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Abstract

This study was a replication of a previous study (in which) participants were given relaxation and deep breathing training to help manage test anxiety. The study examined the correlations between relaxation strategies, gum chewing and variables including socioeconomic status, class rank, GPA, and importance of going to college. Participants included 96 high school students (36 males, 60 females), preparing for the ACT (American College Testing). Results indicated that the relaxation intervention had a significant effect in reducing test anxiety.

Keywords: test anxiety, progressive muscle relaxation, deep breathing, high-stakes testing, socioeconomic status

This Is Just A Test: Overcoming High-Stakes Test Anxiety through Relaxation and Gum Chewing When Preparing for the ACT

Anxiety is a phenomenon that individuals encounter daily. Considered to be one of the most prevalent and pervasive human emotions, it possesses a large sector of the world's population suffering in excessive and overbearing levels. Anxiety can be described as a perceived notion of psychological distress, occurring due to the expectation of a disconcerting and potentially threatening event. Although extensive research has focused on the concept of anxiety, it cannot be defined by purely objective or concrete means. As a result of the ubiquitous nature of anxiety, the construct has been defined as different subtypes (e.g., social anxiety, state-trait anxiety) (Rachman, 2004). The focus of the present study was on one other such subtype, namely, test anxiety.

Within the American education system, the prevalence, significance, and ultimate stakes of standardized testing are increasing (Black, 2005). As a result, today's students are associating a greater sense of consequence with the prospect of being tested, which results in feelings of pressure to perform and fear of not performing adequately. According to John Zbornik, a school psychologist, (as cited in Black, 2005) students who suffered from test anxiety tended to be consumed with feelings of anxiousness, worthlessness, and/or absolute dread in regard to their academic achievement. Test anxiety can produce a physiological hyper-arousal, interfering with students' mental processes and debilitating their ability to function during a test, as well as in the days and weeks leading up to a test (Soffer, 2008). In addition to these emotional and physiological symptoms, anxiety can produce behavioral problems in children (Spielberger & Vagg, 1995). Ultimately, due to the pressure to perform and the perceived importance of high-stakes testing, students' mental states and sense of emotional stability can become impaired.

Rather than feel confident about high-stakes tests and the required higher level thinking, test-anxious students may become overly concerned with the repercussions of failure.

Gum Chewing

Many individuals chew gum as an outlet for relieving their stress. Individuals with high anxiety are more likely to chew gum, as found in an investigation conducted by Smith (2010) analyzing personality traits of frequent gum consumers. Further, chewing gum during high-anxiety situations has proven to show significantly positive effects. For example, Smith (2009) conducted a study using 120 volunteers who were divided into gum and no-gum groups. The volunteers self-reported their mood, chewed gum while reading a short story, then completed both short-term and delayed recall tests. Participants were also given an intelligence test and completed logical reasoning tasks. Smith (2009) found that those who chewed gum had significantly greater alertness ($p = .002$), a more positive mood ($p = .02$) and significantly improved performance on the intelligence test ($p = .045$) versus the control group. In a different study, Ran and colleagues (2010) found that gum chewing relieved test anxiety for Chinese high school students taking a college entrance mathematics exam. Using 257 Seniors, some participants were given gum to chew immediately prior to the exam for 10 minutes. Both the treatment ($n = 132$) and control groups ($n = 125$) took an anxiety questionnaire prior to the test, with the treatment group reporting significantly less anxiety than the control group ($p < .0001$). Together, these findings can indicate the positive effects of relaxation strategies combined with gum for American students who are preparing to take standardized tests.

Relaxation and Deep Breathing

Progressive relaxation started in the early 20th century by Edmund Jacobson who introduced a physiological way of dealing with tension and anxiety (Bernstein, Borkovec, &

Hazlett-Stevens, 2000). Progressive muscle relaxation involves tensing and releasing sets of muscles (hands, calves, thighs, etc.) until the whole body is relaxed. This can be combined with deep breathing to increase the relaxation effect. Jacobsons' actual research came together in 1938 in an extensive book-length technical instruction of "Progressive Relaxation." Since then, a plethora of research has surfaced supporting the uses of systematic relaxation for a multitude of symptoms including: anxiety, speech distortions, and blood glucose levels in the management of diabetes (Detling, 2008; Ganesan, 2009; Grant, 1980).

The present study examined the impact of gum chewing and teaching relaxation techniques to high school juniors preparing for the ACT. The present study tested three hypotheses: 1) the pre-and post-test differences for the experimental group will show a significant decrease in anxiety level; 2) the pre-and post-test differences for the control group will show no significant decrease in anxiety levels; and 3) there will be a significant post-test difference in anxiety levels between the experimental and control groups.

