

RELATIONSHIP BETWEEN TEACHER-STUDENT RAPPORT AND HIGH-STAKES
TESTING PERFORMANCE IN SCIENCE

by

Nathan Shawn Kimbro

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University

2017

RELATIONSHIP BETWEEN TEACHER-STUDENT RAPPORT AND HIGH-STAKES
TESTING PERFORMANCE IN SCIENCE

by Nathan Shawn Kimbro

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University, Lynchburg, VA

2017

APPROVED BY:

Andrea Beam, Ed.D., Committee Chair

Johnson Mathew, Ed.D., Committee Member

Joan Fitzpatrick, Ph.D., Committee Member

ABSTRACT

The purpose of this predictive correlational study was to determine if a predictive relationship existed between teacher-student rapport, as perceived by students, and biology achievement scores. The Teacher-Student Likert Scale Questionnaire was used to measure students' perceptions of rapport with their science instructor. Students' scores on the Maryland Biology High School Assessment were used to measure students' testing performance in science. This study implemented a linear regression analysis to determine if the predictor variable (teacher-student rapport) had a statistically significant predictive relationship with the criterion variable (high-stakes testing performance in biology). A linear regression produced the prediction equation: biology HSA scores = $473.589 + -0.328 \times \text{teacher-student rapport}$. Students' perceived teacher-student rapport statistically significantly predicted biology HSA scores, $F(1, 226) = 12.69, p < .001, R^2 = 0.053, F(1, 226) = 12.699, p < 0.00$. These results indicated that students' biology HSA scores decreased 0.328 points for every point increased on the Teacher-Student Likert Scale Questionnaire. The study took place at a rural high located in southern Maryland and included a total number of 228 participants. Results indicated a statistically significant negative predictive relationship between students' perceptions of teacher-student rapport and high stakes testing performance in biology.

Keywords: teacher-student rapport, high-stakes testing, biology

Dedication

I would like to dedicate this dissertation to my wife, Erin Kimbro, who has given me strength to pursue this life-long goal. She is my rock and provides the foundation to every aspect of my life. Life is a journey that can have many peaks and valleys. Erin has been my companion through them all, and without her, I would not be the person I am today.

Acknowledgments

First, and foremost, I would like to thank my family for their sacrifices. I wish to thank my parents who have guided and pushed me through this unbelievable journey. They have always believed in me and led by example throughout my entire life. I consider myself beyond blessed to have been born to such amazing people. A special thank you is offered to my brother who has alleviated stress throughout this entire process. Having an older brother who was the first member of our family to pursue his Ph.D. proved to be invaluable. He has always been a guiding light as I have attempted to follow in his footsteps. I wish to thank my daughter, Gracee, for providing me with motivation and perspective. I have never loved anyone or anything the way I love her. She has been my breath of fresh air when I needed to stay grounded. Her very presence provided a special motivation for me to succeed at the highest level.

I would like to thank my chair, Dr. Beam, and my committee members, Dr. Mathew and Dr. Fitzpatrick, as well as my research consultant, Dr. Foster, who all helped me climb my personal Everest. I feel blessed that I had such amazing people supporting me. Without these people, none of this would have been possible. Thank you all for inspiring me, challenging me, and molding me into a better writer, educator and a person overall.

Lastly, I would like to thank God for instilling within me a drive to achieve this life-long goal. It is through Him that all things are possible and this dissertation is a testament to that! My favorite verse throughout this process has been James 1:12, "Blessed is the one who perseveres under trial because, having stood the test, that person will receive the crown of life that the Lord has promised to those who love him."

Table of Contents

ABSTRACT	3
Dedication	4
Acknowledgements	5
List of Tables	9
List of Figures	10
List of Abbreviations	11
CHAPTER ONE: INTRODUCTION	12
Overview	12
Background	12
Problem Statement	17
Purpose Statement	18
Significance of the Study	19
Research Question	20
Null Hypothesis	20
Definitions	20
CHAPTER TWO: LITERATURE REVIEW	23
Overview	23
Theoretical Framework	23
Related Research	26
Summary	59
CHAPTER THREE: METHODOLOGY	61
Overview	61

Design	61
Research Question	62
Null Hypothesis	62
Participants and Setting.....	62
Instrumentation	65
Procedures	68
Data Analysis	70
CHAPTER FOUR: FINDINGS.....	73
Overview.....	73
Research Question	73
Null Hypothesis	73
Descriptive Statistics.....	73
Results.....	74
CHAPTER FIVE: CONCLUSIONS	77
Overview.....	77
Discussion	77
Implications.....	80
Limitations	83
Recommendations for Future Research	84
Summary	85
REFERENCES	88
APPENDICES	104
Appendix A.....	104

Appendix B	105
Appendix C	106

List of Tables

Table	Page
3.1 Demographics of Sample.....	62
4.1 Mean, Median, and Standard Deviation for Rapport and HSA Scores	73

List of Figures

Figure	Page
3.1 Scatterplot of biology HSA scores on teacher-student rapport scores.....	71

List of Abbreviations

High School Assessment (HSA)

Individuals with Disabilities Education Act (IDEA)

No Child Left Behind Act, 2001 (NCLB)

Positive Behavioral Interventions and Supports (PBIS)

CHAPTER ONE: INTRODUCTION

Overview

School district leaders across the country are continually challenged to hone effectual pedagogical practices to better serve their respective student and community populations (Pawlas, 2006). These practices should be grounded in evidenced-based strategies that promote student achievement across a variety of continuums. One such pedagogical strategy surfacing in recent literature involves rapport that is developed between teacher and student. Rapport, and its influences on student achievement, have begun to be investigated on a deeper more meaningful level (Frisby & Martin, 2010). This dissertation addressed teacher-student rapport and high-stakes testing in biology at the high school level. Chapter One is designed to provide clarity for the entire study. This chapter begins with background information followed by the purpose and problem statements. Additionally, the significance of this investigation and the definition of key terms are discussed and defined as well.

Background

As budget allocations for public education nationwide continue to decrease while accountability for educational stakeholders readily becomes more intense and structured, educational administrators are becoming more focused on systematic testing outcomes for teacher accountability (Baines & Stanley, 2004). Due to the "value" being placed on these systematic test scores, many educators are implementing pedagogical practices that are reflected in a teach-to-the-test modality with little flexibility to optimize teachable moments (Scot, Callahan, & Urquhart, 2009). In addition to educators facing new testing procedures, current research highlights the pressures many teachers are facing from government mandates. Many teachers must allocate a large portion of their instructional time to teaching to the demands of

high stakes tests rather than providing a well-rounded, holistic educational experience (Knight, 2008). Additionally, educators are continuously overloaded with more and more professional responsibilities that are often mandated by political entities (Wolf, Wolf, & Carpenter, 2002). The preceding truths explain why teachers' self-efficacies and professional identities have become convoluted due to the emphasis being placed on high stakes testing (van Veen, Slegers, & van de Ven, 2005). As many school system leaders are attempting to balance their shrinking budgets, identifying and exploiting pedagogical processes that promote individual student growth while remaining fiscally responsible has become a priority (Guthrie, Ettema & Riddell, 2012; Tarulli, 2004). Additionally, identifying practices that may enhance techniques that are related to higher government mandated high school assessment scores could prove invaluable to educational communities on all levels such as national, state, and local stakeholders (Au, 2007).

If monies are low across-the-board in education, implementing low-cost pedagogical practices could be beneficial to educational communities (Tarulli, 2004). Teachers are expected to be trained in pedagogical strategies that increase student learning (Knight, 2008). When these strategies are low cost in nature, they become more easily accepted and applied by educational communities (Tarulli, 2004). Consequently, it is through this lens that the following research was conducted to evaluate relational variables that directly affect student progress and assessment scores for secondary students in a public educational setting.

Teacher and student rapport has been an area of interest for researchers in recent decades. Researchers have been evaluating the effectiveness of relational variables in teaching including the effects of teacher behavior on student outcomes over the last 35 years (Rutter, Maughan, Mortimore, Oustan, & Smith, 1979). However, before the passage of (No Child Left Behind Act [NCLB], 2001) and before relational variables were evaluated for pedagogical effectiveness,

there existed a different mentality. Many years ago there was little emphasis on teacher-student rapport because it simply was not deemed important (Scott, 2012). The modus operandi revolved around a completely different mentality of education. There existed little, if any, concern for learning styles, teaching styles or the importance of relational variables within the classroom (Scott, 2012). Students who were not able to grasp academic concepts under these circumstances were simply moved out of class, failed, or switched to “alternative placements” (Skiba et al., 2008). However, as researchers have investigated the dynamics between teachers and students, educational leaders have acknowledged the need for evaluating best practices of educators that extend much further than the implementation of academic curricula (Frisby & Martin, 2010). Investigating relational variables within the classroom has become important. Instead of teachers being compartmentalized as individual disseminators of knowledge, there has been a recognition by the leaders in education that other relational variables affect student learning (Frisby & Martin, 2010; McLaughlin & Carr, 2005). Specifically, with the passage of No Child Left Behind Act (2001), every pedagogical component is opened for discussion and evaluation. The importance of teacher-student rapport has begun to be investigated on a deeper, more meaningful level (Gremler & Gwinner, 2000). If the presupposition of politicians and eventually educators is to leave no child behind, rapport and rapport-building strategies must be synthesized and utilized (Frisby & Martin, 2010; Gremler & Gwinner, 2000).

Investigators have positioned teacher-student rapport as an important factor to determine a multitude of pupil behaviors across many different student populations. Students who have a positive educational engagement with their respective educators typically garner greater academic outcomes (Frisby & Martin, 2010) compared to students who do not have established rapport with their instructors. Students perform stronger in their academic subjects for educators

with whom they perceive to have a positive teacher-student rapport (Banks, 2009). Additionally for students who have been diagnosed with a disability, teacher-student rapport has been suggested as a mediating factor for problem behavior (McLaughlin & Carr, 2005). Relationship quality (rapport) between people with developmental disabilities and their caregivers has long been suggested as an important variable influencing the likelihood of problem behavior (McLaughlin & Carr, 2005). Frisby and Martin (2010) investigated the influence of teacher-student rapport and found that rapport enhanced students' perceptions of classroom connectedness and contributed to overall student participation. Parayitam, Desai, and Phelps (2007) identified, through the use of questionnaires completed by students, that open communication between teacher and student facilitated rapport and this in turn led to higher satisfaction levels amongst students.

In their investigation, Chetty, Friedman and Rockoff, (2011) outlined the truly impactful effects that caring teachers can ultimately have on student achievement. Specifically, Chetty et al. (2011) employed a quasi-experimental design and analyzed 2.5 million children (grades 3-8) to determine if value-added teachers impacted a variety of student variables. Value-added simply means (a) teachers who have had an impact on high stakes assessment scores, (b) teachers who know their content well, (c) teachers who know their students well, and (d) teachers who are considered highly qualified by NCLB Act (2001). The researchers evaluated whether students who received instruction from value-added teachers scored higher on high stakes testing and whether these students reaped long term benefits from being edified by these value-added teachers. Chetty et al. (2011) found that being taught by value-added teachers who have developed and maintained a positive rapport and who have an in-depth knowledge of the subject,

greatly increases students' likelihood of making more money, staying in school, and developing a positive self-worth later on in life.

As educational leaders continue to hone curricular concepts and address various learning styles, the impact(s) of rapport has grown in scope. Implementing and maintaining a positive relationship with students is essential to attaining an optimal level of academic achievement (Frisby & Martin, 2010). The roles of teachers and students have transformed over time and the immediate trend in educational communities has targeted maximizing the educational output with fewer resources allocated. The dominating role of authority versus inferiority has morphed to one with collaboration and teamwork (Preves & Stephenson, 2009). As the United States continues to plummet when comparing its academics internationally and the "age of accountability" has focused educators' attention on systematic testing outcomes, there exists a need to evaluate variables that directly affect these outcomes without costing school systems more money (Edsource, 2013).

Standardized test scores are continually being used as accountability measures for teachers and for determining important educational decisions for students (Phillips, 2006; Templin, 2008). Standardized tests have garnered more and more attention since the passage and implementation of the NCLB Act (2001). Previous scholars have indicated that with federal requirements constantly changing, teachers have had to change how they instruct their students because of these statewide testing mandates (Hammerness, 2004). More emphasis by educational and political leaders is being placed on high-stakes testing whether practicing educators agree or not. With this onslaught of new tests compounded by the weight these assessments carry for decision making for both administrators and students, every angle for improved test scores should be evaluated and measured (Riffert, 2005). Accordingly, this study

evaluated the predictive relationship that teacher-student rapport has with high-stakes testing performance in biology at the high school level.

Problem Statement

In an age of increasing accountability for educators compounded with the policies of NCLB Act (2001), low-cost, effectual pedagogical techniques have become invaluable for practicing educators and administrators (Diamond, 2007). Identifying which teacher behaviors elicit optimal student results are paramount for teachers who are facing budget crunches and continually exceeding demands from political stakeholders. The importance of children becoming benefactors of highly qualified teachers who use evidence-based pedagogical practices is integral to every student's success but particularly those labeled as at risk for dropping out (Downey, 2008). To this end, examining strategies that improve teacher-student rapport must be analyzed to ensure students are receiving the most prudent and efficient edification. Additionally, if scholastic communities are tasked with preparing students for life after high school, there exists a need to bolster pupils' toolboxes with more than academic processes and knowledge (Black, 1995). Understanding the importance of relational variables within the teacher-student dyad may identify important processes that extend much further than simple academic curricula. Bennet (2008) and Kamisha and Beadle-Brown (2006) found that rapport is important to student success particularly in relation to students who may have complex needs. It is vital that educators understand the far reaching effects that rapport offers within an educational setting (Chetty, Friedman, & Rockoff, 2011). Current research highlights the need for educators to gain deeper understandings of their pedagogy in order to edify this generation of students. Teachers must be accurately trained for not only the "how and why" of their respective teachings but also be involved with the "what" and "what for" of their teaching practices (Loughran,

2013). The problem is that students do not appear to do as well on high-stakes testing when they perceive a lack of effective teacher-student rapport. Additionally, there is a significant gap in literature when it comes to how teacher-student relationships influence high-stakes testing. Exploring this problem could further assist teachers in the prioritization of pedagogical practices and possibly highlight the overall need for further evaluation of relational variables between instructor and student (Donlevy, 2001).

Purpose Statement

The purpose of this predictive correlational study was to determine if there was a relationship between students' perceptions of teacher-student rapport and high-stakes testing performance at the high school level. Students' perception of teacher-student rapport (independent variable) is defined in an educational setting as an overall feeling between two people encompassing a mutual, trusting, and pro-social bond (Frisby & Martin, 2010; Catt, Miller, & Schallenkamp, 2007; Faranda & Clarke, 2004; Gremler & Gwinner, 2000). High-stakes testing performance (dependent variable) is defined as testing where a student's performance on a specific test has significant impacts on a student's academic career such as promotion to another grade level, admission into a program, and graduation (Brennan, Kim, Wenz-Gross, & Siperstein, 2001; American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999). Specifically, this study analyzed the scores of 228 students at a single high school located in southern Maryland. This analysis used a linear regression to determine the significance of predictive relationships between students' perceptions of teacher-student rapport and high-stakes testing performance in biology.

Significance of the Study

There is abundant information that has surfaced over the last 30 years attempting to address the correlations between teacher behavior and student outcomes. There has been a concerted effort at the post-secondary schooling level to address important relational variables that directly affect academic outcomes (Frisby & Martin, 2010). Specifically, the relationship between teacher-student rapport and academic outcomes has garnered greater interest in recent decades due to the advent and recognition of diverse teaching and learning styles. There are few studies that address teacher-student rapport or its relationship to high-stakes testing, specifically, at the secondary level. Frisby and Martin (2010) addressed students' perceptions of rapport and academic achievement within a collegiate setting and their findings were significant in this field. Scant research has addressed the relationship between teacher-student rapport and high-stakes testing at the high school level. In addition to the gap in research providing substantial significance to this current inquiry, there are professional development implications to be gleaned as well. A salient contribution of this current study is the identification of low-cost, pedagogical strategies that may influence high-stakes testing scores. Educational leaders are continually calling for stronger accountability measures for practicing teachers (Guthrie, Ettema, & Riddell, 2012). Honing pedagogical processes that benefit student populations while simultaneously increasing high-stakes tests scores could prove invaluable for both educators and students. Due to the lack of cost that building a positive teacher-student rapport requires, there is real value in attempting to understand the relationship between teacher and student. Although accountability for teachers has skyrocketed at every level of education (i.e. national, state, and local) over the last decade, the same cannot be said of the funds being allocated to public schools. In other words, teachers are tasked to do more with less time, money and fewer

resources (Linek et al., 2009). Within this perspective, identifying essential elements of pedagogical practices that can bolster a teacher's effectiveness while simultaneously influencing high-stakes testing scores would greatly benefit all educators, regardless of experience or placement. As a result, this inquiry is significant due to the gap in literature from previous research and because of the possible professional development implications.

Research Question

The following research question will guide the present study:

RQ1: Can a student's perception of teacher-student rapport predict high-stakes testing performance in biology?

Null Hypothesis

The research hypothesis for this study:

H₀1: There is no statistically significant predictive relationship between the criterion variable (high-stakes testing performance in biology) and the predictor variable (teacher-student rapport).

Definitions

The following terms are defined to provide clarity for readers who may be unfamiliar with terminology present in this analysis. These terms are used repetitively throughout the dissertation and thus warrant clarification and definition.

