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"The Relationship Between Test Anxiety and Standardized Test Scores"

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COLLEGE OF EDUCATION

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2016

Abstract

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MA, Long Island University, 2002

BA, St. Joseph's College, 1994

Doctoral Study Submitted in Partial Fulfillment

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Abstract

The number of standardized achievement tests that students in the United States are required to take has increased significantly during the past decade. Researchers have found that test anxiety is often a problem related to the increase in testing. This correlational study investigated the relationship between anxiety levels of 50 4th grade students and their standardized test scores. Test anxiety questionnaires and pulse rates were used as a measure of the anxiety level of each of the 4th grade students just before the standardized test was administered, and standardized test scores were used as a measure of academic performance. The data were analyzed using 2 separate Pearson correlations. The first determined the relationship between students' responses on a test anxiety questionnaire and their academic test scores; the second correlation determined the relationship between students' pulse rates and their test scores. The results indicated a significant relationship between the students' levels of test anxiety as measured by pulse rate and performance on the New York State Standardized Science test, but no significant relationship between students' levels of anxiety as measured by the questionnaire. The findings of this study are important to school administrators, teachers, and parents because they could illuminate how test anxiety may impair students' academic performance on standardized tests and thereby mask their true abilities. This study has important implications for positive social change by providing research-based findings that could lead to the development of test anxiety prevention strategies at the local site.

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Dedication

This study is dedicated to anyone who has taken a standardized test and suffers from test anxiety. You are worth more than any test could measure.

Acknowledgments

First and foremost, I would like to thank God for health, energy, and determination to reach my goals.

I would like to thank my husband, Raymond, for his love and encouragement. Without his support, I never would have finished this journey.

I am grateful for my parents. My determination, perseverance, and work ethic come from them.

I would never have been able to finish my dissertation without the guidance of my committee chairs. Thank you to my friends, principal, and colleagues for being helpful and supportive throughout this process.

Lastly, I would like to thank all of my students. By finishing my doctoral studies, I showed them that learning never ends. You can accomplish any goal that you set your mind to!

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Section 1: Introduction to the Study

Introduction

Everywhere around the world, students face the challenge of coping with tests (Ringeisen, Buchwald, & Hodapp, 2010). The number of standardized achievement tests that students in the United States are required to take has increased in recent years (Cizek & Burg, 2006; Putwain, 2008; Segool, Carlson, Goforth, Von Der Embse, & Barterian, 2013; Von Der Embse & Hasson, 2012). Some states use the results to grant or withhold diplomas. Among them include Alabama, Florida, Georgia, Indiana, Louisiana, Maryland, Minnesota, Mississippi, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, South Carolina, Tennessee, Texas, and Virginia (Amrein & Berliner, 2003). Standardized testing has become the norm at every school in every state (Paul, 2013). Over the next few years, over 85% of students will take standardized tests in Math and English Language Arts. In part, this is due to the federal No Child Left Behind education law signed by President George W. Bush in 2001. The law requires 3rd through 8th graders to take annual reading and math tests. Standardized testing programs cost states $1.7 billion a year (Paul, 2013).

Poor performances on the standardized tests can have severe consequences (Gherasim & Butnaru, 2012; Paul, 2013; Von Der Embse & Hasson, 2012). When student achievement fails to meet certain standards individual teachers, as well as school and district administrators, are accountable for the students' performance (Duffy, Giordano, & Farrell, 2008; Segool, Carlson, Goforth, Von Der Embse, & Barterian, 2013; Wiliam, 2010). The No Child Left Behind legislation has repercussions

for schools. The test results are used to make important decisions about teachers' and principals' tenure, promotions, salary increases, contract renewal, and even school funding from the state (Mulvenon, Stegman, & Ritter, 2005). Specifically, schools that do not show adequate performance or demonstrate improvements in standardized test results may be closed after five consecutive years of inadequate progress. Districts want their students to do well. Many newspapers publish the results, and this creates competition among schools (Casbarro, 2005; Skybo & Buck, 2007).

The demands of standardized tests affect not only what is being taught in tested grades but also in non-tested lower grades. To better prepare students for standardized tests given in the upper grades, the curriculum in the lower grades has been changed. Emphasis is placed on academic skills at the expense of social, emotional, and physical goals for children (Madaus & Russell, 2010/2011).

The federal legislature that passed the No Child Left Behind law assumed that high-stakes tests would improve student motivation and raise achievement (Amrein & Berliner, 2003). However, research studies indicate that standardized tests adversely affect student motivation and may even result in more students not completing their academic requirements for a high school diploma (Amrein & Berliner; Cizek & Burg, 2006). Students who have anxiety about science standardized tests, for example, may not take science classes in high school and college and avoid careers in science (Paul, 2013). Students with test anxiety often have feelings of helplessness and powerlessness and low levels of self-worth (Abdi, Bageri, Shoghi, Goodarzi, & Hosseinzadeh, 2012).

Some people assume that rewards and consequences attached to standardized tests will "motivate the unmotivated" to learn (Amrein & Berliner, 2003, p. 32). However, researchers have found that when rewards are attached to performance on tests, students can actually become less motivated to learn and "less likely to engage in critical thinking" (Amrein & Berliner, 2003, p. 32). When it comes to tests that teachers view as high-stakes exams, they tend to take increased control of their students' learning experiences. This prevents the class from having the chance to control their own learning (Amrein & Berliner, 2003). Teachers no longer provide their students with opportunities to study subjects that may be of more interest to them. According to Sheldon and Biddle (1998), standardized tests are discouraging students from becoming lifelong, self-directed learners.

Test anxiety is defined as a feeling of uneasiness or apprehension before, during, or after a test because of worry or fear (Sapp, 1999; Shokrpour, Zareii, Zahedi, & Rafatbakhsh, 2011). Test anxiety affects people of all ages who have to be evaluated, assessed, and graded on their abilities or achievements (Lufi, Okasha, & Cohen, 2004). Test anxiety is an important factor in all academic levels - primary, secondary and tertiary (Akanbi, 2013; Hernandez, Menchaca, & Huerta, 2011). An estimated 10 million elementary and secondary students experienced test anxiety in the mid-1980s (Hill & Wigfield, 1984). Hill and Sarason (1966) suggested that in a typical classroom of 25 students, between one and three students were at risk for developing test anxiety, including students of average intelligence, students with learning disabilities, and even gifted students.

People differ in the levels of anxiety they experience (Betrams, Englert, & Dickhauser, 2013; Hernandez, Menchaca, & Huerta, 2011). A small amount of anxiety could be good. It acts as motivation and can increase achievement by pushing the students to do their best (Akanbi, 2013). On the other hand, too much anxiety can disturb mental skills that students need to be successful on tests (see Table 1; Casbarro, 2005, p. 29). Many students with test anxiety cannot concentrate on the test questions which, in turn, trigger poor performance on tests (Atasheneh & Izadi, 2012). "Anxiety has attested to be one of the important affective filters which relates to success and/or failure in learning" (Krashen, 1987, p. 31). Anxious children can perform below their true abilities (Paul, 2013; Ramirez & Beilock, 2011). Children who have episodes of anxiety which have never been diagnosed and treated can experience serious negative impact on their current and future academic achievement and development (Grover, Ginsburg, & Ialongo, 2007). Test anxiety has become one of the most troublesome factors in schools (Birenbaum & Nasser, 1994; Farooqi, Ghani, & Spielberger, 2012).

Many students with test anxiety have the fight-or-flight response. Consider the case when you are walking in a forest and you encounter a dangerous animal. Your body instinctively prepares to fight or flee. You run faster than you ever thought you could. You feel anxious. Your brain automatically associates your anxiety with danger. Your body automatically reacts as it would when confronted with any stressful situation. Taking a high stakes test can trigger the same emotions.

Table 1

Levels of Anxiety

Level	Characterized by
Low	Little emphasis on test preparation
	Limited time on reviewing content
	Test results not viewed as important
Optimal	Appropriate amount of test preparation
	Adequate levels of content review
	Test results viewed as important
High	Excessive emphasis on test preparation
	Constant preoccupation with upcoming test
	Massive time spent on studying (cramming)
	Test results viewed as extremely important

Note. Levels of anxiety. Adapted from *Test Anxiety & What You Can Do About It* (p.29), by J. Casbarro, 2005, New York: Dude Publishing.

Test anxiety can cause a variety of behaviors such as crying or vomiting and emotions such as worry, fear, stress, etc.; (a) it will cause some students to rush through tests in order to escape the unpleasant experience, (b) some students will refuse to complete any part of the test, and (c) others will quit after completing only a few problems (Rubenzer, 1988). "The 'fight or flight' response can lead to major changes in attitude and effort that include withdrawal, outbursts, overactive behaviors, fatigue, and avoidance of school" (Rubenzer, 1988, p. 3). Test anxiety could cause task avoidance, for

example, staring into space and playing with a pencil. Students who commit these off-task behaviors distract themselves from the task and thus impair their performance (Brown, 1999; Damer & Melendres, 2011).

Williams (1976) discovered that anxious children who have some history of success will do slow, cautious, accurate, on–task work. Unfortunately, they receive low scores because they do not finish the test. Hill and Easton (1977) found that under time pressure, high-anxious children perform poorly. They take twice as much time and make three times as many errors as low-anxious students.

Test scores are often used for grade promotion, admission to an educational program, or job placement (Casbarro, 2005; Salend, 2012; Wiliam, 2010). Pressure to do well is being placed on students by their parents, teachers, peers, and themselves (Chen, 2012; Cizek & Burg, 2006; Damer & Melendres, 2011). This concern about test anxiety is not only prevalent among professional teachers but parents and administrators as well (Cizek & Burg, 2006). Students may feel pressure due to the time limits or the testing location. It could become so severe in some students that it interferes with their ability to learn and to take tests.

