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Fall 2011

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Effects of Relaxation and Deep-Breathing on High School Students: ACT Prep

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Abstract

The purpose of this study was to relieve test anxiety in high school juniors preparing to take the ACT: a high-stakes, college admissions, standardized test. Participants included 81 eleventh grade students (25 males, 56 females) from a Midwestern public high school. Results demonstrated that relaxation training in the experimental group significantly lowered student's perceptions of test anxiety from pre-test to post-test. Further research regarding systematic deep breathing and relaxation techniques is needed.

Key words: test anxiety, high stakes testing, ACT, high school students

Treatment of anxiety as a disorder has received a high rate of efficacy in alleviating symptoms, despite the different components which include cognitive, somatic and behavioral pieces in terms of how anxiety affects an individual. Indeed, treatments include cognitive behavioral therapy, systematic desensitization and rational emotive therapy to name a few. These treatment options work to reduce irrational thoughts and avoidance behaviors. However, these methods alone fall short in addressing the physiological component of anxiety. Physiological components of anxiety include, but are not limited to, sudden arousal, heart palpitations, sweating, dizziness, hyperventilating, and tense muscles (Muris, Mayer, Fraher, Duncan & Van den Hout, 2010). Personality traits can also exacerbate the direct physiological manifestation of anxiety. For example, negative affect (neuroticism) has been shown to correlate with higher reports of physical symptoms associated with anxiety (Howren & Suls, 2011). Thus, treatment options that focus on cognitive restructuring are essential, however, not holistic to the construct of anxiety and its direct effect on an individual.

In accordance with the DSM-IV-TR (American Psychiatric Association, 2000), extreme levels of test anxiety meet criteria for axis I, generalized anxiety disorder (Bögels, Alden, Beidel, Clark, Pine, Stein & Voncken, 2010). It is important to understand that test anxiety is a situation-specific anxiety that occurs only when performance is being evaluated (Putwain, 2008). Students may not suffer from anxiety in other aspects of their lives, but when asked to complete an examination, they may begin to experience the cognitive, emotional, and physiological components of anxiety.

Test Anxiety

As a personality trait, test anxiety can be seen as the situation-specific trait in which a student finds testing to be threatening (Spielberger, & Vagg, 1995; Putwain, Connors, & Symes, 2010). Anxiety, as a personality trait, has been linked to maladaptive perfectionism (Rice,

Leever, Christopher, & Porter, 2006), where the greater the pressure placed on the student to do well on a given test, the more anxious the student would become (Mulvenon, Stegman, & Ritter, 2005). Students with personality trait anxiety will seek to gain approval through their test scores from either parents or teachers, while at the same time this student will feel that regardless of their scores they will never meet those expectations (Rice et al, 2006). Anxiety occurs pre- and post-test because students think that their abilities to retain and remember information will fall short of their own expectations and of their instructors.

Test anxiety, as an emotional state, is exhibited among students who are not necessarily predisposed to other forms of pathology with regard to the anxiety they experience on the day of the test. These circumstances are test specific and include negative self-belief about performance on a test which may be linked to poor study habits, an emotional anomaly during the course of study for that specific test, and avoidant behaviors for the test (Putwain, 2008). Students who do not commonly have test anxiety may experience it if they do not feel prepared for the test.

High-Stakes Testing

Test anxiety is unique because it affects the predictor and criterion related validity of cognitive abilities testing (Wicherts & Scholten, 2010). In other words, the components of test anxiety directly interfere with the outcome of those who must complete an examination to obtain a job, recruit into the military, or go to college (Berry, Clark & McClure, 2011). There is an enormous amount of pressure regarding the results of certain cognitive abilities tests (i.e. ACT, SAT, GRE, ASVAB). Given that the scores have huge implications for those who take them, it is important that these measures accurately represent what is being assessed, and to be able to do this consistently, while minimizing the threat of other variables that may interfere with the score.

For the purposes of this study, participants were preparing to take the ACT exam in pursuit of obtaining college entrance. The American College Testing (ACT) organization was founded in 1959 and created the ACT test to help students better figure out what college to attend and also create an admission standard for colleges (ACT, 2010). In 1966, the American College Testing organization officially changed their name to ACT and began adopting a broader scope of work that branched into other nations. There are four portions of the ACT test: English, Math, Reading, and Science that contain a total of 215 questions (ACT, 2010). There is also an option of taking an additional writing section. The ACT test has been administered in all fifty states since 1960. There are twenty-seven states where at least fifty percent of high school students take the ACT test. Subject matter on the test is based on curriculum mandated to high schools rather than IQ or aptitudes like many other standardized tests (ACT, 2010).

