

FEATURE ARTICLE

Stress Management and Peak Performance Crash Course for Ninth Graders in a Charter School Setting

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Seventeen 9th-grade students at a charter school were selected to participate in a 3-week stress management/peak performance training program that integrated biofeedback into the overall educational schedule. The training program included a weekly visit by the facilitator, who discussed with the students the psychophysiology of stress and neuropsychology of attention, as well as the beneficial aspects of relaxation on the mind and body. These factors have been studied with peripheral biofeedback and EEG biofeedback for over 30 years and are known to facilitate peak performance during tests, social interaction, and various other performance scenarios, such as general academic performance, sports, and music. Students were guided through relaxation exercises and were then asked to think about how and why these exercises fit in to their own personal goals as students and performers. They were instructed to practice at home with an audio CD and worked with the emWave PC®, a heart rate variability biofeedback instrument. The Test Anxiety Quiz was administered pre- and posttraining, and the Behavioral Change Survey was administered posttraining. The students showed mild to moderate improvement on test anxiety and behavioral measures. Overall, significant gains were made in reduction of test anxiety and other behavioral measures. This study suggests that, consistent with the peak performance literature, integration of relaxation techniques into a secondary school setting can improve important measures of students' scholastic achievement.

Introduction

With increased demands on students from family, technology, and academic and athletic competition, students often perform below their potential. Anxiety from these stressors creates a nervous system reaction (sympathetic arousal), which distracts the students' attention from the task at hand to overcoming the anxiety produced by stressors. Stress can impede both attention and concentration (Ellenbogen,

Schwartzman, Stewart, & Walker, 2002), thus negatively impacting the mind's ability to carefully and accurately access information. Other changes in the physiological response to stress include both increased and desynchronized heart and respiration rates, increased sweating and peripheral hand temperature, blood flow away from the digestive tract, and excess tension in muscle fibers. These factors are commonly known as the "fight-or-flight" response. Like the body, the brain focuses its resources on survival, and the ability of the mind to access information is replaced by tuning the attention toward environmental vigilance (distraction) or spacing out and shutting down. This phenomenon has been studied in scenarios where exemplary performance is desired in music (Egner & Gruzelier, 2003; Riley, 2011) and sports performance (Arns, Kleinnijenhuis, Fallahpour, & Bretler, 2007; Strack, Linden, & Wilson, 2011; Thompson, Steffert, Ros, Leach, & Gruzelier, 2008), as well as other high-demand situations, such as surgery (Ros et al., 2009) and functioning of business executives (Loehr & Schwartz, 2003).

For nearly fifty years, biofeedback has amassed a rich body of research and clinical practice. Biofeedback has been used to help patients control stress-related symptomatology and pain. In addition, EEG biofeedback (or neurofeedback) has been helpful in training individuals with attention deficit hyperactivity disorder to improve their functioning. Both biofeedback and neurofeedback techniques have been employed in schools to help students in various ways over the years (Boyd & Campbell, 1998; Carmody, Radvanski, Wadhvani, Sabo, & Vergara, 2001; Cobb & Evans, 1981; Foks, 2005; Hiebert & Eby, 1985; McCraty, 2005; Penkae & Toomim, 2003; Steiner et al., 2013; Zaichkowsky, Zaichkowsky, & Yeager, 1986). This 3-week school-based program teaches students about stress and how to manage stress via self-regulation training with biofeedback. The study measured the effect of these interventions on students' skills of daily behavior around homework, anxiety, conduct, and sleep, at home and in school.

Method

Students were asked to volunteer to participate in three late-morning classes that were spaced at 1-week intervals. Prior to the first class, students were given a Test Anxiety Quiz (TAQ), which was re-administered after the final class. A Behavioral Change Survey was also administered after the final class.

Instruments

The TAQ was developed by The College of William and Mary in Williamsburg, Virginia, and is offered for their students on their webpage. The TAQ is a brief 10-question test; no empirical studies have been published yet on the test's reliability or validity. The Behavior Change Survey (BCS) was developed by the author of this article to survey problems particular to students at the time of the class.

Training

The first class introduced students to the concepts of physiological homeostasis and the fight/flight/freeze response and then taught them how to use the EmWave PC®, a heart rate variability biofeedback instrument that was made available whenever a student wanted to practice alone in the back of the classroom. Diaphragmatic breathing was taught, and students had a chance to practice and work in dyads to give each other feedback on their diaphragmatic breathing techniques.

Students were also given small glass thermometers for use as a simple biofeedback device to measure hand temperature. In addition, they were guided through a relaxation exercise called “autogenic training,” developed by the German psychiatrist Johannes Schultz, which is commonly used to reduce stress through peripheral blood vessel dilation, which results in warmer hand temperature (Luthe & Schultz, 1969). Students were instructed as homework to practice what they had learned and to utilize a CD of autogenic training. They were asked to monitor changes in stress/relaxation level as well as hand temperature prior to and after the guided exercise.