1. *At-risk Students* - Within a secondary school setting, the term "at-risk" focuses on students who are under the threat of academic failure for the given school year (Barley et al., 2002; Calabrese, Hummel, & Martin, 2007).
2. *High-Stakes Testing* – High-stakes testing is defined as testing where the student's performance on a specific test has significant impacts on the student's academic

- career such as promotion to another grade level, admission into a program, and graduation (Brennan, Kim, Wenz-Gross, & Siperstein, 2001; American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999).
3. *Maryland Biology High School Assessment (HSA)* – The Maryland Biology High School Assessment (HSA) is the end-of-year assessment disseminated by the state of Maryland as a graduation requirement for Maryland high school students. The types of test questions are composed of selected response items which require students to choose the best response among four answer choices. All testing items have been chosen and aligned with Maryland’s core learning goals. The Maryland Biology HSA has been validated through a confirmatory factor analysis and is considered a valid measure of biological concepts (Maryland High School Assessments, MSDE, 2014).
 4. *No Child Left Behind Act (2001) (NCLB)* - The No Child Left Behind Act of 2001 (NCLB) is the most recent iteration of the Elementary and Secondary Education Act of 1965 (ESEA), the major federal law authorizing federal spending on programs to support K-12 schooling. The purpose of this act is to ensure that all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at a minimum, proficiency on challenging state academic achievement standards and state academic assessments. This is an Act to close the achievement gap with accountability, flexibility, and choice, so that no child is left behind (U.S. Department of Education, 2004).

5. *Positive Behavior Interventions and Supports (PBIS)* – A proactive plan to teach appropriate school conduct by implementing evidenced-based strategies to students in order to prevent problem behaviors and promote a positive school environment. (Hoyle, Marshall, & Yell, 2011).
6. *Rapport* – Rapport in an educational setting is defined as an overall feeling between two people encompassing a mutual, trusting, and pro-social bond (Frisby & Martin, 2010; Catt, Miller, & Schallenkamp, 2007; Faranda & Clarke, 2004; Gremler & Gwinner, 2000).

CHAPTER TWO: LITERATURE REVIEW

Overview

Many school system leaders nationwide are experiencing harsh to moderate budget cuts. Therefore identifying, implementing, and maintaining low-cost educational strategies could greatly benefit practicing educators. A particular issue worthy of investigation involves the relationship between instructor and pupil and how this relationship affects student outcomes. The purpose of this investigation was to calculate cause-and-effect relationships between teacher-student rapport and high-stakes testing in science for high school students. Additionally, this study attempted to make predictions regarding high-stakes testing and teacher-student rapport. In Chapter Two, the researcher presents the theoretical framework that guides the study before providing an in-depth summary and synthesis of the literature related to high-stakes testing and teacher-student rapport.

Theoretical Framework

In order to properly investigate the relationship between teacher-student rapport and performance by students on high-stakes testing, it is imperative that one understands how behaviorism, and the theories associated with behaviorism, influence student behavior. John Watson is one of the most well-known psychologists in history because of his work with behaviorism. In his description of behaviorism, Watson describes behaviorism as an objective branch of science that is rooted in prediction and control of behavior (1913). Watson attempted to observe and scientifically measure human behavior which he believed to be heavily influenced by the environment. Through his perspective, human learning is essentially like a clay figurine that can be molded and enhanced depending on the respective experiences and environments to which a person has been exposed. Learning, as described by behaviorism, is rooted in two types

of stimulus-response relationships. The two types of stimulus-response relationships: operant and classical. Ivan Pavlov formulated classical conditioning by the process of association (Miller, 2011). Pavlov associated an unconditioned stimulus that elicits an innate reflex with a different, conditioned stimulus in order to produce the same innate reaction. Skinner explored operant conditioning where behaviors of individuals are shaped by the consequences they receive. Additionally, Albert Bandura focused on behaviorism as it relates to cognition. Bandura's theory became known as social learning theory which focuses on socialization; the processes in which society attempts to educate children to behave and interact like the ideal adults of that society (Miller, 2011). Social learning theory derives its genesis from John Watson's behaviorism and is grounded upon the foundation that personality is learned. Social learning theorists have to consider particular situations in the child's learning environment such as a child's prior history of observing learning in that environment, and the child's context when learning in order to determine how the child molds his moral judgments (Miller, 2011). Through observing learning environments, children begin to mold their behaviors based off of observed reinforcements to determine the ideal behaviors the children should exhibit for any given learning situation (Miller, 2011). Social learning theorists have added scientific credibility to learning theory by evaluating real-life social behaviors. With the emphasis of behaviorism and social learning theory focusing on environments and reinforcement, there is a need to investigate and identify pedagogical techniques that can positively mold the personalities of students who attend public secondary schooling. This in turn contributes to the greater goal of molding lifelong learners who positively contribute to society.

It is through this lens of focusing on students' environments and understanding how students shape their perspectives through their individual experiences that warrants further

investigation for students labeled at-risk and students not labeled at-risk alike. Specifically, students who are identified as “at risk” typically face extenuating environmental issues which may have a negative effect on their perceptions of school. Previous investigators have established that poor home environments can have detrimental effects on students’ academic achievement (Hart, Risley, & Kirby, 1997; Wodtke, Harding, & Elwert, 2011). To combat this reality, Knesting (2008) identified four critical factors when determining student persistence for students who were at risk for dropping out: (a) listening to students, (b) communicating caring, (c) the school’s role in dropout prevention, and (d) the students’ role in dropout prevention. Three of the four factors mentioned in this research indicate that developing and maintaining a positive rapport with a classroom teacher may serve to counteract the negative effects of growing up in unstable environments for students who are at-risk for academic failure. Moreover, identifying relational variables that positively contribute to all students’ scholastic experiences is both prudent and valuable for educational practitioners. There are several environmental variables that have been identified through examinations that affect student attrition for at-risk students and non-at-risk students alike: socioeconomic status, gender, and ethnicity (O’Brien, Dukstein, Jackson, Tomlinson, & Kamatuka, 1999; DeBolt, Pasley, & Kreutzer, 1990). The environments that many students entertain consistently reinforce certain behaviors that may not be school appropriate or could even be detrimental to the students’ academic development. Understanding how to properly construct and maintain healthy relationships could be significant for students to achieve at their highest academic level.

Behaviorism and social learning theory provide the basis for examining the environmental influences of at risk students with regards to student performance. As a matter of fact, this is a grounding principle in behaviorism as Watson famously quoted:

Give me a dozen healthy infants, well-informed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select – doctor, lawyer, artist, merchant, chief, and yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. (1924, p. 104)

The influence of environments compounded with the ability to shape behaviors through reinforcements have allowed Watson to provide the foundation for observing rapport. Additionally, the byproduct of behaviorism, social learning theory, has supplemented behaviorism in this study to observe rapport between teacher and student. Subsequently, the ambiance created by rapport, or lack thereof, also necessitates examination through the behaviorist lens because students are constantly being molded by their immediate environments.

Related Research

There is abundant amount of research that analyzes different pedagogical techniques with the purpose of increasing high-stakes testing performance outcomes (Marchant, 2004; Thompson & Allen, 2012). Although research covers a wide arrangement of pedagogical strategies, this related research will focus specifically on the variables (teacher-student rapport and high-stakes testing) under inquiry. Additionally, the succeeding information will address the entire population of students taking their high-stakes assessment in biology. Within that population, there were a variety of subgroups. Therefore, each subgroup is investigated concerning teacher-student rapport and high-stakes testing in science to show how different students may react to perceived teacher-student rapport. Even though the research provides evidence from a variety of contexts, the following related research will focus primarily on whether or not students' perceptions of teacher-student rapport can predict high-stakes testing performance in biology.

Characteristics of At-risk Students

According to Calabrese, Hummel and Martin (2007), definitions for at-risk students tend to revolve around social or academic factors. Social factors encompass demographic characteristics while academic factors are associated with academic performance (Calabrese et al., 2007; Corringer & Lee, 2001). Within a school setting, the term “at-risk” tends to focus on students who embody the academic factors, more specifically, the threat of academic failure (Calabrese et al., 2007; Barley et al., 2002). A potent characteristic of at-risk students is that they are more likely to be uncertain in their future endeavors after high school (Newsome, 2005). Researchers have shown that at-risk students typically have higher absenteeism, tardiness, low expectations of themselves, more tumultuous home environments, engage in more behavior problems in and out of the school setting, and are more likely to drop out of high school (Newsome, 2005; Dryfoos, 1998; Nunn & Parish, 1992). Historically speaking, students who are generally from low socio-economic backgrounds and have minority status are more likely to be labelled at-risk than their dissimilar counterparts (Calabrese et al., 2007; Coleman, 1998).

Research is abundant in regards to the reasons students become at-risk for academic failure. For instance, when investigating past at-risk students who went on to drop out, Suh and Suh (2007) found that there are multifarious reasons why students become academically stagnant. Lack of motivation, inability to keep up with grades, parents’ low educational levels, the number of members living in a single household, and low level of parental engagement have all been identified as factors associated with at-risk students of dropping out (Caraway, Tucker, Reinke, & Hall, 2003; Coley, 1995; Suh & Suh, 2007). Additionally, studies have revealed that variables within the school can contribute to the overall interconnectedness of students to the schooling process. Students who lack a sense of belonging tend to feel alienated which in turn

leads to them dropping out of school (Suh & Suh, 2007). As at-risk students matriculate through their schooling years, natural socialization may make it more difficult to reach these pupils. Getting at-risk teenagers to improve their scholastic performance can be particularly difficult due to all of the life challenges that are present at that age (Wilson, Kauffman, & Purdy, 2011). Consequently, identifying low-cost, effectual strategies becomes paramount for the prevention of at-risk students from dropping out of school. The costs of continually educating at-risk students can become expensive without identifying and implementing low-cost pedagogical techniques. These expenses include implementing extended days, applying extended school years, along with a variety of other fiscal measures (Wilson et al., 2011). These expensive measures are only compounded when facing the alternative. If at-risk students drop out, they cost society (and themselves) an abundant amount of money. Prior research positions the finances spent on individuals who dropped out of school well into the billions (Somers, Owens, & Piliawsky, 2009). From the monetary costs to the individual and society as a whole, dropping out of high school inevitably places a ceiling on a student's potential in the workforce and throughout life.

To underscore this preceding point, Somers, Owens, and Piliawsky (2009) conducted an exploration into the effectiveness of high school dropout prevention and analyzed at-risk ninth graders' role models and their motivations for school completion. The researchers analyzed a school dropout prevention program and synthesized self-reports of ninth graders' perceptions of their motivations to complete high school. Specifically, the investigators examined the validity of self-reports from 140 urban at-risk ninth graders as a viable tool in changing the students' educational attitudes, motivations, and eventually grades. Additionally, the investigators examined the teens' career goals and their respective role models. After evaluating the 140 urban ninth graders who were at-risk for dropping out through a quasi-experimental study, there

were several findings. One such finding is that many at-risk students noted only one career goal that involved a four-year degree; becoming a teacher. This is not surprising as many of the students noted an educator as their respective mentor. Aside from teachers, parents were also regularly chosen as role models for the students. A second result grounded in this inquiry is that early intervention for at-risk ninth graders is imperative if educators wish to reverse the negative perceptions of school held by these students. Ultimately, the dropout prevention program under investigation was not considered to be a significant deterrent to dropping out. A suggestion afforded by the researchers intimated that teachers and parents should work collaboratively, beginning at a young age, in order to curb negative scholastic attitudes for urban at-risk youth.

Interventions for At-risk Students

There have been several strategies afforded by prior research that have been proven to curtail the likelihood of dropping out for at-risk students. According to Azzam (2007), students drop out because they are bored, chronically absent, spend too much time with students not interested in school, have too much freedom in their own lives, and are usually already failing and cannot catch back up. To counteract these staggering numbers, Azzam (2007) suggested that schools and teachers use real-world applications, provide supports for struggling students, enhance the school climate by incorporating appropriate discipline and structure, make sure students are close with at least one adult within the school building, and improve parental communication between home and school. Among these options, the most salient suggested strategy involves the need for students to generate and maintain a positive relationship with at least one teacher within the school building.

In summation, Somers et al. (2009) and Azzam (2007) found that engaging students in their learning, connecting classroom lessons to real-world applications, implementing varying

teaching styles to accommodate individualized learning, and providing proper academic support systems for struggling learners were all found to be effectual strategies in the edification of at-risk students. Additionally, Somers et al. (2009) recommended several important strategies to help with the at-risk population such as hiring highly qualified teachers, reducing class sizes and individualizing instruction, increasing parental involvement, and setting up mentors for each student. The element of rapport must be present in order for a mentorship to take place. Enacting a personalized relationship between student and teacher may contort pre-existing concepts of at-risk students regarding the importance of school. Additionally, implementing a relationship grounded in trust and accountability may provide different perspectives not previously utilized by both educator and pupil.

Prior research has highlighted interventions that focused on at-risk students both at home and at school. For example, Johnson (1997) found that effective school-based interventions for at-risk students included (a) remedial and special education, (b) sex education, (c) substance-abuse, (d) crime prevention programs, (e) parental involvement, and (f) early intervention programs. When investigating effective home-based interventions, Johnson (1997) found that (a) subsidizing housing, (b) nutrition programs, (c) parental education, and (d) parental involvement all proved to circumvent patterns of dropping out by at-risk students. The aforementioned strategies have been found to assist students who are identified for at-risk of dropping out across a variety of continuums. Other notable interventions ingrained in prior findings involve community-based interventions where services are focused on the health and services of the community as a whole. Additionally, societal interventions are highlighted and they are centered on public attitudes, policies, governmental oversight, and monetary allocation as well as service delivery models (Johnson, 1997).

Other potent interventions for at-risk students are evidenced as well. For instance, Gardner, Cartledge, Seidl and Woolsey (2001) reported that the use of a peer mediated after-school program improved reading and math skills for inner-city, at-risk students who were able to attend. Fifteen, African American males were selected to participate in a Level I research design that involved direct, quantitative measures of specific behaviors which were recorded immediately after that behavior transpired. When dissecting the results of this peer-mediated intervention on urban African American youth, the researchers derived some interesting results. They concluded that their findings were consistent with other investigations. Specifically, they noted that urban at-risk students demonstrated improved academic progress when participating in after-school programs and peer-mediated interventions (Gardner, Cartledge, Seidl, & Woolsey, 2001). Placing students with positive peers in a highly structured after-school program has shown to increase academic scores for urban at-risk youth with regards to math and reading scores. While participating in this peer-mediation program, the at-risk students were exposed to interpersonal communication skills, social skills, and teamwork which were all considered to have heavily impacted the reading and math scores exhibited by the at-risk students.

As mentioned above, social skills interventions have been found to decrease undesired classroom behaviors while simultaneously bolstering socialization with at-risk students (Bardon, Dona & Symons, 2008). School and system based interventions have also been evaluated through the form of Positive Behavior Interventions and Supports (PBIS) and were found to have positive effects on students who were deemed to be at risk for academic failure. Specifically, Walker, Cheney, Stage, and Blum (2005) included 72 students in their descriptive study who were identified as at-risk for academic failure across three different elementary schools in southwestern Washington. The research was conducted to determine the most effective and

efficient way to identify students who were at-risk for academic failure. The three modalities of the PBIS identification system were analyzed: school-wide screening, rating scale instruments, and office referrals. The results from this investigation indicated that office discipline referrals and a systematic school-wide screening process are the two most useful ways in identifying elementary students who are at-risk for academic failure (Walker, Cheney, Stage, & Blum, 2005).

There have been superfluous attempts to specifically identify what makes at-risk students succeed in the face of constant obstacles (Gardner, Cartledge, Seidl, & Woolsey, 2001; Johnson, 1997; Walker et al., 2005). Certainly there are multiple variables that contribute to any given student's circumstance. A variable engulfed in every classroom across the nation with every student involves the relationships forged within the walls of school buildings. There exists a need to investigate rapport, its effects within schools, and how this relationship influences at-risk students.

Rapport

Due to the abstract nature of human relationships, rapport can be a difficult term to define empirically. Rapport is a well-known concept within a variety of professional fields but articulating the exact definition of rapport can be difficult (Gremier & Gwinner, 2000). Much research has been done to investigate the effects of rapport, and different fields have produced varied definitions of the term. Definitions for rapport in a psychotherapist-client relationship has centered on the overall quality of the relationship between professional and client (Gfeller, Lynn, & Pribble, 1987). Within higher education, rapport has been identified as the relationship formulated between a professor and student is an interpersonal relationship (Dobrasky & Frymier, 2004; Frisby & Martin, 2010; Frymier & Houser, 2000; Nussbaum & Scott, 1980).

Within this context, rapport has been deemed a relationship-centered experience, and education reflects a rapport oriented field (Frisby & Martin, 2010; Jorgenson, 1992). Although, definitions of rapport are abundant in vast arrays of professional environments, the focus for this inquiry will revolve around educational aspects and definitions of rapport. Definitions and applications are gleaned from previous results in order to grasp a general description of rapport and how rapport has been evaluated and synthesized in the past.

Rapport in an educational setting is defined as an overall feeling between two people encompassing a mutual, trusting, and pro-social bond (Catt, Miller, & Schallenkamp, 2007; Faranda & Clarke, 2004; Frisby & Martin, 2010; Gremler & Gwinner, 2000). Specifically, Catt, Miller, & Schallenkamp (2007) synthesized evidenced-based research in order to outline effectual strategies of capable instructors. They implemented an in-depth analysis of Faranda and Clarke's (2004) study where interviews were conducted with students to determine attributes that effective educators elicit. Catt et al. (2007) extrapolated five themes from Faranda and Clarke's (2004) work: (a) rapport, (b) delivery, (c) fairness, (d) knowledge, and (e) organization. They found that rapport and delivery were the most interesting of these themes. Developing quality interpersonal relationships and implementing trust were prevalent building blocks to rapport building. These researchers provided supplementary strategies to bolster the findings of Faranda and Clarke (2004). They did so by introducing and instituting the acronym ACTION (Alert, Challenge, Trust, Interest, Open and Need). Alert was described as the educator being aware of inferences and providing clarity for students. Challenge simply meant to properly motivate students. Trust involved establishing a trusting relationship with students. Interest encouraged educators to be excited for the subject matter. Open involved the implementation of

effective communication techniques. Need positioned the educator as a model for students to value the importance of learning (Catt et al., 2007).