Not only does test anxiety lead to school failure, but also to poor self-esteem and stress-related physical ailments (Austin & Partridge, 1995; Damer & Melendres, 2011; Huberty, 2010). Some students will complain of stomachaches and headaches. Some may actually vomit. Difficulty sleeping is common (Paul, 2013; Walker, 2000). Some may perspire or experience short term ailments such as tense muscles and a rapid heartbeat (Salend, 2012; Vitasari, Wahab, Othman, & Awang, 2010). Others will express their

fears of failure and be reluctant to attend school. Students with test anxiety may have difficulty organizing their thoughts or reading and understanding the test questions. They may do poorly on the exam even though they know the material (Amiri & Ghonsooly, 2015).

It is important for students to receive help for their test anxiety when they are young. According to Hill and Wigfield (1984), anxiety can become more troublesome as students advance into the upper grade levels. Stress that is not treated can lead to poor academic performance, emotional issues, misbehavior, and even more serious issues such as drug use, health issues, and even suicide.

According to Barth (2001), the teacher plays a major role in determining a student's achievements, perhaps more than anything else. When students sense that their teacher is anxious or stressed about testing, their anxiety increases (Hernandez, Menchaca, & Huerta, 2011). Therefore, teachers should provide a calm and safe learning environment and instill a love of learning in their students. Learning should be fun, creative, and exciting, and it should be measured in many different ways. Children should want to go to school and leave their fears and anxieties outside of the classroom. Students' talents and strengths should be nurtured. Their self-esteem and motivation should increase. To accomplish this, teachers should not teach to the test but use a variety of learning theories including multiple intelligences. Professional development should be provided for all teachers so they are familiar with the standardized tests, test taking strategies, and relaxation techniques. The No Child Left Behind legislation specifically mentions professional development as a factor in improving student learning

(Zimmerman & May, 2003). This type of professional development should lead to an increase in the students' self-esteem, motivation, and test scores. Teachers can promote family involvement by giving parents information about test anxiety, assessment practices, and ways to encourage a child to study effectively and to use test taking strategies (Salend, 2012). Teachers can assess test anxiety by observing students during tests and interviewing them about their feelings (Salend, 2012).

Problem Statement

Due in part to an increase in educational accountability and the frequency of standardized tests, there has been an increased prevalence of test anxiety among students (Putwain, 2008). Test anxiety can affect any student, regardless of gender, ethnicity, socio-economic status, grade level, and intellectual capacity. It can affect students' performance on standardized tests (Vitasari, Wahab, Othman, & Awang, 2010).

Nature of the Study

Test anxiety research has been conducted using high school and college students. This study focused on elementary school children since there is not as much research on this population. This study examined the relationship between test anxiety and standardized test scores. The participants were fourth graders in a suburban elementary school in New York. Fourth graders in New York take three standardized tests. This study focused on the science standardized test. There are many studies focusing on test anxiety and mathematics (Bailey & Montagano, 2012; Devine, Fawcett, Szucs, & Dowker, 2012), reading (Tsai & Li, 2012), social studies (Ryan & MacMillan, 1970), and even physical education (Barkoukis, Rodafinos, Koidou, & Tsorbatzoudis, 2012).

However, test anxiety and science have not been the subject of current research studies. Data were quantitatively analyzed using a Pearson correlation to determine whether anxiety is related to students' standardized test performance.

Research Question and Hypotheses

This study was based on the following research question: Is there a relationship between students' levels of anxiety and their New York State Standardized Science test scores?

$H_0{}^1$: There is no significant relationship between students' levels of test anxiety as measured by pulse rate and performance on the New York State Standardized Science test.

$H_A{}^1$: There is a significant relationship between students' levels of test anxiety as measured by pulse rate and performance on the New York State Standardized Science test.

$H_0{}^2$: There is no significant relationship between students' levels of test anxiety as measured by a test anxiety questionnaire and performance on the New York State Standardized Science test.

$H_A{}^2$: There is a significant relationship between students' level of test anxiety as measured by a test anxiety questionnaire and performance on the New York State Standardized Science test.

Purpose

The purpose of this quantitative study was to investigate the influence that test anxiety has on the New York State Standardized Science test scores. Standardized test

scores are frequently used as a metric in evaluating a student's level of academic success. The results of the research study may be important to school administrators, teachers, and parents in understanding how anxiety can influence a student's performance on standardized tests. The independent variable in the study was the test anxiety levels of the participants. The dependent variable was the standardized test scores. The two variables were compared to determine the existence and nature of the relationship between test anxiety and standardized test performance.

<div align="center">**Theoretical Basis for Study**</div>

The effects of test anxiety on performance were first explained by the Yerkes-Dodson law in 1908 (Buchwald, 2010). Although quite old, it has held up through numerous studies (Buchwald, 2010; Chen, 2012). The relationship between anxiety and performance can be described in a bell curve (see Figure 1; Abdi, Bageri, Shoghi, Goodarzi, & Hosseinzadeh, 2012; Chen, 2012). Figure 1 plots Memory Efficiency on the vertical axis versus Stress Level on the horizontal axis. As stress level increases, memory efficiency approaches an optimum level (peak of curve) at moderate stress levels. As the stress level increases further to a high level, anxiety becomes counterproductive and can lead to distress and diminish the ability to function (Buchwald, 2010). Performance can decrease when anxiety is too high or low (Chen, 2012; Tsai & Li, 2012). In addition to the negative emotional experience associated with test anxiety, high-test-anxious individuals also frequently experience a decrease in test performance (Zeidner, 1998). Hill and Wigfield (1984) researched the levels of anxiety and the causes and consequences of anxiety in evaluative school settings. They showed that when anxious

students worked with their school's professional counselors, test performance can actually improve. Other researchers found that anxiety is negatively related to academic achievement (Akanbi, 2010; Keogh, Bond, French, Richards, & Davis, 2004; Newbegin & Owens, 1996; Sapp, 1999; Tse & Pu, 2012).
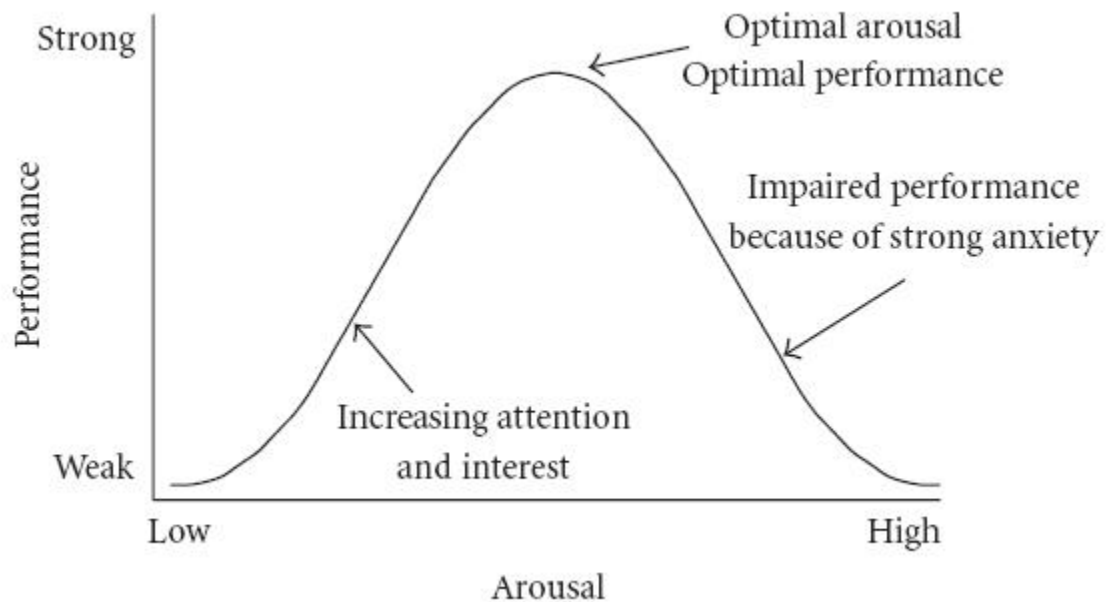
Figure 1. Yerkes-Dodson Law showing the relationship between performance level and stress level. From "The relation of strength of stimulus to rapidity of habit-formation," by R. M. Yerkes and J. D. Dodson, 1908, *Journal of Comparative Neurology and Psychology*, 18, p. 459-482. Adapted with permission of the publisher.

As anxiety increases, performance is expected to decrease (Shokrpour, Zareii, Zahedi, & Rafatbakhsh, 2011; Tse & Pu, 2012; Zeidner, 1998). This effect has been noticed for many years. For example, in 1952, Mandler and Sarason found that test scores can be adversely affected by elevated levels of test anxiety, while test scores can actually increase for students who demonstrate low levels of anxiety. They found that irrelevant

thinking and increased worry impaired conscious thought and inhibited performance (Cassady, 2004; Damer & Melendres, 2011). Time pressure and grade expectations may also increase anxiety. According to Zeidner (1998), when students are required to complete an exam within a certain time constraint, their stress level increases, and the effect of anxiety on test performance is exacerbated. The more difficult the task, the more anxiety will affect performance (Burns, 2004). Students with high levels of anxiety lack focus and attention during a test. They have difficulty encoding, organizing, storing information, and retrieving information effectively (Cassady, 2004). Their study strategies and skills may be ineffective. Poorer preparation leads to higher anxiety. Therefore, test scores are low. "Even when students with high test anxiety possess efficient study skills, they still suffer from anxiety blockage, fail to handle stress in evaluative situations, and thus find it difficult to retrieve relevant information during an exam" (Tse & Pu, 2012, p. 261). Due to the anxiety, many students' grades may not accurately reflect their knowledge which invalidates the test (Shobe, Brewin, & Carmack, 2005).

Definitions

No Child Left Behind Law: A law signed by President George W. Bush in 2001 that states all students can and should achieve at high levels (Casbarro, 2005).

