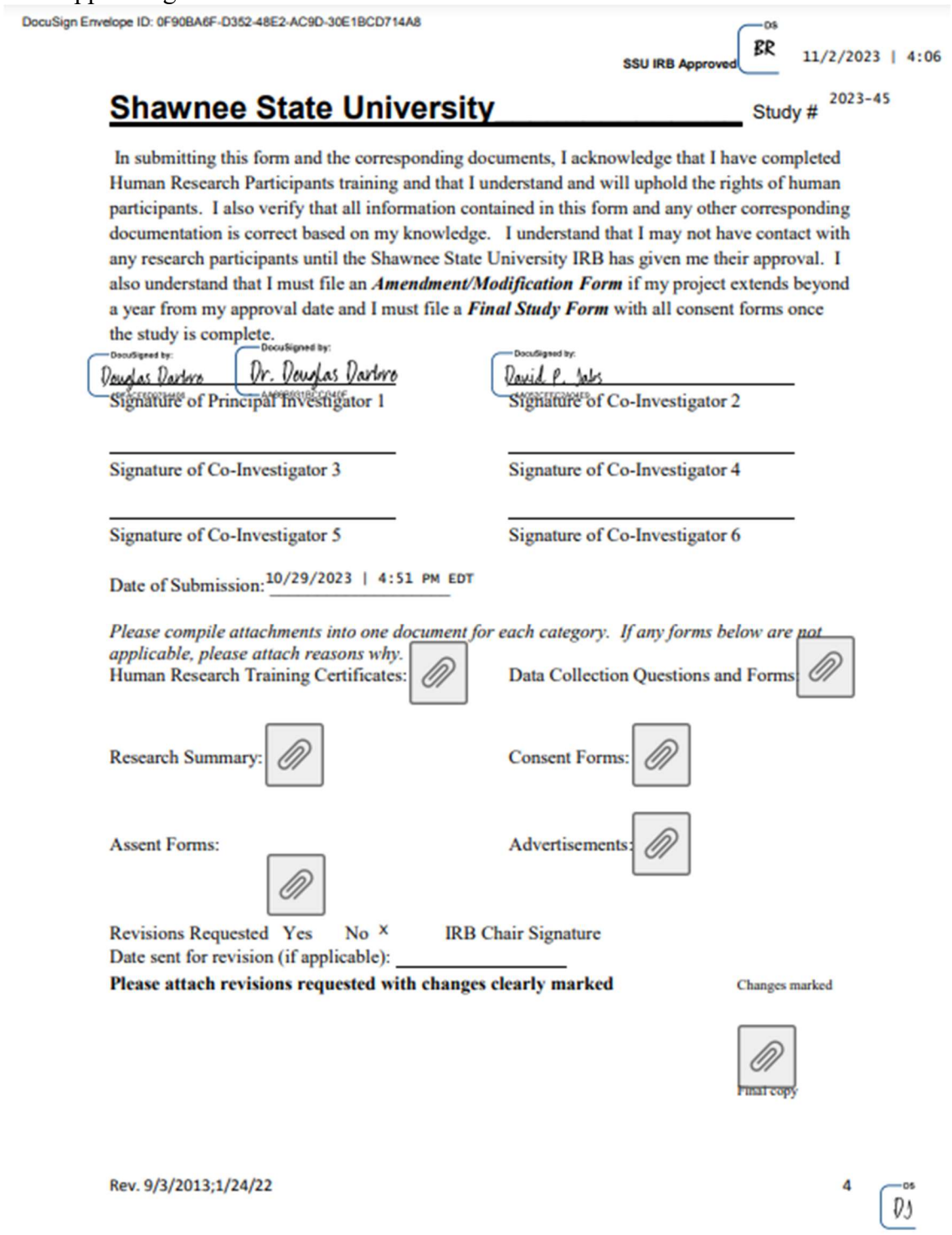
# Appendix A

IRB Approval granted 11/2/2023



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SSU IRB Approved BR 11/2/2023 | 4:06

**Shawnee State University** Study # 2023-45

In submitting this form and the corresponding documents, I acknowledge that I have completed Human Research Participants training and that I understand and will uphold the rights of human participants. I also verify that all information contained in this form and any other corresponding documentation is correct based on my knowledge. I understand that I may not have contact with any research participants until the Shawnee State University IRB has given me their approval. I also understand that I must file an ***Amendment/Modification Form*** if my project extends beyond a year from my approval date and I must file a ***Final Study Form*** with all consent forms once the study is complete.