The implications and assertions that are made based on the scores of ACT's, can have fruitful and negative outcomes for those who take it, especially when the scores are not accurately representative of the student's actual cognitive abilities. In fact, one study that examined testing anxiety specifically with ACT scores, found that test anxiety and self-concept uniformly affected academic achievement (Williams, 1992). Another study concluded that test anxiety affected memory processing in terms of speed and accuracy of declarative memory; and depicted the conflict associated with timed, high-stakes testing, like the ACT's and the in-ability to recall information (Lee, 1995). More and more studies conclude a basic premise that test anxiety is significant and impactful on true test scores and can likely influence the outcome (Bradley, McCraty, Atkinson, Tomasino, Daugherty, & Arguelles, 2010; Everson Smodlaka & Tobias, 1994; Putwain, 2008; Sawyer & Hollis-Sawyer, 2005).

Treating Test Anxiety

There are varied ways to treat and cope with test anxiety (Stowell, Tumminaro, & Attarwala, 2008). These strategies range from cognitive (extra time spent studying), behavioral (systematic desensitization), biological (controlling cortisol levels), to emotional techniques and tools (relaxation techniques) (Kondo, 1997; Stowell, Tumminaro, & Attarwala, 2008). There has recently been some advancement in developing other methods to help students prepare for tests. For example, one study implemented an eight-week, group-counseling format with fifteen African American participants from a Georgia high school (Bruce, Getch, & Ziomek-Daigle, 2009). It was a structured group focusing mostly on discussion and interaction among members to promote higher achievement in test scores. In Georgia, previous data had revealed African-Americans students scoring at a significantly lower rate when compared to their White peers on their high school exit exam. Results of the study found that twelve out of fifteen participants passed all four sections on their Georgia High School Graduation Test (Bruce et al., 2009).

Kondo (1997) found that the use of relaxation techniques was the most effective in treating people with high levels of test anxiety. This is most likely due to the fact that individuals with high test anxiety have difficulty suppressing worried thoughts for cognitive and behavioral methods to be effective. If a student who is highly test anxious cannot control his/her anxiety, extra time spent studying may only lead to greater worry and lower performance, and behavioral methods have not been able to reduce task irrelevant thoughts (Kondo, 1997). However, relaxation is able to help the student control and suppress emotional and physiological anxieties, allowing the student to concentrate better and thus better prepare for and take the examination (Austin, & Partridge, 1995; Kondo, 1997). In 1984, The Board of Trustees at the University of Illinois recommended that its professors use relaxation techniques to help reduce their students' test anxiety and tension (Bass, Burroughs, Gallion, & Hodel, 2002).

Progressive relaxation had its start in the early 20th century by Edmund Jacobson who introduced a physiological way of dealing with tension and anxiety (Bernstein, Borkovec, & Hazlett-Stevens, 2000). Jacobson wrote, "You Must Relax," in 1934 for those interested in learning about muscle relaxation in a way simple enough to follow as a layperson (Jacobson, 1934). His actual research came together in 1938 in an extensive book-length technical instruction of, "Progressive Relaxation." Since then, a plethora of research has emerged supporting the uses of a systematic relaxation technique on a multitude of symptoms that ranges from anxiety to speech distortions to blood glucose levels in the management of diabetes (Detling, 2008; Ganesan, 2009; Grant, 1980).

Rasid and Parish (1998) conducted a study examining the effects of two types of relaxation training using 55 high school students with varying levels of anxiety in an experimental-control group design. Results showed that both behavioral relaxation and progressive muscle relaxation techniques produced significantly lower anxiety scores in the experimental group as compared to the control group. The authors also found that the use of progressive muscle relaxation led to reduced test anxiety in high school juniors in preparing for the ACT. The present study tested two hypotheses: 1) That pre-test and post-test differences for the experimental group will show a significant decrease in anxiety level, and 2) pre-and post-test differences for the control group will show no significant decrease in anxiety levels.

Method

Participants

All eleventh-grade students from a Midwestern high school were invited to participate in the study. Those students who returned a signed parental consent form were included. A signature line for the high school students was included on the parental consent form to indicate participant's assent for the study. Volunteers who participated for this study included 11th grade students from a Midwestern public high school (25 males, 56 females; median age = 17 years). Of the 91 participants, self-declared ethnicities were as follows, 72 Caucasian, 3 African American, 2 Hispanic, 1 Asian American, and 3 who declared themselves as Other. The initial sample size was 85, however, four students unexpectedly dropped out of the study.