Frisby and Martin (2010) expound upon this preceding sentiment adding that rapport has been operationalized through two dimensions: a personal connection and an enjoyable interaction. By expanding on previous research and implementing their own, Frisby and Martin (2010) derived the preceding definition of rapport by examining the relationships between teachers and their respective students at the collegiate level. They synthesized data to determine which classroom relationships (i.e., teacher-student rapport and student-student rapport) contributed to an overall positive classroom environment. Additionally, instructor-student rapport was investigated to determine if rapport influenced student participation in class, student learning outcomes, and overall student perception of being involved in an interconnected classroom. The investigators utilized Likert scale questionnaires to determine the strength of relationships between the instructor and students (instructor-student) and among the students themselves (student-student). After analyzing the Likert scale questionnaires from 233 undergraduate students (125 men, 108 women) from a mid-sized, mid-Atlantic university, the researchers implemented a correlational design to analyze relationships and draw conclusions.

Frisby and Martin (2010) found that when students perceive they have a positive rapport with their instructor and with their respective classmates, they have higher perceptions of classroom connectedness. Moreover, students participated more often in class, and the class atmosphere promoted cognitive and affective learning when students felt a positive rapport between their peers and their instructor. Ultimately, the researchers found that rapport is a positive, interpersonal construct that is utilized in an instructional setting (Frisby & Martin, 2010). As previously indicated, rapport and its respective effects have garnered more attention

as the undeniable influences that practicing educators have on their prescribed students are becoming more salient. Due to rapport being a relatively new variable for educational inquiry, more research should be investigated to determine how the relationships within an educational setting can influence academic and social outcomes (Frisby & Martin, 2010).

Over the past few decades, scholars have continually and progressively highlighted the significance of teacher and student rapport beginning as early as elementary school. Specifically, researchers have evaluated the influences that effectual teacher pedagogy, with respect to rapport, has on long-term student success. In their study, Chetty et al. (2011) underscore the influence of rapport through caring teachers and the ultimate benefits that students receive over the course of their respective life due to this relationship. Through a longevity study that evaluated the residual effects on students of having a caring, well-trained, devoted teacher, researchers found that elementary school educators have undeniable influences on students' lives. These effects are salient well beyond the time periods in which the students were edified by the caring educator. Specifically, Chetty et al. (2011) found that being educated by teachers in elementary school who are highly trained and who hold a deep knowledge of course content joined with having an effectual rapport with students had profound effects on students' lives. Elementary school pupils who had perceived rapport with their highly qualified teachers were exponentially more likely to make more money, stay in school, and develop a greater sense of self-worth than their grade-level counterparts throughout their respective life (Chetty et al., 2011). The intrinsic conclusion within this aforementioned analysis is that rapport, and its positive effects, begins the first day of the first class of a student's scholastic career and can have everlasting effects well beyond the last day of class.

Within post-secondary school settings, rapport has recently seen an influx of investigations. Rapport compounded with sound teaching epistemology has been found to be exponentially influential for college-aged students. One study that focused on thinking and learning styles for effectual teachers found subject knowledge and classroom interconnectedness were essential elements to being viewed as a quality teacher (Li-Fang, 2004). Additionally, Frisby and Martin (2010) found that successful college instructors continually strive to build positive relationships with students and readily encourage them throughout the learning process. Incorporating the natural dynamics of human relationships is imperative to attain optimal student success. Since the college classroom consists of many interpersonal relationships, ensuring a positive classroom experience can have a profound effect on academic outcomes, learning outcomes, and overall retention (Frisby & Martin, 2010).

Research has also been conducted at the high school level with regards to rapport and how rapport positively affects the sense of well-being teachers have about themselves. Petegem, Creemers, Rossel, and Aelterman (2005) observed the interpersonal characteristics and interpersonal relationships between teachers and high school students to determine the teachers' perceptions of their own overall well-being. After analyzing 260 cooperating teachers across 19 vocational and technical schools, the researchers analyzed questionnaires filled out by the teachers to determine the overall well-being of the educators. These interpersonal relationships within the classroom proved to be a factor in how the teachers viewed their pedagogical effectiveness and well-being. When teachers enacted positive, interpersonal relationships with their students, their overall sense of well-being increased. Thus, the importance of a positive, interconnected relationship between the students and their teacher created a desirable classroom environment that contributed to an elevated sense of well-being by the teacher. Furthermore, the

teacher is a dynamic figure within the classroom and has direct and indirect influences on students. Due to these influences, the relationship between the teacher and students directly contributes to the overall learning environment (Petegem et al., 2005). According to the research, implementing an agreeable environment for both the students and the educator contributes to more positive interactions. An “agreeable environment” is derived from positive interpersonal relationships where students and educators feel good and appreciated. These preceding results highlight the value of incorporating a positive classroom environment. The advantages of such an environment extend to both the educators and the students. Promoting a positive classroom environment elicits a feeling of satisfaction for the teacher and sets students up for optimal success.

Overall, the effects of generating, maintaining, and endorsing a positive rapport between teachers and students has profound effects for both the educator and the pupil at all levels of education. Student-driven data reflects the overall importance of rapport at every stage of education (Woods, Badzinski, Fritz, & Yeates, 2012). Rapport is an inexpensive pedagogical technique that requires little monetary investment but an unwavering internal commitment. Specifically, rapport is an imperative strategy for educators of at-risk students (Furda, 2009). At-risk students should be paired with strong, versatile, positive educators to develop a trusting partnership within the classroom (Downey, 2008).

At-risk Students and Rapport

Due to the abstract nature of rapport and the uniqueness that is involved with individual relationships, there are not many holistic strategies available for across-the-board implementation for at-risk students. Although "blanket" strategies are limited and are difficult to apply across situations and circumstances, there has been some research in how to develop and

maintain a positive rapport between teachers and at-risk students. Downey (2008) synthesized published recommendations and strategies from a variety of programs and deduced twelve acute pedagogical strategies for teacher use with students who are identified for at-risk of dropping out of school and then divided them into four groups: (a) teacher-student rapport, (b) classroom climate, (c) instructional strategies and, (d) students' skills. Within the cluster of teacher-student rapport, he recommended building healthy interpersonal relationships between the teacher and the pupil, setting and communicating high, realistic expectations for academic performance, and using students' strengths to promote high self-esteem. An important point to note is the researcher's focus on teacher-student rapport within this study. To supplement Downey's (2008) findings, previous investigators have highlighted the significance of rapport between teachers and students who have been identified for academic failure. Implementing a genuine relationship with at-risk students is imperative for their academic success. Previous results underscore that at-risk students who are academically successful almost always have at least one adult who provides support and acts as a role model for the student (Borman & Overman, 2004; Downey, 2008; Werner, 1990).

Recent research repetitiously underscores the importance of rapport with at-risk students. Current inquiries suggest that rapport and collaborative strategies are vital tools in closing achievement gaps with students from diverse backgrounds. Bennet (2008) examined pedagogical characteristics that were deemed effective for students living in poverty and for students who were labelled at-risk for academic failure. Bennet required students and teachers at Georgia Southern University to take a "socioeconomic driving tour" of their local communities to analyze the socioeconomic disparities that exist within the community. The professors ($N=60$) then had to complete a reflective paper (known as driving papers) to describe what they had seen

on their respective tours. The teachers articulated the “driving papers” and were asked to focus on four main areas: (a) the professor’s own background, (b) a demographic depiction of their current school placement, (c) the effect of the tour on their individual teaching philosophies, and (d) the implications of the tour for the their respective classroom. Bennet used statistical data and analysis to determine three overarching themes of the driving papers: (a) development of awareness of socioeconomic differences, (b) development of empathetic rapport and caring attitudes, and (c) development of a commitment to culturally responsive teaching. The results indicated the educators and students must incorporate an empathic worldview while embracing different sociocultural differences in order to provide (and receive) the best edification possible (Bennet, 2008). Overall, rapport is an integral component for all students but especially for those students from diverse, and socioeconomic backgrounds who at risk for academic failure. Additionally, since many at-risk students entertain extenuating circumstances outside of school, research indicates that empathetic rapport between caring educators and students could be critical for at-risk students’ success (Bennet, 2008).

African American Students and Rapport

There is a large amount of research that has highlighted the achievement gaps between minority students and their White counterparts. Fletcher and Cox (2012) stated, "An extensive accumulation of studies has demonstrated that White students academically outperform African American students, with significant differences in grades, exam scores, high school graduation rates, degree attainment, and long-term educational outcomes (Cokley, McClain, Jones & Johnson, 2011; Hayes, 2010; Kao & Thompson, 2003; Warikoo & Carter, 2009; Wilcox & Angelis, 2010). In order to properly evaluate all aspects of teacher-student rapport (as perceived by students) and students’ high-stakes testing performance, there is a need to communicate the

findings of the influence rapport has had on African American students. Previous findings have illustrated the significance of evaluating possible variables that could influence student achievement for minority students (Fletcher & Cox, 2012). Understanding and comprehending minority students and their respective cultures is integral to their success in academics especially as the United States population continues to become more and more diverse (Kao & Thompson, 2003). As the United States continues to increase its diversity, identifying pedagogical practices that possibly influence these populations and their academic outcomes will become increasingly important and worthy of investigation.

There have been numerous attempts at explaining the long-existing achievement gaps between African American students and White pupils. Achievement gaps between African Americans and White students have been attributed to cultural factors such as socio-economic backgrounds, single parent homes, and poverty-stricken backgrounds (Fletcher & Cox, 2012). All of these preceding factors negatively impact African American students' educational achievements (Goldsmith, 2004). Additionally, national history and prior academic policies have contributed to the current gaps that exist between African American students and White students (Land, Mixon, Butcher, & Harris, 2014).

Land, Mixon, Butcher and Harris (2014) implemented a phenomenological, and narrative study of six successful African American male high school students located in Texas within the seventh largest school district in the United States. Through interviews and qualitative analysis, the researchers attempted to understand the challenges and barriers that young African American males students continually face in high school. Additionally, they identified specific supports and personal characteristics that the participants possessed that contributed to their respective success. Specifically, the successful pupils articulated that overcoming barriers of (a) absent

fathers, (b) negative classroom stereotypes, (c) disruptive home environments, (d) negative aspects of the community, (e) peer pressure, and (f) inadequate school systems were all formidable challenges that they had to successfully navigate. The researchers found that support in spirituality, a desire to make their mother proud, and identifying school personnel with whom they developed a positive rapport all helped the students overcome their obstacles and become successful students. The personal characteristics identified by the researchers of these successful students entailed high self-esteem, spiritual maturity, and inner motivation to succeed. The students credited these preceding resilient traits to maintaining their drive to become successful high school students. Ultimately, the findings suggest that African American adolescents can overcome many of these obstacles by implementing personal resiliency, becoming independent thinkers, and being competent problem solvers (Land, Mixon, Butcher, & Harris, 2014).

Land, Mixon, Butcher and Harris (2014) explained how previous negative stereotypes and an unwillingness to understand African American culture by non-African American educators have contributed to the current gaps in achievement. One salient reason that African Americans struggle more in high school than their white counterparts is the perceived lack of support they get while in school from teachers and administrators (Corringer & Lee, 2001). Additionally, since there are cultural differences within the educational environment, it is imperative that non-African American educators become well-versed in these differences. These differences include personal appearance, presentation styles, and appropriate communication modalities. When non-African American teachers engage in cultural stereotyping, African American students tend to suffer lower academic achievement and endure psychological stress (Howard, 2008). Identifying and acknowledging salient cultural differences is imperative to not only closing achievement gaps, but promoting an atmosphere of acceptance and comfort for all

students to perform at superlative levels. As a result, there is an inherent need for school systems to understand their students from different cultural backgrounds and to implement positive, rapport-building strategies for these respective students to provide a platform for all students to excel academically and socially (Howard, 2008).

If there is an attempt to build a positive, interpersonal relationship with students from different cultural backgrounds, minority students tend to perform stronger academically (Land, Mixon, Butcher & Harris, 2014). When specifically investigating African American males who were academically successful regardless of their societal dispositions (lower socioeconomic status (SES), one parent, lower parental education), rapport with at least one school personnel became exponentially important. The researchers found that when students felt they had a caring adult within the school who genuinely cared for them, this fostered a feeling of rapport that provided necessary tools that allowed the students to be successful (Land et al., 2014). Many African American students are facing difficult obstacles both in and out of school; it is possible for African American students to close achievement gaps especially when placed in environments that foster academic and personal growth (Land et al., 2014). To this end, there is a clear need to evaluate what factors (that are in direct control of practicing educators) that may quell or reverse these influencing variables. Implementing an interpersonal relationship between teacher and student is one strategy that appears to help (Fletcher & Cox, 2012). Enjoying an enhanced relationship between teacher and student provides positive support and sets African American students up for scholastic success (Fletcher & Cox, 2012).

High-Stakes Testing

High-stakes testing has garnered a great deal of attention throughout the last several decades, and these assessments are constantly touted by political leaders for a variety of reasons.

Although the attention that high-stakes testing has received has seemingly increased over the last 30 years, the salient truth is that these tests have been articulated and disseminated for many years prior. In order to provide the proper context from which to evaluate and understand high-stakes testing, there exists a need to explain how these tests became a prominent tool for evaluation and accountability. The following is a brief explanation of the genesis of high-stakes testing compounded with the motivation behind the assessments. Additionally, historical explanations will be evaluated across current testing practices to provide a clear, seamless elucidation of the current testing atmosphere (Marchant, 2004; Moon, 2009).

The history explaining the origin of high-stakes testing goes beyond 150 years. The genesis of high-stakes testing goes back to the 1840s originating in the city of Boston. Back then, these tests were used in order make cross-classroom and cross-school comparisons. However, once the World War I era began, there was a big push by the government and military to implement a large-scale intelligence test: the Army Alpha test. This essentially got the ball rolling for high-stakes testing and by the 1960s the government had created the National Assessment of Educational Progress (NAEP) to assess educational systems and monitor student growth. Coinciding with the NAEP, the government passed the Elementary and Secondary Education Act (ESEA) in 1965. These two entities, the NAEP and the ESEA, were the first to use high-stakes testing on a national level in order to make comparisons and draw conclusions about the nation's schools (Moon, 2009). The influence of these preceding organizations, National Assessment of Educational Progress (NAEP) and the Elementary and Secondary Education Act (ESEA), was unparalleled. Critics of high-stakes testing, however, claim that the assumption of high test scores equating to a higher quality education were directly and indirectly tied to these institutions. In other words, through the influence of the NAEP and the ESEA, the

greater American society began to believe that the schools encompassing students with higher standardized test scores were automatically considered to be receiving a higher quality education than their scholastic counterparts with lower scores (Moon, 2009).

The profound negative effects of educational policies saw the 1970s and 1980s as a natural catalyst to the current testing atmosphere. During this time period, there was the development of the minimum-competency test (MCT) which mandated that all students demonstrate proficiency in basic skills by scoring above a predetermined minimum score. Because students were tasked with scoring above a minimum score, there was a widely held belief that this is where the “teaching to the test” era began. Many educators believed that classroom instruction began to suffer in order to ensure that students achieved above the minimal score on their MCT (Moon, 2009).

The belief system that direct instruction can be “measured” by high-stakes testing began to set the stage for the current testing environment. This misguided attempt to measure academic progress is what educational communities now refer to as the NCLB legislation. This legislation dominates the current testing requirements and has had many critics and proponents alike. One of the major criticisms of NCLB is that it essentially led to a narrow standard for academic success and higher testing outcomes (Thompson & Allen, 2012). Although this legislation began as an in-depth attempt to close gaps in achievement when compared internationally, it has had inadvertent side effects that have created tunnel vision for testing scores with little to no room for teachable moments.

The outcomes of standardized test scores continue to provide direction for accountability measures implemented by local, state, and national governments (Marchant, 2004). Previous findings place high-stakes testing as a centerpiece for decision making for a variety of

stakeholders. In a literature review of substantial research, Marchant (2004) reviewed current information to comprehensively understand the results and impacts of high-stakes testing. Additionally, Marchant (2004) reviewed and synthesized research and concerns in order to determine the influences high-stakes testing has on schools, districts, and states. Marchant (2004) described the current ambiance of the testing atmosphere by explaining how the information derived from these tests has been misused. Specifically, high-stakes tests that were originally designed to provide additional insight into student learning as well as defining effective teaching strategies are now being used to evaluate educators, students, and districts nationwide (Marchant, 2004). Due to this reality, the results of these tests carry a significant power and are being used as the basis to make a variety of important decisions. However, the weight attributed to these test scores have garnered criticisms due to how they are being used. Marchant (2004) points out some of the negative/unintended consequences of high-stakes testing, and questions if the uses of the test scores are valid ways to measure student achievement and educator effectiveness. His argument is that high-stakes testing scores are being used to determine the degree of quality instruction and teacher effectiveness, which were not the original intent of these tests. In particular, Marchant (2004) questions the validity of using test scores to determine quality instruction of a teacher. Due to the mismatching of curricula and high-stakes testing content, along with a plethora of variables that could influence the quality instruction of an educator, there are too many confounding variables present to relate the test scores directly to quality instruction (Marchant, 2004).

Although the criticisms of high-stakes testing continue to pervade headlines and journal articles, the truth remains that there exist no other alternatives on the horizon. There continues to be a need to research valid connections that can be reached from high-stakes testing and exploit

proven, efficient educational strategies that correlate to higher scores and optimal edification. Regardless of the varying opinions saturating educational communities, high-stakes tests are used to make a variety of important decisions such as federal/state monetary allocation as well as determining schools' overall efficiency (Brennan, Kim, Wenz-Gross, & Siperstein, 2001; Marchant, 2004). High-stakes assessments carry the most serious of consequences for both educators and pupils alike with employment and graduation decisions being directly tied to these testing outcomes.

In order to understand high-stakes testing in its current state, it is important to understand how these tests are presently constructed and disseminated. Almost all high-stakes tests are standardized. Standardized simply means that there are a strict set of rules for administering the test and all who take the test must follow the same rules (Marchant, 2004). The premise of these standardized tests is based on the philosophy that these tests are a way for students to demonstrate content knowledge they have learned. The tests are also used as a way to compare students across counties, states, and countries. The true impact of standardized tests are constantly evaluated and scrutinized to determine their respective impacts on educational communities and to establish rank-and-file comparisons with other schools both nationally and internationally.