Standardized test: A test developed by a state that is designed to measure achievement or performance (Mulvenon, Stegman, & Ritter, 2005).

Test anxiety: A feeling of uneasiness or apprehension before, during, or after a test because of worry or fear (McDonald, 2001).

Test anxiety inventory: A scale developed to measure individual differences in test anxiety (Taylor & Deane, 2002).

Yerkes-Dodson Law: An inverted U shaped relationship between test anxiety and performance (Chen, 2012).

Scope and Delimitations

This study was limited to 50 4th grade students enrolled in a suburban, public elementary school. The students' intellectual abilities ranged from learning disabled to gifted. The study was limited to a New York State science standardized test administered to all 4th grade students in the state. Anxiety levels of the students were determined by data collected through questionnaires and pulse rates during the time the test was administered. This study does not take into account their socio-economic backgrounds nor their racial or ethnic backgrounds.

Limitations

Among the study's limitations include:

1. The study was limited to students in one public school in New York.

2. The sample size was relatively small.

3. The participants were only 4th graders.

4. There were only three 4th grade classes in this school.

5. The participants were limited to middle class families living in the suburbs.

6. This study was based partially on standardized test scores which indicate academic performance at a specific point in time.

7. The quality and honesty of the participants' responses on the questionnaire could not be controlled or verified.

Assumptions

When the data were collected, it was assumed that the students would read the questionnaire, interpret the questions, and answer them correctly. The students should have been able to take their pulse rates using a finger tip pulse rate monitor after practicing before the day of the test. The practice session helped insure that any anxiety exhibited by a student on the day the standardized test was taken was most likely not due to the pulse rate testing.

Significance of the Study

It was expected that the results of this study would contribute to the knowledge in the field of elementary education. Most of the current test anxiety studies focus on undergraduate college students (Sapp, 1996). Knowing how test anxiety and standardized test performance are related could help improve teachers', administrators', and parents' understanding of test anxiety. It could help them become more aware of the external and internal factors that affect standardized test scores. This study provided information about test anxiety that will allow administrators and teacher leaders to lead schools to excellence. It is expected to generate social change by leading to changes in curriculum and instructional strategies. The results could also aid in the development of prevention and intervention programs, which, in turn, could decrease test anxiety and increase students' success.

Summary

This quantitative study compared the anxiety levels and standardized test scores of 50 4th graders in a public elementary school in New York. The students' abilities ranged from learning disabled to high ability. I used data from a test anxiety questionnaire consisting of true/false questions and pulse rates taken before a standardized test. The questions on the survey coupled with the pulse rates were used to assign an anxiety level for each student. The data that I collected and the standardized test scores obtained from the principal were analyzed using a Pearson correlation to determine whether the anxiety was related to students' standardized test performance.

Section 2: Literature Review

Introduction

This study consists of five sections: Introduction; Review of Literature; Methodology; Presentation and Analysis of Data; and Summary, Conclusions, Recommendations, and Commentary. Each section is divided into subsections that describe, explain, and summarize the research.

Test anxiety is clearly becoming more prevalent in our society. According to Cizek and Burg (2006, p. 8), "unfortunately, just as the potential for and concern about test anxiety has increased, so has the confusion about what test anxiety is, what causes it, who is affected, and what can be done about it. There is much misunderstanding about test anxiety". For example, (a) test anxiety can occur even in low stakes situations when students take minor tests, and (b) it is not the normal nervousness that people feel during a test. This section will give a description of test anxiety, explain its history, name some factors that may affect test anxiety, and describe how the effects manifest themselves.

Search Strategy

It is important to choose the right resources to collect information for a study. Databases, library catalogues, and Internet search engines can be used for a literature search. I used multiple education databases including ERIC, Academic Search Complete, Education Research Complete, Primary Search, PsycArticles, and Teacher Reference Center on EBSCOhost. Keywords searched were tests, testing, standardized tests, history of testing, test anxiety, test anxiety in elementary schools, and science anxiety.

History of Testing

It is not known for sure when or where the first formal test was given (Christmann & Badgett, 2008). About 500 BC in Greece, an educational system began in which children were tutored at home or attended a military school (Christmann & Badgett). Around 200 BC, the Chinese government gave civil service exams to Chinese citizens. The success on these tests resulted in a job in the administrative system of the Chinese government and a change in social status (Christmann & Badgett, 2008; Madaus & Kellaghan, 1993; Madaus & Russell, 2010/2011). Written exams began in Jesuit schools in Europe in the 16th century. Foucault, a French philosopher/socialist, saw this as "the beginning of a pedagogy that functions as a science" (Madaus & Kellaghan, 1993).

> Through the test, the teacher, and later the policymaker defined what was expected of students, and the test in turn forced students to reveal periodically how their learning was progressing. The written examination guaranteed the movement of knowledge from the teacher to the pupil, but it extracted from the pupil knowledge destined and reserved for the teacher, thus becoming a mechanism for exercising power over the pupil. (Foucault, 1977, p. 187).

In the United States, there is a long history of student testing. During the colonial period, from about 1680 to 1776, a formal education was reserved for wealthy families (Christmann & Badgett, 2008). Reading and reciting were the main methods of assessing academic achievement. Ranking was introduced around 1750. The test scores the examinees obtained on the written as well as oral questions were ranked from high grades to low grades (Madaus & Kellaghan, 1993). During the Civil War, the first nationwide

test was developed to find out students' progress. In 1845, Horace Mann introduced the essay exam in Boston public schools. This type of test spread to the rest of the country and became the main mode of testing for the rest of the century (Madaus & Kellaghan, 1993).

It was only by the 1930s that many schools were administrating the first standardized tests. Until the 1960s, standardized tests had little to do with state or federal policies (Madaus & Kellaghan, 1993). In the early 1960s, policymakers began to use results from standardized tests for information about the condition of American education (Madaus & Kellaghan, 1993). In the mid-1970s, test results were used for high-stakes decisions about promotion or retention and the allocating of funds to schools (Madaus & Kellaghan, 1993).

The number of tests given increased during the 1980s. The tests in the early 1980s did little to measure how much students were learning or how advanced their skills were (Walker, 2000). "The late 1980s saw the rise of assessment tied to accountability for student and school performance, although states were relying heavily on nationally published standardized tests, rather than assessments geared to individual state standards" (Walker, 2000, p. 5). "Today, testing is seen as essential to developing a world-class educational system, motivating the unmotivated, lifting all students to world-class standards, increasing the nation's productivity, and restoring global competitiveness" (Madaus & Russell, 2010/2011, p. 2). Currently, students in grades three through eight take annual standardized tests. This is due to the No Child Left Behind Act of 2001, a law that states all students can and should achieve at high levels. One purpose of standardized

tests is to measure the degree to which students learned content and to see how effectively instruction is being delivered (Cizek & Burg, 2006; Colwell, 2013). Due to the number of standardized tests, students' test anxiety has increased (Cizek & Burg, 2006; Segool, Carlson, Goforth, Von Der Embse, & Barterian, 2013).

History of Test Anxiety

Research on test anxiety has a long and rich history. Yerkes and Dodson studied the relationship between anxiety and performance in the early 1900s (McDonald, 2001). Interestingly, they believed that anxiety would be beneficial to performance. They found that it is doubtful that children will make an effort in preparing for a test or have motivation when taking the test when they lack fear of failure or encouragement to perform well on a test (McDonald, 2001). Therefore, they won't perform to their potential (McDonald, 2001). However, if children have high levels of anxiety before or during a test, they may not show their true abilities, thus impairing their performance (McDonald, 2001). Children under stress have a tendency to pay more attention to "emotionally threatening stimuli such as failure and mistake and less on the required task" (Mavilidi, Hoogerheide, & Paas, 2014, p. 720).

Mandler and Sarason (1952) conducted many studies on how test anxiety affects academic performance. The results of their study suggested that "anxiety present in the testing situation is an important variable in test performance" (Mandler & Sarason, 1952, p. 172). They also developed the Test Anxiety Questionnaire for adults and Test Anxiety Scale for Children. This test anxiety level is important to assess individual differences in test anxiety.

Sarason, Davidson, Lighthall, Waite, and Ruebush (1960) discovered in their research study that test anxiety can be influenced by the academic expectations parents place on their children. Children can sometimes become anxious during a test because they fear they will not meet their parents' expectations.

There were two major research contributions published during the 1960s and 1970s relating to test anxiety (Stober & Pekrun, 2004). The first publication compares transitory anxiety with stable anxiety personality traits (Cattell & Scheier, 1961). The second publication compares worry and emotionality - the two parts of anxiety (Liebert & Morris, 1967). There were many advances in test anxiety research in the 1970s and 1980s (Stober & Pekrun, 2004). Since 1952, there were 1,000 new scientific publications on test anxiety (Zeidner, 1988). "Much of test anxiety research over the past half century has been conducted to help shed light on the aversive effects of test anxiety on examinee performance, and these concerns have stimulated the development of a variety of therapeutic techniques and intervention programs" (Zeidner,1988, p. 5-6). Many of these research studies have provided useful insight into the possible causes and adverse effects of test anxiety.

After the 1980s the number of research publications relating to test anxiety begins to decline (Zeidner, 1998). Although the number of publications relating to test anxiety is on the decline research relating to anxiety, stress, and coping is continuing (Stober & Pekrum, 2004). Zeidner discussed Sarason's (1980) reasons why much interest has persisted over the years in pursuing studies on test anxiety. Evaluative stress situations

provide information about stress and a way of understanding how people cope with stress.

Current Research

Coping with test anxiety continues to be a major research topic. Current researchers are interested in proving and disproving theories about test anxiety from the past. There have been numerous advances including test anxiety research in cognitive psychology and the study of anxiety and cognition (Stober & Pekrun, 2004). For example, an issue that is being studied often is how test anxiety relates to attention, memory, learning, and performance (Stober & Pekrun, 2004). Other researchers have shown that anxious students typically need more time to complete an exam and make a greater effort to achieve the level of performance demonstrated by low anxious students (Mavilidi, Hoogerheide, & Paas, 2014).

