Is It the Cognitive or the Behavioral Component Which Makes Cognitive-Behavior Modification Effective in Test Anxiety?

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Components of Meichenbaum's cognitive–behavior modification treatment for test anxiety were varied in a 2 × 2 factorial design. Desensitization and cognitive treatments were either given or not given. The resultant conditions were (a) desensitization only, (b) cognitive only, (c) the combination cognitive plus desensitization, and (d) neither cognitive nor desensitization (control). Each test-anxious subject was randomly assigned to one of the four groups. On a variety of test anxiety and self-rating measures the combined treatment and desensitization were less effective than the cognitive-only treatment. The results are discussed as consistent with traditional theories of test anxiety and antithetical to a recent behavioral reformulation of test anxiety theory.

The controversy between cognitive and behavioralistic approaches to counseling has a long and rich history. As originally proposed by Wolpe (1958), behavior therapy dealt specifically with overt behavior and minimized the role of cognitive processes. Since the 1970s, however, more behavior therapists have exhibited as keen an interest in modifying covert responses as in modifying observable behaviors (Mahoney, 1974). On the other hand there are still others who advocate traditional behavioral approaches. They are persuaded that the observed effectiveness of cognitive counseling results from its reliance upon behavioral procedures. Ledwidge (1978) has even gone as far as to suggest that cognitive–behavior modification is "a step in the wrong direction." Advocates for cognitive counseling have argued that behavioral remedies really depend on cognitive mediation (Breger & McGaugh, 1965, 1966). In the present experiment we compare the relative effectiveness of a cognitive approach, a behavioral approach, and a combination cognitive–behavioral approach for the treatment of test anxiety.

Test Anxiety

Test anxiety is perhaps one of the most studied areas within personality and counseling psychology. Sarason (1975) recently attempted to integrate his own theory (Sarason, 1972) with the test anxiety theories developed by Mandler and Sarason (1952), Liebert and Morris (1967), and Wine (1971). Sarason suggested that a person’s level of test anxiety is, to a significant degree, a product of experiences that influence attention. The highly test-anxious individual is one who is prone to emit self-centered interfering responses when confronted with evaluative conditions. Two response components have been emphasized. One is emotionality as evidenced by autonomic over-reactivity, for example, sweating, and accelerated heart rate. The other concerns cognitive events, in particular worry. Examples of worry responses include saying to oneself while taking a test, “I am stupid,” or “I will never pass.” Sarason (1975) views test anxiety as primarily a cognitive problem. According to this view, effective treatment must modify enduring self-defeating cognitions.

An opposing view of test anxiety has been offered by Spielberger (1972) who conceptualizes test anxiety as a situation-spe-
cific form of trait anxiety. He contends that "elevations in A-State and worry responses both seem to contribute to the performance decrements that have been observed for high test-anxious persons" (Spielberger, Anton, & Bedell, 1976, p. 323). Spielberger's research indicates that high levels of A-State evoked in test-anxious persons result in (a) task-related error tendencies and (b) worry responses that detract from effective performance. In contrast to Sarason, Spielberger regards test anxiety as a behavioral problem, which should be most affected by a behavioral treatment.

Holding middle ground between cognitive and behavioral approaches to test anxiety is Meichenbaum's (1977) cognitive-behavior modification. Meichenbaum's treatment includes a cognitive component designed to deal directly with the negative self-ruminations (worry) of high-test-anxious persons, and a modified systematic desensitization procedure which includes coping imagery. Meichenbaum's (1972) package thus would appear to treat both the worry and emotionality components of test anxiety. An experimental study showed that subjects exposed to cognitive-behavior modification procedures performed better on several measures than subjects who were in a standard desensitization or a waiting-list control group. These results were maintained at a 1-month follow-up time (Meichenbaum, 1972). Unfortunately, this experiment did not include a group that received only cognitive training. Thus, it is not possible to determine the contributions of the cognitive treatment by itself. A recent study by Holroyd (1976) suggests that cognitive treatment by itself may be more effective than a combination method or a behavioral approach. Unfortunately, Holroyd's combination treatment is not comparable to the widely used method advocated by Meichenbaum.

The present experiment separates the two major components of Meichenbaum's (1972) cognitive-behavior modification package. These components are an insight-oriented cognitive procedure and modified systematic desensitization. Each of the treatment components was varied in a $2 \times 2$ factorial design. There were four groups: (a) a cognitive-only group, (b) a desensitization only-group, (c) a combination cognitive plus desensitization group, and (d) a control group that received no treatment. Because several authors have commented that treatment for test anxiety is ineffective if study habits are deficient (Allen, 1971; McCordick, Kaplan, Finn, & Smith, 1979; Spielberger et al. 1976) study skills training was given to each treatment group.