The widely held belief by many who construct and implement current educational policy is that high-stakes testing provides a foundation for accountability for teachers and students. Researchers have attempted to explain the weighted value given to high-stakes standardized tests, specifically as they deal with teacher accountability. NCLB almost exclusively relies on high-stakes testing to make sweeping assumptions about teacher, school, and district accountability (Templin, 2008). To further drive this premise home, other researchers have

highlighted the “intent” of standardized tests. The “intent” of high-stakes testing in the United States appears to be related to educators being held publicly accountable for students’ test scores (King, 2006). This preceding sentiment highlights the “intent” of standardized tests, there are many who believe that these tests strip teachers of “teachable moments” and lend pedagogical practices to a teach-to-the-test modality of instruction. This concern is highlighted in past and present research. One of the more salient points gleaned from prior literature is trying to determine if these high-stakes tests actually change teacher pedagogy and if it does, is it for the better (Marchant, 2004)? This question has been empirically investigated for years with varying findings.

Due to the outlined pressures that are directly associated with the results from high-stakes testing, there have been elevated interest levels in these assessment outcomes. One salient concern from practitioners is the narrowing of pedagogy to a “one-size-fits-all” mentality that restricts teachers’ abilities to engage in content and conversation outside of that found on the tests (Gulek, 2003). In order to call attention to this preceding issue and to analyze the NCLB Act (2001), Gulek (2003) employed a meta-analytic study to identify and expound upon five proven, test preparation strategies for high-stakes tests. The five proven strategies dissected by Gulek are (a) teaching the content domain, (b) using a variety of assessment approaches and formats, (c) teaching time management skills, (d) fostering student motivation, and (e) reducing test anxiety. Gulek exhaustively imparts the importance of each test-taking technique and explains that if these techniques are used in concert, students will increase their scores on their respective high-stakes tests. Gulek (2003) also discusses the need for educational stakeholders to become assessment literate, or being informed of how to use high-stakes testing results appropriately. Assessment literate is not the ability to teach to the test or to hone pedagogical

processes to teach to the test. It revolves around making sure that the test results are being used in an appropriate way by government and local entities (Gulek, 2003). Educational leaders must understand what these scores actually reflect to properly implement assessment scores as a tool. Although high-stakes testing is vital to student accountability, Gulek (2003) cautions that these are but a snapshot into a student's totality of learning. Understanding that high-stakes assessments are a dynamic process in which students provide snapshots of their current ability at the time is integral in interpreting the results. Compiling assessment results throughout a student's scholastic career provides a holistic picture that may be more applicable and accurate than interpreting a single assessment score at a given time.

High-stakes tests also garner unintended outcomes of which public school leaders must be aware. One obvious unintended outcome is the overwhelming pressures these tests place on public school teachers to raise their test scores (Gulek, 2003). These pressures can have a direct impact on the teaching and learning of students. There are concerns that with so many important decisions relating to testing outcomes, teachers will inevitably feel those pressures and implement a teach-to-the-test instructional modality. However, when empirically evaluating the proven strategies suggested by Gulek that can be implemented to quell the pressures of high-stakes testing, fostering student motivation is certainly a formidable technique and can be readily applied across a multitude of environments. Within the domain of student motivation, getting to know each student and developing a positive relationship or rapport is an important role each teacher can play to enhance pedagogy and increase test scores (Gulek, 2003, p. 42). Additionally, encouraging student motivation promotes a positive classroom experience which in-turn leads to higher assessment outcomes.

High-Stakes Testing for African American Students

Due to the expansive research questions posited in this study, an examination of how high-stakes testing affects varying populations is needed to establish a holistic view of the current testing environment. One such group under investigation is African Americans. African Americans have been disproportionately affected by high-stakes testing outcomes compared to their Caucasian counterparts (Thompson, 2007; Thompson & Allen, 2012). The National Assessment of Educational Progress (NAEP) consistently measures the "progress" of closing achieving gaps among groups of students. While the NAEP has identified a closing of achievement gaps between African American students and their White counterparts, the results have been minimal and largely insignificant. Researchers continue to argue the (lack of) effectiveness of NCLB for African American students. Dropout rates for African American and White students have narrowed over time but there have not been any significant improvements in the quality of education that African Americans are receiving versus their White counterparts. In other words, African American students are continually receiving a substandard education (Thompson & Allen, 2012). These preceding conclusions are highlighted and reinforced through systematic, high-stakes testing scores which is the primary measuring stick for academic success across this country. Instead of pedagogical practices focusing on diversity and cultural education, the primary concern for teachers has become directly tied to testing outcomes. This acute focus has had unfortunate consequences for African American students. Thompson and Allen (2012) underscored several detriments for African American students in the current high-stakes atmosphere. Specifically, they highlighted the lack of improvement in testing score outcomes for African Americans regardless of identification and there has been an increase in student apathy among this population (Thompson & Allen, 2012). Additionally, there are more

punitive measures for African American students than their Caucasian counterparts, and there is an atmosphere of making sure schools "look good" through their testing scores irrespective of the actual quality of the education students are receiving (Thompson & Allen, 2012). The substantive literature that exists underscoring the achievement gaps in high-stakes testing between African American students and Caucasian students is unparalleled (Bacharach, Baumeister, & Furr, 2003; Bankston & Caldas, 1997; Entwisle & Alexander, 1988; Grissmer, Flanagan, & Williamson, 1998; Loehlin, Lindzey, & Spuhler, 1975; Myerson, Rank, Raines, & Schnitzler, 1998).

Additionally, several studies have highlighted a disturbing trend of African American students operating at lower achievement levels for years. In relation to high-stakes testing, studies have illustrated that the average proficiency level for White 13 year old students has been congruent with the average proficiency level of 17 year old African American students (Horn, 2003; Madaus & Clark, 2001). There exists a need to close this gap (among others) and to do so by implementing low-cost, effectual strategies that could benefit all students but particularly for African American students.

When specifically investigating achievement gaps between African American and White students in the field of science, the literature is sparse but consistent with other content fields. Bacharach, Baumeister and Furr (2003) investigated African American students against White students in the field of science with the intention of determining if achievement gaps increase or decrease throughout their respective secondary education. They found a significant gap in academic achievement in science between White and Black children before entering into high school. When they reassessed the students after high school, they found that the students' secondary experience had done nothing to close these pre-existing gaps (Bacharach, Baumeister

& Furr, 2003). The researchers move on to intimate that this gap actually grew during the high school years. It is through this lens of incongruity that this researcher strives to highlight pedagogical practices that could possibly reverse or temper these existing conclusions.

High-Stakes Testing for Males and Females

Although identifying achievement gaps between races has long been a hot topic of educational stakeholders, there are other demographics worthy of investigation. One such difference is the gap that exists between male students and their female counterparts on high-stakes tests. There have been incongruent findings when analyzing the differences in males and females in gaps of academic achievement. For instance, when looking at high-stakes tests involving science, prior findings have found some interesting results. Bacharach, Baumeister and Furr, (2003) investigated science achievement gaps between African American and Caucasian students as well as science achievement gaps between males and females. They found that not only do gaps in science exist for African-Americans and Caucasian students but they also exist for males and females. Males typically perform better on science assessments than females (Bacharach, Baumeister, & Furr, 2003). The researchers completed an analysis of 21,000 children who were enrolled in The National Education Longitudinal Study and concluded that boys do tend to have higher testing results in science than girls. Additionally, the scholars characterized changes in the size of the academic achievement gaps in science between African Americans and Caucasians as well as males and females as they moved through high school. They implemented hierarchical linear modeling (HLM) to analyze the data. The results of the inquiry suggest that high schools did not compensate nor reduce the science achievement gaps that existed between African Americans and Caucasians as well as between males and females. In fact, the results indicated the achievement gaps actually grew wider throughout high school.

Thus, based on this research, Caucasian students outperformed African American students in science achievement scores, and males scored higher than their female counterparts on science achievement scores.

The apparent academic achievement discrepancies prominent in Bacharach, Baumeister and Furr's (2003) study, however, are not consistent with previous findings. For instance, when analyzing a cross-sectional analysis of a variety of subjects, Cole (1997) found minimal academic achievement differences between males and females. Along with assistance from other researchers, Cole conducted a four-year analysis of 1,500 sets of data involving millions of students across a variety of subjects by using the database from the Educational Testing Service (ETS). Her study focused specifically on nationally representative samples that cut across age, academic subjects, and years in order to control for confounding variables that had led previous researchers to differing results. She found that there were minimal differences between males and females for most subject areas. She concluded that there was not a clear picture of one gender greatly excelling over the other gender in any subject (Cole, 1997). This preceding sentiment essentially implies "level" achievement scores between boys and girls across a variety of subjects. Therefore, previous scholars have derived inconsistent empirical results when analyzing academic achievement (gaps) between males and females.

Gaps in academic performance between males and females have been investigated on many levels. Another inquiry explored possible reasons for gaps in (SAT) scores between males and females. Rebhorn and Miles (1999) completed a literature review to determine possible reasons that females underperform when compared to their male counterparts on the mathematical section of the SAT (SAT-M). When conducting their analysis of (SAT-M) scores, Rebhorn and Miles (1999) found that there was a noticeable gap amongst the genders for seniors

who were taking the SAT-M for admission into college. The researchers demonstrated that in 1997, there was a 35-point average gap between girls' scores (492) and their male counterparts (527) on the math portion of the SAT. They posit several possible reasons, some supported by research and some not, for the discrepancies; the SAT is biased against females noting that the scores obtained do not necessarily reflect actual ability, and boys are genetically superior in mathematical ability and/or aptitude. Additionally, males scores contain more variability which contributes to higher scores amongst males, the nature of a timed test contributes to the lower scores for girls, and girls are enrolled in fewer math classes than boys and may be less prepared for the test. Lastly, parents' expectations for their daughters are lower than for their sons, and expectations of educators and administration are different for girls than they are for boys.

Rebhorn and Miles (1999) offered solutions that could possibly address the reasons for such a gap in the scores on the SAT-M between males and females. Their recommendations include removing time limits on the SAT, supplementing SAT scores with other measures that demonstrate content knowledge, and eliminating specific test items that consistently yield higher scores for boys than girls. Other suggestions include educating parents about the gaps and the need for high expectations and high self-perceptions in mathematics for girls, and informing school staff about the potential of all students and encourage girls' progress in mathematics.

Overall, previous results indicate a mixed message when analyzing differences between boys' and girls' academic successes. There have been investigative reports exploring scholastic differences in boys and girls for years through all levels of education (elementary, middle, secondary) to determine what variables may contribute to these findings and the conclusions have been vast and diverse.

One former inquiry worthy of analysis focused on elementary boys' and girls' attitudes about high-stakes testing as well as their respective teachers' attitudes towards the assessments. Booher-Jennings (2008) implemented a qualitative design at an urban elementary school in order to discern how high-stakes testing impacts socialization within the classroom. According to the research, there are salient differences in how boys' achievements and/or failures are rationalized by teachers versus how girls' achievements and/or failures are rationalized by educators. Booher-Jennings (2008) found that educators blamed males' academic failures on poor attitudes and behavior while explaining girls' academic failures on lacking the self-esteem needed to pass the test. The researchers indicated that males may score higher than females in secondary education on high-stakes testing. However, through an emotional and societal lens, boys who do not perform well on high-stakes tests are seen as not working hard enough while girls tend to garner more sympathy from educators if they fail to meet expectations on high-stakes tests (Booher-Jennings, 2008). This is but one example of scholars attempting to reconcile differences between boys and girls on high-stakes tests while analyzing important factors that may contribute to said differences.

There is a plethora of additional research that investigates male and female differences in high-stakes testing. Due to the importance of these tests, there has been a large body of literature devoted to analyzing every detail that could possibly affect the scores. Mora (2011) investigated the phenomenon of boredom and how it relates to high-stakes testing. He documents the effects that test-preparation strategies have on boredom for male and female students in a middle school setting. By incorporating an ethnographic study that followed a group of 30 urban, Latino students, Mora (2011) was able to see how test preparation strategies contributed to the overall atmosphere of the classroom. After analyzing the coded field notes and transcripts from his

qualitative analysis, he found patterns in responses that consistently yielded boredom as a central theme. There were constant test-preparation strategies taught throughout the middle school experiences for all of the students. Significant amounts of time (including multiple and entire classroom periods) were used to prepare students for their impending high-stakes assessments. Implementing lectures, test preparations, and practice tests all led to boredom from students and ultimately a lack of connectedness in the classroom (Mora, 2011). Additionally, he found that, while both boys and girls perform better when they are engaged in student-led activities rather than teacher-led assignments, boys, in particular, tend to perform worse when they feel they are bored. This is important because of the pressure placed on teachers to excel on important state-issued assessments. Mora (2011) found that many of the current pedagogical practices are narrowed to the content found on the state-mandated tests thus limiting creativity and teachable moments for students. This in turn creates unintended, boring classroom strategies that can adversely affect students and student scores. Although completely eliminating boredom from every class experience is difficult, actively pursuing pedagogical strategies that enhance student interest while in class could prove to be invaluable (Mora, 2011).

High-Stakes Testing in Biology

One of the main purposes of this inquiry was to determine the effect of rapport on a high school assessment (HSA) embedded in the field of biology. This investigation took place in the state of Maryland, thus it is important to understand the history of the test under investigation and the historical patterns that this assessment has endured. Additionally, understanding current research on the HSA under investigation may lend some insight to the current dissertation.

The state of Maryland has required some form of graduation exam for upwards of 25 years (Maryland High School Assessments, MSDE, 2014). The exams were previously called

Maryland Functional Tests but morphed into HSAs after a 15-year extensive "revamping" process due to the passage of NCLB Act and the ever-changing focuses of political entities (Maryland High School Assessments, MSDE, 2014). Although there are three subject areas that Maryland evaluates in public secondary schooling (Algebra, Biology, and American Government) in order to attain a diploma, this research study focused primarily on the biology HSA. All HSAs began to be disseminated in 2004 with a "phasing in" process that eventually correlated the achievement of certain scores on the HSA to upholding a graduation requirement. In other words, after 2004, the students had to attain a minimum score on the biology HSA in order to fulfill part of their graduation requirements.

The current biology "blueprint" for the Maryland HSA involves a plethora of questions highlighting important content in a variety of subcategories. There are currently 16 questions involving the skills and processes of biology and 12 items focusing on the structures and functions of biological molecules. Additionally, there are 13 questions analyzing the structure and function of cells and organisms, 13 items on the inheritance of traits, and 9 questions underscoring the mechanisms of evolutionary change. Finally, there are 13 items synthesizing the interdependence of organisms in the biosphere for a total of 76 items (Maryland High School Assessments, MSDE, 2014). This exam has been extensively constructed and boasts high reliability and validity scores. MSDE goes through an arduous plan of constructing each HSA in order to ensure the tests are applicable and measure content that has been covered throughout the course during the school year (Maryland High School Assessments, MSDE, 2014). These test scores are used to make a variety of important decisions for both state and local levels.

Rapport and High-Stakes Testing

The gap in literature for this study revolves around the relatively few studies that have attempted to address rapport and high-stakes testing at the high school level. Within this scope, there has been some research, albeit a small amount, that relates student-teacher rapport with higher testing performance outcomes. Specifically, Donlevy (2001) compared general education students with special education students in perceived rapport and high-stakes testing performance. By reviewing empirical literature, he compared and contrasted these preceding groups of students in an attempt to conclude the importance of rapport on high-stakes testing outcomes. His found that all students, regardless of general or special education placements, benefit from having a positive relationship with adults within their school, specifically teachers (Donlevy, 2001). According to these findings, as more students are affected by the high-stakes testing environment, there is a realization that relational avenues must be explored. It is through these avenues that students in regular and special education are most likely to be set up for success on high-stakes testing opportunities.

Research has been conducted to identify potential factors that could possibly influence teachers' attitudes towards high-stakes testing. To this end, Janisch, Akrofi, and Liu (2012) analyzed the struggles and understandings of a single graduate student as she attempted to teach reading to a struggling sixth grade student who had previously failed a high-stakes test. By employing a qualitative, multi-tier design in which the graduate student would educate the struggling sixth grader daily, the graduate student was then charged with journaling her successes and obstacles. After completing the journaling process, a coding system was enacted by the authors (of this article) to identify patterns and themes within the journals written by the graduate student. The researchers found the following categories were prevalent in the graduate

student's journal: trusting relationships, authenticity, student choice, capacities beyond the test scores, and redemption of testing. They also found that a multifaceted approach involving experiences, perspectives, talents, backgrounds, and specific needs of students must be used in order to solicit higher individual testing outcomes (Janisch et al., 2012). The scholars move on to conclude that instruction must be student-centered in which the teacher has a genuine emotional investment in the student (and vice-versa) in order for struggling students to overcome obstacles related to high-stakes testing outcomes (Janisch et al., 2012).

Not all research regarding rapport and student achievement is solely positive in nature. While many studies highlight the positive outcomes (both relational and scholastic) that invested educators and students have achieved, there are sometimes unintended consequences of the teacher-student relational dynamic. In their study, Young, Horan, and Frisby (2013) found that unexpected and undesirable outcomes can happen as a result of teacher-student rapport. They investigated 124 students at a midwestern university to determine if relational teaching (rapport) correlated with feelings of justice within the classroom setting. While "enjoyable interaction," a key component in the definition of rapport, was the only variable that could predict feelings of justice within the classroom by students, there were other important findings. For instance, the researchers found that relational teaching can have unintended consequences. Some students may feel like teachers favor students who appear to be closer to the teacher than students who are not close with the teacher. This favoritism may include more lenient grading for those students the teacher "likes" (Young et al., 2013). Therefore, it is imperative that educators carefully balance a sense of fairness and openness so that all students feel they are objectively evaluated. Additionally, teachers should carefully consider how they prepare for their respective classes and

their impact on student behaviors within the classroom in order to achieve a feeling of equity by all students (Young et al., 2013).