Mori (1998) discovered that high levels of test anxiety interfered with test performance. Akanbi (2010); Keogh, Bond, French, Richards, and Davis (2004); Newbegin and Owens (1996); Sapp (1999); Segool, Carlson, Goforth, Von Der Embse, and Barterian (2013); Tse and Pu (2012); Unal-Karaguven (2015), and Von Der Embse and Hasson (2012) also found that anxiety and academic performance are negatively related. According to Lee, Anderson, and West (1969), anxiety interferes with problem solving performance. Research conducted by Blankstein and Flett (1992) found that test anxiety is significantly associated with a lack of self-confidence in the ability to solve problems. Wise, Roos, Plake, and Nebelsick-Gullett (1994) discussed this idea: "Does lowered anxiety serve to enhance test performance, or does test performance tend to

lower anxiety?" (p. 338). No significant difference in test performance or level of anxiety was found. Anxiety may increase if a student perceives a test to be difficult and anticipates he/she will fail the exam (Ponsoda, Olea, Rodriguez, and Revuelta, 2000).

Factors that May Affect Test Anxiety

Gender

Gender is one factor that may contribute to the development of test anxiety (Onyeizugbo, 2010; Unal-Karaguven, 2015).When comparing the test anxiety levels of males and females, females consistently scored higher than males (Akanbi, 2013; McDonald, 2001; Myers, 2008; Paul, 2013; Putwain, 2008; Zeidner, 1998). This may be due to females' greater willingness to report test anxiety symptoms (Hill & Sarason, 1966). Women are more uncomfortable and self-conscious in testing situations than men (Lewis & College, 1987). However, the effect of test anxiety on female students tends to be greatest in the middle school and early high school years and weakest in the early elementary years and college (Cizek & Burg, 2006).

Biology

From a biological perspective, test anxiety may be hereditary. "Some children have high levels of anxiety, making them more susceptible to the effects of being evaluated" (Huberty, 2010, p. 35).

> If biological factors are at play in the development of individual differences in test anxiety, they most likely interact with a wide array of environmental experiences and personality factors in determining an individual's manifest level of the construct. The development of test anxiety would best be conceptualized as the

joint interaction between an individual's biological vulnerability to respond to

social-evaluative threat in the environment and certain environmental experiences

which impact upon and further shape, develop, and maintain this propensity.

(Zeidner, 1998, p. 147).

Kagan and Snidman (1991) have provided evidence that anxiety may have strong

biological roots. However, "it is presently difficult to assess the exact role biological

factors play" (Zeidner, 1998, p. 147). Knowledge of a student's family medical history

could be useful in predicting or understanding the possible course of a student's anxiety

disorder.

Age

Age is another variable that affects test anxiety (McDonald, 2001). As cited by

McDonald (2001), studies conducted by King et al. (1989) and Ollendick, King, and

Frary (1989) showed that fear of failing a test increased with age in American and

Australian students. In studies that use specific test anxiety scales, anxiety levels typically

increase with age (Hill and Sarason, 1966; Hill & Wigfield, 1984). According to Cizek

and Burg (2006), test anxiety levels increase through the early grades, stabilize during the

middle school years, and begins to taper off when students enter high school. This could

be due in part to increasing demands and pressures for success from parents and teachers

and more challenging learning materials (Zeidner, 1998). Hill and Sarason (1966)

discussed how test anxiety increases during the elementary school years because of

increased pressures for achievement from parents and teachers. Teachers place greater

demands on children to be independent and responsible (Hill & Sarason, 1966). Araki

(1992) found an increase-decrease-increase pattern in Japanese children. Hernandez, Menchaca, and Huerta (2011) stated that "elementary students are anxious and angry about aspects of testing, including the length of the tests, extended testing periods, and not being able to talk for long periods of time" (p. 581). Elementary students are more likely to show physical signs while older students have behavioral symptoms of test anxiety (Whitaker Sena, Lowe, & Lee, 2007).

Socio-economic Status

Socio-economic status may affect test anxiety (Putwain, 2009). Children from lower socio-economic backgrounds and students who do not speak English as their native language experience more test anxiety (Hodge, McCormick, & Elliott, 1997). According to Sandeep (1977), as children's socio-economic levels decrease, their anxiety levels increase. Willig, Harnisch, Hill, and Maehr (1983) stated that the students who experience the greatest test anxiety are the ones on the borderline of socio-economic groups. Zeidner suggested that "due to the conflict between school and lower-class minority home cultures, lower-class students may experience more failure, frustration, and punitive experiences in schools than middle-class children, thus elevating their levels of test anxiety" (1998, p. 271). There are also differences in test anxiety in various ethnic groups in the United States. These are discussed in the next section.

Research conducted by Von Der Embse and Hasson (2012) indicated a similar level of test anxiety in both urban and suburban schools. Whether a student attends school in a large city or in a suburb does not seem to affect the rates of test anxiety (Von Der Embse & Hasson, 2012).

Race and Culture

Different races are affected differently by test anxiety (Zeidner, 1998). Cultural background influences the way students view and interact with tests (Madaus & Russell, 2010/2011). Although this dissertation focuses on students in the United States, classrooms are made up of children from different cultures such as Asian, African, and Latin American. It is useful to understand these cultural differences and how they may influence anxiety. Spinks and Moerdyk (1980) discussed how "cultural differences in anxiety scale scores depend on the fact that a given situation known to be anxiety provoking in one culture may not give rise to anxiety, or at least to very different forms of anxiety, in another culture" (p. 44). Students from culturally diverse backgrounds are likely to have test anxiety because of social, cultural, and psychological stress and beliefs they feel when their poor performance reinforces negative stereotypes about them (Salend, 2012). "Stereotype threat refers to a performance decline in a task due to the fear of confirming an existing negative stereotype about one's social, gender, or ethnic group" (Tse & Pu, 2012). Stereotype threat creates an imbalance between one's concept of self and one's expectation of success (Tse & Pu, 2012).

A study conducted by Willig, Harnisch, Hill, and Maehr (1983) showed that test anxiety's effects on test scores was less for Black than White children. However, in a study conducted by Hembree (1988), Black students in the elementary grades had more test anxiety than White students. Cizek and Burg (2006) also found that Black students may exhibit higher test anxiety than White students in the elementary grade levels, however, this difference decreases in middle school and is negligible in high school.

Other researchers have found that Black students may encounter distinctive developmental experiences in school and in communities which tend to increase their fear of evaluative situations, such as repeated academic failures, inordinate number of aversive encounters at school associated with punishments and criticism, and negative ethnic stereotypes. (Zeidner, 1998, p. 272).

Black students and other minority students such as Asian Americans have negative attitudes toward tests and acquire high levels of anxiety (Zeidner, 1998).

Latino students have more test anxiety than White students (Cizek & Burg, 2006; Paul, 2013). Hembree's (1988) study also shows that Latino students across grade levels show more test anxiety than White students.

Students in Mexico have higher levels of test anxiety than students in the United States (Cizek & Burg, 2006). This may be due to the fact "that a greater emphasis is placed on obedience to adult authorities in Mexican cultures and therefore evaluations and tests pose a greater threat to Mexican students, resulting in higher test anxiety" (Cizek & Burg, p. 73). Understanding the student's cultural background may help explain how such cultural differences influence his/her anxiety levels.

Zeidner (1998) and Chen (2012) stated that Asian-American students have high levels of test anxiety because of the Asian belief in the efficiency of effort and hard work. Zeidner extended this same observation to include Japanese students as well. "Given the importance of school achievement and test outcomes in Japanese culture, one would expect that test anxiety in Japanese students would be well above the normative level of students in other developed countries" (Zeidner, 1998, p. 279). According to Chen

(2012), Chinese children are more likely to feel more parental pressure than children in Western countries. Cultural background and cultural experiences can clearly contribute to anxiety exhibited by children.

Pressure, Subject, and Ability

The stress of academic excellence causes parental pressures on children to succeed (Chen, 2012; Gherasim & Butnaru, 2012; Walker, 2000). Some factors for cultural differences in test anxiety include the value of culture, the values that parents have, and the educational system including its homework load, emphasis on testing, and testing environment (Zeidner, 1998). According to Einat (2000), students who develop high standards for themselves and fear they cannot be successful in meeting their own standards can develop severe anxiety issues.

Researchers have studied the hypothesis that test anxiety is more likely to be experienced in some subjects than in others. The correlation between anxiety levels and achievement in reading, mathematics, natural science, and social science is negative and in the weak to moderate range (Cizek & Burg, 2006). At the college level, students are more anxious when taking mathematics or physical science tests than English and social science tests (Cizek & Burg, 2006; Nyroos & Wiklund-Hornqvist, 2011). "Test anxiety can be considered a major cause of students' low academic achievement and negative attitudes in science education" (Kurbanoglu & Nefes, 2015, p. 217). It is my opinion that higher test anxiety levels are associated with students' interests in the subject regardless of whether or not the subject area is truly more difficult. For example, those students who enjoy science and find it interesting are more likely to have less anxiety when taking a

science test than a student who is disinterested in that subject (Ali & Mohsin, 2013;

Kurbanoglu & Nefes, 2015).

Test anxiety affects students of all academic abilities. Students with above

average academic ability have the least test anxiety while students with below average

academic ability have the most test anxiety (Cizek & Burg, 2006). Cizek and Burg also

found that test anxiety levels are weakly associated with higher IQ scores. Silverstein,

Mohan, Franken, and Rhone (1964) found that test anxiety and intellectual performance

are inversely related (Sarason, 1963). Students exhibiting high levels of intellectual

performance experience lower levels of test anxiety. Hill and Sarason (1966) discovered

that students with high levels of test anxiety were two years below their classmates in

reading and math by the end of elementary school due to the anxiety they suffered.

