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Implementation and Assessment of a Test Anxiety Reduction Program with 10th Graders and Their Subsequent Performance on the MontCAS Criterion Referenced Test

Nilda Soto Bishop
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IMPLEMENTATION AND ASSESSEMENT OF A TEST ANXIETY REDUCTION
PROGRAM PRESENTED TO 10TH GRADERS AND THEIR SUBSEQUENT
PERFORMANCE ON THE MONTCAS CRITERION REFERENCED TEST

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Implementation and Assessment of a Test Anxiety Reduction Program Presented to 10th Graders and their Subsequent Performance on the MontCAS Criterion Referenced Test

Committee Chair: John Sommers-Flanagan, Ph.D.

This quantitative study investigated the relationship between performance on the MontCAS Criterion Referenced Test of 10th graders at Corvallis High School, Corvallis, Montana who participated in a systematic program for test anxiety reduction, and 10th graders who took the MontCAS but did not participate in the test anxiety reduction program. The population included all 10th graders at Corvallis High School who failed to achieve a score of proficient or higher, or who achieved in the low-proficient range on either the reading or math section on the last MontCAS administration, which was two years prior to this study. Fifteen students were assigned to each the experimental and control groups. The experimental group was exposed to a four hour test anxiety group protocol. The control group received no intervention prior to the test. The intervention design was based on results of meta-analyses of test anxiety research identifying effective treatment approaches. Overall in this study, the test anxiety program did not produce significantly improved test performance among experimental group members as compared to the control group, although some possible trends were noted. Some potential reasons for this lack of significance, including the small sample size, are discussed, as well as recommendations for further research in this important area.

ACKNOWLEDGMENTS AND DEDICATION

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Thanks also to my husband Tom Bishop, who has always believed in my projects, to my daughter Amber Bishop, for technical assistance at all the right times, and to my parents, John and Rita Soto, for their pride and encouragement. Finally, I want to thank the countless other friends, family and colleagues that have helped and supported me.

I dedicate this work to my daughter Andrea Anderson, to the students at Corvallis High School, and to students everywhere who are limited by anxiety from achieving their potential, and perhaps their dreams.

TABLE OF CONTENTS

ABSTRACT	iv
ACKNOWLEDGEMENTS AND DEDICATION	v
LIST OF TABLES	ix
LIST OF FIGURES	x
CHAPTER 1	
INTRODUCTION	
Statement of the Problem.....	1
Purpose of the Study.....	3
Significance of the Study.....	4
Research Questions.....	4
Hypotheses.....	4
Limitations and Delimitations.....	9
Definition of Terms.....	9
Summary.....	10
CHAPTER 2	
REVIEW OF THE LITERATURE	
Test Anxiety Defined.....	12
Effects of Test Anxiety.....	13
Historical Highlights of Test Anxiety Research.....	14
Theories of Test Anxiety.....	15
Social, Cultural, Gender, and Economic Implications of Test Anxiety.....	22

Effective Treatment of Test Anxiety.....	27
Summary.....	38

CHAPTER 3

RESEARCH METHODS

Research Design.....	40
Population and Sample.....	42
Instrumentation.....	43
Procedures.....	45
Conclusion.....	48

CHAPTER 4

RESULTS OF DATA ANALYSIS

Test Results for Experimental and Control groups, and Non-Participants.....	50
Control Vs Non-Participant Scores.....	55
Scores for sub-groups.....	56
Comparison of Mean Score Differences for Math and Reading.....	62
Comparison of First and Second Semester Final Exam Scores.....	63
Questionnaire Results.....	63
Experimental Group Final Evaluation.....	65

CHAPTER 5

DISCUSSION AND IMPLICATIONS

Small Sample Size.....	67
Multiple Interventions.....	68
Time Lag.....	68
Counselor Relationship.....	69
Additional Factors.....	70
Hypotheses.....	71
Questionnaire Results.....	73
Final Evaluation.....	74
Suggestions for Further Research.....	75
Collateral and Incidental Observations.....	77
Conclusion.....	78
REFERENCES.....	81
APPENDIX.....	90

LIST OF TABLES

TABLE 1	
<i>Proficiency Levels of Experimental and Control Groups.....</i>	<i>50</i>
TABLE 2	
<i>Subgroups of Experimental and Control Groups.....</i>	<i>50</i>
TABLE 3	
<i>Comparison of Mean Scaled Scores for Experimental and Control Groups, and Whole Class</i>	<i>51</i>
TABLE 4	
<i>Mean Rank Scores for Eighth Grade Reading and Math Scores of Experimental and Control Groups and Non-Participants.....</i>	<i>52</i>
TABLE 5	
<i>Kruskal-Wallis Analysis of 8th Grade Math and Reading Scores.....</i>	<i>52</i>
TABLE 6	
<i>Analysis of Experimental and Control Groups Using 8th to 10th Grade Difference Scores.....</i>	<i>53</i>
TABLE 7	
<i>Independent Samples T-Test Analysis of 8th to 10th Grade Difference Scores.....</i>	<i>53</i>
TABLE 8	
<i>Mann-Whitney Analysis of 8th to 10th Grade Difference Scores.....</i>	<i>54</i>
TABLE 9	
<i>Comparison of Difference Scores for Experimental Group and Non-Participants.....</i>	<i>55</i>
TABLE 10	
<i>Independent Samples T-Test Analysis of Difference Scores of Experimental Group and Non-Participants.....</i>	<i>55</i>
TABLE 11	
<i>Comparison of Difference Scores for Control Group and Non-Participants.....</i>	<i>56</i>
TABLE 12	
<i>Independent Samples T-Test Analysis of Difference Scores of Control Group and Non-Participants.....</i>	<i>56</i>

TABLE 13	
<i>Comparison of Mean Score Differences of Reading and Math Scores for Experimental and Control Groups</i>	62

TABLE 14	
<i>Questionnaire Results</i>	64

LIST OF FIGURES

FIGURE 1	
Comparison of 8 th and 10 th Reading Scores.....	51
FIGURE 2	
Comparison of 8 th and 10 th Math Scores.....	51
FIGURE 3	
Girls on math test, experimental group, versus girls on math test, control group.....	57
FIGURE 4	
Girls on reading test, experimental group, versus girls on reading test, control group.....	57
FIGURE 5	
Boys on math test, experimental group, versus boys on math test, control group.....	58
FIGURE 6	
Boys on reading test, experimental group, versus boys on reading test, control group.....	58
FIGURE 7	
Special education students on math test, experimental group, versus special education students on math test, control group.....	59
FIGURE 8	
Special education students on reading test, experimental group, versus special education students on reading test, control group.....	59
FIGURE 9	
Students from Pinesdale on math test, experimental group, versus students from Pinesdale on math test, control group.....	60
FIGURE 10	
Students from Pinesdale on reading test, experimental group, versus students from Pinesdale on reading test, control group.....	60

FIGURE 11
Students who receive free or reduced lunch on math test,
experimental group, versus students who receive free or reduced lunch
on math test, control group.....61

FIGURE 12
Students who receive free or reduced lunch on reading test, experimental
group, versus students who receive free or reduced lunch on reading test,
control group.....61

FIGURE 13
Mean Score Differences for Math and Reading.....62

Implementation and Assessment of a Test Anxiety Reduction Program with 10th Graders
And Their Subsequent Performance on the MontCAS Criterion Referenced Test

Chapter 1

Introduction

Academic success has long been and is increasingly an expectation and requirement for the “real world” success of any individual or group in our society. For a student, school achievement becomes an integral part of one’s self-definition and personal identity. Furthermore, school success is essential for sustained academic motivation. Students must perceive themselves as having the skills, resources, and opportunities to succeed in order to continue to put out the effort necessary to put out the necessary effort. Without a sense of motivation and the expectation for success, achievement suffers (Steele, 1997). Truly, it appears that success breeds success, and failure breeds failure.

Statement of the Problem

Montana Schools were required by the state of Montana, in compliance with the No Child Left Behind (NCLB) federal law, to administer the MontCAS Criterion Referenced Test (CRT) in Spring, 2006, to students in third through eighth grades and tenth grade. Tenth grade students had last taken this test in 2004, when it was administered to fourth, eighth, and tenth graders (Measured Progress & Montana Office of Public Instruction, n.d.). The results of the test are reported by the number of students who score in the “novice,” “nearing proficient,” “proficient,” or “advanced” ranges. Because it is a criterion referenced test, the numeric requirements for each category vary with administration. Scaled scores are also reported for every student. Students are tested in reading and math (Montana OPI, 2003).

Test results are important to Montana schools, as in all states. The percentage of students scoring in the “proficient” or “advanced” range is a large factor in determining whether or not individual schools achieve Adequate Yearly Progress (AYP). The final target under NCLB is 100% of students at proficiency or higher by 2014 (Montana OPI, 2003).

One cannot overstate the impact of such requirements on Montana students. Whenever pressure is felt by the schools to prove their competence, students will feel the repercussions. Not only must students perform respectably in the classroom, but they also must perform adequately, or better, on standardized tests. Standardized tests such as the MontCAS Criterion Referenced Test serve as a mechanism by which schools measure academic success. Because of the significance of the test results to each Montana school, the MontCAS, while not a “high stakes test” insofar as a being a requirement for high school graduation, may be considered “high stakes” for schools who count on the results to determine whether or not they achieve AYP. Schools failing to meet AYP for two or more consecutive years risk loss of federal aid (Cochran, 2005).

Are Montana schools achieving AYP? In 2004, 86% of Montana schools achieved AYP, and as of 2005 over 90% had met this mark (Cochran, 2005). These results are encouraging, until one examines closely. With the exception of the Flathead Reservation, the state’s Indian reservations are lagging far behind the rest of the state. Educators fault high teacher turnover, a transitory student population, and grinding poverty (Ogden, 2005). In contrast to NCLB goals, we appear to be leaving certain groups of children behind. Similar situations are occurring in other states. Minorities and the poor are faring badly under NCLB (Anderson, 2004).

How can all schools have a fair and equitable chance of success at testing? Are there factors obstructing test achievement that need to be addressed?

Test anxiety is a specific factor worthy of note. Johnson (1979) estimates the pervasiveness of test anxiety among a school age population to range from 10% to 30%. As Steele (1997) has clearly shown, it is not only the failing students, but often the most capable, on whom certain elements of test anxiety may take its toll. While any student can suffer the effects of test anxiety, members of stigmatized groups, including women, the learning disabled and low SES students are particularly vulnerable. Pervasive societal stereotypes about groups can influence the academic functioning and identity development of individual group members (Steele, 1997).

It is important that all Montana students have a viable chance of achieving success on the MontCAS and other important tests, and that all Montana schools have an equitable chance of achieving AYP. It is critical that any and all factors that create barriers to student test performance be examined, and if possible, alleviated.

Purpose of the Study

If it can be demonstrated that a systematic test anxiety reduction program, presented to students who previously failed to score in the proficient or higher range on the MontCAS at Corvallis High School, or who scored in the low proficient range, can positively affect their performance, other schools may be interested in systematically implementing a similar test anxiety reduction program.

The study proposed herein sought to determine whether an experimental group of students who failed to achieve proficiency or higher on the eighth grade MontCAS administration, or who achieved in the low proficient range, and who were exposed to a

test anxiety reduction program, would significantly increase their test scores, when compared to a control group of students who also failed to score in the proficient or higher range at the last administration, or who scored in the low proficient range, but who were not exposed to a program of test anxiety reduction.

Significance of the Study

Tuncay Ergene (2003), a test anxiety researcher and author of a comprehensive meta-analysis of test anxiety reduction research, laments that, while the literature abounds with well-designed research studies performed with college and university students, there is a dearth of such research using primary, middle, and secondary student subjects. Ergene (2003) states: “Research investigating how and what types of interventions would be effective with primary, middle and high school students should be conducted as it would provide useful information for counselors, psychologists, and educators” (pp. 325-326). This research attempted to address a part of this need.

Research Questions

1. Can high school sophomores who participate in a systematic test anxiety reduction program increase their scores significantly on the MontCAS criterion referenced test?
2. Will students who participate in a test anxiety reduction program show greater increases in math scores or reading scores?
3. Will students who complete this test anxiety reduction program improve other test scores significantly as well?

Hypotheses

Hypothesis 1, Research Question 1:

- The mean difference in 8th to 10th grade scores on the MontCAS Criterion Referenced Test of students exposed to a systematic test anxiety reduction program will exceed the mean difference in 8th to 10th grade scores on the MontCAS Criterion Referenced Test of students in the control group.
- *Null*-There will be no significant difference between the mean difference in 8th to 10th grade scores on the MontCAS Criterion Referenced Test of students exposed to a systematic test anxiety reduction program and the mean difference in 8th to 10th grade scores of the control group, or the mean difference between 8th and 10th grade scores of the control group will exceed those of the students in the experimental group.

Hypothesis 2, Research Question 1:

- The mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of girls exposed to a test anxiety reduction program will exceed the mean difference between 8th to 10th grade mean scores on the MontCAS Criterion Referenced Test of girls in the control group.
- *Null*-There will be no significant difference between the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of girls exposed to a test anxiety reduction program and the mean difference between 8th to 10th grade scores of girls in the control group, or the mean difference between 8th to 10th grade scores of the girls in the control group will exceed the mean difference between 8th to 10th grade mean scores of the girls exposed to the test anxiety reduction program.

Hypothesis 3, Research Question 1:

- The mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of boys exposed to a test anxiety reduction program will exceed the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of boys in the control group.
- *Null*-There will be no significant difference between the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of boys exposed to a test anxiety reduction program and the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of boys in the control group, or the mean difference between 8th to 10th grade scores of the boys in the control group will exceed those of the boys exposed to the test anxiety reduction program.

Hypothesis 4, Research Question 1:

- The mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of special education students who participate in the test anxiety reduction program will exceed the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of the special education students who are in the control group.
- *Null*-There will be no significant difference between the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of special education students who participated in a test anxiety reduction program and the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of special education students in the control group, or the mean

scores of special education students in the control group will exceed those of the special education students exposed to the tests anxiety reduction program.

Hypothesis 5, Research Question 1:

- The mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of students from Pinesdale exposed to the test anxiety reduction program will exceed the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of students from Pinesdale in the control group.
- *Null*-There will be no significant difference between the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of students from Pinesdale exposed to a test anxiety reduction program and the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of the students from Pinesdale in the control group, or the mean difference between 8th to 10th grade scores of the students from Pinesdale in the control group will exceed those of the students from Pinesdale exposed to the test anxiety reduction program.

Hypothesis 6, Research Question 1:

- The mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of students who receive free or reduced lunch and are exposed to the test anxiety reduction program will exceed the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of students who receive free or reduced lunch in the control group.

- *Null*-There will be no significant difference in the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced test of students who receive free or reduced lunch and the mean difference between 8th to 10th grade scores on the MontCAS Criterion Referenced Test of students who receive free or reduced lunch and are in the control group, or the mean difference between 8th to 10th grade scores of the students who receive free or reduced lunch in the control group will exceed those of the students exposed to the test anxiety reduction program.

Hypothesis 7, Research Question 2:

- The mean difference between 8th to 10th grade scores in reading and the mean difference between 8th to 10th grade scores in math on the MontCAS Criterion Referenced Test will be differentiated for students who are exposed to a systematic program of test anxiety reduction.
- *Null*-There will be no significant difference between the mean difference in 8th to 10th grade math and reading scores on the MontCAS Criterion Referenced Test for students who are exposed to a systematic program of test anxiety reduction.

Hypothesis 8, Research Question 3:

- The mean second semester exam scores of students who participated in the test anxiety reduction program will exceed their mean first semester exam scores.
- *Null*-There will be no significant difference between the mean second semester final exam scores for students who participated in a systematic test anxiety reduction program and their mean first semester final exam scores, or mean first semester exam scores will exceed the mean second semester exam scores.

Limitations and Delimitations

1. This research limited itself to a select group of tenth grade students from a particular high school in Western Montana, USA.
2. The number of research subjects of this study was small, reflecting the size of the school and the number of respondents to the researcher's mailed permission packet.
3. The results gleaned from this limited subject pool are not generalizable to other populations because of lack of true random sampling and because of small number of participants.
4. The results of this research may have no impact on test anxiety or on the scores students make on the MontCAS Criterion Referenced Test.
5. The results of this research may have no impact on scores students make on subsequent tests to which they are exposed.
6. The test anxiety interventions may have been flawed, inadequately administered, or of inadequate dosage.

Definition of Terms

Adequate Yearly Progress (AYP) – Specific annual objectives to measure progress of schools and districts to ensure that all groups of students reach proficiency in reading and math by 2014 (Anderson, 2000).

