Accelerated Desensitization with Adaptive Attitudes and Test Gains with 5th Graders

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Abstract

The study evaluates an easily-administered test-anxiety reduction program. An entire fifth grade was screened, and 36 students identified as test-anxious were randomly assigned to an Intervention or a non-participant Control group. The intervention was an accelerated desensitization and adaptive attitudes (ADAA) treatment which involved stretch–tense, deep breath, release–relax and positive suggestion sequences to expedite anxiety reduction and also positive adaptive associations to each of eight learning, review, and testing scenes. The intervention was presented via a 31 minute recording, which students reviewed in five separate sessions over about half the school year. Test gains were calculated from the 2005 Tennessee Comprehensive Assessment tests (TCAPs) given after the intervention, adjusted for individual student 2004 TCAPs before the intervention. The Intervention group attained a significant seven percentile test gain over the Controls. The use of the recorded intervention is seen to vastly reduce the number of professional hours required for an anxiety-reduction program, and the program shows promise as a highly cost-effective means to benefit test-anxious students.

Introduction

Test anxiety is widely considered to include physiological over-arousal, often referred to as "emotionality," along with dread, worry, and expectations of catastrophic failure. Excessive test anxiety often contributes to impaired test performance, and the term "test anxiety" itself is commonly used to refer to the anxiety and its accompanying impairment (Hembree, 1988). In the more severe cases, test-anxiety symptoms meet the American Psychiatric Association's DSM-IV (1994) diagnostic criteria for a social anxiety disorder (Goonan, 2003).

The number of students suffering from test anxiety increases sharply in grades two through four, stabilizes in middle school, and declines somewhat in college (Hembree, 1988). Estimates of the number of test-anxious students vary from 15–35 percent of students, depending on the population surveyed and the criteria used to identify cases (Hill & Wigfield, 1984; McGuire et al., 1987), and the number of students with high test anxiety appears to be increasing with the increased emphasis on high-stakes testing (McDonald, 2001). Most adolescents report being more stressed by tests and schoolwork than by any other aspects of their lives (McGuire, Mitic & Newmann, 1987), which may seem surprising. Yet social concerns generally come and go, while the stress of tests may persist week after week, over a span of many years.

High test anxiety reduces working memory and impairs concentration and reasoning. Highly anxious students score about 12 percentile points below their low-anxiety counterparts (Cassady & Johnson, 2002; Hembree, 1988; Lee, 1999; McDonald, 2001), and the anxiety itself is considered a principal contributing factor. In one memorable instance, a high school junior would tutor her small group of friends in algebra over lunch, and then fail the test the next hour while her friends went on to pass it.

Test anxiety presents a serious academic impairment on all grade levels from elementary school through higher education (Sarason, 1984). In spite of its low profile, it is surely one of the most pernicious emotional and academic problems among students today. Left untreated, performance anxieties can continue into adult years and restrict career opportunities and quality of life (Topp, 1989; Krohne and Laux, 1982).

Treatment

The Hembree (1988) and more recent Ergene (2003) meta-analyses found strong test-anxiety reduction benefits (1.0–1.2 SD effect sizes) from systematic desensitization and other behavioral techniques, from cognitive restructuring, and from skill-focused interventions but only when combined with cognitive or behavioral techniques. More moderate benefits were found from several other approaches.

Cognitive-behavior interventions typically involve multiple components (cf. Velting, Setzer & Albano, 2004) including complex activities such as assessing the rationality of your thoughts and planning ways of dealing with anxiety-provoking situations. Younger students can find it difficult to learn and remember the procedures and to properly implement the activities. While most test-anxiety research is done with college students, the Ergene (2003) meta-analysis found interventions with primary school children attained considerably smaller benefits (.27 SD average effect size based on 5 studies).