Learning disabled children also experience higher levels of anxiety as well as depression

and low self-esteem (Datta, 2014; Lufi, Okasha, & Cohen, 2004). "Students with

disabilities may experience learned helplessness and feelings of stereotype threat, which

can have a negative effect on their attributions and expectations of their success and

failure and contribute to the development of test anxiety" (Putwain & Daniels, 2010,

p. 62).

Causes of Test Anxiety

Expectations

Sarason, Davidson, Lighthall, Waite, and Ruebush (1960) wrote that test anxiety

originated during preschool, when parents set unrealistically high achievement goals, test

anxiety developed from fear of parental rejection. Therefore, children developed low self-

esteem, dependency, and anxiety. Casbarro (2005) believed that from a child's earliest ages, parents establish an environment that either raises or lowers their child's anxiety. A lack of confidence in a specific subject or feelings of low self-worth can influence test anxiety. If a student tends to be very emotional in stressful situations, then he/she will have difficulty in testing situations (Casbarro, 2005).

Teachers and principals are putting pressure on students to do well. The more pressure that schools place on students to achieve high test scores, the greater the test anxiety levels will be (Casbarro, 2005). Teacher-student relationships are an important factor in test anxiety and its influence on school performance (Brown, 1999). A teacher's sincere support and interest in his/her students can reduce anxiety (Atasheneh & Izadi, 2012). According to Phillips, Beeman Pitcher, Worsham, and Miller (1980), teachers may respond differently to students with low and high levels of test anxiety in the ways they use instructional, disciplinary, and social cues.

Similarly, students may feel anxiety from other children. Students in second grade begin to compare achievements with their peers (Brown, 1996). As a result, they may feel competitive and want to perform better than others.

Other Causes of Test Anxiety

Other causes of test anxiety may include confusing test instructions. The questions on the test may be too complicated. The students may not be familiar with the test format, or they might have inadequate study skills.

Like anxiety, if a student's level of concern is too low, he/she would not be interested in learning and retaining the content that was taught. In turn, if the student's

level of concern is too high, the student might not be able to concentrate on the teaching or might become too anxious to remember the information for a test (Casbarro, 2005). Maladaptive forms of perfectionism are associated with test anxiety (Eum & Rice, 2011).

Test Format: Computerized vs. Paper and Pencil

Computerized tests are becoming more popular (Fritts & Marszalek, 2010). The advantages over paper and pencil tests include speed, flexibility, and efficiency (Zeidner, 1998). Similar to paper and pencil tests, the test taker can pause to look back and check over the work they have done. These tests may possess test anxiety reducing factors. Such tests produce a noncompetitive testing environment free from intimidating examiners and proctors and the opportunity to take the test at their own pace whenever they choose with greater control in the administration of the test (O'Neal & Richardson, 1977). Computerized tests benefit students with all levels of test anxiety (Rocklin & O'Donnell, 1987).

Computerized tests can record the test taker's response and how long the person took to make that response. "Analyses of item response times may lead to ways to address speededness issues, as well as methods for identifying and investigating test taker strategies" (Schnikpe & Scrams, 1999, p. 2). "Speededness refers to the extent to which time limits affect test takers' performance" (Schnikpe & Scrams, 1999, p. 5). Test takers engage in many pacing strategies. Some spend too much time on questions forcing them to guess on the remaining questions or not finish the test. Others maintain a uniform "speed throughout an examination, and others allocate time according to item difficulty"

(Schnikpe & Scrams, 1999, p. 2). "The anxiety level of the test taker also affects the response time" (Gonzalez-Espada & Bullock, 2007, p. 100).

Time constraints add pressure to test takers. Under time pressure conditions, highly anxious students perform poorly (Zeidner, 1998). "During tests, high anxious people need significantly more response time and greater effort to achieve the same performance level than low anxious people" (Mavilidi, Hoogerheide, & Paas, 2014, p. 720). The validity of a test decreases when such additional variables as time constraints are included (Scrams & Schnikpe, 1997).

Speed and accuracy are related. "Research shows that the relationship between speed and accuracy depends on the test context and content" (Schnikpe & Scrams, 1999, p. 10). A person's accuracy will decrease when he/she chooses to perform a task more quickly, and spending more time on a question increases the chances of getting a correct response (Schikpe & Scrams, 1999). "Speed (measured by the time to finish a test) is uncorrelated with test score on an untimed test, and time-limit scores (number correct after a given amount of time on a test) are comprised of both speed and level factors" (Schnikpe & Scrams, 1999, p. 8). As the time of a test begins to expire, the test taker may respond to questions after only minimal processing (rapid guessing). This type of responding provides little information about the test taker's ability (Scrams & Schnikpe, 1997).

On the other hand, computerized testing may have disadvantages for students with high levels of test anxiety in that it tends to increase test anxiety and consequently impairs performance (Zeidner, 1998). Students that are not computer literate may

experience more anxiety than experienced computer users. Ward, Hooper, and Hannafin (1989) found no difference in actual performance between paper and pencil tests and computerized tests. In their study, the students who took the computerized tests reported significantly higher levels of anxiety, and they thought that computerized tests were more difficult than paper and pencil tests. As cited by Bringsjord (2001), in a study conducted by Glowacki, McFadden, and Price (1995), 53% of their subjects experienced anxiety about taking a test on a computer.

Effects of Test Anxiety

Teachers have a tendency to report mostly the negative effects that testing has on students rather than emphasizing the positive effects (Cizek & Burg, 2006). Some of the effects are obvious and observable such as crying, becoming ill, or inappropriate behavior such as cheating. There are also more subtle effects that may have a long term impact on students such as academic motivation, students' attitude toward education, and on the students' self-esteem (Cizek & Burg, 2006). Test anxiety can reduce a student's effort or increase indifference towards tests. It can also cause poor self-esteem. According to Cizek and Burg (2006), test anxiety can decrease student motivation to learn. "As a person assumes a test to be more threatening, the more anxious and less confident he will be before the examinations" (Amiri & Ghonsooly, 2015, p. 855).

Research conducted by Hill and Sarason (1966) showed that students with high levels of test anxiety were over a year behind national norms, and students with low levels of test anxiety were a year ahead in math and reading. Students with test anxiety were two times more likely to be left back and have low grades on their report cards. Hill

and Sarason (1966) concluded from the results of their study, that children who show the greatest increases in anxiety have the smallest increases in test performance, and children who show the greatest decreases in anxiety show greater increase in performance. Thus, they found that anxiety and test performance had a negative correlation (Hill & Sarason, 1966).

Coping With Test Anxiety

Teaching students how to manage anxiety can be quite challenging and often may require a team effort. It is the responsibility of the teacher leader along with parents, principal, and school counselor to help students overcome test anxiety. Students with anxiety often have bad study habits and lack test taking skills (Bass, Burroughs, Gallion, & Hodel, 2002). In order to do well on tests, students need to know what to study and how to study. As such, students should be taught successful test taking strategies. Since students are unique, a variety of study strategies should be taught (Bass, Burroughs, Gallion, & Hodel, 2002). Such strategies may be beneficial to students by helping them relax, stay focused, and motivate them to achieve success on exams (Salend, 2011). "Students are more likely to be comfortable and relaxed during a test when they have greater confidence in their test taking skills" (Bass, Burroughs, Gallion, & Hodel, 2002, p. 28). Teachers can provide that greater confidence by helping students improve their memory skills by using model memory devices and provide examples for when to use these strategies (Bass, Burroughs, Gallion, & Hodel, 2002). Students can be trained to make efficient use of their study time (Motevalli, Roslan, Sulaiman, Hamzah, Hassan, & Garmjani, 2013). Some researchers contend that requiring students to take

exams will encourage them to study more, while others believe that by not requiring students to take exams will reduce their anxiety and help them perform better (Amiri & Ghonsooly, 2015).

Practice tests should be given so the students are familiar with the format and time limit. If teachers show their students how to read for main ideas, understand key words and definitions, to create a study plan, use time efficiently, and complete familiar questions first, anxiety levels can be reduced (Bass, Burroughs, Gallion, & Hodel, 2002). In addition, teacher leaders could inform parents about the importance of developing good sleep habits and eating a healthy diet.

> Learning how to cope with tests is also an important area of research. Coping behaviors help students to deal with the experience of stress and anxiety in test situations and may eliminate or modify the conditions that cause stress, thus keeping negative emotions at bay, and may – depending on the coping strategy chosen – promote adaptational outcomes and positive functioning. (Stober, 2004, p. 215).

Schutz, Distefano, Benson, and Davis (2004) used the Emotional Regulation during Test-taking (ERT) scale to study coping measures. These researchers hope that "the ERT may become a useful tool to help students learn to prepare and take tests in a manner that will provide a more accurate reflection of the effort, ability, and the strategies used to take tests" (Schutz, Distefano, Benson, & Davis, 2004, p. 268). They believed that during tests, students can use task focusing thought to manage their time or use test taking strategies to cope with their anxiety. The students may engage in self-talk and encourage

themselves to do well and focus. They could write about their thoughts and feelings before taking a test. This is called expressive writing (Paul, 2013; Ramirez & Beilock, 2011). The students could make a list of their negative thoughts and then create a positive statement for each one. For example, instead of saying "I'm going to fail this test," they could think "I'm going to try my best" or "I have the ability to do this."