Anxiety – Distress or uneasiness caused by fear of danger or misfortune (Random House Webster's College Dictionary, 1999).

Criterion Referenced Test (CRT) – An assessment that measures the participant's score to a predetermined level or standard of achievement (Guindon, 2003).

MontCAS – A criterion referenced test designed for the state of Montana, covering a broad range of objectives in reading and mathematics (MontCAS Test Administrator’s Manual, 2005).

No Child Left Behind – A federal act which reauthorizes the Elementary and Secondary Education Act (ESEA) and imposes specific expectations for an enhanced accountability system for states (McCollough, 2003).

Scaled Scores – A technique for reporting test scores when the degree of difficulty varies from one subtest to the next (Guindon, 2003).

Standardized Test – Tests that use uniform conditions of administering and scoring and adhere to rigorous guidelines of test construction, making it possible to compare scores across different individuals as well as successive scores for the same individual over time (Guindon, 2003).

Test Anxiety –The tendency of people to respond to nervousness induced by the testing situation with worried negative self centered thoughts or statements and physical symptoms of anxiety (Spielberger, 1976).

Summary

Montana tenth graders took the MontCAS criterion referenced test March, 2006. Results obtained on this test are a significant factor in determining whether a school makes AYP for the year. If not a “high stakes” test, it is certainly a high pressure test. Students who suffer from test anxiety are at a disadvantage in obtaining test scores commensurate with their abilities on the MontCAS or other high pressure tests. This may be particularly true for stereotyped or stigmatized groups of students, including minority students, girls, learning disabled students, and students from low SES

backgrounds. The presentation of a test anxiety reduction program could address some of the factors that keep these students from achieving higher test scores, and as such could be of benefit to the students and to their schools.

Chapter 2

Review of the Literature

Test Anxiety Defined

Over the years, as test anxiety research has developed and evolved, a variety of definitions and descriptions of this construct have emerged. Tuncay Ergene (2003, p.314) favors Spielberger's (1972) definition: Test anxiety is an "unpleasant state characterized by feelings of tension and apprehension, worrisome thoughts and the activation of the autonomic nervous system when an individual faces evaluative achievement-demanding situations." Wine's (1971) definition is more limited; she describes test anxiety as the tendency of people to respond to nervousness induced by the testing situation with worried negative self-centered thoughts and statements.

King, Ollendick, and Gullone (1991) describe test anxiety as unpleasant emotional reactions, characterized by subjective feelings of tension, apprehension, nervousness, and uncertainty, precipitated by evaluative situations. King et al. (1991, p. 25) go on to explain that while moderate levels of test anxiety "may enhance a student's performance," higher levels tend to interfere with the student's optimal performance.

Reinhard Pekrun et al. (2004, p. 290) use Zeidner's (1998) definition, stating that test anxiety is "anxiety subjectively relating to taking tests and exams, including anxiety related to the threat of failing an exam and the associated negative consequences." They identify some components of test anxiety, including "nervousness, worry cognitions, physiological activation, fearful facial expressions, and impulses to escape." Increased heart rate and perspiration are common physiological responses of test anxiety (Sarason, Sarason, and Pierce, 1990).

Perhaps it is a “low response threshold for anxiety in evaluative situations” (Ergene, 2003, p. 314) that most simply characterizes test anxiety. Test anxiety, then, is manifested in the tendency of students to perceive threat in evaluative situations. Test anxious students experience a reduced sense of self-efficacy, anticipate failure, and experience intense emotional reactions at the very first sign that of failure (Ergene, 2003). Such an experience is likely to be evoked when a person believes that her or his intellectual motivation and social capabilities may be affected by the test situation (Sarason et al., 1990).

Effects of Test Anxiety

As soon as a child enters school, success and failure experiences may play a vital role in whether or not the child develops test anxiety (King et al., 1991). Once manifested, test anxiety can be extremely disabling, correlating negatively with performance on ability and achievement tests (Hembree, 1988). While it may begin in early childhood, unless mitigated in some way, the effects of test anxiety may continue to plague an individual throughout his or her lifetime.

While many test anxious students are otherwise characterized as good students, once presented with the testing situation they become less task-oriented and more passive than non-test anxious counterparts (Wine, 1979). They may experience difficulty in reading and comprehending instructions, as well as struggle with recall and organization. For these reasons, test anxious students achieve lower academic grades than other students of equal ability (King et al., 1991). This leads to lower self-esteem and increased defensiveness (Hembree, 1988). Indeed, some students may refuse to go to school rather than endure the anxiety brought on by tests and examinations (King et al., 1991).

The academic potential of test anxious students is consistently underestimated. This misinterpretation of intelligence, aptitude, and achievement scores challenges the validity of the entire process of testing (Hembree, 1988). The achievement of educational and professional goals are very often tied to test performance, and the loss to society of the contributions of test anxious individuals may be considerable (Gonzalez, 1995).

Despite the prevalence of test anxiety, taking tests is a part of every student's life. In fact, the focus on achievement testing as an integral part of the educational system in the United States is growing, and the affective reactions of students is becoming more pronounced (Schultz, Distefano, Benson, & Davis, 2004).

Adaptive coping with testing and evaluative situations is vital for the psychological well-being of students, and vital as well for the attainment of their goals and aspirations. Modifying the conditions that produce their stress helps students learn to cope with the stress of testing (Zeidner & Hammer, 1990); improvement in test performance and even GPA are consistently shown to correlate with test anxiety reduction.

Historical Highlights of Test Anxiety Research

Stober & Pekrun (2004) trace early studies of test anxiety as far back as 1914, while acknowledging that the investigation of this concept under its own name did not emerge until 1952. In this year, Mandler and Sarason published a series of articles relating test anxiety to performance. This same year also marked the development of the first instrument to measure test anxiety. Thus 1952 is widely regarded as the year in which test anxiety emerged as a focus of serious study (Pekrun et al., 2004). The concept has been widely investigated since this time, and has developed in the areas of conceptualization, assessment, and treatment.

In the 1960's and early 1970's, two important advances in conceptualizing test anxiety were made. One distinguished worry and emotionality as the two basic dimensions of anxiety (Liebert & Morris, 1967). The other distinguished for the first time anxiety as a transitory state from anxiety as a stable personality trait (Spielberger, 1972). During the 1970's and 1980's, model constructions of test anxiety were developed. In particular, cognitive models focused on the effects of test anxiety on attention and cognitive performance, resulting in a sizeable body of research appearing in scientific publications (Stober & Pekrun, 2004).

Since the 1980's, research on this topic has decreased. Because of its continued importance as a variable in basic research in cognition and emotion, as well as its importance in various areas of applied psychology that explore performance and achievement, there has been a recent resurgence of interest in this subject (Stober & Pekrun, 2004).

Many studies have addressed the differential impact of emotionality factors of test anxiety, including such physiological reactions as arousal, trembling, and sweating, and the worry, or cognitive manifestations of test anxiety. Worry is manifested as task debilitating thoughts, negative self-evaluations, and off-task thoughts. The worry component in particular has consistently been shown to have an inverse relationship with performance (Bodas & Ollendick, 2005). Much current research on test anxiety continues to focus on the role of cognitive-attentional deficits. The advances of the last decade, however, reflect a more multidimensional aspect of test anxiety (Stober & Pekrun, 2004).

Theories of Test Anxiety

Test anxiety theories are classified into two broad categories. Interference models propose that test anxiety exists when the individual's ability to perform is interfered with by thought processes, behaviors, psychological phenomena, or physiological responses. This interference can be cognitive, autonomic, or a combination of both. Skills deficit models, on the other hand, propose that lack of knowledge of preparation and test-taking skills causes anxiety and poor performance (Gambles, 1994).

Test anxiety theory was introduced by Mandler and S. Sarason (1952) in an attempt to account for the effects of anxiety on test performance. Their research showed that test anxious college students performed more poorly on tests than those who were low in test anxiety. These results were most pronounced when the testing environment was stressful and "ego-involving." Mandler and Sarason concluded that there were two types of learned drives affecting test performance. The "learned task drive" is elicited by the demands of the task, and stimulates task-relevant responses, leading to the reduction of the drive upon completion of the task.

The "learned anxiety drive" can produce either task-relevant responses or task-irrelevant responses. Task-irrelevant responses, including feelings of inadequacy, helplessness, and disturbing autonomic responses, interfere with test performance. Mandler and Sarason (1952) further discovered that when stress was minimized, high test-anxious individuals performed better, but low test-anxious individuals performed more poorly. They concluded that high test-anxious persons respond to evaluative situations with negative, self-centered thinking, while low test-anxious persons react with

increased learned task drive behaviors and task-relevant responses that facilitate performance.

In 1967, Liebert and Morris proposed that test anxiety has two major components: worry and emotionality. Worry describes the cognitive evaluative ruminations of test anxiety, while emotionality describes the unpleasant autonomic responses. Worry concerns performance and the consequences of failure and poor evaluation relative to others. Emotionality includes muscle tension, sweaty palms, etc. (Sharma, 2002).

Emotionality tends to peak immediately before a test, and falls off rapidly when the test is concluded. Furthermore, emotionality is not related to performance expectancy. Worry is related to performance expectancy, and tends to be fairly constant across time (Liebert & Morris, 1967).

Worry impairs performance by reducing the amount of working memory available, such that task performance is seriously impaired. While test-anxious individuals must put in more effort to achieve the same satisfactory levels of performance as their non-test-anxious counterparts, they have the capability of performing well when their worry is contained (Keogh et al., 2004). Of the two components of test anxiety, worry has been found to contribute more to test anxiety and poor performance (Liebert & Morris, 1967; Keogh et al., 2004).

Wine (1971) expanded on the work of Liebert and Morris (1969), as well as Mandler and Sarason (1952), suggesting an attentional interpretation of test anxiety. Wine placed a great deal of emphasis on the attention that is drained by the distractive cognitions of test-anxious persons. She contended that high test-anxious individuals divide their attention between the demand characteristics of the test, and task-irrelevant cognitions such as

worry and self-criticism. These irrelevant cognitions distract from the task demands of testing, resulting in poor performance. Low test-anxious persons, she felt, are able to focus their attention fully on the task at hand.

Spielberger's (1972) trait-state differentiation provided a conceptual framework for the identification and classification of the major variables in anxiety research. Trait-State theory recognizes the affective and cognitive processes that characterize anxiety, and identifies the stressors that evoke different levels of state anxiety in those who differ in trait anxiety. These variables include stress, cognitive appraisal of threat, and various psychological defenses. Trait-State furthermore recognizes the interrelationship between these variables.

Trait-State theory identifies trait anxiety, or A-trait, as a proneness to anxiety in general, and state anxiety, or A-state, as a transitory state or condition characterized by tension, apprehension, and the activation of the autonomic nervous system. Situations which elicit the evaluation of one's personal adequacy are perceived as ego-threatening, and are perceived as more threatening by persons high in A-trait than those low in A-trait. Differential levels in state anxiety have been shown to influence performance on a variety of tasks (Spielberger et al., 1976). Trait-State theory holds that students high in A-trait are hyper-vigilant in scanning the environment for potential threat, resulting in selectively negative biases which further lead to distraction and thought interference (Spielberger et al., 1976; Keogh & French, 2001).

Trait anxiety, then, predisposes one to habitually experience emotions that interfere with test-taking performance. If emotions resulting from testing are very specifically

related to a point of time before, during, or after the testing situations, they are seen as state test emotions (Keogh, Bond, French, Richards, & Davis, 2004).

Sarason et al. (1990) also stressed the relevance of cognitive interference and attentional factors in test anxiety. They contended that in spite of vast differences in the content of possible self-preoccupied cognitions, their commonality is that they reduce on-task behavior during testing by diverting attention from relevant cues, causing the individual to misinterpret perceived cues. Anxious self-preoccupations involve a heightened concern over one's perceived inadequacies and shortcomings. The test anxious person is focused on perceived present and potential dangers and threats, and their perceived inability to cope with them. Thus, it is not the nature of the danger, but the misinterpretation of the events that causes test anxiety (Sarason et al., 1990).

Sarason et al. (1990) identified the following as the cognitive events that occur in anxiety producing situations:

1. The situation is perceived as difficult, challenging, and threatening.
2. The individual judges him- or herself to be ineffective or inadequate in dealing with the task being confronted.
3. The individual becomes primarily and exclusively focused on his or her personal inadequacy and the undesirable consequences of this inadequacy.
4. Strong self-deprecatory preoccupations interfere with task-relevant cognitive activity.
5. The individual fully anticipates failure and resulting loss of regard by others.

It is self-consciousness, perceived helplessness and expectation of negative consequences that occupy the attention of the test-anxious person.

Cognitive information-processing perspectives abound in current test anxiety research. A low-anxious individual, according to this perspective, searches the environment for cues, focuses on cues that facilitate thought and action, and integrates new and old information to make constructive decisions. A test-anxious person becomes self-preoccupied, which leads to a state of self-reference. To the extent that self-preoccupation prevents an individual from attending to environmental cues, the cues are dealt with in accordance with the person's perhaps idiosyncratic system of information-processing. Thus self-preoccupation interferes with task-relevant cognitive processes. Thoughts such as "I don't know what to do" from a person who might otherwise have the wherewithal to perform the task at hand are self-defeating (Sarason et al., 1990).

There is mounting evidence that test anxious individuals are not only more susceptible to distraction from internal, self-deprecatory thoughts, but also to a general susceptibility to distraction (Keough & French, 2001). Keough, Bond, French, Richards, and Davis (2004) concluded that while worry is an important factor in predicting test anxiety, so is susceptibility to distractions. Distraction, even from non-threatening cues, plays a key role in the disruption of test performance. For some individuals, failure to perform at their best on tests is attributable to their inability to filter out irrelevant material, either internal or external.

Zeidner (1998) addressed the importance of family and interpersonal influences in test anxiety. Parental child-rearing practices, standards and expectations, and feedback and support systems may all influence the child's development of an internal locus of control. Test anxious students, lacking this internal locus, develop feelings of hopelessness and

fear of failure, which contribute to the cognitive interference characteristic of test anxious individuals (Creighton-Lacroix, 2000).

After peaking in the 1980's, the number of scientific publications on test anxiety has decreased significantly. This may be due in part to the fact that test anxiety is often subsumed under different constructs including exam anxiety, performance anxiety, and math or statistics anxiety (Stober & Pekrun, 2004). In spite of the reduction in quantity of research, the last decade has seen some important advances. Coping behavior related to test anxiety is major topic in current research. Coping behaviors help student deal with the experience of stress and anxiety encountered in testing. Acquiring coping skills helps ameliorate negative emotions and promotes positive functioning. Also, the research has broadened its view to include pre-examination and post-examination phases of test anxiety (Stober, 2004).

Current research in particular emphasizes the multidimensional nature of test anxiety (Stober, 2004). The rise in multidimensional perspectives of test anxiety has allowed previously minimized dimensions, such as skills deficit and emotionality components, to re-emerge as relevant within the broad construct. Interestingly, current consensus is that test anxiety and the resulting poor school performance can be accounted for by a combination of interference, including cognitive and behavioral factors, and skills deficits, including poor study and test-taking skills (Sharma, 2002).

Stress over tests is normal, and even useful. It is the inability of the test-anxious person to respond to that stress in a productive way that makes it debilitating. Every teacher knows students who, while quite bright and apparently capable of success, are terror stricken at exam time. Some of these students become fixated on the consequences

of their perceived impending failure, such that their cognitions become destructive (Sarason et al., 1990). Current theories that address cognitive-attentional interference and skills deficits, along with emotionality components, point to therapeutic possibilities for test anxiety reduction.

Social, Cultural, Gender, and Economic Implications of Test Anxiety

Test anxiety is not limited to a particular culture or group, but appears to be pervasive across cultural and geographic boundaries (Bodas & Ollendick, 2005). There are variations of test anxiety symptoms unique to specific cultures. Sharma (2002, p. 52) states: “Although test anxiety is a universal emotion, cultural variations mediate socio-ecology which in turn can differentially determine anxiety experience, pattern of expression and interpretations.”

A practical focus, then, is on the need to better understand the specific processes that hamper the performance not only of individuals who experience test anxiety, but also of groups who under-perform on tests, and what can be done to improve that performance. In the culture of America, group stereotypes can influence the cognitive functioning and identity development of individual group members (Steele, 1997). Indeed, across grade levels, females exhibit greater test anxiety than males, and Black and Hispanic students report more test anxiety than White students (Hembree, 1988).