Summary

Evaluating pedagogical practices to determine efficient ways of maximizing teaching is important to practicing educators (Paige, 2006). It is vital to identify strategies and techniques that can be infused in the classroom that can assist all students. One such resource that must be further investigated is the relationships between teachers and students and how these relational variables influence scores on high-stakes testing. High school assessments are used for determining educator and student accountability measures with many important decisions being tied directly to these testing outcomes (Marchant, 2004). With this in mind, identifying and implementing pedagogical practices that improve teacher-student relationships while simultaneously improving high-stakes testing performance outcomes could prove to be paramount for educators and students. Specifically for students who are identified as at risk of dropping out, these variables become magnified as they may be the difference in succeeding and/or failing in school and ultimately in life (Azzam, 2007).

There is a salient need for effectual rapport between all students and their respective educators in order for the students (and teachers) to maximize their scholastic opportunities (Donlevy, 2001; Frisby & Martin, 2010; Janisch et al., 2012; Young et al., 2013). There is a need to understand the importance of rapport for all students when looking at high-stakes testing outcomes at the high school level. Due to the importance of high-stakes test and the repercussions they influence, evaluating strategies for increased high-stakes testing performance is integral (Marchant, 2004). Overall, there is compelling evidence that suggests that all students benefit from teacher-student rapport (Azzam, 2007). Developing an ambiance of genuine

rapport may be vital for the success of many student populations and must continue to be investigated for possible positive repercussions. As more research becomes available to reflect on the positive influences that rapport has on students and teachers alike, the picture becomes clearer. The more teachers invest in students, the more likely these students are to actually succeed in academia and in life (Downey, 2008).

CHAPTER THREE: METHODOLOGY

Overview

This study is significant in today's educational climate for many reasons. Developing rapport involves a personal investment involving little to no monetary investment. Thus, this positions this study as a logical avenue for identifying inexpensive, effectual, pedagogical techniques. Moreover, the implications for professional development opportunities in conjunction with a deeper understanding of student behaviors bolster the overall importance of this investigation. If educators are regularly professionally developed, then including information for building positive teacher-student rapport may be infused into these opportunities to hone practices and encourage relational growth. This study investigated the predictive relationship between teacher-student rapport and high-stakes testing as they directly relate to the larger goals of producing positive members of the greater society and preparing students for collegiate and real-world pathways. To provide proper context for this study, this chapter outlines the methodology of this investigation. It begins with the research design and follows with the research question and the null hypothesis. Next, the participants, setting, instrumentation, and procedures are discussed in detail. Finally, the data analysis implemented for this study is reviewed and explained.

Research Design

This study employed a predictive correlational research design. Correlational research attempts to discover relationships between variables by implementing correlational statistics (Gall, Gall, & Borg, 2007). Correlational research is a potent tool to investigate cause-and-effect relationships between particular variables (Gall et al., 2007). This type of research design is useful when investigating educational and social science phenomena. There are two main

reasons for applying a correlational design: (a) to investigate the relationships between variables under study and (b) to see if scores on one variable predicts scores on other variables (Gall et al., 2007). One salient advantage that correlational design has over causal-comparative design is that the correlational design can describe the degree of the relationship between the variables under study (Gall et al., 2007). Because the present study attempted to predict a relationship between two variables on (student perceptions of teacher-student rapport and biology outcome scores), the predictive correlational design was utilized.

Research Question

The following research question will guide the present study:

RQ1: Can a student's perception of teacher-student rapport predict high-stakes testing performance in biology?

Null Hypothesis

The research hypothesis for this study:

H₀1: There is no statistically significant predictive relationship between the criterion variable (high-stakes testing performance in biology) and the predictor variable (teacher-student rapport).

Participants and Setting

The county where the high school is located is a rural county housing approximately 90,000 total residents in the southern portion of Maryland. The participating high school in the study is one of four high schools located within the county's school system. The single high school used for this study edifies approximately 1500 students from 9th - 12th grade(s). This study follows Frisby and Martin's (2010) example of examining instructor-student rapport among participants (N=233) from a single college. Therefore, for the purposes of this inquiry,

there were a total of 369 students completing the Maryland Biology High School Assessment (HSA) in May. Out of the possible 369 students who took the Maryland Biology High School Assessment, 228 participated in this study. The demographics of the participants are presented in the table below.

Table 3.1

Demographics of Sample (n = 228)

White	Afr. Am.	Multirace	Hispanic	Asian	Male	Female
187	16	8	16	1	90	138

To ensure that the findings for this study were valid, it was important to consider the statistical power analysis for this study. Statistical power involves sample size, level of significance, directionality, and effect size. For this study, with $n = 228$, at the $p < 0.05$ alpha level, with an effect size of 0.310, the power analysis resulted in a 0.997. The alpha level $p < 0.05$ is essentially the safeguard level of accidentally rejecting a null hypothesis when it is actually true. The effect size of 0.310 indicates the magnitude of difference or effect in the population under study (Gall et al., 2007). The power analysis resulted in a 0.997 or 99.7%. This is to say that if a significant difference is found, there is a 99% confidence that the difference is true and is not an error. Ultimately, the statistical power of 99% refers to the probability that a statistically significant test will lead to a rejection of a false null hypothesis (Gall, et al., 2007).

The need for the selection of certain populations to examine the extent teacher-student rapport is related to high-stakes testing created no opportunity for random assignment within the participants. Due to the fact that all tenth-grade students who were enrolled in a biology class

took the Maryland HSA, there was no opportunity for random assignment. The purpose of the study specifically looked at relationships between teacher-student rapport with regards to HSA scores, thus effectively eliminating the possibility for random sampling. Due to the impossibility of random sampling, convenience sampling methods were utilized and implemented.

Convenience sampling is a nonprobability sampling technique that selects a sample that both suits the purposes of the study and is convenient to the researcher and his purposes (Gall et al., 2007). A limit to convenience sampling is that it is more difficult to make valid inferences from findings to larger populations. Thus, generalizability of findings can be more difficult.

However, if the sample is carefully conceptualized, it is possible to use inferential statistics to generalize findings although findings should be used in consortium with other studies (Gall et al., 2007).

The southern Maryland county is a rural county housing 90,484 total residents. The county is ranked in the top 15 wealthiest counties in the country based on median household income. Its median household income is approximately \$92,395 which is almost exactly \$20,000 more than the state average of \$72,999. The number of people living below the poverty line in the county is 4.9 percent, which is just over half the state average for Maryland at 9.4%. Additionally, the demographics of the county consists of 82% -White, 13.2% - African American, 3.3% - Hispanic, 1.5% - Asian according to the National Census Bureau in 2010. The high school used for this study is one of four high schools located in the district. The high school enrolls approximately 1450 students and is consistently ranked in the top 350 high schools, among both private and public, in the country by several news publications. The school's demographics are closely reflective of the county data: 74% - Caucasian, 14% - African American, 4.5% Hispanic, 5.6% - Multiple races, 1.6% - Asian. The vast majority of students

attending the high school under study fall within the high and middle class ranges with fewer students living in lower class environments. Student attendance is strong throughout the county with attendance rates over 94% for the 2013-2014 school year and the high school under investigation reflects the strong attendance record throughout the county (96%).

The participants in this study were enrolled in the school's biology class prior to taking their biology HSA. The biology classes all followed the same curriculum throughout the school year to promote consistency and fidelity within the biology curriculum. There were five teachers who were on the biology team. These educators collaborated every week to develop and ensure plans to remain consistent across every biology class. As a result of these collaborations, all of the teachers followed the same basic plan from week-to-week.

Instrumentation

There were two instruments used for the purposes of this study. One instrument was in the form of a Likert scale questionnaire entitled Teacher-Student Likert Scale Questionnaire, and the other was a state mandated, high-stakes test in the form of a biology High School Assessment (HSA) implemented by the state of Maryland.

Teacher-Student Likert Scale Questionnaire

The Teacher-Student Likert Scale Questionnaire was utilized to measure perceived teacher-student rapport. Likert scale questionnaires asks individuals to score their level of agreement with different statements: (1) strongly agree, (2) agree, (3) somewhat agree, (4) neither agree nor disagree, (5) somewhat disagree, (6) disagree, and (7) strongly disagree. The Teacher-Student Likert Scale Questionnaire used for this study has been administered by prior researchers (Frisby & Martin, 2010; Frisby & Myers, 2008; Gremier & Gwinner, 2000; Young, Horan, & Frisby, 2013) and it boasts a high internal consistency measure. Using these preceding

measurement tools, the participants (the students) of the study reported on the degree of rapport that the students perceive they have with their respective teacher. This method has been successful for prior researchers investigating the relationships of rapport and academic achievement (Frisby & Martin, 2010). This experiment used the Teacher-Student Likert Scale Questionnaire adapted and implemented by Frisby and Myers (2008) to measure perceived instructor-student rapport. The instrument adapted by Frisby and Martin (2010) and Frisby and Myers (2008) was originally created by Gremler and Gwinner (2000) to measure perceptions of rapport. This study utilized the adapted Teacher-Student Likert Scale Questionnaire used in Frisby and Martin's (2010) study that measured students' perceptions of teacher-student rapport. The Teacher-Student Likert Scale Questionnaire for perceived teacher-student rapport contains seven items measuring enjoyable interactions between teacher and student, e.g., "I look forward to seeing my teacher in class". Additionally, the scale employs four items for personal connection between teacher and student (e.g. "I have a personal relationship with my teacher"). Prior research positions enjoyable interactions and personal connections as being congruent with potent qualities of rapport (Frisby & Martin, 2010; Jorgenson, 1992). While these are not the only qualities of rapport identified through prior investigations, they remain as consistent characteristics to identifying the presence of rapport between instructor and pupil (Frisby & Martin, 2010). The Teacher-Student Likert Scale Questionnaire asks students to respond on a scale between 1 and 7: (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neither agree nor disagree, (5) somewhat agree, (6) agree, and (7) strongly agree. The lowest score a student could report on the Teacher-Student Likert Scale Questionnaire was a 0 and the highest score a student could report was a 77. Within this instrument the lower the score, the lesser degree of perceived rapport felt by the students between themselves and their biology teacher.

The higher the score reported by the student indicated a higher degree of perceived rapport felt by the student with their biology instructor. Gremler and Gwinner (2000) reported an internal consistency ranging from 0.93 to 0.96 using this measurement. After employing essentially the same scale for their research, Frisby and Martin (2010) endorsed a 0.94 internal consistency for their study. Therefore, the Teacher-Student Likert Scale Questionnaire boasts a strong internal consistency and can be utilized to measure perceptions of teacher-student rapport.

High School Assessment for Biology

High School Assessment (HSA) outcomes are investigated by employing and synthesizing a biology HSA mandated by the state of Maryland. The Maryland HSAs consist of two core-subject tests that are administered periodically through secondary students' high school careers. High school students in Maryland must take the biology HSA in ninth grade or tenth grade and a government HSA in eleventh grade. The biology HSA must have a minimum passing score of 400 in order for students to receive their Maryland high school diploma. The biology HSA is a multiple-choice test that consist of 99 questions with scores ranging from 0-650. The higher the score attained on the biology HSA, the greater the understanding of biological curriculum concepts as set forth by the Maryland State Department of Education ((Maryland High School Assessments, MSDE, 2014). A confirmatory factor analysis (CFA) was conducted for the 2013 biology HSA to determine the underlying domain(s) and structures for the test and to test the overall internal consistency of the assessment. A CFA evaluates whether individual items on tests actually reflect characteristics of the area content it is supposed to be evaluating. In other words, is the test actually measuring the content under study (Maryland High School Assessments, MSDE, 2014)? The Maryland State Department of Education employs a complex CFA model in order to derive the internal consistencies for their HSAs. In

order for a CFA to be a good fit and boast high internal consistencies, certain scores must be ascertained on several indices. In short, there are scores from three separate indices that must be met in order for the CFA to be considered a good fit for internal consistency. The first index, the Tucker-Lewis Index (TLI), must have a value higher than a 0.94 in order to signify a good fit (Hu & Bentler, 1999). The second index, the comparative fit index (CFI), must boast a score greater than 0.90 to indicate a good fit (Hu & Bentler, 1999). The third index, the root mean square error of approximation (RMSEA) must have a value less than or equal to 0.06 in order to indicate a good fit (Hu & Bentler, 1999). After performing the CFA, the following internal consistency measures for the Maryland Biology HSA were found: TLI = 0.98, CFI = 0.98 and the RMSEA = 0.017. All measurements and tests performed within the CFA prove the internal consistency measures for the biology HSA are a good fit and are both valid and reliable. Therefore, both measurement tools for teacher-student rapport and the biology HSA boasts high internal consistency measures and have been previously tested and have been found to be valid and reliable sources of measurement for the purposes of this study.

Procedures

The following is a step-by-step description of this study's procedures. The first steps in the procedures for this study were obtaining necessary permissions. Approval was granted by the school district to conduct the study (see Appendix A) in March of 2015. Approval from the Institutional Review Board (IRB) (see Appendix B) was sought and granted. After obtaining permission from the superintendent and approval from IRB, the researcher contacted the individual high school's principal and informed him of the district's permission to conduct the study. Next, students who had taken the biology HSA in the spring of 2015 had to be identified.

By June 2015, the guidance department at the school under study had received all the scores from every student who had taken the biology HSA in the spring of 2015. In May of 2016, the guidance office gave the researcher the biology HSA scores for every student who had taken the biology HSA ($N = 369$) in the previous spring of 2015. Next, in May of 2016, the researcher had to locate what science classes the students who had taken the biology HSA the previous year were currently in. These students had to be located in order to complete the Teacher-Student Likert Scale Questionnaire. In other words, the students who had taken the biology HSA in the spring of 2015 were in a different science class in the spring of 2016. Therefore, the researcher had to locate the science teachers who had students in their class who had taken the biology HSA in the prior spring. These teachers were identified by the principal. The principal used a master schedule and the HSA scores printout to identify which teachers currently had students in their classes who had taken the biology HSA in the prior spring. Once the teachers were identified, the researcher spoke to each science teacher individually about handing out consent forms (see APPENDIX C) and the Teacher-Student Likert Scale Questionnaires to their current class. In summation, the current science teachers were asked to disseminate the consent forms and the Teacher-Student Likert Scale Questionnaires to their current students. However, the students were reporting about their biology teacher from the previous year.

Prior to the science teachers giving their students the Teacher-Student Likert Scale Questionnaires, parental consent was sought. Out of the possible $N = 369$ students who had completed the biology HSA in the spring of 2015, $n = 228$ returned parental consent forms and agreed to participate in this study. Once the science teachers received the parental consent forms, they placed them in a manila envelope, sealed it, and delivered them to the researcher.

After receiving the parental consent forms, the researcher gave the current science teachers the Teacher-Student Likert Scale Questionnaires to hand out to those students who had returned their signed consent forms.

The Teacher-Student Likert Scale Questionnaires measuring teacher-student rapport were disseminated by the current science teachers of students who had taken the biology HSA in the previous spring. The students wrote their names on the Teacher-Student Likert Scale Questionnaires but they did not write their previous biology teacher's name. Once the Teacher-Student Likert Scale Questionnaires were disseminated, students had approximately ten minutes to fill out their responses. Once the students completed the Teacher-Student Likert Scale Questionnaires, the science teachers collected the scales and immediately placed them in a manila envelope. After the teacher sealed the Teacher-Student Likert Scale Questionnaires envelope, they returned them to the researcher. After receiving the feedback from the Teacher-Student Likert Scale Questionnaires, data analysis commenced to determine if there was a statistically significant predictive relationship between the criterion variable (biology HSA scores) and the predictor variable (teacher-student rapport). Once data analysis was completed, the biology HSA scores, the consent forms, and the Teacher-Student Likert Scale Questionnaires were placed in sealed envelopes and locked in a storage cabinet.

Data Analysis

A linear regression was used to analyze the predictive relationship between students' perceptions of teacher-student rapport and biology high-stakes testing outcomes. The linear regression analyzed if the predictor variable (perceived teacher-student rapport) can predict the criterion variable (biology HSA scores) and determine if there is linear relationship between the two. The prediction analysis, by use of a linear regression, involves discussion in terms of

strength, direction, and statistical significance. Before testing the assumptions for the analysis, the data were screened for missing data, outliers, normality, linearity and multicollinearity. Once the data had been screened, the assumptions were tested to determine if they were tenable and analysis could continue. In order for a linear regression analysis to be conducted, several assumptions must be met: (a) the variables under study must yield continuous scores, (b) there is a linear relationship between the variables under study, (c) independence of observations, (d) there should be no significant outliers, (e) homoscedasticity, and (f) residual errors of the regression line are approximately normally distributed (Gall et al., 2007). The assumption testing is described below.

To assess the linearity assumption a scatterplot of perceived teacher-student rapport against biology HSA scores was plotted. Visual inspection of the scatterplot indicated a linear relationship between the variables (Figure 3.1). In order to test the assumption for independence of observations, a Durbin-Watson test was implemented. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.18. A scatterplot was also used to determine that there were no significant outliers present (Figure 3.1). The assumption of homoscedasticity was met through a visual inspection of a plot of standardized residuals versus standardized predicted values. In order to test the assumption of normality for residuals (errors), a histogram and a normal probability plot were used and demonstrated no violation of this assumption. Therefore all assumption tests were found to be tenable for conducting a linear regression analysis. The researcher conducted a linear regression on the data. Results are reported in Chapter Four.