Physical activity and positive images can contribute to desensitization interventions. Running has been used in lieu of relaxation in the successful treatment of phobias, including difficult-to-treat hospitalized agoraphobics (Orwin, 1973). An early component analysis indicates that exposure, strenuous activity, and positive images can each contribute significantly to anxiety-reduction benefits (Driscoll, 1976). The use of strengths and optimism to trump fears and failures is a central tenet in the currently popular positive psychology (Seligman, 2002) and has broad implications for longer-term adaptation (Fredrickson & Losada, 2005). Exposure, physical involvement and positive adaptive images components are combined in the present intervention protocol.

While the Hembree 1988 meta-analysis found that test-anxiety reduction improved test performance by as much as 12 percentile points, more current research suggests smaller or even negligible gains (cf. Spielberger & Vagg, 1995). Unfortunately, given the present concern with test results, the contributions of test-anxiety reduction remain uncertain.

Test-anxious students tend to have poorer study habits and poorer test-taking skills than other students. Test-anxiety reduction appears to benefit those students with reasonably satisfactory skills, while the remaining students with poor skills must improve upon their skills to benefit (Spielberger, 2005; Vagg & Spielberger, 1995). The challenge would be to combine anxiety reduction with skill and attitude benefits in a relatively simple manner that does not overwhelm or confuse students.

Anxious students seldom receive sufficient anxiety-reduction training. The students themselves are unaware that their anxieties can be treated, do not want to appear odd or conspicuous, and seldom seek treatment on their own. Grade school counselors are not generally trained in test-anxiety reduction protocols and are otherwise occupied. And finally, the four or five hours of professional time that the average anxiety-reduction protocol requires would overwhelm counseling staff and school finances (Cheek, Bradley, Reynolds & Coy, 2002). The present program is meant to use skills that professional counselors already have and to be implemented with a minimum of additional training.

While recorded interventions could vastly reduce the number of professional hours required, recorded treatments such as systematic desensitization have been found to produce only about half of the benefits produced by professionally-administered versions (Hembree, 1988). The challenge is to construct a protocol that performs well in recorded administration.

The present study pilots a resource-efficient, technology-based anxiety-reduction protocol that school counselors can readily implement and schools can easily afford, and assesses whether the program can improve scores on high-stakes standardized tests.

Method

Measures

The Tennessee Comprehensive Assessment Program (TCAP) scores were used as the measure of student test achievement. The TCAP is a statewide test covering reading and language, math, science, and social studies, with the reading and math portions weighted more heavily. The test is ordinarily taken in two-hour sessions over four or more days. The total internal reliability alpha for prior versions has been .95-.96, with adequate evidence of content validity but poor evidence of construct validity (Cizek, 2005). Aggregate scores are used here for the primary analysis, and separate section scores are then analyzed as well.

The outcome measure was the Post-intervention TCAP scores, taken in the spring of 2005 after the intervention, while the Pre– scores taken in the spring of 2004 prior to the intervention served as the baseline measure. TCAPs, reported as Normal Curve Equivalents in 2004 but as Criterion Reference Scores in 2005, are normed on separate scales with means of 50 and 352 for the two years respectively. To facilitate comparison, the two are presented in this study as standardized scores with 0.0 as the mean and 1.0 as the standard deviation.

The Westside Test Anxiety Scale is a ten-item instrument designed for use in classrooms to screen for anxiety impairments in as time-efficient a manner as possible (Driscoll, 2004). The scale has six items assessing performance impairment, somewhat similar to the Alpert-Haber Debilitative Anxiety Scale (1960); and four cognitive items assessing worry and fears of failure, which interfere with concentration (Cassady & Johnson, 2002). The scale has been found to successfully identify students who will benefit academically from test-anxiety reduction training (Driscoll, Holt & Hunter, 2005). The scale takes only ten minutes to administer, and most students can score their own responses. The scale is public access, involving no cost to the schools.

Participants

The study was conducted at an East Tennessee intermediate school serving a population that was primarily rural and poor, with 68% of the students qualifying for free or reduced-cost lunches. Approximately 175 students from all seven fifth-grade classrooms were screened for test anxiety.

The study included the most anxious 24% of the school students, as identified by scores of 3.2 or higher on the anxiety scale. Students receiving special education services were not included due to IEP requirements.