In American society, the ability to sustain school success requires that one be able to define oneself as an academic achiever. As Steele (1997) points out, such identity formation depends on one’s perception of good prospects in the educational domain. That is, an individual must perceive that the interests, skills, resources, and opportunities required to prosper as a student are attainable. Elliot and Dweck (2005) also view the

perception of competence to be fundamentally motivating, while the perception of incompetence is averse to motivation. While this may serve a self-protective function, it denies some individuals the opportunity for continued growth and development.

Additionally, the individual must feel a sense of belonging to the academic domain--of being accepted and valued there (Steele, 1997). Without this perception, the relationship to school, as well as school achievement, suffers.

Standardized tests are an area of particular concern. They continue to generate gender and race gaps in achievement despite years of national attention (Gambles, 1994). The underperformance of Blacks and Hispanics on standardized tests and the lag in math and science experienced by women show a disturbing pattern of underachievement. Test anxiety and bias compete for top billing as the villain of the standardized testing arena (Anderson & Sauser, 1995).

Indeed, there is ample evidence that institutionalized racism, however unintentional, impacts standardized tests. Amrein and Berliner (2002) found that high stakes tests are more likely to be found in states with higher percentages of African Americans and Hispanics, and in states with the greatest degree of poverty, affecting disproportionate numbers of racial minorities and the poor.

What then, in the experience of stigmatized groups, might frustrate their identification with some or all aspects of school achievement and how might this impact test anxiety among these groups (Steele, 1997)? One only has to turn to the social structure of this culture to understand. Historically and currently, equal educational opportunity has been denied based on socioeconomic disadvantage, social and racial segregation, and cultural restrictions (Steele, 1997). Some teachers and administrators, often unknowingly, hold

lower performance expectations for certain groups of students, and evaluate the school climate much less favorably when working with these groups (Alexander & Entwisle, 1987). Long exposure to stereotypes about their groups cause some group members to internalize the stereotypes perpetuated about them. These stereotypes, having become internalized, become part of the individual's self concept, and create an inherent sense of risk of being judged inferior (Steele, 1997).

Another situational threat occurs when a group member, while not succumbing to the stereotype, nevertheless fears having the stereotype of inferiority confirmed (Steele, 1997). This fear, called stereotype threat, can affect the members of any group about whom a negative stereotype exists. It is cued merely by recognizing that a group stereotype could apply to oneself in a given situation (Steele, 1997).

Stereotype threat affects those individuals who have not internalized the stereotype; that is, they neither believe nor accept the stereotype as applied to them. General features of stereotype threat are as follows:

1. It is not tied to the psychology of a particular group, but affects members of any group about whom there exists some generally known negative stereotype.
2. Different groups experience different degrees and forms of stereotype threat.
3. One need not accept the stereotype to be affected by it.
4. The difficulty of dispelling the stereotype increases with the difficulty of the work in the domain.

Stereotype threat, as well as internalized stereotype, affects test performance. Frustration with a test alerts a test-taker that the results of the test could confirm, or be seen to confirm, a negative group stereotype. These thoughts have been shown to

interfere with test performance for many groups (Steele, 1997). Sawyer & Hollis-Sawyer (2005) found that the manipulation of stereotype threat produced significant variation in test outcomes. Test anxiety is a major mechanism through which stereotype threat occurs. Stereotype threat, which affects a broad array of groups and domains, often emerges when tests are characterized as diagnostic and may be less present when tests are characterized as non-diagnostic (Steele, 1997).

Chronic stereotype threat can pressure disidentification, or a reconceptualization of oneself and one's values as separate and removed from the threatening domain, including tests, or school in general. Disidentifying offers a student the emotional self-protection of not caring about the domain in relation to the self. It also undermines sustained motivation in the effected domain. The cost of disidentification with the school domain is tremendous (Steele, 1997).

Not all students who are members of stigmatized groups disidentify with school. For those who remain identified, stereotype threat is particularly frustrating, as many who remain domain-identified are those with the skills and self-confidence to persist in their academic pursuits. Indeed, more and more of these students may become disidentified over time. Those students who continue to identify with school and testing under-perform only when the risk of stereotype threat is present. The disidentified are likely to under-perform even when stereotype threat is removed (Steele, 1997).

Any group for which there exists a broadly known negative stereotype may experience disidentification or stereotype threat in test-taking. Steele (2003) originally researched the effects of stereotype threat on African American males in general academic areas, and on women in math. As a professor and researcher at the University of Michigan, he

observed that even when White and African American students were matched for scores on the SAT exam, African American students got lower grades in college. The equivalent quality of their preparation and access to education did not seem to eliminate the racial gap amongst these students. Also discouraging was the high drop-out rate among Black college students when compared to their White counterparts. Aronson, Lustin, Good, and Keough (1999) discovered that Black college students were dramatically affected by stereotype threat conditions. Black students performed significantly worse than Whites on a standardized test when the test was presented to them as diagnostic of their intellectual abilities, thereby heightening the Black students' risk of stereotype threat. However, when told that the same test was a non-evaluative problem solving task, Blacks performed as well as Whites. Similar results have been repeated with Latino students, and even with elderly study participants, who, when primed with stereotypes regarding old age and senility, performed worse on a test of short-term memory than when given a stereotype about the wisdom of the elderly (Aronson et al., 1999).

Many women in higher education find it difficult to identify with math as a domain, due to stereotypes in which math is seen as unfeminine or male-dominated (Steele, 1997). Steele, Spencer, and Aronson (2002) found that women at the University of Michigan performed lower than their SAT scores would have predicted in difficult math classes. This predicament may contribute to women's high attrition from math, engineering, and physical science fields. Just as with African American males, Steele et al. (2002) found that when women could be assured that the test was non-evaluative, stereotype threat was minimized or eliminated, and women performed as well as men. The implications cannot

be overstated. Poor performance in school or on tests may not be due to lack of skill or preparation; some students may be undermined by stereotype threat or disidentification.

Students from low socio-economic backgrounds are also at risk for stereotype threat (Zeidner, 1990). Poor children are more likely to drop out of school than are their more advantaged peers (Clarke, 1997). The burden of poverty, which Clarke contends is distasteful to educators and to American society at large, makes it much harder for a student to succeed. American Indians are the most poverty-stricken group in our nation. Indian children are three times more likely to be poor than White children. Not only do Indian students have the highest poverty rate in the nation, but they also have the highest unemployment rate (Clarke, 1997). Failure rates of Indian children in school, in light of these facts, are also, not surprisingly, seriously high. While it is very easy and convenient for some to blame the school failure of American Indian children on their own heritage, the truth is that poverty is the most significant culprit (Clarke, 1997). Given the well established empirical evidence that social, cultural, gender and economic factors contribute largely to test and school underperformance, it becomes clear that these must be considered in any program to intervene in test anxiety.

Effective Treatment of Test Anxiety

Methods for treating test anxiety have been developed and tested extensively, and there is a compelling body of work that addresses this topic. The subject is complex. To be effective, test anxiety reduction programs must address an intricate interaction between personality factors, coping skills, autonomic responses, and environmental factors (Schwarter, 2003). People with different levels and patterns of anxiety are known to respond differently to different environments and testing situations, as well as to the

various treatment techniques. Some individual characteristics known to influence test anxiety treatment include cognitive style, personality traits, real and perceived ability, perceived importance of the testing event, and background characteristics, such as gender and family pressure (Anderson & Sauser, 1995). While there are less orthodox methods of test anxiety treatment, such as dance/movement therapy (Erwin-Grabner, Goodill, Hill & Von Neida, 1999) and Gestalt therapy (Garcia, Baker & Demayo, 1999), these have not proven efficacious, and treatment has emphasized more traditional techniques and strategies, which have been extensively tested and proven.

Ergene (2003) points out that earlier treatment of test anxiety was directed at reducing physiological arousal through behavior methods. Later, cognitive approaches prevailed. Recent methods have favored combined approaches. Sud and Sharma (1990) and Sharma (2002) identify the following methods as effective for reducing test anxiety: systematic desensitization, relaxation training, cognitive restructuring and attentional-skills training, participant modeling, and study-skills training. Brown (1999) lists essentially the same components, but creates separate categories for “other behavioral techniques” and adds “eclectic treatments.”

Ergene, in his 2003 meta-analysis of 56 test anxiety studies, classifies treatment approaches as behavioral, cognitive, cognitive-behavioral, and skills training. While Ergene found cognitive and behavioral approaches to be effective when used alone, study skills-alone approaches were only minimally successful. Significantly, the effectiveness of behavioral and/or cognitive approaches when combined with skill focused therapy had a much higher effect size than any approach used alone. Effective behavioral treatments included systematic desensitization and relaxation training, although relaxation training

was effective only as part of a combined approach. Modeling was an effective component in combination therapies. Among the cognitive therapies, cognitive restructuring produced the largest effect size, especially when combined with skills deficit training. Ergene concludes that the most effective approach may be the combination of the following approaches: (1) studying and test taking skills; (2) the opportunity to observe someone model test-taking; (3) cognitive self-monitoring, with practice; and (4) relaxation training under specific testing conditions.

Ergene (2003) also analyzed the effectiveness of various delivery systems for test anxiety reduction. He concluded that a combined group and individual approach is the most efficacious. Students in groups seem to find alternative solutions to their own problems by observing other students perceptions. They also see that they are not the only student who experiences test anxiety. This concurs with the conclusions of Gonzalez (1995), who found that group discussions of students' experiences in using new coping skills was essential to the treatment process. Additionally, Ergene (2003) identified 201 to 350 minutes of treatment time as optimal, with decreasing effect sizes as the time moves from this range in either direction.

Internalized stereotype, leading to disidentification of students from academic domains, and stereotype threat have been demonstrated to have a significant effect on test anxiety (Steele, 1997; Steele, 2003; Steele et al., 2002; Good et al., 2003; Sawyer & Hollis-Sawyer, 2005). Stereotype threat is a pressure that interferes with performance, much as do other self-defeating cognitions. Reducing this pressure, then, should improve the test performance of students (Steele, 1997). O'Brien (2000) implores counselors and other help professionals to consider providing programs that assist individuals, especially

minority individuals, to view themselves in a positive manner. Such programs, says O'Brien, will go a long way toward reducing test anxiety and cultivating a positive academic atmosphere.

Dweck and Molden (2005) contend that people's beliefs about the "fixedness or malleability" of intelligence is vital to academic success. Those who believe intelligence to be a malleable trait tend to set a high priority on learning and self-development, and utilize more effective self-regulating strategies when they feel intellectually threatened. Students who believe intelligence to be a fixed trait attribute intellectual challenges to deficient ability, and are less likely to persist when threatened. Change from an entity to an incremental theory of intelligence leads to changes in motivation, behavior, and outcomes.

Steele (1997) suggests specific strategies aimed at reducing stereotype threat. These are:

1. Optimistic teacher-student relationships, which discredit negative stereotypes through the authority of affirming adult relationships.
2. Assigning challenging rather than remedial work to students, demonstrating respect for their potential, rather than reinforcing the ability-demeaning stereotype.
3. Stressing the expandability of intelligence in response to experience and training.
4. Minimal direct praise and minimal attention to right and wrong answers.

All these strategies are designed to bolster self-efficacy for socially stigmatized groups.

A multifaceted treatment approach to treatment of test anxiety is generally accepted to be the most effective approach in treating test anxiety; consequently, it may be worthwhile to investigate some of the more widely accepted approaches more closely.

The following test anxiety reduction interventions will be explored: skills training, relaxation and systematic desensitization, other behavioral interventions, cognitive interventions, including rational emotive therapy, and cognitive restructuring of “stereotype threat” thinking.

Skills Deficit Training. Skills deficit training assumes that a student’s test anxiety is due to a deficit in study skills and/or test-taking skills (Gamble, 1994); training to compensate for this deficit addresses one or both. This training consistently shows moderate to small effect sizes unless combined with cognitive and behavioral techniques and relaxation, in which case significant reduction in test anxiety is likely (Gonzalez, 1995; Sharma, 2002; Ergene, 2003). Results also improve significantly when skills deficit training is combined with systematic desensitization (Brown, 1999; Ergene, 2003).

Gonzalez (1995) recommends explicitly informing students that improving their testing skills will reduce their anxiety and improve their scores. When preparing for standardized tests, Carter et al. (2005) and Conner (2003) recommend increasing test-wiseness by practicing with the same format as the actual test. Carter et al. (2005) further recommend providing students with a rationale for each strategy introduced, providing multiple opportunities to watch someone model the strategy, and providing repeated opportunities for students to practice applying the strategies using practice tests.

Other test-wiseness strategies include checking all work, marking skipped questions, and doing the easiest questions first. Specific to math sections, students may be taught to recopy problems to an easier format when appropriate, and to draw pictures that represent the problem when figuring out the function to be used. In language tests, students are encouraged to underline key words, read the questions before they read the passages, and

mark passages where information is found for a specific answer. Finally, in multiple choice tests, students are taught to eliminate obviously wrong answers, and answers with extreme qualifiers (Carter et al., 2005).

Relaxation Training and Systematic Desensitization. Both relaxation and systematic desensitization strategies are behavioral techniques for reducing anxiety. Relaxation exercises are shown to reduce the autonomic components of anxiety. A common relaxation technique consists of identifying muscles that become tense in stressful situations, and learning tension-releasing exercises which the student can practice after the training. It may be helpful to identify muscles that become tense in certain stressful situations, and muscle groups that the students find themselves least able to relax (Gonzalez, 1995.) Other very common techniques include deep breathing and visualization exercises.

Relaxation is an integral component of systematic desensitization, which is the most frequently investigated of any test anxiety treatment (Sharma, 2002), and has consistently been found to effectively reduce test anxiety (Hembree, 1988; Gonzalez, 1995; Sharma, 2002). Although the main goal of this treatment is to reduce emotional reactions associated with exams, Sharma (2002) points out that it also involves cognitive processes which direct the student to attend to and rehearse relaxation cues while imagining the various hierarchical elements of test anxiety.

Systematic desensitization presents a hierarchy of test anxiety stress-producing stimuli. The least threatening of these is read while students imagine the scene as clearly as possible while deeply relaxed. The next most threatening is then read, and so on. The process continues until all the stress-producing stimuli have been presented. King et al.

(1991) found this procedure to be highly effective when used with a group of junior high school students. Systematic desensitization reduces both self-reported trait and state anxiety (Brown, 1999).

Other Behavioral Interventions. King et al. (1991) found that test anxious individuals are frequently off task. They are more easily distracted by irrelevant stimuli in evaluative situations than are their non-test anxious counterparts. High test anxious students typically experience increased intrusive, irrelevant thoughts and high emotional arousal. One form of coping during testing, then, involves task focusing processes, which self-direct the test-taker during testing. The critical element in this process is the task-focused nature of the individual's internal talk. For example, task-focused thoughts about time management and specific test-taking strategies keep students focused on the test and release them from disruptive, irrelevant thoughts. Relaxation strategies like deep breathing may also result in lowering anxiety during testing (Schutz et al., 2004). Keough and French (2001) state that any intervention that effectively decreases off-task behavior automatically increases on-task behavior.

Modeling is another behavioral strategy that is utilized in test anxiety treatment. Having a role model with whom the students can identify diminishes social threats that may grab the students' attention and cause them to lose focus on the test-taking task (Steele et al., 2002). Modeling can be provided by using a group intervention structure, where other students can model appropriately for each other. The group facilitator can also serve as an effective model for on-task behaviors and use of effective test-wiseness strategies while providing instruction. Attention-focusing and modeling techniques are particularly effective when combined with other behavioral techniques, such as relaxation

and systematic desensitization, and/or cognitive skills training (Hembree, 1988; King et al., 1991; Brown, 1999).

Cognitive Interventions. Many highly test-anxious individuals experience frequent and intense task-irrelevant, self-critical and self-defeating thoughts. The attention required by these thoughts does not allow them to attend appropriately to test-taking tasks, compromising their performance. Although there may be little or no difference in performance and cognitive interference between test-anxious and non-test anxious individuals in non-testing situations, during testing these individuals process their successes and failures in distinctive ways; their anxiety is related to how threateningly they view test-taking (Sarason et al., 1990).

Test anxious students can be taught to be sensitive to the defeatist self-statements they experience during testing situations, and encouraged to produce more constructive thoughts that they can then practice and utilize (Fletcher & Spielberger, 1995; King et al., 1991; Sud & Sharma, 1990; Keough & French, 2001). If students can change their self-appraisals, they can change their emotional experience, and thus regulate test anxious feelings (Schutz, 2004).