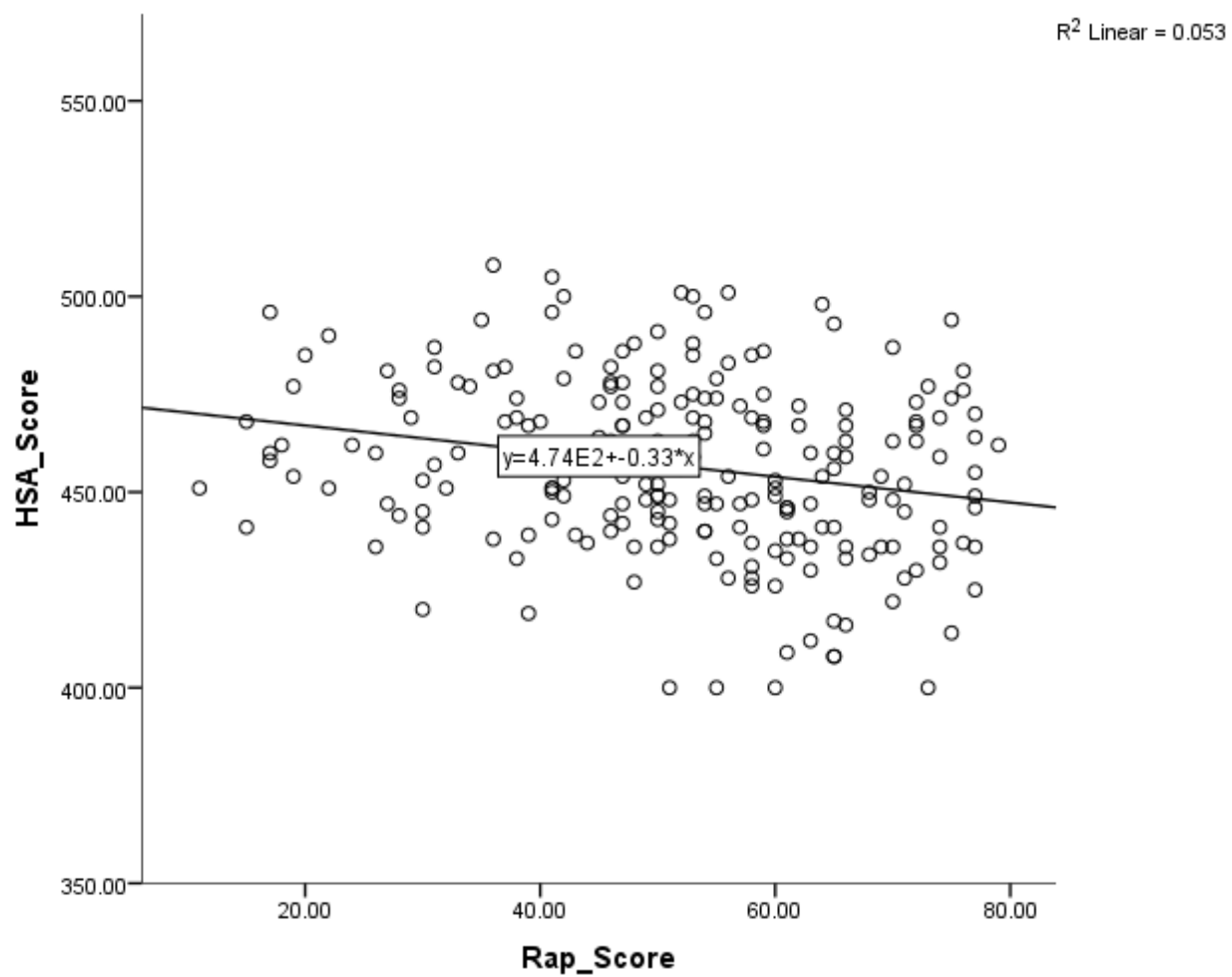


Figure 3.1. Scatterplot of biology HSA scores on teacher-student rapport scores (n = 228).

CHAPTER FOUR: FINDINGS

Overview

The purpose of this correlational study was to determine if a predictive relationship existed between teacher-student rapport, as perceived by students, and Maryland Biology High School Assessment scores. The Teacher-Student Likert Scale Questionnaire was used to measure students' perceptions of rapport with their biology teacher. Students' respective scores on their Maryland Biology HSA were used to measure their academic performance in science. Additionally, a linear regression was used to determine if there was a predictive relationship between the variables under examination and the strength of the relationship. Chapter Four reviews the research question and hypothesis before reporting the findings of the analysis.

Research Question

The following research question will guide the present study:

RQ1: Can a student's perception of teacher-student rapport predict high-stakes testing performance in biology?

Null Hypothesis

The research hypothesis for this study:

H₀1: There is no statistically significant predictive relationship between the criterion variable (high-stakes testing performance in biology) and the predictor variable (teacher-student rapport).

Descriptive Statistics

The following are the descriptive statistics for the participants in this study. These descriptive statistics include the sample of students under study who returned their consent forms ($n = 228$). Once the sample was analyzed, the prediction analysis and results are discussed. The

mean biology high-stakes performance score for all participants ($n = 228$) was 456.59 ($SD = 21.80$) which implies a low standard deviation with respect to the mean. The mean score for students' perceptions of teacher student rapport for all participants ($n = 228$) was 51.86 ($SD = 15.34$) which suggests an average standard deviation with respect to the mean. The descriptive statistics for both teacher-student rapport and biology HSA scores are shown below.

Table 4.1

Mean, Median, and Standard Deviation for Rapport and HSA Scores ($n = 228$)

	Participants	Mean	Median	Std. Deviation
Rapport Score	$n = 228$	51.86	53.00	15.34
HSA Score	$n = 228$	456.59	457.00	21.80

Results

The following are the detailed results for this study.

Null Hypothesis

The research question for this study was a prediction analysis to investigate if perceived teacher-student rapport could predict testing performance outcomes in high-stakes testing in biology. This question involved the following sample ($n = 228$). A linear regression was implemented to determine if there was a statistically significant predictive relationship between the predictor variable (teacher-student rapport) and the criterion variable (biology HSA scores). The following is an explanation of the assumption tests and results of the linear regression.

A linear regression was run to understand the effect of students' perceptions of teacher-student rapport on high stakes testing performance in biology. In order for a linear regression analysis to be conducted, several assumptions must be met: (a) the variables under study must

yield continuous scores, (b) there is a linear relationship between the variables under study, (c) independence of observations, (d) there should be no significant outliers, (e) homoscedasticity, and (f) residual errors of the regression line are approximately normally distributed. The assumption testing is described below.

To assess the linearity assumption a scatterplot of perceived teacher-student rapport against biology HSA scores was plotted. Visual inspection of the scatterplot indicated a negative linear relationship between the variables (Figure 3.1). In order to test the assumption for independence of observations, a Durbin-Watson test was implemented. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.18. A scatterplot was used to determine that there were no significant outliers present. The assumption of homoscedasticity was met through a visual inspection of a plot of standardized residuals versus standardized predicted values. In order to test the assumption of normality for residuals (errors), a histogram and a normal probability plot were used and demonstrated no violation of this assumption. Next, the results of the linear regression are presented.

In order to properly understand the results of a linear regression, a basic understanding of the equation model is necessary. A linear regression model is constructed to determine if a predictive relationship exist between the predictor variable (teacher-student rapport) and the criterion variable (biology HSA scores). The following is the generic equation for running a linear regression: $Y = B_0 + B_1X$. Within this equation B_0 is a constant (y-intercept), B_1 is the slope, X is the value of the predictor variable, and Y is the value of the criterion variable.

The linear regression for this analysis produced the following prediction equation: biology HSA scores = $473.589 + -0.328 \times \text{teacher-student rapport}$. Therefore, according to this analysis, $Y = \text{HSA scores}$, $B_0 = 473.589$, $B_1 = -0.328$, and $X = \text{teacher-student rapport scores}$.

The results of this equation indicated that students' perceived teacher-student rapport statistically significantly predicted HSA biology scores, $F(1, 226) = 12.69, p < .001$, accounting for .053 of the variation in HSA scores with adjusted $R^2 = .050$, a small size effect according to Cohen (1988). For every point increased on the Teacher-Student Likert Scale Questionnaire, the biology HSA score decreased 0.328 points. Predictions were made to determine the mean biology HSA score for students who scored a 30, 45, and 60 on the Teacher-Student Likert Scale Questionnaire. For a score of 30 on the Teacher-Student Likert Scale Questionnaire, the biology HSA score was predicted to be 463.75 (95% C.I., 458.91 to 468.59); for a score of 45 on the Teacher-Student Likert Scale Questionnaire, the HSA score was predicted to be 458.84 (95% C.I., 455.80 to 461.88); for a score of 60 on the Teacher-Student Likert Scale Questionnaire, the biology HSA score was predicted to be 453.92 (95% C.I., 450.78 to 457.06). Thus, there is a statistically significant negative predictive relationship between the criterion variable (high-stakes performance in biology) and the predictor variable (teacher-student rapport). Therefore, the data rejected the null hypothesis.

CHAPTER FIVE: CONCLUSIONS

Overview

The following chapter addresses the results of this study as they relate to prior literature and research. Furthermore, this chapter discusses the implications of this study as it adds to the existing body of knowledge about the variables under investigation. Finally, limitations of this study coupled with future recommendations for research are addressed and explained.

Discussion

The purpose of this predictive correlational study was to determine if students' perceptions of teacher-student rapport could predict high-stakes testing performance in science at the high school level. A linear regression was conducted and found a statistically significant negative predictive relationship between the criterion variable (high-stakes testing performance in biology) and the predictor variable (teacher-student) rapport. A linear regression produced the prediction equation: biology HSA scores = $473.589 + -.0328 \times \text{teacher-student rapport}$. Students' perceived teacher-student rapport statistically significantly predicted HSA biology scores, $F(1, 226) = 12.69, p < .001, R^2 = 0.053, F(1, 226) = 12.699, p < 0.00$. This finding found that students' biology HSA scores decreased 0.328 points for every point increased on the Teacher-Student Likert Scale Questionnaire. The following discusses the findings and how these results compared with prior literature and research.

Null Hypothesis

H₀₁: There is no statistically significant predictive relationship between the criterion variable (high -takes testing performance in biology) and the predictor variable (teacher-student rapport).

The null hypothesis for this study investigated the predictive relationship between high-stakes testing in biology and perceived teacher-student rapport. This study rejected the null hypothesis and found a statistically significant predictive relationship between the criterion variable (high-stakes testing performance in biology) and the predictor variable (teacher-student rapport). The particularly interesting result from this study was that the significant relationship that existed between teacher-student rapport and high-stakes testing outcomes was negative.

Although there was a negative relationship, it is not entirely surprising due to the involvement of this study employing high-stakes tests. Prior research has highlighted inconsistencies within high-stakes testing performance outcomes for students in science. For instance, Bacharach, Baumeister and Furr (2003) found that males typically have higher testing performance outcomes than their female counterparts. These findings were informative but were in contrast to the results found in Cole's (1997) research. Cole (1997) found minimal academic achievement differences between males and females in high-stakes testing. Furthermore, she concluded that there was not a clear picture of one gender greatly excelling over the other gender in any subject (Cole, 1997). This preceding sentiment essentially implies "level" achievement scores between boys and girls across a variety of subjects. Thus, previous scholars have derived inconsistent empirical results when analyzing high-stakes achievement scores.

The findings for this study were still somewhat surprising in relation to prior research and literature. Prior research positioned rapport to have a positive influence on learning outcomes. Several prior studies found positive correlations between perceived teacher-student rapport and academic outcomes. For instance, Downey (2008) suggested that developing rapport between teacher and student is an effective strategy for academic success for all students and especially students who are identified for being at-risk for academic failure. Additionally, Bennet (2008)

found that developing rapport between (at least) one caring educator and the student could be integral for that student's academic success. Somers, Owens, and Piliawsky (2009) and Furda (2009) also placed emphasis on the importance of students finding at least one teacher they can trust and develop a meaningful, trustworthy, relationship in order to be academically successful in school. Frisby and Martin (2010) found that when college students perceived that they have a positive rapport with their respective instructor, they had a greater feeling of classroom connectedness. This feeling of belonging promoted both cognitive and affective learning. Furthermore, Chetty, Friedman, and Rockoff, (2011) found that elementary school students endured lifelong benefits from being educated by a teacher with whom they had a positive rapport with and who had sound content knowledge. The findings for this study were somewhat surprising due to the negative predictive relationship that was found between the predictor variable (teacher-student rapport) and the criterion variable (HSA scores).

One explanation for the contrast in this study's results to those previously mentioned involves the HSA scores elicited by this sample under study ($n = 228$). Only two students did not earn the minimum 400 points to pass the biology HSA out of the entire sample ($N = 369$). These two students did not complete their consent forms; thus they did not participate in this study. Therefore, it is reasonable to suggest that since all of the scores were passing scores, and there were no failing scores, this data could have influenced the relationship between the predictive variable and the criterion variable. The predictive relationship for the variables under study could have been influenced had there been the inclusion of failing HSA scores. Additionally, if the sample included a greater dispersion of HSA scores, including failing and passing scores, the results may have been different. The standard deviation for the HSA scores was 21.80. This standard deviation is small considering the range (0-650) for the HSA scores.

Because the scores were so closely dispersed, the predictive relationship could have been influenced. Future studies should incorporate as many high-stakes scores as possible (both passing and failing) in order to derive a more accurate assessment of the relationship between perceived teacher-student rapport and high-stakes testing performance in science.

Additionally, these findings are in contrast to previous studies that indicated that perceived presence of teacher-student rapport could be positively correlated to academic success. This examination found a negative predictive relationship. There are several possible explanations as to why this study found conflicting results when compared to prior research. High-stakes testing outcomes have a variety of repercussions associated with their scores (Marchant, 2004; Brennan, Kim, Wenz-Gross, & Siperstein, 2001). These outcomes influence whether or not students pass a particular class, graduate on time, or gain acceptance into college (Marchant, 2004). Because so many factors are affected by high-stakes performance testing outcomes, there are many motivations for students to pass the test. Therefore, it is reasonable to suggest that rapport may be more difficult to detect when attempting to see its effect on high-stakes testing outcomes due to the many motivations students have when taking these tests. There are other possible explanations as to why this study's findings contrasted with prior literature which are described in the implications and limitations below.

Implications

This study added to the existing body of knowledge and theory with regards to rapport and high-stakes testing at the high school level in several ways. Although this examination elicited surprising findings, there are still important implications that can be gleaned from the results. One salient implication is that teacher-student rapport may be less important as it pertains to high-stakes testing at the high school level for many students. Due to the

innumerable number of outcomes associated with high-stakes testing at the high school level, many students will be motivated to do well on these tests for a variety of different reasons. These varying motivations may contribute to students' success on high-stakes tests. Thus, focusing solely on teacher-student rapport may be a mistake for many students at the high school level. This is not to say teacher-student rapport is not important. Rather, teacher-student rapport should be considered in concert with other pedagogical strategies such as educators constructing a deep understanding of their curriculum content (Chetty, Friedman, & Rockoff, 2011).

All of the biology teachers who instructed the sample under study are considered to be highly qualified according to NCLB (No Child Left Behind Act, 2001). Therefore, all of these teachers were believed to be strong in their content area knowledge of biology. There was a high passing rate for the biology HSA (only two students did not pass their HSA) and there was a negative predictive relationship elicited from this study. This implies that content knowledge could be a more important focal point for educational leaders than rapport construction when it comes to professional development. Again, this is not to suggest that rapport is not important. Rather, rapport may be integral for optimal student performance for some students but may not be as important for other students when compared to content knowledge, or other variables, as it pertains to high-stakes testing.

Another implication involves analyzing the student populations who are involved with taking high-stakes tests. All students had to take the biology HSA to receive their high school diploma. This includes advanced placement, honors, general education, and special education students. The results for this study yielded a statistically significant negative relationship between teacher-student rapport and high-stakes testing in science for $n = 228$. Analyzing the impact that teacher-student rapport has on different student populations may be beneficial to

determine if rapport is more important to certain student subgroups than others. For instance, although for the purposes of this study the sample was too small, several students who were at-risk for academic failure participated in this study. Almost all of the students who were identified as at-risk students posted high marks for perceived teacher-student rapport. Although many of them posted high rapport scores, many scored right at or slightly above the passing score (400 points) on the biology HSA. Prior research suggests that perceived teacher-student rapport may be more important to students who struggle academically and who struggle with the material on high-stakes assessments (Downey, 2008). The passing score for the biology HSA is 400 points but the highest possible score a student could receive on the HSA was 650. Many students who reported a high rapport score but obtained an HSA score right at or above 400 could be the ultimate beneficiaries of teacher-student rapport. There were students who were right on the cusp of passing but were not predicted to get over the 400-point threshold to pass their biology HSA. All of these students would go on to pass their HSA. Had these students not had a perceived rapport between themselves and their science teacher, it is possible they would not have passed their biology HSA. Thus, it is reasonable to suggest that students who barely passed the biology HSA, and had a high score of perceived rapport, could have benefited the most from the perceived relationships between teacher and student. This could possibly have demonstrated the greatest effect of perceived teacher-student rapport. Had students who struggled to learn the necessary biological content not perceived that they had a positive rapport with their respective biology teacher, it is reasonable to suggest that these students would not have passed their biology HSA. More research analyzing which student subgroups could benefit more from perceived teacher-student rapport should be conducted with regards to rapport and high-stakes testing at the high school level.

Limitations

There were several limitations that must be considered with the findings of this study. The limitations to this study could have influenced the results. First, due to the abstract nature and subjectivity of rapport, other motivational variables could have affected students' HSA scores rather than teacher-student rapport (Janisch, Akrofi, & Liu, 2012). For example, students must pass their biology HSA in order to receive their Maryland high school diploma. This requirement would suggest that some students may simply score well on their exam because they want to graduate. Moreover, many students are driven by other factors as well. Students who know they will be attending college or other higher learning institutions, may want to bolster their applications by performing well on these statewide assessments. Many students are conscientious of their grade point averages and class ranks. Some of these students may simply want to score well on their biology HSAs to see how they compare with their classmates overall. Thus, it is possible that other motivational factors could have influenced the HSA scores.

Another limitation to this study is the selection of the participants from a single high school. Pulling the sample participants ($n = 228$) from a single high school could limit generalizations and make it difficult to apply findings across other settings. Drawing the student population from a single high school limits the ability to address other possible influences to the students' high-stakes scores as well. For example, there is a wide body of literature that suggests students from poorer environments typically perform worse in school, and on high-stakes tests, than their affluent counterparts (Irvin, Meece, Byun, Farmer, & Hutchins, 2011). The high school under investigation for this study resides in a county with a median household income of \$92,395 which is \$20,000 over the state average. Thus, it is reasonable to suggest that students from other districts which have a more diverse socioeconomic population may garner different

results on high-stakes testing outcomes due to rapport in combination with their household income.