DocuSigned by: Douglas Dartez — Signature of Principal Investigator 1

DocuSigned by: Dr. Douglas Dartez — Approved Chair

DocuSigned by: David P. Jobs — Signature of Co-Investigator 2

Signature of Co-Investigator 3

Signature of Co-Investigator 4

Signature of Co-Investigator 5

Signature of Co-Investigator 6

Date of Submission: 10/29/2023 | 4:51 PM EDT

*Please compile attachments into one document for each category. If any forms below are not applicable, please attach reasons why.*

Human Research Training Certificates:

Data Collection Questions and Forms:

Research Summary:

Consent Forms:

Assent Forms:

Advertisements:

Revisions Requested Yes No X IRB Chair Signature

Date sent for revision (if applicable):

**Please attach revisions requested with changes clearly marked**

Changes marked

Final copy

Rev. 9/3/2013;1/24/22 4 DS DJ

# Appendix B

PHRP Completion

CERTIFICATE

OF COMPLETION

PHRP Online Training, Inc. certifies that

**David Jabs**

has successfully completed the web-based course "Protecting Human Research Participants Online Training."

Date Completed: **2023-08-27** Certification Number: **2991593**

PHRP
Protecting Human
Research Participants
Online Training

# Appendix C

Approval to use data from Lutheran High School East

CLEVELAND Lutheran HIGH SCHOOL ASSOCIATION

April 22, 2024

Lutheran High School East is excited about the research project that David Jabs is undertaking and the valuable insights that it will provide to our school as we seek to better serve our students. As part of David's research, we are giving him access and approval to use a number of data points about our students. Those data points include:
-Attendance records of students
-Demographic information of students
-Grade point average of students
-Extracurricular status of students
-Standardized assessment results

David will be using those records as he studies the question "Are prior academic achievement, attendance, athletic participation, and demographics significant predictors on Iowa State Assessment performance?"

Please contact me if you have any questions.

Chris Steinmann - Superintendent & CEO, Cleveland Lutheran High School Association
csteinmann@clhsa.org
(216)469-3057

*Christ-centered living. We teach it. We believe it.*

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# BIBLIOGRAPHY[1]

David Paul Jabs

Candidate for the Degree of

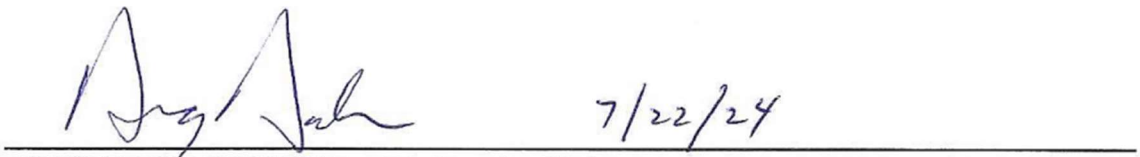
Master of Science Mathematics

Thesis: ARE PRIOR ACADEMIC ACHIEVEMENT, ATTENDANCE, ATHLETIC PARTICIPATION, AND DEMOGRAPHICS SIGNIFICANT PREDICTORS ON IOWA STATE ASSESSMENT PERFORMANCE?

Major Field: Mathematics

Education: Bachelor of Science in Secondary Education

Completed the requirements for the Master of Science in Mathematics, Portsmouth, Ohio in August 2024.




ADVISER'S APPROVAL: Dr. Douglas Darbro