Students learn that they are causing their own anxiety, and that they are capable of controlling their thoughts to make them more productive (Fletcher & Spielberger, 1995). These new, more constructive thoughts may be self-instructive, coping self-statements, or self-reinforcing statements. Pre-performance instructions that direct a student's attention to focus on task-relevant thoughts are effective for high-worry individuals, and have no detrimental effect on the performance of low-worry individuals (Sarason et al., 1990).

The main goal of cognitive therapy is to replace worry cognitions of test-anxious students with thoughts and behaviors that are incompatible with their occurrence. Test anxious students are first trained to be sensitive to their negative cognitions, and secondly, to respond to their negative self-statements with task relevant thoughts. They are taught three types of task-relevant cognitions: (a) self-instructions (e.g., “Just take one question at a time”); (b) coping self-statements (Don’t worry. Worry won’t help anything”); and (c) self-reinforcing statements (Its working! I can control my thoughts!”) These simple, clear cognitions help students to cope with worry and emotionality reactions during test-taking. Students are also encouraged to engage actively on test relevant tasks (Fletcher & Spielberger, 1995).

Rational Emotive Therapy (RET) techniques have also been found to be effective in refuting negative cognitions associated with poor test performance (Sharma & Sud, 2002). However, cognitive techniques have the advantage of requiring far less time to explain and apply, and are more useful in programs where time is limited, perhaps because they focus more narrowly on modifying worry cognitions (Fletcher & Spielberger, 1995).

Adding the element of relaxation training can greatly increase the effectiveness of cognitive techniques (O’Brien, 2000). O’Brien recommends this combination for minority students in particular. Brown (1999) also found the outcome of cognitive therapy combined with relaxation had higher effect sizes than either treatment by itself. The combination of cognitive and behavioral interventions, especially systematic desensitization, also shows increased effectiveness, as each treatment addresses independent components of test anxiety (Brown, 1999).

Cognitive Restructuring of “Stereotype Threat” Thinking. Disruptive pressures have been shown to decrease performance through a variety of mechanisms, including interfering anxiety, self-conscious thinking, and distracted thinking. Stereotype threat is yet another disruptive pressure that must be addressed (Steele, 1997). Generally, stereotype threat effects emerge when the tests are characterized as diagnostic. The effects are mitigated by characterizing the tests as non-diagnostic (Steele et al., 2002).

Stereotype threat interferes with test performance when frustration with the test alerts the tester to the possibility that the test could confirm, or be seen to confirm, a negative group stereotype. This person may perceive the testing situation as threatening due to the belief that outcomes are based on factors beyond their control, such as race or gender. The resulting feeling of low self-efficacy challenges the successful performance of the test-taking task (Sawyer & Hollis-Sawyer, 2005). A person taking a test while trying to suppress the concerns raised by this threat experiences the ironic effect of keeping the thought activated. The effort to suppress stereotype concerns while trying to focus on a test may be the process that interferes with test performance (Steele et al., 2002). If the individual perceives that testing outcomes depend on personal qualities that he or she can control, the test is less threatening and a more accurate and fair assessment (Sawyer & Hollis-Sawyer, 2005). The individual experience of stereotype threat is likely to vary from group to group, and from individual to individual, and different mediational interventions may prove beneficial for the varied processes activated by the threat (Steele et al., 2002).

In statewide, high stakes testing, students are keenly aware of, and may even exaggerate, the consequences of poor performance. Good et al. (2003, p. 648) state:

“...arming students with the means to overcome the stereotype threat they are likely to experience during these tests could potentially reduce the race and gender gaps that have troubled standardized testing for decades.”

When students are encouraged to think of intelligence as expandable rather than fixed, or to attribute difficulties to the novelty of the situation rather than their own inadequacies, student achievement is meaningfully increased. This has been found to be the case for Hispanic, Black, low-income, and female students (Steele et al, 2002).

It is also helpful for students to shift the blame from internal attributes (i.e., lack of ability) to more neutral and external causes (i.e., the difficulty of the context). In other words, students should be directed to “reattribute” academic and especially testing difficulties (Good et al, 2002). Changing students’ explanations for test difficulty from pejorative to non-pejorative can help reduce vulnerability to the negative consequences of low self-esteem and self-defeating cognitions, particularly for members of stereotyped and stigmatized groups (Steele et al, 2002).

Good et al. (2002) found that combining of these two cognitive interventions can meaningfully increase student achievement, especially for students who face negative stereotypes about academic challenges. Students in their study increased standardized test scores significantly after participating in a program that included these interventions. Thus, they conclude that students improve by learning new attitudes that help them deal with the anxieties that develop in part from their social identities. The performance of girls, minorities, and low-income students was boosted by addressing the psychologically threatening nature of stereotype-mediated assessments.

Conclusion. Test anxiety reduction is an important concern in the fields of psychology and education. Just as there are many ways of conceptualizing test anxiety, there are many ways of approaching its treatment. Test anxiety treatment has come to encompass a combination of intervention treatments that have proven to be efficacious, including skills training and various behavioral and cognitive interventions (Ergene, 2003), which seem to work best in certain combinations. Students who suffer from test anxiety tend to lose motivation to continue trying to succeed (Carter, 2005). Programs to help improve test-taking abilities are effective, and should be considered as part of a school's curriculum (Britton, 1998).

Summary

The focus on achievement testing as an integral part of the educational system in the United States is growing, and the affective reactions of students is becoming more pronounced (Schultz, Distefano, Benson, & Davis, 2004). Test anxiety occurs when students perceive threat in testing situations, often resulting in a reduced sense of self-efficacy and anticipation of failure (Ergene, 2003). Such an experience is intensified when a person believes that her or his intellectual motivation and social capabilities may be affected by the test situation (Sarason et al., 1990). Test anxiety results in a misinterpretation of intelligence, aptitude, and achievement scores which challenges the validity of the entire process of testing (Hembree, 1988).

Modifying the conditions that produce test anxiety helps students learn to cope more effectively (Zeidner & Hammer, 1990). Current research emphasizes the multidimensional nature of test anxiety (Stober, 2004). A variety of efficacious treatments have been proposed, including cognitive-attentional interventions and skills

deficit interventions. Additionally, social, cultural, gender and economic factors must be considered in test anxiety intervention programs.

Reduction of test anxiety is indeed an important concern in psychology and education. As Tuncay Ergene (2003) states, "...there is an urgent need for the development of effective test anxiety reduction programs for primary, middle, and high school students (p.326)."

Chapter 3

Research Method

This study investigated the relationship between performance on the MontCAS Criterion Referenced Test of selected 10th graders at Corvallis High School who participated in a systematic program for test anxiety reduction, and selected 10th graders at Corvallis High School who took the MontCAS but did not participate in the test anxiety reduction program.

The research method for this study proceeded as follows:

Research Design

This study used a related two-group design, as described by Sapp (1999). This design uses a stratified sampling procedure, and involves an experimental group and a control group matched on certain variables. The variables matched in the two groups in this study were:

1. Gender
2. Identification as involved in special education program
3. Identified as receiving “free or reduced lunch”
4. Identified as living in Pinesdale, or not
5. Having failed to score in the proficient range in math versus reading, or scoring in the lower proficient range in math versus reading.

The purpose of matching is to theoretically identify each individual in the experimental group as closely as possible with a “counterpart” in the control group, thus minimizing between-group variability or error at the onset of the experiment. This seemed particularly important because of small group size in this study. True random

assignment may have left the variables listed above skewed to an extent that compromised results. Once the two groups were matched, each group in its entirety was randomly assigned to be either the control or experimental group. According to Sapp (1999, p. 28), this combination of matched pairs and random assignment to experimental conditions “results in a more precise statistical analysis of the effects of treatment interventions for test anxiety than does random assignment alone.”

The experimental group received a four week, one hour per week intervention (240 minutes) designed to reduce test anxiety. They also had an individual session of approximately ten minutes at the conclusion of the four week group sessions. The control group received no intervention but was informed that they would have the opportunity to participate in the same intervention before final exams at school.

All 10th grade students at Corvallis High School took the MontCAS the week of March 6, 2006. When test results were returned to Corvallis High School by Montana Office of Public Instruction, the mean difference in reading and math scores between 8th and 10th grade administrations were compared for both groups. The difference in performance was computed and the results compared and analyzed. While it was originally determined that a t-test would be most useful, due to the smaller than expected group sizes, it was decided that a non-parametric test would be completed also. The Mann-Whitney was selected.

The experimenter also collected the following collateral data:

1. Difference in mean difference scores between math and reading sections of the MontCAS, to determine whether more success was noted on one or the other.

2. Difference in 1st and 2nd semester exam mean scores, to determine whether there appeared to be any generalization of the skills learned in the test anxiety reduction program.

Population and Sample

The population for this study included all 10th grade students at Corvallis High School who failed to achieve a score of proficient or higher, or who achieved in the low-proficient range, on the last MontCAS administration, which was when they were in the 8th grade. For the purpose of this study, low proficient constituted students scoring in the lower 60% of the proficient range based on scaled scores. Students had to have attended Corvallis School District when they were in the 8th grade to be considered, as there was access to 8th grade scores for those students only.

Seventy-nine students were identified in this population. All identified students were between 15 and 16 years old. Parents of each of these students were sent letters asking permission for their child to participate in the study. Thirty-nine parent permission forms were returned, and each child of these parents was approached, had the program explained, had questions answered, and was asked to sign an assent form if they wished to participate. Thirty students agreed to participate; fifteen were assigned to each group.

Further clarification may be needed relative to the classification of students as being from “Pinesdale.” Pinesdale is a polygamous fundamentalist Mormon community. Approximately 25% of the population of Corvallis High School is from Pinesdale.

Corvallis High School, over the years, has developed an excellent working relationship with the Pinesdale community, and students from Pinesdale are an integral part of the school. Nevertheless, as these students represent a cultural group separate in

life-style and beliefs from the rest of the population of Corvallis, it seems reasonable to assess these students not only as part of the general population, but also as a distinct group for research purposes.

Instrumentation

The major instrument used in this study to determine whether the test anxiety reduction program was successful in reducing test anxiety was the MontCAS Criterion Referenced Test, developed by Measure Progress Testing Service and the Montana Office of Public Instruction. Sud and Sharma (1990) clearly state that performance is generally accepted as the most important variable in test anxiety research. Exam scores are the reason that test anxiety programs are implemented; to be considered effective, test anxiety reduction programs should positively influence test scores.

The MontCAS is sent to Montana OPI for scoring; scores are reported back to schools. The levels of performance possible are: novice, nearing proficiency, proficient, and advanced. Scaled score ranges are available for each level. Scaled scores range from 200 to 300, with a 95% confidence interval. Mean difference in scaled scores were used in this study to determine whether there was a significant difference in scores between the experimental and control groups.

This study did not utilize a standard test anxiety measure to identify test anxiety in participating students. Test anxiety is known to be a complex structure, which can include one or any combination of cognitive, affective, behavioral, or social factors that interfere with effective task performance. Chronically low achieving students may suffer from test anxiety without being able to label the discomfort they feel, particularly if they are a member of a minority group or students with low SES. Thus, by offering this

program to any student not achieving proficiency on the MontCAS, or who was in the lower range of proficiency, it was deemed possible to effect change in the amount of test anxiety that is actually present, but not necessarily perceived.

Rost and Schermer (1992, p. 85) state that “the main disadvantage of available test anxiety questionnaires is their lack of relevance to planning, conduction, and evaluation of clinical and educational counseling and intervention.” Such questionnaires often arbitrarily measure for certain components of test anxiety (Rost & Schermer, 1992).

As most methods of measuring test anxiety are self-report inventories (Anderson & Saucer, 1995), in order to get some self-assessment of the major factors of test anxiety that would be addressed, the experimenter created a six item checklist, to be completed by students in both the experimental and control groups. The checklist contained six symptoms that correspond to the test anxiety factors to be addressed in the test anxiety reduction program. The factors addressed in the test anxiety program were deliberately selected from those interventions found most effective by the meta-analytic studies of test anxiety treatment programs, and especially the comprehensive work of Tuncay Ergene (2003).

The checklist developed for this study asked students to list the symptoms they identified as having experienced during previous testing, in order of the most commonly experienced to the least experienced. The six symptoms listed on this checklist are:

1. I get flooded by negative thoughts when taking tests.
2. I feel tense when I take tests. My heart races, I feel shaky, my palms sweat...
3. I lose focus when taking tests.
4. I work myself up just thinking about having tests coming up.

5. I don't use test-wiseness skills.
6. I judge myself as being the kind of person or part of a group that just doesn't do well on tests.

Following administration of the MontCAS, both groups of students were given a questionnaire which again listed these symptoms. After each item on each administration of the checklist, the student was asked to select one of the following responses:

1. I have not experienced this.
2. I have experienced this. I do not experience it any longer.
3. I have experience this. I experience it less than I used to.
4. I experience this feeling as much as I ever did.

Students did not sign either of these questionnaires, in order to protect their anonymity and encourage frankness.

Procedures

The procedures of this experiment were as follows:

1. Records of all students who were in the eighth grade at Corvallis Middle School in Spring of 2004, and who participated in the administration of the CRT's, were reviewed by researcher to determine qualifying students.
2. The researcher sent a letter to the parents of each student meeting the above criteria, in compliance with University of Montana IRB requirements, asking for permission for their child to participate in the research. Parents were informed of the basic experimental design,

including division of participants into experimental and control groups, and permission to withdraw from experiment at any time.

3. All students identified as stated above were asked if they wanted to participate in the study, and were asked to sign an assent form if they did agree to participate. This form clearly specified the voluntary nature of the experiment, the conditions of the experiment, and stated that students could terminate their participation at any time they chose.
4. All students who agreed to participate, and who received parental permission, were included in experiment.
5. An individual independent of this research coded qualifying students with a random identification number. They were also coded to identify the following:
 - Students who scored in the novice (N), nearing proficient (NP) or low proficient (LP) range in:
 - math: M
 - reading: R
 - Gender: B or G
 - Identified as a Special Education student: SP
 - Identified as Free or Reduced Lunch participant: FR
 - Identified as being from Pinesdale: PD
6. Experimenter attempted to match the groups such that they were as nearly matched as possible through blind selection (Related Two-Group Design: Sapp, 1999).

7. Experimenter randomly selected one group to be the experimental group, and the other to be the control group through blind selection.
8. The same independent party (see #5) re-matched numbers to students and gave list of students in each group to the researcher.
9. The researcher developed a test anxiety intervention program to which experimental group was exposed. This program utilized a combination of skill-focused approaches with behavioral and cognitive approaches to test anxiety reduction. The procedures used were those pointed to by the results of meta-analyses of test anxiety treatment programs. A combination of individual and group treatment designs was used. Students had four 1-hour group sessions, and a final individual interview before testing.
10. The control group received no intervention.
11. Researcher trained an unbiased party who facilitated the experimental group.
12. Test anxiety reduction program was facilitated.
13. 2006 CRT's were administered.
14. Following the administration of the Spring, 2006 CRT's, and the release of scores by Montana Office of Public Instruction, researcher determined the mean difference between experimental and control group scaled scores.

15. Numbers in each group who improved were compared, using the Independent Samples T-Test and the Mann-Whitney non-parametric test.

Conclusion

The implications of this research on Montana schools could be significant. The No Child Left Behind law requires that all students in 3rd through 8th grades, and again in the 10th grade, take the MontCAS Criterion Reference Test. The results of this standardized test are a large part of determining whether the school is making Adequate Yearly Progress (AYP). Schools that fail to make AYP are put on notice, and may ultimately lose funding and/or be taken over by other agencies. In Montana, the majority of schools failing to make AYP are schools on Native American reservations; it may well be that the implications of this research are most important for Montana schools with high minority and/or low SES populations.

Chapter 4

Results of Data Analyses

The purpose of this study was to investigate the relationship, if any, between performance on the MontCAS Criterion Referenced Test by 10th graders at Corvallis High School who participated in a systematic test anxiety reduction program and students who did not participate in the program.

One hundred-five students took the MontCAS at Corvallis High School in the eighth grade and were retaking it in the tenth grade. Seventy-nine qualified on the basis of their eighth grade MontCAS scores. Packets were sent to parents of each of these students, explaining the research process, asking for permission for their children to participate, and encouraging them to discuss the process with their children. Thirty-nine signed parental permission forms were returned. The researcher met with all 39 students to explain the process and answer questions, and to request student assent to participate. Thirty signed the assent, and were divided into two related groups, matched on the variables described previously. Each group had 15 students. All matching was done by an impartial party, and the experimenter was not made aware of individual characteristics of group members. The researcher then met again with both groups to discuss group assignments, and to remind the control group that they would be offered the same intervention after the experimental group had completed it.