A limitation worth investigating in future research would be the timing and usage of the Teacher-Student Likert Scale Questionnaire. In this study, students reported their perceived teacher-student rapport with their biology teacher months after having the teacher in class. Students may have changed their perceptions, for a variety of reasons, during this time-lapse. In future studies, this limitation can be addressed by having students provide their perceived teacher-student rapport scores shortly after finishing the class with their respective teacher. Additionally, because the Teacher-Student Likert Scale Questionnaire measures rapport specifically for a student and their teacher, it may be more useful to use this instrument with in-class assessments across a variety of classes for the same teacher. Additionally, the possible advantages to coupling the Teacher-Student Likert Scale Questionnaire with a different dependent variable is discussed below.

A final limitation to this study involves the fact that students filled out their Teacher-Student Likert Scale Questionnaire while in the presence of their current science teacher. Although the students did not write their former biology teacher's name on their Teacher-Student Likert Scale Questionnaires, they did write their own names. Students may have been influenced by the fact they were reporting on their former biology teacher while in the presence of their current science teacher.

Recommendations for Future Research

Continued research about how teacher-student rapport affects student achievement, especially at the high school level, is important moving forward. Future studies should expand their sampling to include a more diverse population from a variety of different schools if

possible. Drawing a larger, more diverse sample size from a variety of geographical locations would help validate and generalize studies in the future (Gall, Gall, & Borg, 2007). Furthermore, assessing a larger population of students could be beneficial in determining if certain student populations benefit more from students' perceptions of teacher-student rapport. Additionally, using different instrumentation for the dependent variable may assist in determining the relationship between perceived teacher-student rapport and students' academic performances.

Using a different instrument for the dependent variable could be useful for a variety of reasons. Practically all high-stakes tests have many important outcomes associated with achieving a passing score such as moving on to the next grade, graduating, and college acceptance (Marchant, 2004; Brennan, Kim, Wenz-Gross, & Siperstein, 2001). Most high-stakes tests have a minimum score that must be achieved in order to pass. Students must pass their high-stakes tests in order to receive a high school diploma in most states. Therefore, because of the variety of possible motivations students may have to pass their respective high-stakes tests, it may be difficult to pinpoint the impact of teacher-student rapport. Choosing and implementing a different instrument for measuring students' academic performance may be beneficial in honing the true impact of perceived teacher-student rapport in academic performance in future studies.

Summary

This study found a statistically significant predictive correlation between the predictor variable (students' perceptions of teacher-student rapport) and the criterion variable (high-stakes testing performance in biology). The findings in this study were somewhat surprising because the statistically significant predictive relationship that did exist was a negative one. Most of the existing prior research suggests that rapport between teacher and student is a positive, interpersonal construct that usually elicit positive learning outcomes (Bennet, 2008; Chetty,

Friedman, & Rockoff, 2011; Downey, 2008; Frisby & Martin, 2010; Furda, 2009). Therefore, finding statistically significant negative predictive relationship appears to be incongruent with prior research. However, there are possible explanations as to why the research question produced a statistically significant negative predictive correlation.

For the most part, the findings for this study were surprising with regards to prior research. Mottet, Frymier, and Beebe (2006) suggested that students enter into classrooms with relational goals among themselves, their classmates, and their teacher. This is to say, that students enter classrooms with the hope that their classmates and their instructors will like them. This need to be “liked” and “accepted” directly contributes to the overall feelings of teacher-student rapport (Petegem, Creemers, Rossel, & Aelterman, 2005). In addition, students’ perceptions of teacher-student rapport have been found to positively affect learning outcomes (Frisby & Martin, 2010). Therefore, the findings for this study may appear to be in contrast to prior literature. However, the fact that a negative correlation existed did not minimize the importance of perceived teacher-student rapport necessarily. For example, for some students, the fact that they exhibited very high rapport scores while simultaneously producing lower HSA scores may be indicative of the true influence of teacher-student rapport. The passing score for the biology HSA is 400 points. In order for students to pass, they must achieve this threshold. The rapport scale was measured from possible scores ranging from 0-77. Therefore, there were many students who scored right at or just above the 400 point threshold while self-scoring their rapport questionnaires well above 60, and in some cases well above 70. It is possible that these students reaped the greatest rewards from perceived teacher-student rapport because they barely passed their biology HSA while claiming to have a positive rapport with their teacher. It is reasonable to suggest that had these students who passed by a narrow margin not had a perceived

positive rapport with their respective biology teacher, they may not have passed their biology HSA altogether.

A salient conclusion that can be derived from the results of this study is that rapport may not be as significant of a factor for passing high-stakes tests as other variables. Prior research specifically identifies that many types of students benefit the most from having at least one caring educator in their school building with whom they relate well (Downey, 2008; Borman & Overman, 2004; Werner, 1990). However, one main difference in this study that may account for the discrepancies in prior research involves the usage of a high-stakes test as the dependent variable. Due to the many outcomes, motivations, and influences that high-stakes testing involves, ascertaining predictive correlations for these specific variables may be difficult. More research in the area of teacher-student rapport at the high school level should be conducted with a different dependent variable in order to determine the true impact perceived teacher-student rapport has on academic achievement.

REFERENCES

- American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (1999). *Standards for educational and psychological testing*. Washington, DC: American Psychological Association.
- Au, W. (2007). High-stakes testing and curricular control: A qualitative meta-synthesis. *Educational Researcher*, 36(5), 258-267. doi: 10.3102/0013189X07306523
- Azzam, A. M. (2007). Why students drop out. *Educational Leadership*, 64(7), 91-93.
- Bacharach, V. R., Baumeister, A. A., & Furr, R. M. (2003). Racial and gender science achievement gaps in secondary education. *The Journal of Genetic Psychology*, 164(1), 115-26. Retrieved from Taylor & Francis (ISSN: 1940-0896).
- Baines, L. A., & Stanley, G. K. (2004). High-stakes hustle: Public schools and the new billion dollar accountability. *The Educational Forum*, 69(1), 8-15. doi: 10.1080/0013172040898466
- Banks, R. C. (2009). Caring teachers and their impact: A phenomological study of students' perceptions (Order No. 3382072). Available from Education Database. (305020486). Retrieved from <http://ezproxy.liberty.edu/login?url=http://search.proquest.com.ezproxy.liberty.edu/docview/305020486?accountid=12085>
- Bankston, C.L., & Caldas, S. J. (1997). The American school dilemma: Race and scholastic performance. *The Sociological Quarterly*, 38, 423-429. doi: 10.1111/j.1533-8525.1997.tb00485.x

- Bardon, L. A., Dona, D. P., & Symons, F. J. (2008). Extending class wide social skills interventions to at-risk minority students: A preliminary application of randomization tests combined with single-subject design methodology. *Behavioral Disorders, 33*(3), 141-152. Retrieved from <http://search.proquest.com/docview/219675966?accountid=12085>
- Barley, Z., Lauer, P., Arens, S., Apthorp, H., Englert, K., Snow, D. & Akiba, M. (2002). Helping at-risk students meet standards: A synthesis of evidence-based classroom practices, No. ED-01-CO-0006, Office of Educational Research and Improvement, Washington, DC.
- Bennet, M. M. (2008). Understanding the students we teach: Poverty in the classroom. *The Clearing House, 81*(6), 251-256. Retrieved from: <http://dx.doi.org/10.3200/TCHS.81.6.251-256>
- Black, K. (1995). Tech prep/school-to-work: Preparing students for life beyond high school. National Association of Secondary School Principals. *NASSP Bulletin, 79*(575), 10. doi: 10.1177/019263659507957503
- Booher-Jennings, J. (2008). Learning to label: Socialisation, gender, and the hidden curriculum of high-stakes testing. *British Journal of Sociology of Education, 29*(2), 149-160. doi: 10.1080/01425690701837513
- Borman, G. D., & Overman, L. T. (2004). Academic resilience in mathematics among poor and minority students. *The Elementary School Journal, 104*(3), 177-195. doi 10.1086/499748

- Brennan, R. T., Kim, J., Wenz-Gross, M., & Siperstein, G. N. (2001). The relative equitability of high-stakes testing versus teacher-assigned grades: An analysis of the Massachusetts comprehensive assessment system (MCAS). *Harvard Educational Review*, 71(2), 173-216. Retrieved from <http://search.proquest.com/docview/212301951?accountid=12085>
- Calabrese, R. L., Hummel, C., & Martin, T. S. (2007). Learning to appreciate at-risk students. *The International Journal of Educational Management*, 21(4), 275-291.
doi:<http://dx.doi.org/10.1108/09513540710749500>
- Caraway, K., Tucker, C.M., Reinke, W. M., & Hall, C. (2003). Self-efficacy, goal orientation, and fear of failure as predictors of school engagement in high school students. *Psychology in the Schools*, (40), 417-427. doi: 10.1002/pits.1009
- Catt, S., Miller, D., & Schallenkamp, K. (2007). You are the key: Communicate for learning effectiveness. *Education*, 127(3), 369-377. Retrieved from <https://www.jstor.org/stable/3202948?seq=1>
- Chetty, R., Friedman, J. N., & Rockoff, J. E. (2011). *The long-term impacts of teachers: Teacher value-added and student outcomes in adulthood*. (Harvard Educational Review, working paper No. 17699). doi: 10.3386/w17699
- Cokley, K., McClain, S., Jones, M. & Johnson, S. (2011). A preliminary investigation of academic disidentification, racial identity, and academic achievement among African American adolescents. *The High School Journal*, 95(2), 54–68. doi:10.1353/hsj.2012.003
- Cole, N. S. (1997). The ETS gender study: How males and females perform in educational settings. *Educational Testing Service* (143), 2-37. Retrieved from <http://files.eric.ed.gov/fulltext/ED424337.pdf>

- Coleman, J. (1998), Social capital in the creation of human capital, *American Journal of Sociology*, Vol. 94 (supplement), S95-S120.
- Coley, R. J. (1995). *Dreams deferred: High school dropouts in the United States*. Princeton, NJ: Educational Testing Service, Policy Information Center.
- Corringer, R. and Lee, V. (2001). Social capital and dropping out of high school: Benefits to at-risk students of teachers' supports and guidance. *Teachers-College-Record*, 103(4), 548-581.
- DeBolt, M. E., Pasley, B. K., & Kreutzer, J. (1990). Factors affecting the probability of school dropout: A study of pregnant and parenting adolescent females. *Journal of Adolescent Research*, 5, 190-205. doi: 10.1177/074355489052006
- Diamond, J. B. (2007). Where the rubber meets the road: Rethinking the connection between high-stakes testing policy and classroom instruction. *Sociology of Education*, 80(4), 285-313. doi: 10.1177/003804070708000401
- Dobransky, N. D., & Frymier, A. B. (2004). Developing teacher-student relationships through out of class communication. *Communication Quarterly*, 52(3), 211-223. doi: 10.1080/01463370409370193
- Donlevy, J. (2001). High-stakes environments and effective student-teacher relationships: Some lessons from special education. *International Journal of Instructional Media*, 28(1), 1. Retrieved from <http://educatorandcurricularoles.wikispaces.com/file/view/High-stakes+environments+and+effective+student-teacher+relationships+Some+lessons+from+special+education.pdf>
- Downey, J. A. (2008). Recommendations for fostering educational resilience in the classroom. *Preventing School Failure*, 53(1), 56-64. doi: 10.3200/PSFL.53.1.56-64

- Dryfoos, J.G. (1998). *Safe Passage: Making it through adolescence in a risky society*. New York: Oxford University Press.
- Edsource, (2013). *U.S. scores stagnant, other nations pass us by in latest international test*. Retrieved from <http://edsource.org/2013/u-s-scores-stagnant-other-nations-pass-by-in-latest-international-comparison/52052>
- Entwisle, D. R., & Alexander, K. L. (1988). Factors affecting achievement test scores and marks of Black and White first graders. *Elementary School Journal*, 88, 449-471. doi: 10.1086/461550
- Faranda, W. T., & Clarke, I. I. (2004). Student observations of outstanding teaching: Implications for marketing educators. *Journal of Marketing Education*, 26(3), 271-281. doi: 10.1177/0273475304268782
- Fletcher, E.C., Jr, & Cox, E. D. (2012). Exploring the meaning African American students ascribe to their participation in high school career academies and the challenges they experience. *The High School Journal*, 96(1), 4-19. Retrieved from <http://search.proquest.com/docview/1315304102?accountid=12085>
- Frisby, B. N., & Martin, M. M. (2010). Instructor-student and student-student rapport in the classroom. *Communication Education*, 59(2), 146-164. doi:10.1080/03634520903564362
- Frisby, B. N., & Myers, S. A. (2008). The relationships among perceived instructor rapport, student participation, and student learning outcomes. *Texas Speech Communication Journal* 33(1), pp. 27-34.
- Frymier, A. B., & Houser, M. L. (2000). The teacher-student relationship as an interpersonal relationship. *Communication Education*, 49(3), 207-219. doi: 10.1080/03634520009379209

- Furda, M. (2009). *The best leadership practices of principals in high performing and high poverty schools in Ohio*. (West Virginia University). ProQuest Dissertations and Theses, 135-n/a. Retrieved from:
<http://search.proquest.com/docview/305031913?accountid=12085>. (305031913).
- Gall, M.D., Gall, J.P., & Borg, W.R. (2007). *Educational research: An introduction* (8th ed.). Boston, MA: Pearson Education.
- Gardner, R. I., II, Cartledge, G., Seidl, B., & Woolsey, M. L. (2001). Mt. Olivet after-school program: Peer-mediated interventions for at-risk students. *Remedial and Special Education*, 22(1), 22. Retrieved from
<http://search.proquest.com/docview/236327609?accountid=12085>
- Gfeller, J. D., Lynn, S. J., & Pribble, W. E. (1987). Enhancing hypnotic susceptibility: Interpersonal and rapport factors. *Journal of Personality and Social Psychology*, 52(3), 586. doi: 10.1037/0022-3514.52.3.586
- Goldsmith, P. (2004). Schools' racial mix, students' optimism, and the Black-White and Latino-White achievement gaps. *Sociology of Education*, 77(2), 121–147. doi: 10.1177/003804070407700202
- Gremler, D. D., & Gwinner, K. P. (2000). Customer-employee rapport in service relationships. *Journal of Service Research*, 3(1), 82-104. doi: 10.1177/109467050031006
- Grissmer, D., Flanagan, A., & Williamson, S. (1998). Why did the Black-White score gap narrow in the 1970s and 1980s? In C. Jencks & M. Phillips (Eds.) *The Black-White test score gap* (pp. 182-226). Washington, DC: Brookings Institute Press.
- Gulek, C. (2003). Preparing for high-stakes testing. *Theory into Practice*, 42(1), 42-50. Retrieved from: <http://www.jstor.org/stable/1477317>

- Guthrie, J. W., Ettema, E. A., Riddell, J. B. (2012). Public schools still have more money and employees per pupil than they did in 2000, but are now feeling a financial squeeze. *Education Next*, 12(4). Retrieved from <http://educationnext.org/public-schools-still-have-more-money-and-employees-per-pupil-than-they-did-in-2000-but-are-now-feeling-a-financial-squeeze/>
- Hammerness, K. (2004). Teaching with vision: How one teacher negotiates the tension between high ideals and standardized testing. *Teacher Education Quarterly*, 31(4), 33-43. Retrieved from <http://www.jstor.org/stable/23478649>
- Hart, B., Risley, T. R., & Kirby, J. R. (1997). Meaningful differences in the everyday experience of young American children. *Canadian Journal of Education*, 22(3), 323. Retrieved from <http://search.proquest.com/docview/215377356?accountid=12085>
- Hayes, D. (2010). Predicting parental home and school involvement in high school African American adolescents. *The High School Journal*, 94(4), 154–166. Retrieved from <https://www.jstor.org/stable/41236878>
- Horn, C. (2003). High-stakes testing and students: Stopping or perpetuating a cycle of failure? *Theory into Practice*, 42(1), 30-41. doi: 10.1207/s15430421tip4201_5
- Howard, T. C. (2008). Who really cares? The disenfranchisement of African American males in preK-12 schools: A critical race theory perspective. *Teachers College Record*, 110, 954-985.
- Hoyle, C. G., Marshall, K. J., & Yell, M. L. (2011). Positive behavior supports: Tier 2 interventions in middle schools. *Preventing School Failure*, 55(3), 164-170. doi: 10.1080/1045988X.2010.503975

- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling* 6(1)1–55. doi: 10.1080/1070551990954011
- Irvin, M. J., Meece, J. L., Byun, S., Farmer, T. W., & Hutchins, B. C. (2011). Relationship of school context to rural youth's educational achievement and aspirations. *Journal of Youth and Adolescence*, 40(9), 1225-1242. doi: 10.1007/s10964-011-9628-8
- Janisch, C., Akrofi, A., & Liu, X. (2012). Coming to know: One teacher widens and deepens her knowledge about struggling students. *Journal of Thought*, 47(1), 6-20,96-97. Retrieved from <http://journalofthought.com/wp-content/uploads/2015/04/06janischetal.pdf>
- Johnson, G. M. (1997). Perceptions of the effectiveness of interventions for at-risk students: A survey of inner-city school administrators. *Canadian Journal of Education*, 22(4), 445. doi: 10.2307/1585794
- Jorgenson, J. (1992). Social approaches: Communication, rapport, and the interview: A social perspective. *Communication Theory*, 2, 148-156.
- Kamisha, S. G., & Beadle-Brown, J. (2006). Defining and measuring rapport: Implications for supporting people with complex needs. *Tizard Learning Disability Review*, 11(3), 21-30. doi: <http://dx.doi.org/10.1108/13595474200600024>
- Kao, G. & Thompson, J. (2003). Racial and ethnic stratification in educational achievement and attainment. *Annual Review of Sociology*, 29(1), 417–442. doi: 10.1146/annurev.soc.29.010202.100019

- King, M. D. (2006). Assessment in support of conceptual understanding, student motivation to learn science. In M. McMahon, R. Simmons, R. Sommers, D. DeBaets, & F. Crawley (Eds.), *Assessment in science: Practical experience and education research* (pp. 31-39). Arlington, VA: NSTA Press.
- Knesting, K. (2008). Students at risk for school dropout: Supporting their persistence. *Preventing School Failure*, 52(4), 3-10. doi: 10.3200/PSFL.52.4.3-10
- Knight, C. R. (2008). *The effects of high-stakes testing on teacher accountability*. (Order No. 3316096, Capella University). *ProQuest Dissertations and Theses*, 138-n/a. Retrieved from <http://search.proquest.com/docview/89250809?accountid=12085>. (89250809).
- Land, A., Mixon, J. R., Butcher, J., & Harris, S. (2014). Stories of six successful African American males high school students: A qualitative study. *National Association of Secondary School Principals. NASSP Bulletin*, 98(2), 142-162. doi: 10.1177/0192636514528750
- Li-Fang, Z. (2004). Thinking styles: University students' preferred teaching styles and their conceptions of effective teachers. *The Journal of Psychology*, 138(3), 233-52. doi: 10.3200/JRLP.138.3.233-252
- Linek, W. M., Sampson, M. B., Gomez, K. A., Linder, P. E., Torti, C., Levingston, C., & Palmer, J. (2009). Middle school alternatively certified science teachers: Resources, teacher choices, and student achievement. *The Journal of Educational Research*, 102(6), 403-412,480. doi: <http://dx.doi.org/10.3200/JOER.102.6.403-414>
- Loehlin, J.C., Lindzey, G., & Spuhler, J. N. (1975). *Race differences in intelligence*. San Francisco: Freeman.