Austin and Partridge (1995); Cheek, Bradley, Reynolds, and Coy (2002); Larson, El Ramahi, and Conn (2010); Nemati and Habibi (2012); Paul (2013), Schutz, Distefano, Benson, and Davis (2004); and Segool, Carlson, Goforth, Von Der Embse, and Barterian (2013) promoted relaxation training to decrease test anxiety. They suggest using tension reduction strategies to slow down breathing which helps the student relax. "Teachers could use relaxation strategies in their whole classrooms prior to high-stakes testing or when students express or exhibit negative thoughts, feelings, or anxiety about evaluative situations" (Segool, Carlson, Goforth, Von Der Embse, & Barterian, 2013, p. 497). Art and music can also be used to reduce stress and add an element of fun (Cheek, Bradley, Reynolds, & Coy, 2002). Teachers can encourage their students to de-stress by providing opportunities for verbal and non-verbal expressions before and after the test (Hernandez, Menchaca, & Huerta, 2011).

Sometimes students are not given the opportunity to learn techniques to cope with testing situations. Instead, they learn to cope inappropriately through avoidance behaviors and defensiveness that interferes with their performance.

Denney (1980) and Finger (1976) reported that although the treatment of test anxiety using a variety of methods leads to a reduction in self-reported anxiety, the

research indicated that lowered anxiety is not often accompanied by improvements in test performance.

Authentic Assessment

Due to the pressures and anxieties that students feel from standardized tests, there is a need for authentic methods of assessment. In authentic assessment, students are informed of the standards that they will be graded on in advance. Knowing in advance the criteria that will be used for assessing student performance may alleviate some anxiety. "Standardized tests have become irrelevant in measuring the dynamic skill of thinking" (Bullens, 2002, p. 8). By being assessed throughout the learning process, students have an opportunity to reflect upon their work and evaluate themselves (Bullens, 2002). While most tests are completed at the end of a unit, assessment should be a continual process to assess students' progress in order to help them meet learning standards (Burke, 1999). Students need to be involved in and take ownership of the evaluation process (Bullens, 2002). Students will be motivated because there will be real rewards for success (Madaus & Kellaghan, 1993). "Authentic methods of assessment such as rubrics, checklists, portfolios, and reflections provide a more accurate picture of what students know because the vehicle by which their knowledge is demonstrated is varied, thereby allowing more students to be successful" (Bullens, 2002, p. 24). Assessing a student's academic performance using these other tools may prove more accurate than currently used standardized tests.

Summary

Accountability through testing in schools across America has changed education in elementary schools (Landry, 2005). "Most education experts agree that testing has helped shape the form and substance of American education" (Zajano, 1993, p. 4). Students are tested more frequently and at younger ages. The increased pressure to do well causes anxiety and stress. Research shows that highly anxious students do not perform well on standardized tests. Age, gender, ethnic, and socioeconomic background are significant predictors of test anxiety scores (Putwain, 2007).

The results of this study will contribute to the knowledge and literature in the field of education. Although this study will close gaps in the literature, there are many questions about test anxiety that still exist. Current research will lead to future studies.

Section 3 will describe the participants, setting, research design, data collection, and analysis.

Section 3: Research Method

Introduction

The primary purpose of this research study was to determine whether test anxiety is related to New York State Standardized Science test scores. The hypothesis that there is a significant relationship between students' levels of test anxiety and performance on the standardized test was tested. Data were collected in the forms of test anxiety questionnaires, pulse rates, and standardized tests scores.

Section 3 includes the research design, data collection methods, and data analysis methods. The selection of the participants, the setting, and informed consent procedures are also discussed.

Research Design and Approach

A quantitative approach was used to answer the hypotheses and research questions. According to Creswell (2003), "a quantitative approach is one in which the investigator primarily uses postpositivist claims for developing knowledge, employs strategies of inquiry, and collects data on predetermined instruments that yield statistical data" (p. 18). The quantitative data provides general information on the sample and the research problem. This study used quantitative data in the form of questionnaires, pulse rates, and standardized test scores.

The purpose of this quantitative study was to determine if test anxiety is related to standardized test scores. This study used a nonexperimental correlational design, where there is no manipulation of the situation (Creswell, 2003). Correlational designs are often used to identify the relationship of one variable to another (Creswell, 2003). In this study,

there was a quantitative independent variable (level of test anxiety) and one quantitative

dependent variable (the performance on the New York State Standardized Science test).

A Pearson correlation was then used to determine if the relationship was statistically

significant. Two separate Pearson correlations were calculated. The first correlation

determined if there was a significant relationship between the students' responses to a

Test Anxiety Questionnaire and their test scores. The second correlation was used to

determine if there is a significant relationship between the students' pulse rates and their

test scores. This study used three forms of data collection: (a) questionnaires,

(b) standardized test scores, and (c) pulse rates.

Setting and Sample

The study was conducted in a suburban public elementary school on Long Island,

New York. Approximately 600 students attend this school.

Three 4th grade classes participated. The teachers volunteered their classes

because they are colleagues of mine in the same elementary school. There were 75 4th

graders enrolled in this school. The students' abilities ranged from learning-disabled to

gifted. They came from middle class families. All of the participants were White. Fourth

graders take several standardized tests. Among these are English Language Arts,

Mathematics, and Science. This study used only the Science test. The sampling design

was single-staged and purposeful since the researcher had direct access to the participants

(Creswell, 2003). It was a convenience sample because the participants were readily

available and chosen due to the proximity to the researcher.

Participation in the study was voluntary. There were no risks to the students. I told the students that they could decide not to participate or to discontinue participation at any time. No one was required to answer any survey question that he or she chose not to answer. Pseudonyms replaced the names of the participants. After a 5-year period, I will destroy all data, whether on paper or in a computer.

I am currently a second grade teacher at the school where the study took place. I collected the data.

Instrumentation and Materials

Several methods of data collection tools were used in this study. Parental consent forms were collected by me before any data were collected. The students also signed a student assent form. The first collection tool was a Test Anxiety Questionnaire (see Appendix A). I amended Sarason's (1958) Test Anxiety Scale (TAS) to suit the purpose of this study. The reliability coefficient of the TAS is 0.87 indicating high reliability (Akabani, 2013). The TAS consists of 21 true/false questions (Ali & Mohsin, 2013). I chose to include 14 true/false questions on the questionnaire in this study. The wording of the questions was modified to a 4th grade reading and comprehension level. I decided to use true/false questions instead of Likert-type questions because of the age of the participants. The 4th graders would find it easier and less confusing to decide between two options (true or false) as opposed to four or five choices for each question.

Pulse rates were included in this study due to the findings of Deffenbacher (1986). While performing on a test, high test-anxious students had higher pulse rates than those with low levels of test anxiety (Deffenbacher, 1986). I collected the students' pulse

rates before the standardized test begins. Pulse rates were determined using a battery -

operated pulse monitor (Microsoft MS-2032). Pulse rate refers to the number of

heartbeats per minute. The participants gently pressed their thumbs on the heartbeat

detection pad for a few seconds. The pulse monitor calculated the participants' pulses and

displayed the numbers on the screen. Students wrote their pulse rates on a form (see

Appendix B). An average 4th grader's pulse rate is between 60 and 140 beats per minute

(http://tipnut.com/pulse-rate-chart/, 2012, Chart 1). To determine each student's pulse

rate anxiety rating, pulse rates were taken one week before the standardized test was

administered (baseline pulse rate) and then again just before the test began. The

difference in the pulse rate taken just before the exam begins and baseline pulse rate was

used as a measure of each student's anxiety level. The larger the difference, the higher the

student's anxiety level.

The participants completed the New York State Standardized Science test. Part 1

is the Written Test, which consists of 29 multiple-choice questions and 12 short answer

questions. This part was given in the participants' classrooms under the supervision of

their teachers. Special education students were given the appropriate testing

accommodations including extended time and a separate location with minimal

distractions. Although this section of the test has no time limit for all students, it took

about an hour to administer the test. During Part 2, the Performance Test, the participants

individually completed hands-on experiments and answered 14 constructed response

questions. This part of the test took place in the gymnasium under the guidance of the

school's science teacher. Special education students were given the appropriate testing

accommodations for Part 2 of the test also. Seventy-five minutes were needed to administer this part of the test. The participants had 15 minutes to complete each of the three stations. I obtained the test scores from the principal.

Threats to Quality and Validity

Threats to the quality and validity of the study may include the students misunderstanding the questions on the questionnaire. A student who is not usually anxious may exhibit signs of anxiety during the test due to an illness. Some students are anxious all of the time. Therefore, they would have anxiety despite the standardized tests. Children who are generally weak in Science may have more anxiety and perform poorly on the Science standardized test than on the other standardized tests. The classroom environment may also impact the validity. One teacher may have a calm, positive environment while another teacher may be negative.

To strengthen the overall validity of the study, the following strategies were used:

1. Triangulation of data: Data were collected through questionnaires, pulse rates, and standardized test scores (Creswell, 1998).

2. Prolonged time in the field: I have spent a total of 16 years teaching in this school. I am familiar with and have built trust with the students and teachers that will take part in this study. "In the field, the researcher makes decisions about what is salient to the study, relevant to the purpose of the study, and of interest for focus" (Creswell, 1998, p. 201).

3. Peer debriefing: Colleagues and the committee chair helped improve the quality of the study. I asked colleagues to proofread, edit, and make sure that there are no threats to the validity (Creswell, 1998).

4. Transferability: I used rich, thick descriptions to convey the findings. The pulse rates were compared to the anxiety questionnaire to see if there is a relationship. Do students with high pulse rates have high anxiety as measured by the survey? I computed the average score on the anxiety survey using Excel.

The demonstration of validity of New York State assessments relies heavily on the agreement with the State Learning Standards. During the test development process, judgment and analysis are used to ensure that each question is related to the appropriate standard. All questions are field-tested in random school districts in New York. The data from the field tests will be analyzed. If the majority of the students correctly answer a question, the question may be too easy and may be deleted from the test. If a question receives a lot of incorrect answers, the question may be too hard or is worded awkwardly. The question is either reworded to be grade level appropriate or eliminated from the test.