Students were then randomly assigned to the Intervention and Control groups at an approximate 3:2 ratio, to include more students in the treatment group, and assignment was stratified by prior first term grades. Of the 24 students assigned to the Intervention group, parental permission was obtained for all but one student, who was dropped from the study. A second student was dropped because no Post-intervention scores were available, resulting in 22 subjects in the final Intervention group. Fourteen students were assigned to the non-participant Control group and no parental permission was required for these students.

The final sample of 36 students included 16 boys and 20 girls, with 11 boys and 11 girls in the Intervention group and 5 boys and 9 girls in the Control group. The sample was primarily Caucasian but included nine African-American students and one Hispanic student, with six of the African-Americans in the Intervention group and the remaining three and the one Hispanic in the Control group.

The mean anxiety score was 4.0 for the Intervention group and 3.8 for the Controls, where 3.0 and above is considered "moderately high," 3.5 and above is "high" anxiety and 4.0 and above might be termed "severe" or "extreme" anxiety. Thus, both groups were highly anxious and the Intervention group was somewhat more anxious.

Materials

The present anxiety-reduction training relied upon a multi-component intervention protocol presented on a 31-minute recorded audio CD (Driscoll, 2003). The rationale, components, and sequencing are as follows:

The protocol begins with eight minutes of stretch, tense, deep breath, release–relax, and positive suggestions to calm and relax students. The stretching and tensing of the major muscle groups are thought to counter the physiological components of arousal, and the deep breaths replace the shallow breathing often associated with high anxiety. Tensed muscles fatigue quickly, and relaxation is then suggested and follows easily as students release their breath and release their muscles. Additional suggestions are used to promote relaxation and to facilitate involvement with the guided imagery and expectations of benefits.

Once relaxed, students imagine an activity that they find especially interesting and are instructed to re-experience the sense of interest in it. Interest in school subjects contributes to academic performance, and an interested attitude can be considered a plausible counter to a fearful attitude. Adaptive emotions such as eagerness and a sense of challenge are found to correlate with higher test achievement, whereas hopelessness correlates with lower achievement (Pekrun et al., 2004).

The protocol then instructs students to imagine themselves in each of eight sequential learning, review, and test-taking scenarios in which they are interested in the activities.

Students are asked to imagine being in class and to imagine being actually interested in what the teacher is explaining. In another scene, students are asked to imagine reviewing the material, feeling pleased by what they already know, and recognizing that they are free to organize the material however they feel will be most helpful.

One scene introduces a test-taking skill. Students imagine not knowing an item on a test, realizing that they do not need to know every item, moving on to another item that they do know, and finding it interesting.

Between each of the scenarios, the students are prompted to do an additional tense–relax sequence to curb any surges of anxiety triggered by the scene, to reinstate the calmness, and to prepare for the next scene. The experience of release and safety at the conclusion of a stressful scene is thought to contribute to the conditioning. Each of the scenarios and its subsequent tense-release sequence takes about two and a half minutes, and these comprise the majority of the protocol.

Since anxiety tolerances vary, the pacing could be critical. Exposure scenarios that are appropriately challenging for one student may be overwhelming for another. Anxiety tolerances are believed to be not so critical with the present protocol, as the tense–release segments counter even strong surges of anxiety and cannot be overwhelmed or inhibited by such surges. The tense–release sequences also actively engage students, maintaining involvement during the recorded administration.

Variations in student tolerances, along with lapses in concentration, may be the principal reasons that recorded protocols under-perform compared to live administrations. Recorded versions of the present protocol have produced consistent anxiety-reduction benefits across multiple samples that are comparable to professionally-administered protocols (Driscoll, 2005).

While it may seem unrealistic to expect highly test-anxious students to find anything pleasant in taking tests, in the guided imagery sequences many students can and do imagine being interested the scenarios. Once they can imagine being interested, they may be more able to experience interest in the actual situations.