- Loughran, J. (2013). Pedagogy: Making sense of the complex relationship between teaching and learning. *Curriculum Inquiry*, 43(1), 118-141. doi: 10.1111/curi.12003
- Madaus, G., & Clark, M. (2001). The impact of high stakes testing on minority students. M. Kornhaber & G. Orfield (Eds.). Raising standards or raising barriers: Inequality and high stakes testing in public education (pp. 83-121). CH: University of Chicago Press.
- Marchant, G. J. (2004). What is at stake with high stakes testing? A discussion of issues and research. *The Ohio Journal of Science*, 104(2), 2-7. Retrieved from <http://hdl.handle.net/1811/25124>
- Maryland High School Assessments, Maryland State Department of Education (2014). *Maryland high school assessment and modified high school assessment 2013 technical report*. Retrieved from http://www.marylandpublicschools.org/msde/divisions/planningresultstest/2013HSA_Mo dHSA/Maryland_2013_Tech_Report_04_03_14.pdf
- McLaughlin, D. M., & Carr, E. G. (2005). Quality of rapport as a setting event for problem behavior: Assessment and intervention. *Journal of Positive Behavior Interventions*, 7(2), 68-91. doi: 10.1177/10983007050070020401
- Miller, P. (2011). *Theories of developmental psychology* (5th ed.). NY: Worth.
- Moon, T. R. (2009). Myth 16: High-stakes tests are synonymous with rigor and difficulty. *The Gifted Child Quarterly*, 53(4), 277-279. doi: 10.1177/0016986209346945

- Mora, R. (2011). "School is so boring": High-stakes testing and boredom at an urban middle school. *Penn GSE Perspectives on Urban Education*, 9(1), 1-10. Retrieved from <http://www.urbanedjournal.org/archive/volume-9-issue-1-fall-2011/school-so-boring-high-stakes-testing-and-boredom-urban-middle-sch>
- Mottet, T. P., Frymier, A. B., & Beebe, S. A. (2006). Foundations of instructional communication. In T.P. Mottet, V. P. Richmond, & J. C. McCroskey (Eds.), *Instructional communication: Rhetorical and relational perspectives* (pp. 3-27). Boston: Allyn & Bacon.
- Myerson, J., Rank, M.R., Raines, F. Q., & Schnitzler, M.A. (1998). Race and general cognitive ability: The myth of diminishing returns to education. *Psychological Science*, 9, 139-142. doi: 10.1111/1467-9280.00026
- Newsome, W. S. (2005). The impact of solution-focused brief therapy with at-risk junior high school students. *Children & Schools*, 27(2), 83-90. doi: <https://doi.org/10.1093/cs/27.2.83>
- No Child Left Behind Act of 2001, P.L. 107-110, 20 U.S.C. § 6319 (2001)
- Nunn, G. D., & Parish, T. S. (1992). The psychological characteristics of at-risk high school students. *Adolescence*, 27, 435-439. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/1621573>
- Nussbaum, J. F., & Scott, M. D. (1980). Student learning as a relational outcome of teacher-student interaction. In D. Nimmo (Ed.), *Communication yearbook 4*(pp. 553-564). New Brunswick, NJ: Transaction Books.
- O'Brien, K. M., Dukstein, R. D., Jackson, S. L., Tomlinson, M. J., & Kamatuka, N. A. (1999). Broadening career horizons for students in at-risk environments. *The Career Development Quarterly*, 47(3), 215-229. doi: 10.1002/j.2161-0045.1999.tb00732.x

- Paige, R. (2006). No child left behind: The ongoing movement for public education reform. *Harvard Educational Review*, 76(4), 461-473,727. doi: <http://dx.doi.org/10.17763/haer.76.4.0016r66937737852>
- Parayitam, S., Desai, K., & Phelps, L. D. (2007). The effect of teacher communication and course content on student satisfaction and effectiveness. *Academy of Educational Leadership Journal*, 11(3), 91-105. Retrieved from <http://ezproxy.liberty.edu/login?url=http://search.proquest.com.ezproxy.liberty.edu/docview/214233009?accountid=12085>
- Pawlas, G. E. (2006). Making sense of methods in the classroom: A pedagogical presence. *Choice*, 43(11), 2046. doi: <http://dx.doi.org/10.1590/S1518-76322009000100005>
- Phillips, M. (2006). Standardized tests aren't like T-shirts: One size doesn't fit all. *Multicultural Education*, 14(1), 52-55. Retrieved from <http://search.proquest.com/docview/216509611?accountid=12085>
- Petegem, K. V., Creemers, B.P.M., Rossel, Y., & Aelterman, A. (2005). Relationships between teacher characteristics, interpersonal teacher behavior and teacher wellbeing. *The Journal of Classroom Interaction*, 40(2), 34-43. Retrieved from http://lib.ugent.be/fulltxt/RUG01/001/269/825/RUG01-001269825_2010_0001_AC.pdf
- Preves, S., & Stephenson, D. (2009). The classroom as stage: Impression management in collaborative teaching. *Teaching Sociology*, 37(3), 245-256. doi: 10.1177/0092055X0903700303
- Rebhorn, L. S., & Miles, D. D. (1999). High-stakes testing: Barrier to gifted girls in mathematics and science? *School Science and Mathematics*, 99(6), 313-319. doi: 10.1111/j.1949-8594.1999.tb17490.x

- Riffert, F. (2005). The new accountability: High schools and high-stakes testing. *The Journal of Educational Thought*, 39(3), 333-336. Retrieved from <http://search.proquest.com/docview/213797786?accountid=12085>
- Rutter, M., Maughan, B., Mortimore, Oustan, J., & Smith, A. (1979). *Fifteen thousand hours*. MA: Harvard University Press.
- Scot, T. P., Callahan, C. M., & Urquhart, J. (2009). Paint-by-number teachers and cookie-cutter students: The unintended effects of high-stakes testing on the education of gifted students. *Roeper Review*, 31(1), 40-52. doi: 10.1080/02783190802527364
- Scott, C. (2012). The enduring appeal of 'learning styles'. *Australian Journal of Education*, 54(1), 5-17. doi: 10.1177/000494411005400102
- Skiba, R. J., Simmons, A. B., Ritter, S., Gibb, A. C., Rausch, M. K., Cuadrado, J., & Chung, C. (2008). Achieving equity in special education: History, status, and current challenges. *Exceptional Children*, 74(3), 264-288. Retrieved from <http://sped461.pbworks.com/f/skiba+2008.pdf>
- Somers, C. L., Owens, D., & Piliawsky, M. (2009). A study of high school dropout prevention and at-risk ninth graders' role models and motivations for school completion. *Education*, 130(2), 348-356. Retrieved from <http://www.futurescholars.rutgers.edu/FutureScholars/Images/A%20study%20of%20High%20School%20Dropout%20Prevention.pdf>
- Suh, S., & Suh, J. (2007). Risk factors and levels of risk for high school dropouts. *Professional School Counseling*, 10(3), 297-306. doi: <http://dx.doi.org/10.5330/prsc.10.3.w26024vww6541gv7>

- Tarulli, L. (2004). Taking the leadership initiative: How you can fight the budget cut battle. *School Libraries in Canada*, 24(3), 39-46. Retrieved from <http://search.proquest.com/docview/222536549?accountid=12085>
- Templin, M. A. (2008). Making problematic standardized assessment for teacher accountability: Using political theory to guide science teacher education research. *Journal of Science Teacher Education*, 19, 413-416. doi:<http://dx.doi.org/10.1007/s10972-008-9107-6>
- Thompson, G. L. (2007). *Up where we belong: Helping African American and Latino students rise in school and in life*. San Francisco: Jossey Bass.
- Thompson, G. L., & Allen, T. G. (2012). Four effects of the high-stakes testing movement on African American K-12 students. *The Journal of Negro Education*, 81(3), 218-227, 301-302. Retrieved from <http://search.proquest.com/docview/1237499637?accountid=12085>
- U.S. Department of Education. (2004). *No Child Left Behind Act*. Retrieved from <http://www2.ed.gov/policy/elsec/leg/esea02/pg1.html#sec1001>
- van Veen, K., Slegers, P., & van de Ven, P. (2005). One teacher's identity, emotions, and commitment to change: A case study into the cognitive-affective processes of a secondary school teacher in the context of reforms. *Teaching & Teacher Education: An International Journal of Research and Studies*, 21(8), 917-934. doi: 10.1016/j.tate.2005.06.004
- Walker, B., Cheney, D., Stage, S., & Blum, C. (2005). Schoolwide screening and positive behavior supports: Identifying and supporting students at risk for school failure. *Journal of Positive Behavior Interventions*, 7(4), 194-204. doi: 10.1177/10983007050070040101

- Warikoo, N. & Carter, P. (2009). Cultural explanations for racial and ethnic stratification in academic achievement: A call for a new and improved theory. *Review of Educational Research*, 79(1), 366–394. doi: 10.3102/0034654308326162
- Watson, J.B. (1913). Psychology as the behaviorist views it. *Psychological Review*, 20, 158-177.
- Watson, J. B. (1924). *Behaviorism*. New York: Norton.
- Werner, E. (1990). Protective factors and individual resilience. In J. Shonkoff & S. Meisels (Eds.), *Handbook of early childhood intervention* (2nd ed.; pp. 97-116). New York: Cambridge University Press.
- Wilcox, K. & Angelis, J. (2010). High school best practices: Results from cross-case comparisons. *The High School Journal*, 95(1), 138–153.
- Wilson, D. S., Kauffman, R. A., & Purdy, M. S. (2011). A program for at-risk high school students informed by evolutionary science. *PLoS One*, 6(11)
doi:<http://dx.doi.org/10.1371/journal.pone.0027826>
- Wodtke, G. T., Harding, D. J., & Elwert, F. (2011). Neighborhood effects in temporal perspective: The impact of long-term exposure to concentrated disadvantage on high school graduation. *American Sociological Review*, 76(5), 713-736. doi: 10.1177/0003122411420816
- Wolf, S. A., Wolf, K. P., & Carpenter, M. (2002). Teaching true and to the test in writing. *Language Arts*, 79(3), 229-240. Retrieved from http://www.csun.edu/~krowlands/Content/Academic_Resources/Composition/writing_on_demand/Wolf-%20teaching%20true%20to%20the%20test.pdf

Woods, R., Badzinski, D. M., Fritz, J., & Yeates, S. E. (2012). The "ideal professor" and gender effects in Christian higher education. *Christian Higher Education, 11*(3), 158-176.

Retrieved from: <http://dx.doi.org/10.1080/15363759.2011.598378>

Young, L. E., Horan, S. M., & Frisby, B. N. (2013). Fair and square? An examination of classroom justice and relational teaching messages. *Communication Education, 62*(4), 333-351. doi: <http://dx.doi.org/10.1080/03634523.2013.800216>

APPENDIX A
SCHOOL DISTRICT PERMISSION

Calvert County Public Schools

Superintendent of Schools

htt

March 2, 2015

To Whom It May Concern:

Calvert County Public Schools has given Mr. Nathan Kimbro permission to conduct research for his dissertation. He will be conducting a correlational study involving perceptions of rapport and high stakes testing. Likert scale questionnaires and Biology HSA test scores will be utilized to determine correlational statistics. The research will be conducted at Huntingtown High School. Permission has been granted for the 2014-2015 school year.

All research will be conducted immediately following the Institutional Review Board's (IRB) guidelines including parental permission if applicable.

Sincerely,

Superintendent of Schools

c: Ms. Workman, Assistant Superintendent of Operations
Mr. Weber, Principal of Huntingtown High School

Tracy H. McGuire, President • Pamela L. Cousins, Vice President
Kelly D. McConkey • William J. Phalen, Sr. • James C. Platt • Alexya I. Brown, Student Member

APPENDIX B**IRB PERMISSION**

LIBERTY UNIVERSITY[®]

INSTITUTIONAL REVIEW BOARD

5/26/2016

Nathan Kimbro

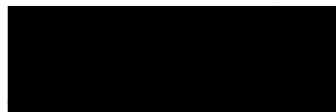
IRB Approval 2533.052616: Relationship Between Teacher-Student Rapport and High Stakes Testing Performance in Science

Dear Nathan Kimbro,

We are pleased to inform you that your study has been approved by the Liberty IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,



Administrative Chair of Institutional Research

The Graduate School

LIBERTY
UNIVERSITY[®]

Liberty University | Training Champions for Christ since 1971

APPENDIX C

PARENTAL CONSENT FORM

The Liberty University Institutional
Review Board has approved
this document for use from
5/26/2016 to 5/25/2017
Protocol # 2533.052616

PARENTAL CONSENT FORM

RELATIONSHIP BETWEEN TEACHER-STUDENT RAPPORT AND HIGH STAKES TESTING PERFORMANCE IN SCIENCE

Nathan S. Kimbro
Liberty University
School of Education

Dear parent/guardian, your student is invited to be in a research study involving whether or not teacher-student rapport is related to higher biology high school assessment scores. Your student was selected as a possible participant because he/she took the biology high school assessment last year. I ask that you read this form and ask any questions you may have before agreeing to allow your student to be in the study.

Nathan Kimbro, a doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information: The purpose of this correlational study is to evaluate students' teacher-student rapport and high stakes testing performance (in biology) among different student populations at the high school level.

Procedures: If you agree to allow your student to be in this study, I will ask your student to do the following things:

1. Your student will report to their regularly scheduled science class.
2. Their science teacher will hand out the Likert scale questionnaire that measures students' perceptions of rapport with their biology teacher from last year.
3. Your student will fill out the Likert scale questionnaire.
4. Your student will turn the Likert scale questionnaire in to their current science teacher when completed.
5. The entire process of filling out the Likert scale questionnaire should take no more than 5-10 minutes.
6. Your students' scores from their Likert scale questionnaire will be correlated to their biology HSA score to determine if a relationship exists between the two.

Note that all of the information from the Likert scale questionnaire will be kept confidential, meaning that I will know what data belongs to whom but will not disclose any identities.

Study Risk and Benefits: The only potential risk from this investigation for your student is a breach of confidentiality if the data is lost or stolen. In order to address this risk, the data will be kept in a locked file cabinet to which only the primary investigator will have a key.

The Liberty University Institutional
Review Board has approved
this document for use from
5/26/2016 to 5/25/2017
Protocol# 2533.052616

For the purposes of this study, your student is not expected to receive direct benefit(s) for completing the high school assessment or the Likert scale questionnaire. However, this study is significant and may produce important findings that could contribute to society for the following reasons. The fact that developing rapport between a teacher and a student involves a personal investment that requires little to no money positions this study as a logical avenue for identifying teacher strategies that can be effective for all educators. The findings of this study could help develop teachers into better educators if they understand how important of a role rapport plays in educating students. If rapport between teacher and student is found to be related to higher biology HSA scores, then educators can be professionally developed with rapport-building strategies. These strategies could in turn help build teacher-student rapport which could possibly increase test scores. This study aims at investigating the relationship(s) between teacher-student rapport and high stakes testing as they directly relate to the larger goals of producing positive members of society.

Compensation: There will be no compensation for participating in this study.

Confidentiality: The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify your student. Research records will be stored securely, and only the researcher will have access to the records. All data will be stored in a locked file cabinet where the primary investigator has a key. The data will be stored for no less than three years. Once three years have passed, all data will be destroyed by using a paper shredder.

Voluntary Nature of the Study: Your student's participation in this study is voluntary. Your decision whether or not to allow your student to participate will not affect your current or future relations with Liberty University. If you allow your child to participate, they are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions: The researcher conducting this study is Nathan S. Kimbro. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact him at (C) 443-532-2011 or email: natekimbro@yahoo.com. You may also contact the researcher's faculty advisor, Dr. Andrea Beam, at abeam@liberty.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd, Carter 134, Lynchburg, VA 24515 or email at irb@liberty.edu.

Notify the researcher if you would like a copy of this information to keep for your records.

Statement of Consent: I have read and understood the above information. I have asked any questions that I have and have received answers. I consent to participate in the study.

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN ADDED TO THIS DOCUMENT.)

Parent Name (Print)	Parent Signature	Date
---------------------	------------------	------

Student Name (Print)	Student Signature	Date
----------------------	-------------------	------