To ensure the validity and reliability of the participants' pulse rates, pulse monitors were used. Heart rate monitors have been marketed as an accurate way to measure heart rate. It is generally assumed that various measures of physiological arousal such as pulse rate and blood pressure are valid indicants of anxiety (Morris & Liebert, 1970; Nemati & Habibi, 2012; Wang & Liao, 2012). I was hoping to achieve similar results as Conley and Lehman (2011); Deffenbacher (1986); Harleston, Smith, and Arey (1965); Hughes (2005); Morris and Liebert (1970); and Papousek, Nauschnegg, Paechter,

Lackner, Goswami, and Schulter (2010). High test anxious participants had higher pulse rates than those low in test anxiety. Morris and Liebert (1970) found that emotionality and worry were positively related to pulse rate. In a study conducted by Harleston, Smith, and Arey (1965), high-anxious subjects produced the greatest increase in heart rate at the beginning of the problem solving task and sustained the greatest increase in heart rate throughout the task, while low-anxious subjects produced the smallest initial change and sustained the change for a shorter period of time. Hughes found elevations in students' blood pressure before an exam. Papousek, Nauschnegg, Paechter, Lackner, Goswami, and Schulter (2010) observed increases in students' blood pressure before and during an exam.

Data Collection Procedures

The data collection process could not begin until parental consent forms had been signed and collected from the students' parents. Follow-up letters were sent to parents who did not return the first consent form. Only then could the students participate in the study. Anyone who returned a consent form received a piece of candy. Of the 75 returned forms, only 50 granted permission for participation. The students signed a student assent form.

A week before the standardized test, I established a baseline for each participant. At the teachers' convenience, I asked the students to individually complete the Test Anxiety Questionnaire. I reminded the students that most people get anxious before a test. This is a normal feeling. Using the pulse monitors, the participants found their resting heart rate and recorded it on the forms.

Ten minutes before the beginning of the standardized test, the participants took their pulse rates again and recorded it on the forms.

Data Analysis Plan

The objective of the data analysis plan is to determine if there is any significant relationship between a student's anxiety level and academic performance on the New York State Standardized Science Test. Test anxiety questionnaires and pulse rates were used to determine anxiety level just before the standardized test was administered. The rubric score on the New York State Fourth Grade Standardized Science Test was used to measure academic performance. The rubric test score is the one given to each student's parents. A Pearson correlation test was then used to determine if a statistically significant relationship exists between anxiety level and academic performance. The data were analyzed using two separate Pearson correlations. The first determined if there is a statistically significant relationship between the students' responses on a test anxiety questionnaire and their test scores and the second between the students' pulse rates and their test scores.

The data collected from the questionnaire were entered into an Excel spreadsheet. The Test Anxiety Questionnaire (see Appendix A) consisted of true and false answers. I assigned a numerical score of one for each question answered true and a zero for each question answered false (except for Questions 11, 12, and 14 where a true answer was assigned a zero and false was a one). Each student's total score on the questionnaire is used as a measure of the student's anxiety level. Students with survey scores close to 14 were more anxious than students with scores close to zero. The scores on the

standardized test were also entered. New York State standardized rubric test scores range from a 1 (poor) to a 4 (outstanding).

The baseline pulse rates taken one week before the standardized test was administered and the pulse rates taken just before the exam began were then entered on the Excel spreadsheet. The difference between the pulse rate and the baseline pulse rate was calculated by Excel for each student. The larger the difference between these two pulse rates, the higher the anxiety level. Excel was also used to calculate the mean (average) for all the items entered in each column of the spreadsheet. A Pearson correlation test was used to analyze the data. This test measures the degree and the direction of the linear relationship between variables (Gravetter & Wallnau, 2005). The results of the Pearson correlation showed whether or not there is a relationship between test anxiety and standardized test scores. I was then able to compare and analyze the results.

The findings from this study are discussed further in Section 4.

Section 4: Presentation and Analysis of Data

Introduction

The purpose of this study was to determine the relationship between students'

levels of anxiety and their New York State Standardized Science test scores. The

hypothesis—that there is a statistically significant relationship between students' levels of

test anxiety and performance on the standardized test—was tested using the following

two null hypotheses:

$H_0{}^1$: There is no significant relationship between students' levels of test

anxiety as measured by pulse rate and performance on the New York State Standardized

Science test.

$H_0{}^2$: There is no significant relationship between students' levels of test

anxiety as measured by a test anxiety questionnaire and performance on the New York

State Standardized Science Test.

Quantitative data were collected through test anxiety questionnaires, pulse rates,

and standardized tests scores. The data were compiled into an Excel spreadsheet and then

analyzed using a Pearson correlation. Two separate Pearson correlations were calculated.

The first correlation determined if there was a significant relationship between the

students' responses to a Test Anxiety Questionnaire and their test scores. The second

correlation was used to determine if there was a significant relationship between the

students' pulse rates and their test scores. Section 4 includes a review of the description

of the participants and data collection procedures, the results of a Pearson correlation, and

the data analysis.

Review of Participants and Data Collection Procedures

This study took place in a suburban elementary school. Three 4th grade classes participated. Fifty out of the 75 students returned the consent form and agreed to participate. Their abilities ranged from learning disabled to gifted. The students were all White and came from middle class families.

To establish a baseline a week before the New York State Standardized Science test, the participants completed a Test Anxiety Questionnaire (see Appendix A) and took their pulse rates using battery-operated finger tip monitors. Ten minutes before taking the standardized test, the students took their pulse rate again. The test scores were obtained from the principal.

Data Analysis

After collecting data from the questionnaires, pulse rates, and standardized tests scores, all data were entered into an Excel spreadsheet (see Appendix E, Anxiety Level Data). I examined the relationship between test anxiety and standardized test scores. The Pearson correlation statistical test was computed by comparing (a) the difference between the pulse rate and the pre-test baseline pulse rate to (b) the standardized test score and (c) the total score on the Test Anxiety Questionnaire to (d) the standardized test score. A Pearson correlation test measures the relationship between two variables. In this study, the Pearson correlation was used to show whether there was a relationship between test anxiety and standardized test scores.

An anxiety level was established for each student using the pulse rates and answers on the Test Anxiety Questionnaire (see Appendix A). The baseline pulse rate

was subtracted from the pulse rate that was taken right before the test (Pulse Anxiety

Score). Then I calculated a score for each questionnaire (Questionnaire Anxiety Score). A

true answer received a score of one, and each false answer received a zero (except for

questions 11, 12, and 14 where a true answer is assigned a zero and false is a one).

Students with questionnaire scores close to 14 were more anxious than students with

scores close to zero.

A Pearson correlation coefficient (r) was then computed using Excel to analyze

the relationship between the Questionnaire Anxiety Score and NY State Standardized

Science rubric test scores (see bottom of Table 2 in Appendix C). The result was $r =$

-0.1603. To determine whether the Pearson correlation test results represent a statistically

significant negative relationship between anxiety level and standardized test score, I

compared the Pearson correlation coefficient (r) with the critical value of the Pearson

correlation coefficient http://capone.mtsu.edu/dkfuller/tables/correlationtable.pdf. In the

table, df denotes degrees of freedom, $df = N – 2$, where N denotes the sample size and p

represents the significance level (sometimes referred to by the symbol alpha). ($1-p$) can

be interpreted as the confidence level that the null hypothesis can be rejected. In this

research study, $N = 50$ and $df = 48$. Using the aforementioned table, the magnitude of the

critical values for Pearson correlation coefficient equals 0.2787. In this study, the

magnitude of the Pearson correlation coefficient comparing students' responses on the

Test Anxiety Questionnaire and the rubric test scores was 0.1603. Since this is less than

0.2787, I cannot reject null hypothesis $H_0{}^2$ and conclude there is no significant

relationship between the students' responses to the Test Anxiety Questionnaire and their

test scores. Similar Pearson correlation results were obtained using raw standardized test scores in place of the rubric test scores.

Finally, a Pearson correlation was used to compare the Pulse Anxiety Score and the test scores (see Appendix C, Anxiety Level Data). The greater the difference between the pulse rate taken 10 minutes before the standardized test was administered and the baseline pulse rate taken a week before the test is used as a measure of how anxious each student is at the time of the exam. The result of the Pearson correlation coefficient computation was $r = -0.3215$. Since the critical value for the Pearson correlation coefficient is 0.2787, I can reject null hypothesis H_0^1 and conclude there is a significant negative relationship between the students' pulse rates and their test scores with a 95% confidence level ($p = 0.05$). Therefore, it can be stated that there is a significant relationship between students' levels of test anxiety as measured by pulse rate and performance on the New York State Standardized Science. There was less than a 1 in 20 chance that the observed data could have happened by chance. However, the Pearson correlation coefficient comparing questionnaire score with standardized test score was only $r = -0.1603$. When compared to the critical value for Pearson correlation coefficient value of 0.2787, this is not large enough to reject null hypothesis H_0^2 with a 95% confidence level. Therefore, there is no significant relationship between students' levels of test anxiety as measured by the Test Anxiety Questionnaire and performance on the New York State Standardized Science test.

Summary

The results of the data analysis indicate there is no significant relationship between students' levels of test anxiety as measured by the Test Anxiety Questionnaire and performance on the New York State Standardized Science test. However, there was a significant negative relationship between the pulse rates and test scores

Section 5 will include an interpretation of the findings, implications for social change, recommendations for action, and recommendations for further study.

Section 5: Summary, Conclusions, and Recommendations

Introduction

The primary purpose of this study was to determine the relationship between test anxiety and the scores on the New York State Science Standardized test. Fifty 4th grade students from a suburban school district in New York participated in the study. Quantitative data were collected through questionnaires, pulse rates, and standardized test scores. The data were used to test the hypothesis that there is a significant relationship between students' levels of test anxiety and performance on the New York State Standardized Science test. A Pearson correlation was used to analyze the data.