The present protocol is thus a desensitization training boosted by tense–release anxiety-containment sequences, by positive expectations, and by imagined interest and competence in the learning, review, and testing scenarios. It is referred to as accelerated desensitization and adaptive attitudes (abbreviated ADAA) An earlier pilot study showed substantial test gains among highly-anxious college students on academic probation, although interpretation of findings is compromised by methodological weaknesses including inadequate randomization, incomplete compliance and limited access to test scores (Driscoll, Holt, & Hunter, 2005).

Experimental Design

A true experimental design (Campbell & Stanley, 1966) was used to test for effects of the Intervention on the Post-intervention TCAP test scores. Analysis of covariance (ANCOVA) was used to identify and separate the contributions of the Pre-intervention scores from the contributions of the Intervention itself. The Pre– scores are the covariate, and controlling for these adjusts for Pre-interventions differences and reduces the error variance, improving the precision of the analysis (Lewicki & Hill, 2005; Wildt & Ahtola, 1978; see also Ware & Galassi, 2006).

Procedure

The school counselor met initially with the Intervention students in same-sex groups and explained the intervention and answered questions, aiming to overcome their apprehension about the training and to instill confidence. She had them try out stretching and tensing, taking deep breaths, and relaxing; and imagining scenes. Most of the students were familiar with imagining scenes through prior work with guided imagery.

The counselor had the students complete the recorded CD training in each of the next two sessions in small same-sex groups, to insure compliance, and stayed with the students through the reviews. The students completed the training a third time at home, reporting back to the counselor when they completed the review. The fourth and fifth trainings were conducted in larger groups, also same-sex. The counselor noted that students were apprehensive at the initial session, but appeared comfortable after the first training session.

The school had six six-week terms. The screening, introduction, and four of the recorded trainings were conducted during the second and third terms, while the final training was conducted during the fifth term, a week prior to state testing. Thus, the five CD reviews took place over the course of about half of the school year.

The school counselor did not explain the test-anxiety program to the classroom teachers, who were not involved with the program and did not ask her any questions about it. The program sessions were meant to appear to classroom teachers as just one of the many types of student sessions that the counselor conducted on a regular basis.

The school counselor spent approximately 40–50 hours with the project, which included the research tasks, and anticipated that the experience she gained would reduce the time per student required for a second similar project.

Results

The Pre– to Post– Means for Intervention and Control students are seen in Figure 1: Pre– to Post– TCAP scores.

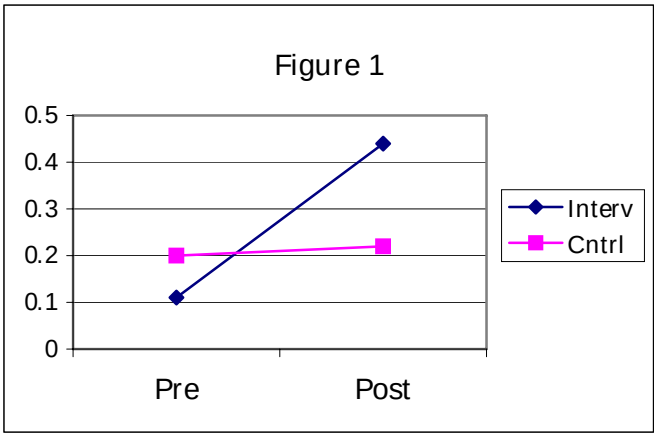

Figure 1: Pre– to Post– TCAP Means

ANCOVA

TCAP 2004 Pre– scores correlated r = .86 with 2005 Post– scores, indicating substantial stability in student scores relative to the other students over the academic year. The Pre– to Post– correlations for the Intervention and Control groups were .86 and .89 respectively, indicating satisfactory homogeneity of slopes. The analysis of covariance provides Post-intervention Gain scores adjusted for initial differences in the Pre– scores, (See Table 1: Adjusted Gains on TCAPs).

Table 1
Adjusted Gains on TCAPs

	Adj. Gains
Intervention	.33
Control	.03
Interv. – Cntrl.	.29*
* $t = 1.71$, $df = 33$, $p < .05$	

The adjusted gain scores for the Intervention and Control groups were .33 and .03, respectively. The difference between these scores was .29 SD, which was statistically significant at the $p < .05$ level. The treatment effect size was .29 SD, which corresponds to a 7.1 percentile gain for the Intervention group against the Controls.