The second session familiarized the students with the concepts of cognitive flexibility, heart rate variability, and positive mental attitude. During the session, the students engaged in a discussion of their experiences with homework assigned the previous week. They also practiced hand-warming skills using handheld thermometers. After downloading “respiration pacer” applications on their smartphones, students were instructed to use these apps on a daily basis. They were told to try to get their breathing rate to match six breaths per minute (4 s in and 6 s out) and were taught why this was relevant to their performance in and out

of school. They were also told they may increase or decrease respiration rate on the pacer to allow for individual variability and comfort since we each have slightly different heart-resting phases based on body size and lung capacity.

Homework after the second session included practicing their paced breathing with the respiration pacer app, listening to the CD of autogenic training, and using the emWave. Students were also asked to teach their parents how to breathe diaphragmatically.

The third session included deepening students' understandings of how neural circuitry and psychophysiology are influenced by positive or negative mental thoughts and attitudes, and how this affects anxiety, attention, and focus in academics, sports, music, or social performance. Students were also introduced to the concept of imagery by being guided through a visualization of a calm and peaceful place in nature, then being asked to imagine taking a test using the skills of relaxation and psychophysiological regulation learned in the class. Peaceful piano music was paired with the guided imagery exercise. After the third session, students continued the homework previously assigned and, once again, they were encouraged to practice every day.

One to two weeks after the class, students were re-administered the TAQ. Additionally, students, parents, and the teachers were given a BCS asking if the students' behavior had gotten worse or better on a 0–10-point graduated scale. The seven questions on the survey asked about tending to and completing homework, appearing more relaxed at home, changing behavior, dealing better with conflict, sleeping better, gaining self-control, and an open-ended question asking respondents to list what was learned in the stress management/peak performance class.

Results

All students participated willingly in the training, but only 11 students followed through by participating in the voluntary assessment measures. The TAQ has a simple scoring system, which rates a score of 0–10 as high test anxiety, 10–15 as moderate test anxiety, and 15–20 as low test anxiety. Overall, scores changed from more to less test anxiety, moving from a pretraining average score of 12.45 to a posttraining average score of 14.54 (see Figure 1). One student who was not cooperative with the test protocol was eliminated due to a lack of compliance (which was fair because cooperation and compliance was necessary for the integrity of the study). If his score is omitted, the mean change in the 10 students who fully participated increases from 12.1 to 14.8, nearly bringing the group into the low test-anxiety range.

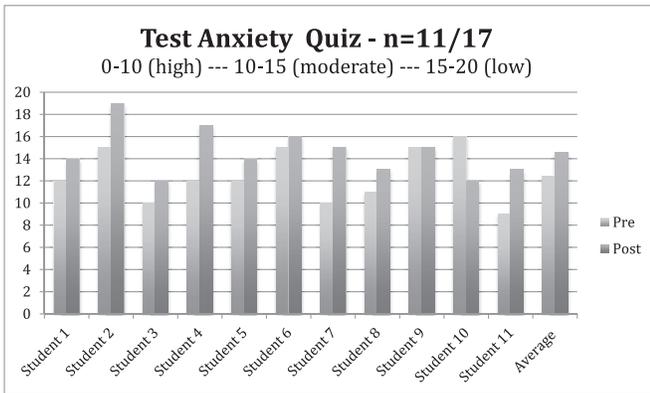


Figure 1. Pre- and posttraining scores on the TAQ.

The BCS (see Figure 2) was given to students, parents, and the teacher 1–2 weeks after the relaxation training. The teacher was asked if student grades had changed, and the response was that “test grades have improved” with a +1.5 rating.

Discussion

Several questions arise as to the integrity, validity, and success of this study and the data presented. The first issue involves the size and duration of the sessions. This was a small sample of students. In addition, three sessions were too short a period of time to learn properly and to fully integrate the stress management techniques. Posttests were handed out by the teacher 1–2 weeks after the class ended, whereas the study design called for them to be handed out and completed at the close of the last training session. In spite of these limitations, the data collected reflected positive change in the following measures: reduced test anxiety and improvements on seven BCS items: completing homework at home, appearing more relaxed at home, behaving better at home and school, dealing better with conflict, sleeping better, and gaining self-control, with a carryover to parents.

This study suggests that further research is warranted using a larger pool of students and additional sessions of training. Also, including teachers in the study would help to support the overall goals of the study.

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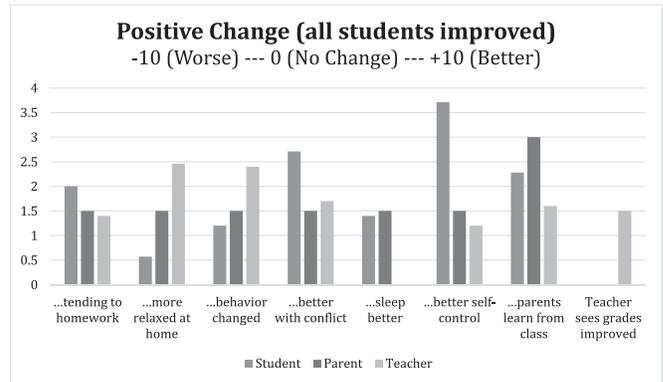


Figure 2. Posttraining scores on the BCS.

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