Measures and Instrumentation

Westside Test Anxiety Scale. The Westside Test Anxiety Scale (WTAS; Driscoll, 2007) was originally designed to identify students suffering from anxiety impairments who could benefit from anxiety reduction. The WTAS consists of 10 items, each using a Likert response scale where 1 = "never true" and 5 = "always true." It yields an overall anxiety score and measures anxiety impairments with six items assessing incapacity (i.e., memory loss and poor cognitive processing) and four items measuring worry and dread (i.e., catastrophizing) which interferes with concentration (Driscoll, 2007). Scores for the two subscales, incapacity (items 1, 4, 5, 6, 8, & 10) and worry (items 2, 3, 7, & 9), are obtained by summing the respective item responses. A total score is then obtained by adding up the scores and dividing by 10 (Grimes & Murdock, 1989) where higher scores indicate a greater level of test anxiety. In the present study, the total score was obtained in order to measure a general level of test anxiety.

Deep breathing instructions were obtained from an online reference (Anxiety Community, 2010). Selection for this method was utilized due to the simplicity and applicability to high school students under a limited amount of time. The guided progressive muscle relaxation technique was selected for the purposes of focusing on all parts of the body from feet to head.

Procedures

All participants were given the WTAS (pre-test) and a short demographic questionnaire to complete during their physical education (PE) class and participant's pre-test scores were rank-ordered from highest to lowest and then divided in half. Participants with the highest anxiety scores were then assigned to the experimental group (N = 37), and the rest of the participants were assigned to the control group (N = 44).

The control group participated in PE as normally expected while the experimental group met in the wrestling gym where there were mats available for the students to lay down on and the lights were dimmed to create a relaxing environment. Training took place at school, two days a week, over a five-week period butting up to the actual standardized testing date. On training days, the researchers began by discussing the upcoming standardized **test**, which included the ACT to elevate levels of anxiety. During training, relaxing music was played in the background. While in training, participants in the treatment group were taught both deep breathing exercises and progressive muscle relaxation. Participants practiced breathing exercises for five to ten

minutes at the beginning of each session and then proceeded through the progressive muscle relaxation for the following 15-20 minutes. At the conclusion of the five weeks, participants in both the experimental and control groups completed the Westside Test Anxiety Scale as a post-test measure of anxiety.

Results

Comparisons of pre- and post-test measures of test anxiety between the experimental and control groups are presented in Table 1. An independent-samples t-test was conducted to examine differences between the pre-test and post-test scores of several groups: Experimental, Control, Honors, and Non-honors. A significance value of .05 was utilized. Results revealed a significant difference between pre- and post-test mean scores for the experimental group ($t(36) = 4.06, p < .05$). There was no significant difference found between pre- and post-test mean scores for the control group ($t(43) = 1.26$). Therefore, the treatment of relaxation training in this sample appeared to have a significant effect on lowering overall test anxiety between pretest ($M = 3.59, SD = .59$) and post-test ($M = 3.06, SD = .11$) for the experimental group. Further analyses revealed no significant difference between the pre- and post-test scores for students enrolled in the Honor's program who were also part of the experimental treatment group. However, the same was not true for students not enrolled in Honors classes. In other words, there was a statistically significant difference between the pre-test and the post-test scores of students in the experimental group who were not enrolled in Honor's classes.

Table I
Comparison of pre- and post-test measures of anxiety for the experimental and control groups

Group	Mean / sd (pre-test)	Mean / sd (post-test)	t-value (pre-post)	df
Experimental	3.59 / .59	3.06 / .11	4.06 *	36
Control	2.42 / .10	2.31 / .11	1.26	43
Honor's	3.22 / .63	2.94 / .71	1.26	10
Non-Honor's	3.70 / .49	3.20 / .56	3.75*	23

* $p < .05$

Discussion

The present study investigated the effects of relaxation techniques on test anxiety in high school students. Juniors in high school were taught two relaxation techniques; after which the treatment group reported a significant decrease in anxiety as compared to a group of their peers receiving no training. Participants in this study were from ages 16 to 19 years and results supported earlier findings that relaxation techniques can be learned and utilized successfully by children and young adults (Zaichkowsky & Zaichkowsky, 1984; Lohaus & Klein-Hessling, 2003). Students completing relaxation training reported a significant reduction in test anxiety

scores, whereas students in the control group reported no significant change in levels of anxiety. In addition to improvements in anxiety levels, another study demonstrated that the use of yoga and relaxation improved self-confidence and communication in children (8-11 years) with emotional and behavioral difficulties (Powell, Gilchrist & Stapley, 2008). Other studies have supported the use of relaxation and deep breathing in young children and young adults for a range of issues that affect school performance (Armstrong, Collins, Greene, & Panzironi, 1988; King, Ollendick, Murphy, & Malloy, 1998; Lohaus & Klein-Hessling, 2003).