The Beta coefficient for the Pre– scores was .87, accounting for 75% of the outcome variance. The Beta coefficient for the Intervention was .29, accounting for 8.7% of the outcome variance not accounted for by the Pre– scores. That is, the Intervention accounted for 8.7% of the changes in the positions of individual student scores relative to other students over the academic school year.

The gains on the four subscales are presented in Table 2: Adjusted Gains on TCAP Subscales. The Intervention group showed statistically significant gains in the Reading and Social Studies sections, compared to the controls; a moderate gain in Science; but no advantage in Math. A closer look reveals that the Intervention students improved as much in math as in the other three areas, whereas the Controls improved in math but not in the other three areas.

Table 2
Adjusted Gains on TCAP Subscales

	Reading	Math	Science	Social Studies
Intervention	0.32	0.42	0.20	0.27
Control	-0.10	0.44	-0.16	-0.12
Interv. – Cntrl	0.42	-0.03	0.36	0.39
$p <$	.05	NS	.15 (NS)	.05

Discussion

The students in the Intervention and Control groups appeared to be reasonably well-matched by Pre-intervention TCAP scores, initial test anxiety, gender, and race. The initial small difference in the Pre– TCAPs was adjusted for through the use of the multivariate statistics.

The Intervention protocol included both anxiety-reduction training and the mental rehearsal of positive studying and test-taking attitudes, following Spielberger's (2005) suggestions that test-anxiety reduction should be combined with study and test-taking skills improvement. Since the five CD trainings spanned over half of the school year, the students had ample time to gain confidence and also to practice the suggested studying and test-taking patterns well before the TCAPs. However, although the intervention was designed to improve skills in addition to reducing anxiety, these specific skills were not assessed. Thus, we cannot say whether or to what extent study and test-taking skill gains contributed to the overall benefit. Future research should measure improvements in study and test-taking skills in response to the trainings.

The classroom teachers were not involved in the intervention program and had little or no information about it other than what their students might choose to offer. It seems unlikely, therefore, that the Intervention students received any special treatment from the teachers, although teacher attitudes were not assessed and the possibility cannot be ruled out. Blind interventions are the ideal, and future researchers would do well to assess what

teachers knew and the attitudes of the teachers and to insure that teachers do not have expectations that might contribute to the outcome.

The use of recorded instructions means that specific features of the treatment are actually presented, insuring protocol integrity for those sections of the intervention. Yet, the entire program was administered by a single school counselor who appeared to have good rapport with her counselees. There is no way to gauge how the counselor qualities affected the results or whether a less skilled counselor might expect the same test score gains. A study involving several counselors and tracking counselor behaviors with students would be needed to estimate the contribution of individual counselor variables to outcome. As students are initially apprehensive about the intervention, counselor rapport would appear to be an important feature to calm initial reluctance and orient the students to the recorded protocol.

The Intervention students were found to improve on the Reading and Social Sciences sections, and somewhat on Science, in comparison to the controls. On the Math section the Intervention and Control groups showed similarly substantial gains, yielding no comparative advantage for the Intervention. This odd result may suggest that the Intervention benefits reading comprehension areas and not math, or it may be merely a statistical fluctuation that would not appear upon replication. Replication is needed before a reasonable conclusion can be drawn.

While a 7.1 percentile gain was attained in the present sample, a more stable estimate is best determined from several similar intervention studies rather than from just one. Further research is needed to confirm these results with additional fifth grade samples and to explore outcomes with secondary school students and college students. If corroborated, the 7.1 percentile gain might be considered a respectable benefit for so few counselor hours invested.

Conclusions

It appears that test benefits might be attained with a minimal number of professional staff hours and modest financial resources. While the intervention can be presented "live," the recorded option allows counselors to present a sophisticated technical intervention with a minimum of additional training and also frees the counselors to focus more on the students and guide them through the process. Pending further study, the use of the recorded protocol appears to be a viable, efficient means for school counselors to help improve test scores among intermediate grade students.

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