Students were matched according to eighth grade math and reading scores categories on the MontCAS Criterion Referenced Test: Novice, Nearing Proficient, or Low Proficient. Students were also matched by gender, whether they were in special

education, whether they received free or reduced lunch, and whether they resided in Pinesdale. Final group make-up was as follows:

Table 1

Proficiency Levels of Experimental and Control Groups

	Math, Novice	Math, NP	Math, LP	Read, Novice	Read, NP	Read, LP
Experimental	2	4	9	2	4	3
Control	1	6	8	3	4	2

Table 2

Subgroups of Experimental and Control Groups

	Girls	Boys	SPED	Pines	F & R
Experimental	9	6	2	3	7
Control	9	6	2	5	5

The experimental group received a four week, one hour per week intervention (240 minutes), as well as a 10 minute individual session at the conclusion of the 4 week program. The control group did not complete the program before the administration of the MontCAS exam.

Test Results for Experimental and Control groups, and Non-Participants

Hypothesis 1 addressed the relationship between mean scores for students who were and who were not exposed to the test anxiety reduction program. Before addressing this issue, it was important to assess the experimental and control group samples to determine whether significant differences existed between these groups regarding their eighth grade math and reading test scores.

Table 3 compares mean score differences in reading and math for the experimental group, the control group, and the entire group of students who took the test in the 8th and

10th grades. Figures 1 and 2 graph these scores. All student scores were made available to the researcher by the Corvallis High School principal:

Table 3

Comparison of Mean Scaled Scores for Experimental and Control Groups, and Whole Class

	N	Reading, 8 th	Reading, 10 th	Math, 8 th	Math, 10 th
Experimental Group	15	260.13	273.93	248.60	252.13
Control Group	15	246.73	255.40	245.87	248.80
Whole Class	105	263.71	270.30	261.34	257.96

Comparison of 8th and 10th Reading Scores

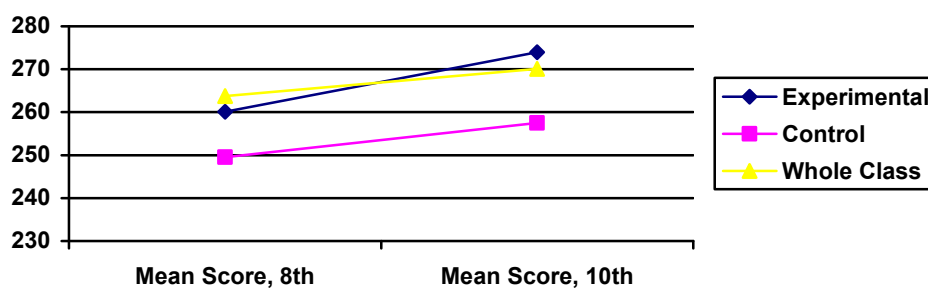


Figure 1

Comparison of 8th and 10th Math Scores

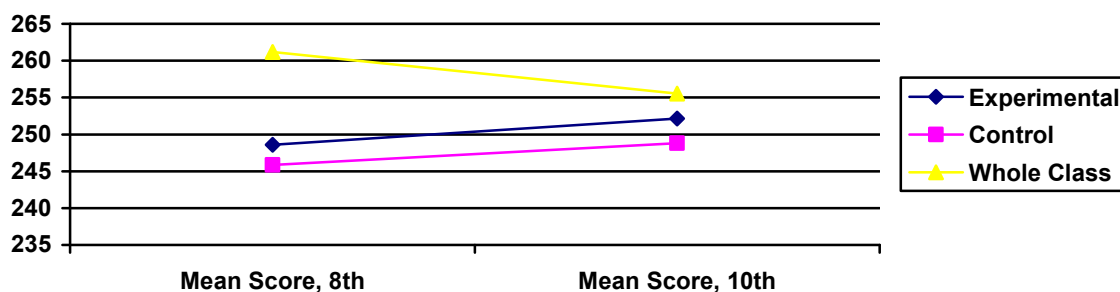


Figure 2

Tables 4 and 5 show mean scores and Kruskal-Wallis analyses on the MontCAS eighth grade scores for the experimental (n=15) and control groups (n=15), as well as comparisons with the other 75 students who took the test in the eighth grade and were retaking it in the tenth grade, but were not formally part of this study:

Table 4

Mean Rank Scores for Eighth Grade Reading and Math Scores of Experimental and Control Groups and Non-Participants

	GRPTYPE	N	MEAN RANK
MATH 8	Experimental	15	37.50
	Control	15	33.10
	Non-part	75	60.08
	TOTAL	105	
READING 8	Experimental	15	49.70
	Control	15	37.63
	Non-part	75	56.73
	TOTAL	105	

Table 5

Kruskal-Wallis Analysis of 8th Grade Math and Reading Scores

	Math 8	Reading 8
Chi-Square	14.379	5.164
Df	2	2
Asymp. Sig.	.001	.076

a. Kruskal Wallis Test

Overall, the results displayed in the above tables show no significant differences between the experimental and control groups on the eighth grade MontCAS math and reading scores. In contrast, the non-participant group of 75 students had significantly higher eighth grade scores ($p=.001$) and a statistical trend toward higher scores on their eighth grade reading scores ($p=.076$) than both the experimental and control groups.

The question of whether the experimental group scored higher on their 10th grade MontCAS math and reading tests (Hypothesis 1) was evaluated using two different statistical procedures. First, results using Independent Samples T-Test are included in Tables 6 and 7. While it is acknowledged that normal distribution assumptions were not adequately met for the T-test, because it was part of the original list of procedures, it was decided to complete this test for exploratory purposes only. Using 8th and 10th grade test difference scores, these results indicate no significant differences between the experimental and control groups on either the MontCAS math or reading tests (see Table 7). There is a lack of statistical significance reported, despite the fact that the average reading scores for experimental group members increased by 13.8 points, versus 8.67 for the control group, and average math scores for experimental group members increased by 3.53 points as compared to 2.93 points for the control group. In other words, although reading and math scores increased to a greater degree in the experimental group, these increases were not statistically significant.

Table 6

Analysis of Experimental and Control Groups Using 8th to 10th Grade Difference Scores

	Grptype	N	Mean	Std. Deviation
Difference Reading	Experimental	15	13.8000	13.47060
	Control	15	8.66667	13.79268
Difference Math	Experimental	15	3.5333	14.58897
	Control	15	2.9320	12.98110

Table 7

Independent Samples T-Test Analysis of 8th to 10th Grade Difference Scores

	t-test for Equality of Means			
	t	df	Sig. (2-tailed)	Mean Difference
Difference Reading	1.031	28	.311	5.13333
Difference Math	.421	28	.677	2.12133

Due to the very small sample sizes, and on recommendation of the dissertation committee, differences between the experimental and control groups were also analyzed using a non-parametric procedure, the Mann-Whitney Test. The results using this procedure are nearly identical to the T-Test results, showing no significant differences between groups on the math and reading tests (see Table 8).

Table 8

Mann-Whitney Analysis of 8th to 10th Grade Difference Scores

	Grptype	N	Mean Rank	Sum of Ranks
Difference Reading	Experimental	15	16.87	253.00
	Control	15	14.13	212.00
	Total	30		
Difference Math	Experimental	15	16.40	246.00
	Control	15	14.60	219.00
	Total	30		
			Difference Reading	Difference Math
Mann-Whitney U			92.000	99.000
Wilcoxon W			212.000	219.000
Z			-.853	-.561
Asymp. Sig. (2-tailed)			.394	.575
Exact Sig. [2*(1-tailed Sig.)]			.412 ^a	.595 ^a

a. Not corrected for ties.

Following analysis of Hypothesis 1, it was decided to evaluate whether there were significant differences between the experimental and control groups as compared to all other students who took the tenth grade MontCAS at Corvallis High School. T-Tests for

independent samples were conducted to evaluate for these differences (see Tables 9 and 10).

TABLE 9

Comparison of Difference Scores for Experimental Group and Non-Participants

	Grptype	N	Mean	Std. Deviation
Difference Reading	Experimental	15	13.8000	13.47060
	Non-Participants	75	4.7733	20.40904
Difference Math	Experimental	15	3.5333	14.58897
	Non-Participants	75	-6.5067	11.57627

Table 10

Independent Samples T-Test Analysis of Difference Scores of Experimental Group and Non-Participants

	t-test for Equality of Means			
	t	df	Sig. (2-tailed)	Mean Difference
Difference Reading	1.639	88	.040	.902667
Difference Math	2.932	88	.022	10.04000

As reported in Table 10, difference scores between the experimental group and all non-participants for 8th and 10th grade MontCAS scores were significantly different on both math and reading subtests (reading: $p=.040$; math: $p=.022$). For the experimental group, the mean change from 8th to 10th grade in reading scores were +13.8 as compared to +4.8 for the non-study participants. The mean change from 8th to 10th grade in math scores was +3.5 for the experimental group and -6.5 for non-participants.

Control Vs Non-Participant Scores

As reported in Tables 11 and 12, difference scores between the control group and all non-participants for 8th and 10th grade MontCAS math and reading scores were significantly different on math, but not reading (reading: $p=.37$; math: $p=.04$). For the control group, the mean change from 8th to 10th grade in reading scores was +8.7 as

compared to +4.8 for the non-participants. The mean change from 8th to 10th grade math scores were +1.4 for the control group and -6.5 for the non-participants.

Table 11

Comparison of Difference Scores for Control Group and Non-Participants

	Grptype	N	Mean	Std. Deviation	Std. Error Mean
Difference Reading	2 3	15 75	8.6667 4.7733	13.79268 20.40904	3.56126 2.35663
Difference Math	2 3	15 75	2.9320 -6.5067	12.98110 11.57627	3.35171 1.33671

Table 12

Independent Samples T-Test Analysis of Difference Scores of Control Group and Non-Participants

	t-test for Equality of Means			
	t	df	Sig. (2-tailed)	Mean Difference
Difference Reading	.921	88	.370	3.89333
Difference Math	2.194	88	.041	7.91867

Scores for sub-groups

The second through the sixth hypotheses of this research dealt with whether the various sub-groups of the experimental groups would increase scores significantly when compared to the sub-groups of the control group. As made clear by Table 2, the numbers in these sub-groups are too small to determine significant statistical difference. However, the information was still of interest to the experimenter. Accounting for both math and reading tests, there are ten sub-group sets of scores to compare. These subgroups and corresponding mean score differences are reported below:

1. Girls on math test, experimental group, versus girls on math test, control group:

Experimental group: -1.44; Control group: +5

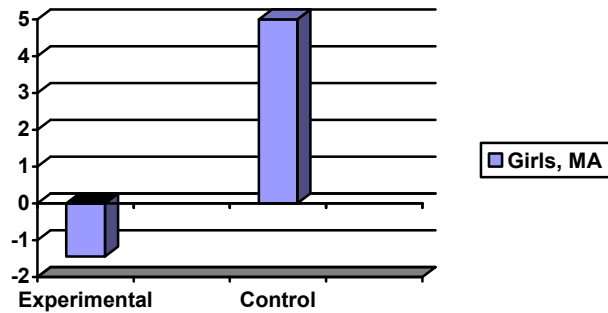


Figure 3

2. Girls on reading test, experimental group, versus girls on reading test, control group:

Experimental group: +11.8; Control group: +8.4

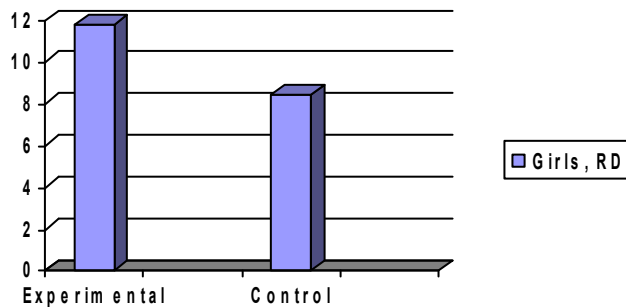


Figure 4

3. Boys on math test, experimental group, versus boys on math test, control group:

Experimental group: +11; Control group: -.166

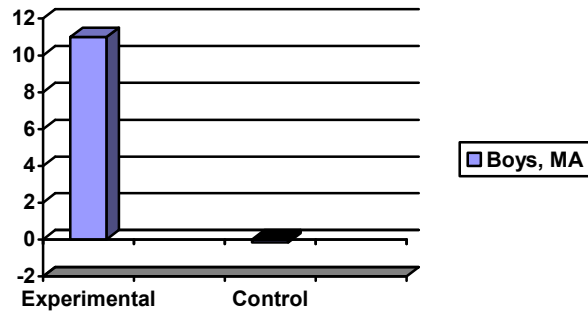


Figure 5

4. Boys on reading test, experimental group, versus boys on reading test, control group:

Experimental: +16.66; Control: +7.166

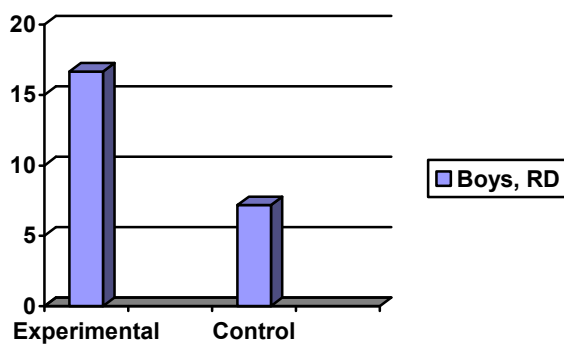


Figure 6

5. Special education students on math test, experimental group, versus special education students on math test, control group:

Experimental: +10.5; Control: +6

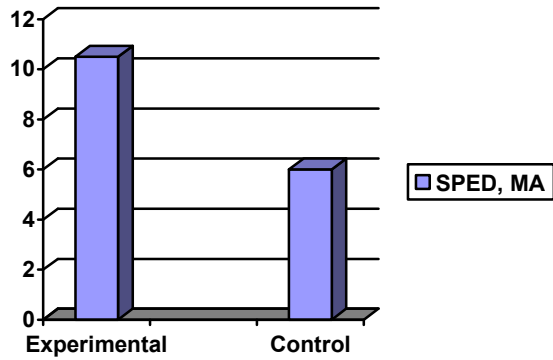


Figure 7

6. Special education students on reading test, experimental group, versus special education students on reading test, control group:

Experimental: +12.5; Control: +14.5

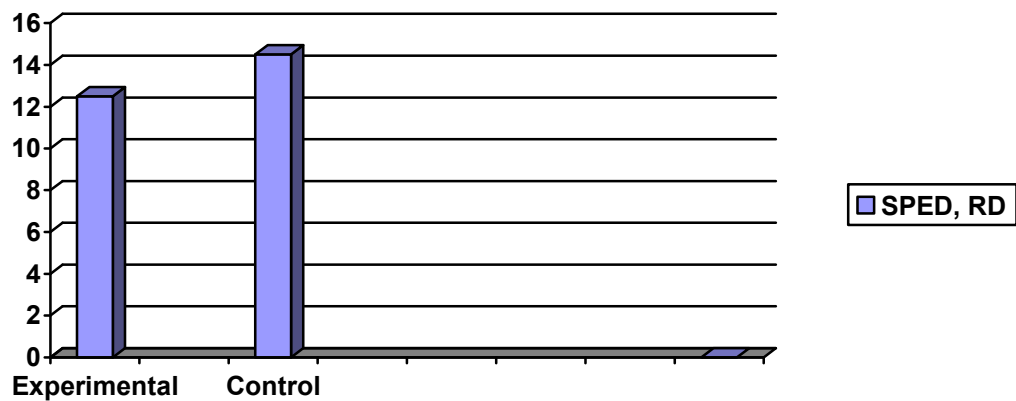


Figure 8

7. Students from Pinesdale on math test, experimental group, versus students from Pinesdale on math test, control group

Experimental: +16.3; Control: -2

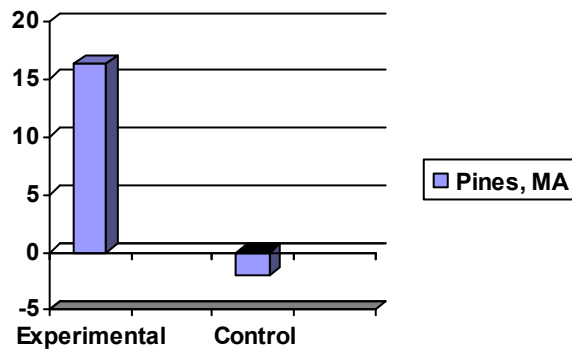


Figure 9

8. Students from Pinesdale on reading test, experimental group, versus students from Pinesdale on reading test, control group:

Experimental: +33.33; Control: +15.8

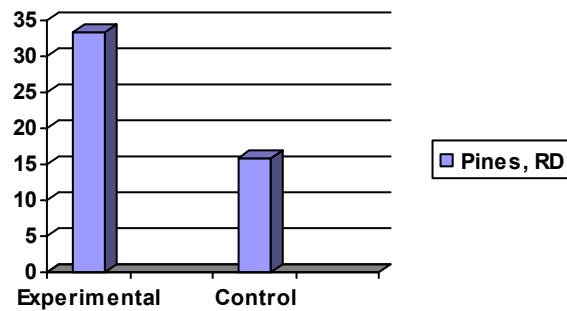


Figure 10

9. Students who receive free or reduced lunch on math test, experimental group, versus students who receive free or reduced lunch on math test, control group:

Experimental: +5.57; Control: -7.4

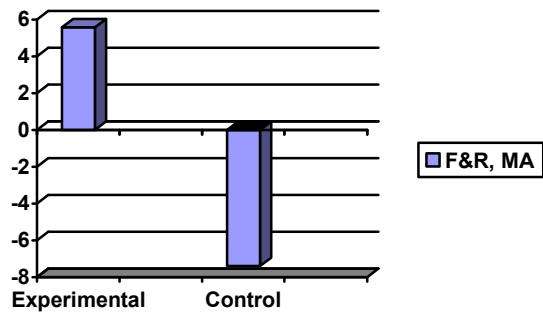


Figure 11

10. Students who receive free or reduced lunch on reading test, experimental group, versus students who receive free or reduced lunch on reading test, control group:

Experimental: +19.57; Control: +17.6

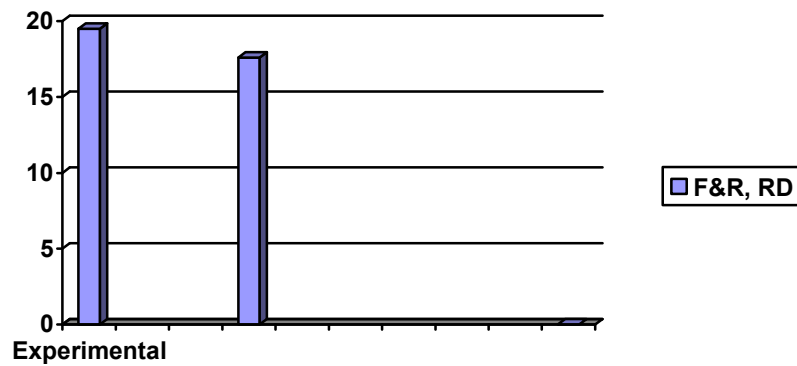


Figure 12

While the small numbers make statistical significance impossible, it may be noteworthy that in eight of the ten sub-groups, the increase in mean score of the experimental group is greater than the increase in mean score of the control group. The exceptions are in the “girls, math” and “special education students, reading” sub-groups.

Comparison of Mean Score Differences for Math and Reading

Hypothesis 7 examined whether there would be a difference in mean score differences between math and reading tests. Table 13 shows the difference between these two tests when comparing the increase in mean score between eighth and tenth grade administrations of the MontCAS:

Table 13

Comparison of Mean Score Differences Between Reading and Math Scores for Experimental and Control Groups

	Difference, RD	Difference, MA	Difference, RD - MA
Experimental	+13.8	+3.53 ^a	+10.27
Control	+7.93	+2.93	+5

Thus, both the experimental and control groups increased their mean reading score more than their mean math score.

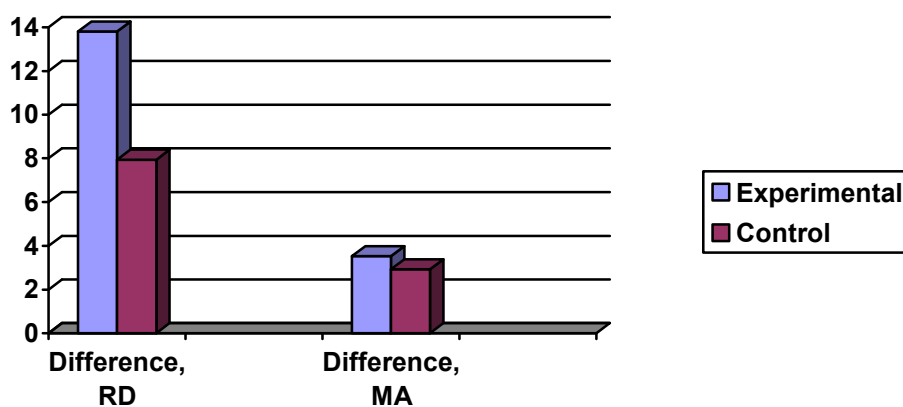


Figure 13

Comparison of First and Second Semester Final Exam Scores

The final hypothesis posed in this research, Hypothesis 8, examined whether the effects of participation in the test anxiety reduction program would generalize to exam scores. That is, would exam scores for second semester exceed those of first semester for the experimental group?

This proved not to be the case. Mean exam score for first semester for the experimental group was 81.37. Mean exam score for second semester was 80.47, for a decrease of .9 points.

Questionnaire Results

While group members were not given a formal test anxiety measure, members of both groups, once they had been established, were given a six item checklist corresponding to the test anxiety factors that were determined, by review of the literature, to be the most beneficial program components, and which would be addressed in the test anxiety reduction program.

Table 14 identifies the six factors investigated, the number of students in the experimental and control groups who initially identified each one as a problem area, and the numbers who, at the conclusion of their participation in the program, reported either that they experienced this problem less or not at all, or who reported that they experienced the problem just as much as ever.

Table 14

Questionnaire Results

	1 ^a	2 ^a	3 ^a	4 ^a	5 ^a	6 ^a	Total
Exp Grp- # Identifying this as a Problem Pre-intervent	5	7	15	6	10	7	50
Exp Grp- # Experiencing Less or Not At All, post- intervention	12	9	13	12	13	7	66
Exp Grp-# Experiencing As much as Ever, post- intervention	1	1	0	0	0	2	4
Contr Grp- # Identifying this as a Problem Pre-intervent	10	9	13	10	11	11	64
Contr Grp- # Experiencing Less or Not At All, post- Intervention	5	8	7	3	7	6	36
Contr Grp-# Experiencing As much as Ever, post- intervention	3	3	5	3	3	7	24

^aQuestionnaire Categories:

1. I get flooded with negative thoughts when taking tests
2. I feel tense when I take tests. My hear races, I feel shaky, my palms sweat
3. I lose focus when taking tests. My mind goes blank
4. I work myself up just thinking about having tests coming up
5. I don't use "test wiseness" strategies
6. I judge myself as being the kind of person or part of a group that just doesn't do well on tests

Experimental Group Final Evaluation

Following the four group meetings of the test anxiety reduction program, members of the experimental group were interviewed individually to assess their reactions to the program, and to find out whether they felt they needed additional support in test taking. One question asked the students to rate the usefulness of each of the techniques covered in the program. They were to use the following scale: 1, for “not at all useful”; 2, for “a little bit useful”; 3, for “pretty useful”; and, 4, for “very useful.” Following is a list of the techniques and the mean response given:

Affective, Cognitive, and Behavioral Techniques:

1. Deep Breathing	3.33	6. Individual Systematic Relaxation	2.64
2. Systematic Relaxation	3.13	7. Replacement Thoughts	2.63
3. The 45-Second Breather	3.07	8. Visualizing Safe Place	2.27
4. Re-Focusing Strategies	3.00	9. The “Whoosh” Technique	2.23
5. The “Stop” Technique	2.67		

Test-Wiseness Techniques:

1. Read Question First	3.67	7. Estimate Answer	2.93
2. Make Educated Guess	3.53	8. Underline Phrases	2.80
3. Skip Around	3.47		
4. Check All Answers	3.33		
5. Draw Pictures of Math Problems	3.20		
6. Underline Key Words	3.17		

Other interesting findings were that eight out of fifteen experimental group members remembered as particularly meaningful the concept of expandability of intelligence, and fourteen out of fifteen thought they would use the handouts given throughout the program again. When asked whether they knew of other situations in which the techniques they had learned might come in handy, some of the answers included: before dancing on stage (1); during job or college interviews (2); in stressful job situations (3); for anger control (3); for taking driving test (2); in athletic competition (3); and in public speaking (2).

Chapter 5

Discussion and Implications

This study investigated the effectiveness of a four hour test anxiety group protocol on subsequent student performance on the MontCAS by 10th graders at Corvallis High School. These students had previously taken the test in the 8th grade and, for the purposes of this study, their 8th grade test scores were compared to their 10th grade test scores.

Standardized tests have become an integral part of the school experience. Test anxiety affects 10%-30% of the school age population (Johnson, 1979), and may impact poor and minority students in particular (Steele, 1997). Any alleviation of test anxiety, and associated improved test performance, could prove beneficial to students and to schools, whose effectiveness is evaluated based on student test results.

The test anxiety program used in this experiment was based on the results of meta-analyses of test anxiety research, especially that of Tuncay Ergene (2003), who identified the most effective treatment approaches. Overall, the test anxiety program did not produce significantly improved test performance among experimental group members, as compared to the control group. Some problems inherent in the research and some possible reasons for the lack of significance will be discussed, as well as recommendations for future research.

Small Sample Size

The small sample size, which was due to the small population available to the experimenter, was certainly problematic. The authenticity of the research imposed its

own restrictions in this matter. Nevertheless, because of the small sample size, some of the analyses of the data lack the statistical power needed to draw conclusions.

Multiple Interventions

Because the intervention selected for this experiment was multi-faceted, even if a significant difference had been determined between the experimental and control groups, there would have remained the question of which of the intervention components, or which combination of the intervention components, made any difference. The researcher relied on a review of the test anxiety research to help determine the salient factors in effective test anxiety reduction programs. Ergene (2003) and others previously identified key factors in this design. Nevertheless, it may have been useful to clarify in this particular study and with these particular subjects the level of importance of the factors included, if any.

In order to determine this, the experiment could be replicated leaving out various intervention components. The cognitive restructuring element in this experiment is directly related to the literature on stereotype threat (Steele, 1997; Steele, 2003; Steele et al., 2002; Good et al, 2003; Sawyer & Hollis-Sawyer, 2005). Leaving out the cognitive restructuring element and replicating the experiment with the same intervention offered for the control group would help determine the level of impact, if any of the cognitive restructuring component of this experiment. The same process could be repeated for any of the other components as needed. This would make it necessary that each of the components be very clearly defined and delineated.

Time-Lag

Another inherent problem with this study was the two year lag between test administrations; that is, between eighth and tenth grades. Certainly it raised the question of the possible effect of simple maturation, although this would apply to all 105 students repeating the test, and more importantly, the effect of instruction in the content areas assessed. A much shorter time span would have increased the likelihood that increased learning and developmental factors could be ruled out as having a major effect on improved scores. However, the issues addressed by this research (i.e. the need for students to perform as well as possible on this assessment), are authentic, and the authenticity of the situation also dictates that the test is only administered at the high school level in the tenth grade, and that it had been two years since the last administration.

A pre-post test experience using a “practice test” put out by the company who writes the MontCAS would have eliminated the time-lag problem. This would not have been, however, an authentic testing situation, and would not have given the same information. The research would have lost the high pressure of an authentic testing situation critical to this experiment. Therefore, the researcher accepted the two-year lag, hoping that the research results would be decisive enough to determine whether or not the intervention was an important influence in test scaled scores.

Counselor Relationship

Another threat to the validity of this research was the relationship of the experimenter with the student participants. Although there was an effort to eliminate or at least minimize any blending of the school counselor’s role and the experimenter’s role, there

was no way to eliminate the students' awareness of the experimenter's usual role as counselor.

Again, there is little in an authentic, school based experiment that can be done to eliminate this threat. Certainly, the non-use of her title in the consent letters to parents was necessary. Also, the fact that the experimenter was not the group facilitator was vital. Nevertheless, it must be acknowledged that some influence on the part of the school counselor was perceived by the students in both groups.

Additional Factors

Other factors that may have compromised the validity of this research are as follows:

- A. Statistical Regression – The natural regression of extreme scores towards the mean appears to have had some influence on the results of this experiment.
- B. Experimental Attrition – It was impossible to predict how many students who began the study would complete it, or whether the number in each of the groups would remain the same. In this case, the groups remained stable.
- C. Expectation Effects or Demand Characteristics – Subjects could have determined the research hypotheses and attempted to produce the desired results.
- D. Evaluation Apprehension – Test anxiety may have been extremely high due to apprehension of participating in an experiment, thus influencing the outcome.

- E. Placebo Effect – The tendency of subjects to believe in the effectiveness of treatment could have influenced the results of the experiment.
- F. Generalization of the Results – The experiment was conducted in a specific high school in Western Montana, which has a specific make-up of students. Generalization beyond the population of this high school is not possible due to small sample size and lack of true random sample.
- G. Inherent Characteristics of Students/Families Who Choose to Participate/Not Participate – Certainly there may be characteristics of students and their families who agreed to participate that differentiate them from those who chose not to participate.

Hypotheses 1

Hypotheses 1 addressed the relationship between mean scores for students who were or who were not exposed to the test anxiety reduction program. No significant difference between experimental and control groups was noted when comparing the eighth grade scores of these groups, but both groups were significantly lower in reading and showed a trend toward lower scores in math than did the 75 students whose scores were recorded but who did not participate in the study. This is to be expected, as the research targeted students who had low scores on the eighth grade test in reading, math, or both.

Comparison of 10th grade scores indicated no statistically significant differences between the experimental and control groups on either math or reading, despite the fact that the experimental group outperformed the control group in both cases. Thus, Hypothesis 1 was not supported.

There are several possible reasons for the lack of support for Hypothesis 1. First, because of the very small sample size, there would need to be a very large experimental effect for there to be statistical significance. Additionally, as is usually the case with small sample sizes, there was a fairly large variance among student scores in the experimental and control groups. These factors together make it unlikely that this study would be sensitive to detecting a small but clinically significant effect.

Interestingly, both the experimental and control groups did show some improvement when compared to the non-participant group. Comparison of the experimental group to the 75 non-participants in the research project indicated significant results in both math and reading. Comparison of the control group and non-participants indicated a significant difference in math, but not in reading.

Although potentially important, the significance between the study groups and the non-participants is best accounted for as a natural statistical regression to the mean. This is certainly supported by the fact that while the experimental group improved significantly when compared to the non-participants, so did the control group. There may be other factors, however, that influenced these results, and that are of experimental interest.

One possible factor is the amount of attention both groups received following their identification as candidates for inclusion in the experimental and control groups. In the introduction to Chapter 4, the steps in obtaining subjects for both the experimental and control groups were described. Some of these steps are necessary to fulfill the requirements as outlined by the Institutional Review Board. Others are logistical requirements. Either way, there is a great deal of time spent with students explaining the

process and explaining the benefits of the research. At least some, if not all, of these students would very much like to relieve their anxiety by increasing their test scores. Sapp (1999) identifies “demand characteristics” as an inherent threat to validity. It is possible that the subjects, knowing the desired outcome, unconsciously produced results as close as possible to the desired outcome. The placebo effect, or tendency of subjects to believe in the effectiveness of treatment, may also have influenced these results.

Hypotheses 2-6

These hypotheses addressed the relationship between mean scores for sub-groups of students who were or who were not exposed to the test anxiety reduction program. There were 10 sub-groups, five in reading and five in math. It is obvious that the sub-group numbers are too small to be of statistical significance.

However, it was of interest to the researcher that of ten sub-groups, eight showed higher differences in mean scores for the experimental than the control group. This may show a slight trend toward a consistently higher increase in mean scores for most sub-groups who were exposed to the intervention.

Two sub-groups that may warrant some attention are the Pinesdale students on the math test (Experimental - +16.3; Control - -2), and the Free and Reduced Lunch students on the math test (Experimental - +5.57; Control - -7.4). These groups show trends that are clearly significant, especially to administrators who are seeking interventions that might help facilitate AYP, in spite of the small “n”.

Hypothesis 7

This hypothesis examined whether there would be any difference in mean score differences between the math and reading tests. Both the experimental and the control groups raised their scores more in reading than in math. However, none of these results was significant.

Hypothesis 8

This hypothesis questioned whether mean semester exam scores would improve for the experimental group. In other words, would results generalize to semester exams? No such discernable results were obtained, and the hypothesis is rejected, and the hypothesis was not supported.