Students in American public schools need interventions to combat the adverse behavioral, cognitive and physiological effects of high stakes testing (Carter, Williams, & Silverman, 2008). The increase in test anxiety among students may be attributed to the increase in distribution of high-stakes testing in American public schools (No Child Left Behind Act, 2002; Black, 2005). This higher anxiety can result in students becoming overly concerned with the consequences of failure (Spielberger & Vagg, 1995), thus adversely affecting their ability and desire to learn (Cheek, Bradley, Reynolds, & Coy, 2002).

It is unlikely that high-stakes testing will be eliminated or significantly reduced in the near future (No Child Left Behind Act, 2002; Triplett & Barksdale, 2005). Schools can play a role in addressing test anxiety by incorporating intervention programs such as relaxation training into the curriculum (Cheek et al., 2002). School counselors and teachers can have a scheduled time of day to teach students how to respond to physiological and psychological responses to anxiety and stress through the utilization of relaxation training. The interventions discussed in this article are brief and not difficult for children to learn. These interventions and techniques can be implemented in the academic environment to mediate anxiety and can be generalized to life skills.

Results of this research should alert administrators, parents, and teachers that students are experiencing adverse effects from having pressure to perform and that there is a need to address this with students (Cheek et al., 2002). Principals, administrators, and teachers can model for children how to respond to stress and anxiety and thus impact student's responses to pressure and anxiety. If performance anxiety is not addressed in elementary school, it could continue through the adult years and impact quality of life and career paths (Miller, Morton, Driscoll, & Davis, 2006). Principals have an incentive to lead their school to success on high-stakes testing in order to continue receiving funding for their schools. The principals in effect, give teachers the responsibility to promote desired results on high-stakes testing. As a result, teachers experience pressure to produce high test scores which relates to their job security. Consequently, this causes teachers to feel disempowered, anxious, and alienated (Triplett & Barksdale, 2005).

Suggestions for further research include more effective control of testing effects, as comparisons of ACT scores and pre- and post- measures from other schools were not included. It was possible that students may have disseminated information among cohorts therefore a diffusion of treatment may have taken place. Students receiving relaxation training may have shared their learning with peers assigned to the control group. Thus, by learning the relaxation techniques, some of the students in the control group may have out-performed students in the treatment group. A salient and applicable incentive to the research should also be considered as post- questionnaires were not all completed. The participants who completed both pre- and post- test measures were entered in a drawing to win fifty dollars; however, not all completed the full procedure.

An unexpected finding during the time of analysis was that Honors students who participated in this study did not receive any benefits associated with the treatment. In other

words; Honors students reported no change in levels of anxiety after treatment was implemented. These findings may contribute to Rice, Lever, Christopher and Porter's (2006) findings regarding adaptive and maladaptive perceptions in high achieving and gifted students. High achieving students with maladaptive aspects of perfectionism (depression, physiological stress, overly self-critical) were found to be more emotionally stressed than those who were able to adapt to demanding events. However, analyses regarding traits that contribute to adaptive and maladaptive behaviors, as well as perfectionist constructs were not examined in this study.

Further research into the psychological markers that contribute to the lack of successful intervention is needed in addition to gender implications (Wicherts & Scholten, 2010). Eum and Rice (2011) found that of their 134 participants, women who were maladaptive perfectionists were those who were more likely to be test anxious. Other studies do note the gender differences associated with test anxiety, suggesting that being female serves as a better predictor for test anxiety than being male, and the ratio of test anxiety to gender specific criteria is much higher for young girls as well (Cassady & Johnson, 2002; Elliott & McGregor, 1999; Hancock, 2001; Putwain, 2007).

There is also little known regarding the direct effects that relaxation and deep breathing have on actual test scores. Not enough research emphasizes gender in the context of high stakes testing. However, the inclusion of this in any replication of relaxation and deep breathing treatment methods can be effectively incorporated into a study such as this. Further investigation into appropriate treatment methods for Honors students when other methods are unsuccessful is needed.

Although the research supporting relaxation in the schools as an effective means in reducing anxiety is plenty (Deuskar, 2008; Donato, 2009), further emphasis on the different methods of relaxation and deep breathing as well as its systematic properties also need to be addressed and further explored. Broota and Sanghvi (1994) found that a specific type of relaxation with Yoga techniques was more effective than the Jacobson progressive muscle relaxation technique. With a clear indication that different methods are indeed being utilized, working towards forming a systematic approach that can be useful to school counselors should be pursued given the outcomes of much of the research today.

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This research was supported in part by grants from the College of Education and Professional Studies at Eastern Illinois University.