Interpretation of Findings

First, a Pearson correlation (r) was used to analyze the data collected through questionnaires and the standardized test scores. The results were $r = -0.1603$, which indicated that there was no significant relationship between the two variables. Null hypothesis H_0^2 could not be rejected.

Then, a Pearson correlation was computed using the data from the pulse rates and standardized test scores. The result was $r = -0.3215$, which indicated a moderate negative relationship between pulse rates and test scores. Null hypothesis H_0^1 was rejected with at least a 95% confidence level, indicating that there was a significant relationship between students' levels of test anxiety as measured by pulse rate and performance on the New York State Standardized Science test. As the pulse rate increased, the test score decreased. This result is consistent with the findings of Akanbi (2010); Keogh, Bond,

French, Richards, and Davis (2004); Mandler and Sarason (1952), McDonald (2001); Mori (1998); Newbegin and Owens (1996); Sapp (1999); and Tse and Pu (2012).

Implications for Social Change

It is expected that the results of this study will contribute to the knowledge in the field of education. This study was significant because it compared the relationship between test anxiety and standardized test scores. Tests are a significant source of anxiety to many students. This study may help improve teachers', administrators', and parents' understanding of test anxiety. It may help them become more aware of the external and internal factors that affect standardized test scores. Administrators and teacher leaders can integrate data-driven decision making and instruction in order to lead schools in the direction of excellence. There could be positive social changes in curriculum, instructional strategies, prevention, and intervention strategies. This may increase students' success and decrease test anxiety. If school districts search for ways to decrease students' test anxiety, they could also help improve students' self-esteem (Hembree, 1988). "By helping students decrease their levels of test anxiety and improve their self-esteem and academic outcomes, social change may be achieved through increased quality of life for students during and after graduation from high school" (Murphy, 2014, p. 70). This study will also contribute to the literature on test anxiety among elementary students.

Recommendations for Action

I recommend that action be taken in schools to decrease students' levels of test anxiety. If anxiety is not addressed in elementary school, it could continue into adulthood and impact quality of life and careers (Miller, Morton, Driscoll, & Davis, 2006).

It is recommended that school administrators provide teachers with professional development about test anxiety. "Before teachers can take action to help students reduce their levels of test anxiety, teachers must understand how performance pressure affects students in the form of test anxiety" (Murphy, 2014, p. 71). Test anxiety can affect students both behaviorally and cognitively (Murphy, 2014). Administrators should also provide teachers with training in relaxation techniques (Murphy, 2014). Adults in the school should be able to model for the students how to respond to anxiety (Larson, El Ramahi, & Conn, 2010).

Although principals and teachers have a responsibility to help students succeed on standardized tests in order to continue to receive school funding, the school's atmosphere can have an effect on students' performance on tests and anxiety. A warm and energetic environment can promote success, reduce test anxiety, and instill a love of learning in students (Larson, El Ramahi, & Conn, 2010).

It is also recommended that teachers take action in their classrooms to help their students to decrease their feelings of test anxiety during tests (Murphy, 2014). If the focus of the classroom is on testing instead of learning, then test anxiety will increase (Cizek & Burg, 2006). According to Zuercher-White (1998), deep breathing and muscle relaxation are two techniques that effectively decrease anxiety. Using these techniques will help

students focus on the test instead of on their anxiety. The physical condition of the room in which the exam is administered is also important. If the room is too hot or cold or too dark may make the students uncomfortable and unable to focus on the test questions. All of these distractions can contribute to test anxiety (Cizek & Burg, 2006).

Parents can contribute to students' test anxiety. Parent training workshops can be held to inform parents how to help reduce the students' test anxiety at home. If parents create a positive and supportive home environment when their children are young, there will be less test anxiety later on (Casbarro, 2005).

Recommendations for Further Study

There are many questions about test anxiety that still exist (McDonald, 2001). Current research will lead to future studies. This study could be reproduced using a larger sample of students in different grade levels. Besides the Science test, other NY State Standardized tests such as English Language Arts (ELA) or Math could be studied. Interviews are a qualitative component that could be added to this study.

Gender differences in coping with test anxiety remain an issue that is worthy of further observation and exploration (Stober, 2004). More research is needed on the effects of test anxiety on minorities, students with disabilities, and different age groups. How are students affected in other countries? Does socio-economic status play a role in test anxiety?

McDonald (2001) believes that future studies need to explore the links between anxiety, learning, and performance. "Does test anxiety cause low attainment or does lack of knowledge result in children becoming anxious about tests" (McDonald, 2001, p. 95)?

More research could be conducted to show how test anxiety affects changed in academic ability over time. Future studies might examine if male and female students experience test anxiety differently and which stress reducing coping strategies work best in improving test performance (Stober, 2004).

A future study could look at report card grades, test scores, and test anxiety. Test scores and final class grades could be compared between students with and without test anxiety. Another study could compare the standardized test scores of students who utilized test anxiety relaxation techniques to those that did not. Test anxiety could be further researched in students with differing parental or teacher expectations of standardized test scores.

Conclusion

Test anxiety is a popular topic of research beginning as far back as the early 1900s. "Fear of exams and testing situations is widespread and appears to be becoming more prevalent, possibly may be due to the increasing frequency of testing and the importance placed on testing" (McDonald, 2001, p. 96). This study provided evidence that test anxiety is related to standardized test performance. The data analysis using Pearson correlation suggests a moderate negative relationship between test anxiety and standardized test performance based on the pulse rate data. As anxiety increases, test performance declines.

According to Stober and Pekrun (2004), individual differences in test anxiety play a major role not only for students' achievement at school, but also for their school-related motivation, academic self-concepts, career advancement, personality development, and

health. It is the responsibility of the teacher leader to adequately prepare the students, teach relaxation techniques, and not put unnecessary pressure on them to do well. Good teacher leaders with the help of parents, administrators, and counselors should encourage all of the students to just try their best.

Although this is just one study about test anxiety in a suburban school district in New York, it adds to the knowledge of test anxiety in elementary school students. The participants in this study were only White 4th graders. Therefore, future research is needed to determine how test anxiety affects different races, gender, ages, and learning abilities. Through increased awareness of the effects of test anxiety, this study may promote social change and improve students' performance on standardized tests.

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Appendix A: Test Anxiety Questionnaire

Name_____   Teacher's Name _____

Test Anxiety Questionnaire

Read each sentence. Decide if it is true or false. Circle your answer.

1. I get nervous before a test.	True	False
2. My stomach hurts or feels upset before or during a test.	True	False
3. I usually think about failing the test.	True	False
4. During a test, I get so nervous that	True	False
I forget everything that I studied.		
5. As soon as the test is over, I stop worrying.	True	False
6. Timed tests make me nervous.	True	False
7. I can't sleep the night before a test.	True	False
8. I do not like taking standardized tests.	True	False
9. When I don't do well on a test, I get upset.	True	False
10. When taking a test, I sometimes get distracted.	True	False
11. I feel confident and relaxed while taking tests.	True	False
12. Now that I have taken the ELA and Math tests,		
I feel more relaxed about taking the Science test.	True	False
13. My nervousness has increased	True	False
throughout the year.		
14. My nervousness has decreased	True	False
during the year.		

Note. Adapted with permission from http://www.psych.uw.edu/psych.php?p=161.

Appendix B: Pulse Rate Form

Pulse Rate for the NY State Science Test

Name (first and last names) _____

Date _____

Teacher's Name_____

1. Press the red button to turn on the pulse monitor.

2. Press your thumb to the thumb pad.

3. Hold your thumb there until you see a number. This may take several seconds.

4. Write that number in the box below.

5. Press the red button to clear the pulse monitor.

Appendix C: Anxiety Level Data

	Survey Score = Survey Anxiety Rating	Baseline Pulse Rate	Pulse Rate	Pulse Rate-Baseline Pulse Rate = Pulse Anxiety Rating	Raw Test Score	Rubric Test Score
	4	59	54	-5	66	3
	3	80	71	-9	85	4
	4	84	78	-6	66	3
	10	68	61	-7	89	4
	9	70	109	39	81	3
	4	71	89	18	91	4
	12	60	72	12	54	2
	2	73	68	-5	87	4
	6	69	68	-1	63	2
	8	82	96	14	62	2
	2	79	90	11	82	3
	4	81	56	-25	70	3
	4	67	69	2	71	3
	8	60	80	20	69	3
	6	75	60	-15	87	4
	9	97	66	-11	75	3
	4	67	75	8	83	3
	5	63	69	6	80	3
	9	76	91	15	97	4
	4	61	59	-2	65	3
	2	60	58	-2	87	4
	5	68	80	12	90	4
	3	85	86	1	87	4
	6	72	47	-25	80	3
	2	76	72	-4	96	4
	10	75	55	-20	95	4
	6	65	84	19	54	2
	0	85	102	17	67	3
	6	67	74	7	95	4
	8	78	80	2	81	3
	9	82	72	-10	96	4
	5	72	63	-9	70	3
	7	48	53	5	72	3
	7	112	90	-22	74	3
	7	89	95	6	82	3
	0	72	70	-2	65	3
	11	56	69	13	76	3
	7	49	88	39	65	3
	5	52	74	22	92	4
	10	104	76	-28	91	4
	4	88	69	-19	83	3
	7	90	71	-19	70	3
	11	46	92	46	55	2
	4	64	61	-3	99	4
	12	93	79	-14	85	4
	11	74	84	10	85	4
	2	89	68	-21	95	4
	13	53	74	21	69	3
	7	113	106	-7	83	3
	4	100	91	-9	85	4
AVERAGE =	6.16	74.38	75.28	1.3	78.94	3.3
	PEARSON CORRELATION BETWEEN RUBRIC TEST SCORE & SURVEY ANXIETY RATING = -0.1603					
	PEARSON CORRELATION BETWEEN RUBRIC TEST SCORE & PULSE ANXIETY RATING = -0.3125					