Questionnaire Results

The questionnaire was a six-item checklist identifying problem areas with test anxiety. Students were to identify which, if any of the items were problematic for them, before the intervention, and after participating in the intervention. Perhaps the most interesting observation is how many more problems were identified by the control group pre-intervention (Experimental group identified 50; Control group identified 64), and how many more of the items were still identified as problematic by the control group after having participated in the intervention (Experimental group identified 4; Control group identified 24).

The amount of attention given to each group before they were divided, and even afterward to explain the procedure, has already been addressed. The researcher can only speculate that there may have been some result from the control group believing the experiment to be important, and their own roll to be less important than that of the

experimental group. If that is the case, it may help explain these differences. This may be another part of the phenomenon identified by Sapp (1999) as “Demand characteristic.” That is, when the subject feels unable to meet the demand, is it possible that some resentment may result?

Final Evaluation

The final evaluation completed by the experimental group in the 10-minute final interview was very revealing. “Test-wiseness techniques” were much closer in perceived usefulness, and were generally preferred by the students. There was a larger variation in the “affective, cognitive, behavioral techniques” covered in the intervention. “Deep breathing”, for example, was judged far more useful than cognitive techniques such as “replacement thoughts.” Possibly related, only eight out of fifteen experimental group members were able to expand on the concept of “expandability of intelligence.”

While not quantitative, these subjective observations nevertheless offer interesting possibilities. As early as 1967, Liebert and Morris identified the two major components of test anxiety: emotionality and worry. Emotionality involves the autonomic responses of test anxiety, including muscle tension, sweaty palms, etc. Emotionality, while uncomfortable and certainly identified by subjects as troubling, is not related to performance expectancy (Sharma, 2002). Worry describes the cognitive evaluative ruminations of test anxiety (Liebert & Morris, 1967). Worry impairs performance by reducing the amount of working memory available (Keough et al., 2004). Past research suggests that worry is more likely to contribute much more to poor performance than emotionality (Liebert & Morris, 1967).

This research project targeted any student who had not achieved proficiency on the MontCAS in the eighth grade, in attempt to effect change in the amount of test anxiety present, but not perceived. In so doing, there may have been an over-representation of students experiencing emotionality. These students' anxiety may not necessarily impact test scores. Likewise, there may be an under-representation of students who experience the worry component of test anxiety, which does impact outcome in testing situations. Unfortunately, because a standard measure of worry and emotionality was not employed in this study, this potential explanation for the results is only speculative.

Possibly related to worry, or negative cognitions and self-evaluations, is Dweck and Molden's (2005) idea concerning self-theories of intelligence. Students who believe intelligence is a "fixed" trait tend to value performance more than learning. Those who believe in intelligence as incremental in nature value learning more than performance. Certainly the "test-wiseness" strategies are easier to control and can increase performance right away, as compared to the affective/cognitive/behavioral techniques. Without a self-theory of incremental intelligence, students may have seen little gain in learning these techniques. With a self-theory of incremental intelligence, they might have understood the benefit of practicing techniques that would gradually increase their ability to learn. Too few of the students in this study really understood the concept of intelligence as incremental.

Suggestions for Further Research

The results of this research were neither positive nor dramatic. Yet, there may be some implications gleaned from this work that may be of use to those who will continue to work toward the alleviation of discrepant and non-representative test results.

1. A larger sample size is needed: Unquestionably there is a need for a larger experimental group. This may be achieved by working with a much larger school district that makes up a sufficient “n.” As a pre-existent relationship with the school district is often needed for such research, this will require a unique and trusting relationship with more than one school district. There already exist groups of professionals who could function within these parameters. Among these those who work for “co-ops” that offer mental health services to school children in a number of districts.
2. Random sampling: With larger sample grouping, random sampling may be reasonable, and may improve research results.
3. Use a screening instrument: In this research, it was assumed that students identified as failing to achieve proficiency would respond positively to the intervention design. Based on results, and consistent with current literature, an instrument may be needed that will identify students whose test scores are specifically impaired by the “worry”, rather than the “emotionality” component of test anxiety. Test anxiety reduction must be focused on those students who qualify as experiencing worry components of test anxiety, including those who experience stereotype threat.
4. Installation of Concept of Expandability of Intelligence: Dweck & Molden, (2005) and Elliot & Dweck, (2005), as well as Steele, (1997), clearly address the changes manifested when subjects can move from a concept of intelligence as fixed, to a concept of intelligence as expandable. Only eight out of fifteen students involved in the experimental group remembered this as a meaningful

concept from the intervention. This lesson, as well as other cognitive interventions, should be emphasized, and an attempt made to make these concepts relevant and believable in the lives of the experimental subjects.

5. **Additional Time:** Given the results of this study, the intervention time of 240 minutes may be inadequate. More time may need to be invested at the beginning, perhaps in individual interviews to identify students with “worry” anxiety components, and also to thoroughly introduce the concept of “expandability of intelligence.”
6. **Individual Interventions:** It may well be that, for high school students, individual test anxiety interventions are more effective than group interventions. Perhaps future research could evaluate these different methods of test anxiety treatment delivery.
7. Perhaps making test anxiety programs part of the educational program of all students could eliminate, or at least reduce the subtle barriers that impact the effectiveness of the program, and maximize the benefit to students and schools.

Collateral and Incidental Observations

1. Students in the Intervention Group expressed delight in being selected to participate in the group. They consistently, when asked, confirmed that they enjoyed the group. The group process seemed to be very reinforcing. The relationship with the group presenter, the presentation of materials, and the inter-relationship with other group members were all positive for the experimental group. One example of their enthusiasm was the consistent group member report

that they would use the skills learned in group in various other situations in their personal lives.

2. Music: Music of various types was tried in group. The final conclusion was that no music is best, as some students reacted negatively to any type of music offered. While some students reported that they preferred having music, their performance did not suffer without it.
3. A seating chart devised before the first group meeting saved time and made it easier for the facilitator to keep the group focused on the intervention.
4. It would have been useful to begin the first meeting with an explanation of how these particular students were selected to participate in the experiment. In spite of pre-group explanations, there was still some concern that the group had been selected because they were “bad students.”
5. The facilitator found it to be effective to personalize the intervention as much as possible. For example, to begin a new technique by saying, “You know, when I take a test...”
6. Clever and appealing titles of various group exercises seemed to appeal to experimental group members. Exercises with such titles were quite popular. It would be smart to create “catchy” titles as much as possible for all exercises.
7. A simple Likkert scale would be easy to construct in place of the questionnaire devised for this research. It would be empirically sounder, then, and clearer, to re-use the same instrument at the conclusion of the intervention, perhaps resulting in more accurate results.

Conclusion

While the results of the research project were far from conclusive, some hopeful trends are to be gleaned. The greatest obstacle to the hoped-for results may have been the small participant numbers. It is possible that, with some important modifications, this subject matter could be pursued to more meaningful results. Test anxiety on standardized tests like the MontCAS will continue to plague some students, and may have the most devastating effects on stigmatized groups, such as minorities and the poor. It behooves us to pursue this until all students are able to demonstrate their best performance, consistently, on evaluative instruments of all kinds.

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Appendices

Note: Appendices based largely on the work of the following: (See References)
Carter et al., 2005; Conner, 2003; Dweck & Molden, 2005; Ergene, 2003; Fletcher & Spielberger, 1995; Gonzalez, 1995; Good et al., 2003; Keogh & French, 2001; King et al., 1991; O'Brien, 2000; Sarason et al., 1990; Sawyer & Hollis-Sawyer, 2005; Schutz et al., 2004; Schwartz, 2003; Sharma, 2002; Steele, 1997; Steele et al., 2002; Sud & Sharma, 1990.

APPENDIX A
Outline of Study Skills Group

OUTLINE OF STUDY SKILLS GROUP

- I. Week 1: WEDNESDAY, FEBRUARY 8, PERIOD 3 (B)
 - A. Explanation of test-wiseness; expandability of intelligence
 - B. Explanation of major obstacles to test achievement
 - C. Introduction to attentional/thought training (Improving your ability to keep your attention focused on the task at hand, i.e., testing)
 - D. Introduction to multiple choice testing strategies in reading
 - E. Practice test, multiple choice, reading
 - F. Discussion of how practice test went, especially attention focusing.

- II. Week 2: WEDNESDAY, FEBRUARY 15, PERIOD 4 (A)
 - A. Introduction to relaxation techniques
 - B. Introduction to constructed response test strategies, reading
 - C. Practice test, constructed response, reading
 - D. Discussion of practice test, especially attention focusing and relaxation. Also discussion of general attitude of test takers and how this impacts testing.

- III. Week 3: WEDNESDAY, FEBRUARY 22, PERIOD 1 (A)
 - A. Introduction to thought-stopping (controlling intrusive thoughts while testing)
 - B. Re-cap of other techniques (attention and relaxation)
 - C. Introduction to calculation test, Part I (with calculator), math
 - D. Practice test, calculation, Part I (with calculator), math
 - E. Introduction to calculation test, Part II (no calculator), math
 - F. Practice test, calculation, Part II (no calculator), math
 - G. Discussion of tests and effectiveness of various strategies

- IV. Week 4: WEDNESDAY, MARCH 1, PERIOD 2 (B)
 - A. Systematic relaxation
 - B. Introduction to constructed response test, math
 - C. Practice test, constructed response, math
 - D. Review and discussion of:
 - 1. Constructive ideas and attitudes for test-wiseness
 - 2. Attentional/thought training for test-wiseness
 - 3. Relaxation techniques for test-wiseness
 - 4. Thought-stopping techniques for test-wiseness

Students will have folders with handouts for every week. They will be encouraged to take them home and review them as needed.

APPENDIX B
Outline of Study Skills Group, Week 1

MontCAS Study Skills Group, Week 1

Tuncay Ergene (2003) in his meta-analysis of 56 experimental studies on test anxiety was able to determine the most salient factors in effective test anxiety research programs. It may be useful to consider these as you direct the TIQ program. Remember, these elements have been found most effective when used in the combinations that have been included in this program. These elements are: test-taking skills, cognitive restructuring, relaxation practice, attentional training, systematic desensitization, and the reduction of cultural stereotypes.

Session I: Focus on Cognitive Restructuring

Estimated Time Frame:

Introduction (Improving Your TIQ), Barriers, and Overcoming Barriers:
app. 10 minutes

Common Distracting Thoughts and Discussion:
app. 10 minutes

Reading-Multiple Choice Strategies:
app. 20 min

Reading-Multiple Choice Practice Test:
app. 15 min

Wrap-up Discussion and Check-In:
app. 5 min

Session I Outline:

Distribute folders in the color of the students' choice, and pass stickers through the room so that each student can put a title and name sticker on his/her folder. Distribute handouts.

I. Introduction and explanation to group members

This is a critical part of this session, as it introduces the "cognitive restructuring" concept that is so vital to the success of this intervention.

That is to say, this is the beginning of setting the positive attitude and laying the foundation for the students to understand that they truly are capable of being successful test-takers.

They must be helped to believe that intelligence is truly expandable, and that they must learn to attribute their frustration not to personal qualities of inferiority, but to outside forces they can address.

Their foundational sense of failure has to be aggressively challenged, but without over-doing it. There is a delicate balance of being realistic and honest and at the same time truthfully optimistic about the students' possibilities.

Keep in mind that every aspect of the TIQ Program has been designed as a specific treatment component for some aspect of test anxiety as reported in the research. But while some programs have spent weeks on any one of these elements, this program touches on each and moves on. This can only work if the students are engaged from the beginning in a positive atmosphere where the potential for positive change is taken for granted. It will also help if students are encouraged to practice through the week on the skills that are covered in each session.

A. Introduce Handout # 1: Improving Your Test-Taking Intelligence (TIQ).

1. Emphasis here has to be on the growth potential for not just test-taking IQ (TIQ), but for intelligence in general. Make certain that students understand the relevance of the neuronal connections in the background.
2. Students are probably nervous since they have no idea what this program is all about, so remember to help them lighten up! Humor and comfortable talk is definitely appropriate here.

Sample script for introduction: Hi, and welcome. It's great to have you all here. Hopefully everyone has a folder with a title sticker and a name sticker, and a set of handouts. If you don't have these, let me know. My name is _____. I'm going to be facilitating this group on improving your test-taking IQ. A lot of research has gone into this program, and we think we have some good ideas about making each of you a wiser test taker. If every idea you

hear doesn't seem to meet your need, please be patient. There are several strategies. A few of them are bound to work for you. Let's start by looking at the title handout, the one with the picture of all the neurons connections forming in your brain. This is what we expect to happen to you during this group. A lot of neurons will be forming and connecting to help you be a better test taker. Would someone be willing to read the words at the bottom of this page?

B. Introduce Handout # 2: Barriers to Test Wiseness
(2 identical handouts, one colored and one white)

1. The important point of this handout is to have students' cognitive processes actively working. As they review the barriers on the handout, students are requested to consider which of these barriers applies to them, and then order those that apply as to which is most (#1) to least (#2, #3, etc.) relevant in their own test taking history.
2. When students have completed one, have them copy this on to the next (identical) page. No names, please. Explain that this is just to give the experimenters an idea of which barriers are most common in the group.
3. Collect one "Barriers" handout from each student.

Sample Script for "Barriers to Test Wiseness": Your second handout is about the barriers to test wiseness that keep a lot of people from doing their best work on a test. Its important that you look carefully at this list and consider what kinds of barriers are mostly affecting you personally. Please decide on which of these are your barriers, and put a number one by the one you think is your biggest barrier, two by the next, and so on. You don't have to number them all if you know that some of them just don't apply to you. Just number the ones that are problems for you. (Give them time.) When you're done numbering, would you please copy whatever you put on your blue sheet onto the white one. Make it exactly the same as your blue sheet. No names, please. Then pass up the white sheets. This is so that we can get an idea of which of these problems are most common in this group.

Introduce Handout #3: Overcoming Barriers

4. The purpose of this handout is simply for students to understand that the TIQ program will address each of these barriers to their test-taking success. Explain that by the end of the four weeks, each of these solutions will have been implemented at least once for them to practice.
5. While all questions should be addressed, there is a need to keep things moving

Sample script for "Overcoming Barriers": Your next handout shows you that we're going to address all those barriers to test wiseness, and how we plan to help you get over each one. How

about if I read the barrier, and someone volunteers to read each of the ways we're going to address it? (Read through handout.)

II. Cognitive Restructuring: Call attention to next handout, Distracting and Replacement Thoughts (2 identical handouts)

- A. Explain that this handout addresses the first solution on the previous handout. It may not be the most troubling barrier for all of them, but it will certainly be relevant for some, and perhaps the majority.
- B. Students are asked to focus on some pretty troubling cognitions. Be sensitive to the fact that it may be difficult for them; adolescents often respond to embarrassment or affective discomfort by being silly. That's ok, as long as order is maintained.
- C. Encourage students to discuss the sorts of obstructionist cognitions they are familiar with. This both gives them the sense that they are not alone in having these negative thoughts, and the idea that everyone in the group is going to be working seriously to control these thoughts. There is power in numbers.
- D. Encourage students as they compose their own personal "mantra" of statements that will block the negativity of their previous barriers. If it seems appropriate, let them know that this technique has been proven highly successful in many test anxiety reduction programs.

Sample script for "Distracting and Replacement Thoughts":

This next handout is really interesting. It addresses getting flooded by distracting negative thoughts when you're trying to concentrate on a test. This is the most common of all the test wiseness barriers, so we're going to go over it together briefly.

Would you please read through the distracting thoughts? Can any of you relate to saying these kinds of things to yourself when you're taking a test? Can you think of any other thoughts like these that really get in the way of your test wiseness? (Allow for any examples if they have any.)

Now, please hear this: If you replace those thoughts with positive ones, you'll be a much more successful test taker. It is not easy, but it can be done. The thoughts at the top of this page can only be destructive to you. The replacement ones can only help you. You really have nothing to lose by changing from a destructive way of thinking about tests to a constructive way of thinking.

This is something that really requires some practice, especially if you've been saying those negative ones for a long time. Probably some of you have been saying this kind of thing to yourself for years.

At the bottom of this sheet, there's room to come up with your own replacement thoughts. Yours should be very personal, the things you know

make you feel more positive. Please spend some time and come up with two or three that are very strong and very positive for you.

Notice that they have to be honest. Don't say, "I'm the smartest person that ever lived," for example. There's probably someone out there smarter than you, and your brain isn't going to trust you if you're just ridiculous. Just write down two or three sentences that you know you can remind you to think differently when you're taking a test. Then, if you really want this to work, you need to start practicing these sentences every time you have to take a test, or make some kind of presentation, or anything like that.