Method

Participants

Students from a midwestern public high school were invited to participate in the study and those 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 (36 males, 60 females; median age = 17 years). Of the 96 participants, self-reported ethnicities were as follows: 92 Caucasian, three Hispanic, and one marked as "other."

Measures and Instrumentation

The Westside Test Anxiety Scale (WTAS: Driscoll, 2007) was originally designed to identify students suffering from anxiety impairments related to testing who could benefit from anxiety reduction. The WTAS consists of 10 items, each using a Likert response scale (1 = “never true”, 5 = “always true”), yielding an overall anxiety score. While this instrument has subscales to assess anxiety specifically through anxiety-produced incapacity and worry, in the present study a mere total score was attained in order to measure a general level of test anxiety. (Driscoll, 2007; Grimes & Murdock, 1989).

Deep breathing instructions were obtained from an online reference (Anxiety Community, 2010). These instructions were utilized due to the simplicity and applicability to high school students. The deep breathing instructions were as follows: students were instructed to first become aware of their breathing and to notice how deep breaths expand their stomachs. Then, participants were guided through the process of taking deep breaths through their noses, holding their breath for a count of three seconds, and then exhaling through their mouths. Students were taken through approximately five minutes of deep breathing in this manner. Following deep breathing, students were led through a scripted progressive muscle relaxation sequence in order to focus on relaxing all parts of the body (Wolpe & Lazarus, 1966). This sequence began with the participants tensing and then releasing the muscles in their feet (starting with the toes) and moving upwards through guided relaxation until facial muscles were tensed and relaxed. Throughout this time, participants were instructed to breathe in deeply through their noses while tensing the respective muscle sub-group, hold the tension and the breath, and then release the tension in the muscle and exhaling through their mouths.

Procedures

All participants were given the WTAS as a pre-test and a demographic questionnaire to complete during their physical education class. Participants were then randomly assigned to either control ($N = 48$) or experimental ($N = 48$) groups with matched pairs based on WTAS pre-test scores, SES, gender, ethnicity, class rank and GPA. The control group, who were not taught any relaxation techniques, participated in their regularly scheduled physical education class while the experimental group met in a separate, dimly-lit gym where mats were provided for participants to lie on in order to create a relaxing environment.

The intervention was implemented twice a week for five weeks, leading up to the actual standardized test date. Each session with the experimental group lasted approximately a half hour. At the start of each session, researchers facilitated dialogue regarding the upcoming ACT and their preparation in order to elicit elevated levels of anxiety before implementing the intervention. Participants in the experimental group were taught both deep breathing and progressive muscle relaxation. Participants practiced breathing exercises for approximately five minutes at the beginning of each session before being led through the progressive muscle relaxation for the following 15-20 minutes. In addition, participants were asked to chew gum as they practiced the progressive muscle relaxation. At the conclusion of five weeks, participants in both the experimental and control groups completed the WTAS as a post-test measure of anxiety.

Results

Data was obtained through SPSS using a paired samples *t*-test, an independent samples *t*-test, and a bi-variate, Pearson product-moment correlation coefficient with a significance level of .05. As indicated by an independent samples *t*-test, there was no significant difference between pre-test WTAS scores of the experimental ($M = 3.18, SD = .81$) and control ($M = 3.16, SD = .73$)

groups, $t(94) = .08, p = .937$. Results of a paired samples t-test showed a significant difference between the pre-test and post-test WTAS scores ($M = 2.58, SD = .78$) of the experimental group, $t(45) = 6.78, p < .05$. However, there was no significant difference between the pre-test and post-test WTAS scores ($M = 3.15, SD = .89$) of the control group. See Table 1 for pre-test and post-test WTAS score for each group. There was a significant difference between male ($M = 2.867, SD = .75$) and female ($M = 3.35, SD = .73$) students on the pre-test WTAS scores, $t(94) = 3.11, p = .002$. Consistent with these findings, there was also a significant difference between male ($M = 2.57, SD = .78$) and female ($M = 3.04, SD = .89$) students on the post-test WTAS scores, $t(90) = 2.57, p = .012$.

Table 1. *Pre-test and Post-test WTA Group Statistics*

	Experimental			Control		
	N	M	SD	N	M	SD
Pre-test WTAS Scores	48	3.18	.81	48	3.16	.73
Post-test WTAS Scores	48	2.58	.78	48	3.15	.89

Discussion

The current study explored the effects of deep breathing along with progressive muscle relaxation while chewing gum on test anxiety with students preparing to take the ACT. Investigators hypothesized that deep breathing along with progressive muscle relaxation while chewing gum would decrease the level of perceived test anxiety on the WTAS post-test. Results revealed significant data supporting the hypotheses. The data indicated that the treatment decreased perceived test-anxiety among the experimental group as indicated by the WTAS,

which is consistent with a similar study (Larson et al., 2011). The control group's WTAS scores did not reveal any notable change in perceived test anxiety, thus a significant difference between the experimental and control groups' post-test scores was recorded. These findings are significant because the implementation of deep breathing and progressive muscle relaxation is cost-effective and does not require specialized training or other resources. The instruments are accessible, regardless of socioeconomic status, and research indicates that they are effective among various age groups (Larson, El Ramahi, Conn, Estes, & Ghibellini, 2010; Tatum, Lundervold, & Ament, 2006; Yin-Hsing & Meng Ling, 2011).