We've given you two of these sheets so that one stays in your folder to review next week, and the other you can take with you to remind you of what you're going to say to yourself, so that you can practice through the week. Any questions about this?

Is anyone willing to share one of their replacement thoughts with the group? (Allow for very brief sharing if they want.)

III. Reading Section Rehearsal #1 & #2: Multiple Choice Test Strategies and Test Practice.

IV. Conclusion of Session I: Open Discussion

Hopefully there are at least five minutes left to process how successfully students were able to utilize their new thoughts on the practice test. If there is time, address any concerns students have about the program, discuss what is on the agenda for the next session, etc. Ideally students will leave the session feeling relaxed, confident, and hopeful for their chances of improving their "TIQ".

(No practice script here. By now you get the picture. Keep it moving, keep it comfortable, and above all, keep it positive.)

APPENDIX C
Outline of Study Skills Group, Week 2

MontCAS Study Skills Group, Week 2

Research does not support relaxation by itself as an effective means of alleviating test anxiety. However, in combination with cognitive restructuring and test-taking strategies, it is quite useful. Moreover, it is a critical component of systematic desensitization, which has consistently shown to be an effective technique for relieving test anxiety, and which we will introduce in the fourth week.

Session II: Focus on Relaxation

Estimated Time Frame:

Relaxation Training:

app. 15 minutes

Reading-Constructed Response Strategies:

app. 20 min

Reading-Constructed Response Practice Test:

app. 15 min

Wrap-up Discussion and Check-In:

app. 10 min

Session II Outline:

Distribute folders and distribute handouts if necessary. This is a good time to be welcoming students and ask them if they had a chance after the last session to practice their positive replacement thoughts. You might remind them to make sure they remember these now, so that they can keep them in mind as they do the exercises for Session II.

The various elements of the TIQ program are introduced very briefly. Nevertheless each element is critically important. Review for yourself the major elements covered, and find any opportunity to review them with your group.

Keep in mind that these techniques will "stick" only if they are reviewed weekly, and if students actually practice the techniques during the rest of the week.

Some important elements from last week are:

1. Expandability of human intelligence - intelligence continues to increase as long as we continue to exercise our brains
2. If we attribute "barriers to test-wiseness" to forces we can control, we can do something about them. If we attribute them to our own lack of resources (I'm stupid... I can't do this...) we give up our ability to control the situation. Thus, we must replace negative, self-defeating thoughts with positive, self-validating ones (replacement thoughts).

Also remember that the research tells us that combining test-taking skills that are as similar as possible to items that students will encounter in the authentic testing situation, with techniques that help them relax and be positive, best prepares students to overcome their anxieties.

I Introduction and explanation to group members

High school students tend to be very self-conscious about relaxation exercises. In order to get them to cooperate, it will be necessary to NOT take the process too seriously. Let them enjoy themselves, and allow them to joke and have fun, as long as things don't get to the point that the experience is unproductive.

Hopefully students are more comfortable with the group process this week, as it is no longer "mysterious" to them.

Music is an appropriate tool during relaxation exercises, but not during the test-taking strategies or practice tests, as they will not have these during the regular test administration.

A. Introduce Handout # 1: Introducing Oxygen: Nature's Antidote for Stress

1. Encourage students to sit comfortable in their desks in order to get the maximum benefit
2. Point out that students have two copies of each relaxation exercise, in case they want to take a copy with them to help practice.

Sample script for Oxygen: "Our goal for last session was to help you replace negative thoughts with more productive replacement thoughts. The goal this session is to allow yourself to relax so that you can do your best on tests. Not that we want to get too relaxed. A little bit of anxiety makes us try our best. It's when we have too much anxiety that our performance starts to go downhill.

Our first handout for this session teaches us some breathing techniques that are really helpful for a lot of people. What is an antidote? (Wait for correct response.) That's right. Oxygen really is nature's stress antidote. We can't possibly be as stressed with plenty of oxygen as we can when we're only getting a little bit. When we're stressed, a lot of us start breathing in a really shallow way, so we aren't getting as much oxygen as our bodies need to feel relaxed. So let try it. (Go through exercise 3 times.)

B. Introduce Handout #2, "Other Quick Stress Relievers"

1. Again, remind students to get relaxed in their desks, and...
2. Let them know that they have two copies so that they can take one with them.

Sample script for "Quick Stress Relievers": You're going to find that getting enough oxygen is the basis for most other stress relievers, but you can add things to the breathing exercises that help a lot of people get even more relaxed. Let's go through these two exercises...

C. Introduce Handout #3, "The 45 Second Breather"

1. Remind students to get relaxed...
2. Remind students that they have an extra copy to take with them if they choose.

Sample script for "45 Second Breather": This last exercise is really useful because it combines a lot of things we've covered, last class and this class. Let's try it...

Sample script for when exercise is completed: The great thing about this breather is that you can personalize it for yourself. If you like a certain part of it more than others, just do the one's you're comfortable with. That way, if you want, you can have a 15 or 30 second breather whenever you want. Any comments or questions about any of these relaxation techniques? Did you notice that the "45 Second Breather" points out that we don't want to be so relaxed that we lose our competitive edge? We need some stress in order to care enough to do our best, so we don't really want to fall asleep or anything. But when our heart is racing and our hands are shaking, that much stress isn't helpful, and we need to do something about it that really helps.

II. Reading Section Rehearsal # 1 & #2: Constructed Response Test Strategies and Test Practice.

III. Conclusion of Session II: Open Discussion

Hopefully there are about 10 minutes to process the relaxation exercises, the test-wisness exercises, and to remind students yet again, if there's enough time, about expandability of intelligence and the importance of using their replacement statements. Any general observations the group chooses to make at this time will be useful.

APPENDIX D
Outline of Study Skills Group, Week 3

MontCAS Study Skills Group, Week 3

Not only does test anxiety cause students to experience internal distractions that inhibit performance (ie, negative self-evaluations), but it also makes students more susceptible to external distractions. Thought after thought "invades their minds" and makes it challenging to focus on the task at hand (like, the test!).

Students report the inability to focus as the most common and most troubling of all test anxiety symptoms (my mind just went blank!!). The worst thing about panic is that it spawns panic; and panic spawns more panic; until finally the expected disastrous results occur and the expectation of failure is confirmed.

Students need to be taught to acknowledge and accept the situation, knowing that in time, they can regain control. A test anxiety program needs to teach techniques that help students feel in control of their cognitive processes so that they aren't rendered helpless by such situations.

Session III: Focus on Focus

Estimated Time Frame:

How to Bring Your Mind Back When It's Wandering:

app. 3 minutes

What If My Mind Goes Blank:

app. 3 minutes

Math Calculator Test Prep:

app. 30 minutes

Math Calculator Practice Test:

app. 20 minutes

Wrap-up Discussion and Check-In:

app. 4 minutes

Session III Outline:

Distribute folders and distribute handouts. This is a good time to be welcoming students and ask them if they had a chance after the last session to practice their relaxation exercises or replacement thoughts. Once again, the preceding lesson is

important to review as it has elements that will be included in this session. It's also good to remind them that the techniques they are learning can only be mastered (and thus useful) if they PRACTICE!

"Improving Your TIQ" has now introduced the concepts of an expandable intelligence, of confronting their negative (and attention-stealing) thoughts with replacement, empowering thoughts. It has also introduced (hopefully) adolescent-appropriate relaxation techniques. Students have also spent a great deal of time learning "test-wiseness" techniques, that is, test-taking skills, and have had opportunities to practice them along with all the other skills and techniques they have learned.

Remind students that they are now half-way through the program. By now most of them will be comfortable with the group and familiar with the group routine. Sometimes discipline issues arise with the familiarity and routine. Keep things moving at a brisk pace so that this doesn't become a problem in this group.

I Introduction and explanation to group members

Most of these students are going to relate to the problem of losing focus. Some are going to find it uncomfortable to even think about it. This is a source of huge frustration and embarrassment for many students.

Normalize this problem. Hopefully students will feel free to share their own experiences, so that everyone realizes how common it is.

A. Introduce Handout #1: How to Bring Your Mind Back

1. Always have someone read aloud, or do so yourself. Never assume that all these students can read.
2. Encourage students to practice both techniques, but each student will pick ONLY ONE of them that they will practice and use regularly.
3. Let them know that people who use these exercises a lot often use them a hundred times (or more) during one test!! (Use them as often as you need to!)

Sample Script for How to Bring Your Mind Back: "This week we are going to learn some techniques to help us focus better on tests. A lot of people find their mind concentrating on anything BUT the test questions. Most of them try hard to re-focus on the test, but pretty soon they find their mind off on some other ideas, some other thoughts, and a lot of times they can't even remember the question they were trying to figure out before, much less answer it!"

"The two exercises on this handout help you regain control of your thought processes. Pick one and get good at it. Use it over and over. People who get good at this technique might use it a hundred times during one test. Who care? No one knows what you're doing; use it as much as you need to.

Let's try them. Remember, figure out which one works best for you and learn to use it." (Go through exercises.)

B. Introduce Handout # 2, What If My Mind Goes Blank?

1. Emphasize that this really does happen to everyone at some time or another.
2. Remind them that, as with all handouts and exercises introduced, they may find they don't need the entire process as it is detailed. But they should go through the whole thing once, and then decide what part of it will truly work for them.
3. Whatever they leave out, it should never be the acknowledgement of the problem. That in itself normalizes and empowers the student to go forward with the rest of the process.

Sample script for Blank Mind: "Almost everyone has had the experience of blanking out in the middle of a test. The worst possible thing you can do is let this panic you. The best possible thing you can do is to remember that it really is possible for you to get control over your thoughts. After all, you've been doing it for two weeks in this group, and we're going to do it for two more weeks."

"Have you noticed that all the lessons we've covered are cumulative? Do you all know what cumulative means? It just means that each lesson builds on the skills learned in the past one. This one is no different. Let's try it..."
(Go through exercise.)

Sample script for when exercise is completed: "So how do you think this will work for you when you're taking tests? You know, you have nothing at all to lose by trying it. And you might find out it really works for you. Always remember that the deep breathing exercises are really important to get oxygen into your body so that you can resist letting yourself get carried away by your stress.

Any questions? OK, lets get on with the test-wiseness lesson for today!"

II Math skills section and practice test(s).

III Conclusion of Session III: Open Discussion all skills and techniques covered today, and in preceding sessions if there is time.

APPENDIX E
Outline of Study Skills Group, Week 4

MontCAS Study Skills Group, Week 4

This is the last group session. Just as the first session was designed to give the students an idea of what was to come, and also to encourage their expectation of success, this week's session is a wrap up, and a reminder of how far they've come. The entire group should have a sense of celebration at having completed the program and having increased in test-wiseness.

Systematic desensitization has repeatedly been demonstrated to be an effective test anxiety management technique. It is included last because it allows students to rehearse the relaxation skill they learned in Week 2. As set up in this program, the systematic desensitization process will also incorporate a cognitive element. Each student will create their own systematic hierarchy of test-taking stressors, and practice relaxing as they read each one. Then they will come up with a cognitively based "plan for success" for each item in their hierarchy. They will be encouraged to select some of the techniques they have learned as these plans.

Session IV: Focus on Review and Success

Estimated Time Frame:

Climbing the Test Anxiety Ladder:

app. 5 minutes

Changing the Test Anxiety Ladder &

Climbing the Test Success Ladder (establishing the hierarchy):

app. 5 minutes

Climbing the Test Success Ladder (relaxation) &

How to Turn Test Anxiety into Test Success (establishing the plans):

app. 20 minutes

Math Constructed Response Practice:

app. 10 minutes

Math Study Skills Review:
app. 10 minutes
 Review of Other Techniques:
app. 10 minutes

Session IV Outline:

Distribute folders and distribute handouts. This is a good time to be welcoming students and ask them if they had a chance after the last session to practice their focusing techniques.

Students need to be reminded that tests are normally stressful only when they are difficult. Even if the skills they are working on in "Improving Your TIQ" may not be as applicable on classroom tests, they should keep in mind that they will be taking standardized tests, not only the MontCAS, but eventually, for many of them, SAT and ACT tests. On these tests, the material will be quite a bit harder, and the skills and techniques they are learning will be more important than ever.

Remind students that this is the last group session, and thank them for their enthusiastic participation. Remind them that each of them will meet one more time, individually, with one of the team members, to help us evaluate the success of the students and the program.

IV. Introduction and explanation to group members

Systematic desensitization will be new to all of these students, and may seem a little "weird". Because they are now comfortable with the group, they may be more comfortable giving it a try. Inform students that this is the most widely researched technique for reduction of test anxiety, and that it is one of the most successful.

A. Introduce Handout #1: Climbing the Test Anxiety Ladder

1. Ask students if this ladder of before-test thoughts looks familiar to any of them
2. Ask them to identify any that make them anxious.
3. Explain that everybody's experience is unique; they may have experienced thoughts that are not listed, or in a different order, or different thoughts with different kinds of tests. Not all these ideas will make every person anxious, but some might make most people very anxious.

B. Introduce Handout #2 & #3: Changing the Test Anxiety Ladder and Climbing the Test Success Ladder

1. As they complete "Changing the Test Anxiety Ladder," they begin to work on their own hierarchy. They do not have to complete all twelve, but should list only stressors they really experience.
2. When they have a hierarchy, all students will go through the entire list and practice relaxing. Explain that this technique

succeeds because they are conditioning their minds to relax; the mind cannot relax and be anxious at the same time. The more they practice this technique on their own, the more successfully it will work for them.

- C. Introduce Handout #4, How to Turn Test Anxiety into Test Success.
4. Review this list of possible methods for overcoming the items on their hierarchy.
 5. Have them go back to the Test Success Ladder, and for each item on their hierarchy, have them write a plan for overcoming it. The list on Handout #4 is only to provide ideas. They can use these ideas or come up with their own unique plans.
 6. Have students share problems and plans with the group.

Sample Script for Handouts 1 - 4: We're going to start out this week by taking a look at an example of how some people psych themselves out from the minute they hear they're going to have a test until the time they have to take the test. (Read examples or have volunteer read.)

Can you see how some people, just by letting their thoughts and ideas run wild, are really setting themselves up? Does anyone have any ideas how someone with all this going on in their mind might get a grip? You know, how they might get a handle on all the anxiety that's going wild in their minds? What can someone in this situation tell themselves? What kinds of thoughts could they concentrate on to stop feeling so out of control? You know, if you look at these thoughts, they don't have to be negative. It depends on how your mind interprets them, doesn't it?

Let's look at the next handout. You really do have some techniques to help you from getting more and more anxious as you climb your own ladder. On the third handout, there's a ladder there for you to list some ideas and thoughts that you might have when your thinking about a test coming up. You don't need to have ten. Just any thoughts that you have when your teacher assigns you a test. List those thoughts, starting at the bottom, and climbing up the ladder. (Allow time for them to create their anxiety hierarchy.)

Let's see how many items you guys listed...(Get numbers from group.) Now we're going to do the relaxation part, the part that doesn't let us get anxious, because our brains can't be anxious and relaxed at the same time. If you teach your brain to relax in these situations, your brain will finally get it, and keep relaxing!

I'm just going to say the numbers. When I say a number, you read what you have listed for that number. Then I want you to pause and do the "45 Second Breather." You can do part of it or all of it. Do you all remember how to do it? (You may have to very briefly review the elements of the Breather.) Remember, we're only going to do this once. You can practice this all by yourself at home as many times as it takes to re-train your brain. Ok, lets start...(Say numbers until you've gone as far as the students have listed items.)

OK, now that you're totally relaxed, we're going to one more thing about these stressors that are creating anxiety in your life. You're going to come up with a plan for every one of them that will help you remember that when you start changing the way you look at these things, they might stop being such a big problem for you. I'm going to give each of you a red pen, because the plan should look bold and emphatic! (Pass out pens.)

If you take a look at the fourth handout (How to Turn Test Anxiety into Test Success) you'll see that there are some ideas you can use for your own. Or, you are welcome to come up with your own unique plans, or combination of plans for your list. Use whatever you think will help you. Remember to write with your red pen.

(Allow students to share their anxiety provoking thoughts and their plans with the group.)

V. Math constructed response practice.

VI. Math review

**VII. Last handout - How Are You Doing With the Barriers...
Ask students to read and give response. No names. Collect these!!**

VIII. Have students close up folders and say, "Tell me what you remember from the Improving Your TIQ Program. Allow student input to drive the review.