The use of low-cost interventions for test anxiety has significant implications for students of all backgrounds. Baker and Johnston (2010) found a correlation between a student's socioeconomic status and the pass rate on a high-stakes test. In their study, 14,049 8th graders' test scores on the reading portion of The Florida Comprehensive Achievement Test were used to determine if there was a relationship between SES and pass rate. Results indicated that high SES students had approximately a 64 percent pass rate, whereas students from a low SES background (as defined by whether the respective student's school received Title I funding) had only a 39 percent pass rate. The fact that SES was positively correlated with class rank in this study provides further evidence to suggest a discrepancy among socioeconomically disadvantaged youth. In an attempt to explain this discrepancy, researchers have addressed concerns such as lack of relational support and inadequate resources in low SES schools (Bergeron, Chouinard, & Janosz, 2011; Oxford & Lee, 2011).

While no findings were found for gender with regards to controlled variables such as levels of anxiety, class rank, and whether or not they were planning to attend college, it is important to note that similar studies have suggested that women tend to be more concerned

about the prospects of getting into college and rank its importance higher than their male counterparts (Larson & Rose, 2011). Using census data as well as surveys of more than 1,000 respondents, Severiens and Dam (2012) found that more women are enrolled in college, less women drop out than men do, and women tend to perform better during post-secondary school than men. Research also suggests women are more likely to have higher levels of test anxiety (Lowe & Lee, 2008). Female students were in fact significantly more anxious than male students in this study's pre- and post-test measures of anxiety. Anecdotally, the female participants in the current study and similar studies have endorsed higher levels of anxiety, more motivation to attend college, and increased levels of pressure for high-stakes testing (Larson, El Ramahi, Conn, Estes, & Ghibellini, 2010; Larson & Rose, 2011). Using self-reported measures with 1,953 adolescent boys and girls, Selkirk, Bouchev & Eccles (2011) found that 6th grade girls reported significantly higher levels of test anxiety than their male counterparts. Given the research that suggests women have higher levels of perfectionism and anxiety (Cassady & Johnson, 2002; Elliott & McGregor, 1999; Eum & Rice, 2011; Hancock, 2001; Putwain, 2007), relaxation techniques may be an accessible, cost-effective way to support this population, alleviate symptoms, and maximize potential for high-stakes testing.

In addition to females, the research consistently shows that lower socioeconomic status is strongly correlated with lower success rates in the school setting, limited opportunities both in the school setting and while in the work force, (Goodman, Miller, & West-Olatuji; 2012; Jablonska et al., 2012), inferior teaching (Goodman, Miller, & West-Olatuji; 2012), and more deviant behavior. Jablonska et al. (2012) found that through data on 4798 adolescents' grade point averages and parental SES that low SES was correlated with poorer academic performance. Similarly, the current study reported that socioeconomic status was correlated with class rank

and grade point average. Once again, the accessibility and cost-effectiveness of teaching relaxation techniques provides a means to assisting oppressed and underprivileged populations like low SES students. The scripts available are user-friendly, require no formal training, necessitate little time and energy to implement, and can be successfully used with people of virtually all ages. Despite these advantages, relaxation techniques are not widely used in the classroom setting at the present time. Future studies should investigate the effectiveness of teaching relaxation techniques to a more diverse population in regards to SES, ethnicity, and gender.

In furthering this study, researchers could extend the design to more diverse populations in order to better understand the extent to which the intervention is efficacious. Deep breathing and progressive muscle relaxation exercises exist in many variations and, therefore, further research on the variations of the interventions and their effectiveness should continue to be investigated. Additionally, gender is an important variable that requires further analysis with regard to test anxiety because the current results are inconsistent with some past research. Therefore, the impact of gender on test anxiety is uncertain (Larson & Rose, 2011, Lowe & Lee, 2008; Onyeizugbo, 2010; Severiens & Dam, 2012). Regardless of these specific variables and because of the effectiveness of this economical intervention, it is recommended that administrators and teachers utilize deep breathing and progressive muscle relaxation in order to maximize student achievement and promote overall mental and physical health.

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