Method

Subjects

Seven male and 17 female students from a large west coast university served as self-referred subjects. The students, who ranged in age from 18 to 30 years, had responded to an announcement either in their psychology classes, the college newspaper, or posters placed around campus. Freshman and students who had received a nonsatisfactory mark (D or F) during the previous term were excluded from the study. Students were asked not to volunteer unless they were convinced that their anxiety problem seriously interfered with their academic performance. Although there were originally 37 volunteers, 9 dropped out by the end of the first week and an additional 4 were dropped from the study because they missed 2 or more treatment sessions.

Treatments

Subjects were assigned to groups of 2-4 persons for two 1-hour biweekly meetings during the 5 weeks of the treatment period. Assignment to groups was random within scheduling constraints. The groups met in the time period between midterms and final examinations of the spring 1977 semester. Three treatment groups were used: (a) Meichenbaum's (1972) cognitive-behavior modification test anxiety treatment; (b) the cognitive or insight component of this treatment; and (c) the modified desensitization component of the same treatment. A fourth group served as a waiting-list control.

Cognitive-only treatment. Meichenbaum's (1972) cognitive component is designed to help test-anxious subjects become aware of their subvocal statements and the relationship between these interfering self-statements and subsequent experiences of anxiety. The

1 The rationale for excluding freshmen was that their anxiety might have been associated with college in general rather than with tests specifically. By excluding students with recent Ds or Fs on their transcripts we hoped to eliminate students with ability deficiencies.
Information such as how to study for various test formats, emotional misconceptions about learning, and listening for professors' emphases. Following the presentation, the experimenters examined each set of notes and offered suggestions for improvement.

Waiting-list control group. This group was told all of the available space and group times had been filled and that they would be offered counseling immediately after the other groups completed the treatment program. They were asked to return and participate in the posttreatment assessment procedure.

Because of differential dropout rates, the cognitive-only group eventually contained 5 subjects, the desensitization-only group had 7, and the remaining two groups had 6 subjects apiece. The slightly unequal size made the design nonorthogonal, and this problem was compensated for in the analysis by using the least squares solution for analysis of variance (Lindman, 1974).

Experimetners/counselors. Two advanced clinical psychology students (both male) served as counselors. Each counselor conducted one group of each type so that counselors and groups were completely crossed.

Each counselor was provided with a manual (Meichenbaum, Note 1) detailing the use of the procedures involved. In addition, training sessions were conducted by the supervising professor to insure uniformity of treatment. These included role playing of treatment sessions and a discussion of common problems and questions. All treatment sessions were taped for later review.

Outcome Measures

The outcome measures included the Liebert-Morris (1967) Test Anxiety Scale, self-ratings of Emotionality and Worry, and a digit symbol performance task. The Liebert-Morris scale was chosen because it has a well-documented record of reliability and validity. The 10-item questionnaire is divided into two subscales: Emotionality and Worry. Each subject was given a digit symbol performance task after factor analysis of earlier test anxiety measures identified the two distinct clusters of items. Items loading highly on the Worry factor emphasize cognitive characteristics such as worrying about tests or lacking self-confidence. Items loading on the Emotionality factor refer to autonomic arousal. Validation studies have demonstrated that Worry scores correlate negatively with exam grades and performance expectancy (Morris & Liebert, 1970). Worry is most-analogous to trait anxiety, as it appears stable over time, and Emotionality increases before an exam and decreases at afterward (Spiegler, Morris, & Liebert, 1968). Self-ratings of Emotionality and Worry were obtained using a magnitude estimation method. The standard for magnitude estimation was 100 "for being so anxious you cannot function at all." Grossberg and Grant (1978) recently argued that magnitude estimation is one of the few valid methods for obtaining self-ratings in clinical studies. It was expected that measures of emotionality should be most affected by the desensitization treatment while measures of worry should be most influenced by the cognitive treatment. The Liebert-

counseling rationale presented to subjects is that such negative self-statements produce feelings of anxiety, which serve to distract them from more task-relevant thoughts and behaviors. Subjects are asked to complete homework assignments that consist of monitoring and recording these self-statements. The focus then shifts to the development of new, more positive, self-statements and self-instructions to replace the subjects' previous negative thoughts. Subjects are given sample self-statements, some of which they can either adopt (cafeteria style) or can use as ideas for developing their own self-statements (for instance, "Just take it one step at a time," or "Keep calm, pay attention to what I'm doing"). Coping techniques include imagery rehearsal (practicing dealing with the situation cognitively) and self-instructional training.

Modified desensitization treatment. Meichenbaum's (1972) modified desensitization treatment procedure varies only slightly from the guidelines for group systematic desensitization outlined by Paul (1966) and Paul and Shannon (1966). Meichenbaum (1972) describes two changes in the Paul and Shannon procedure that were utilized in the present study.

First, during the relaxation-training sessions and also during the remainder of the procedure, the use of slow, deep breathing is emphasized. After relaxing the muscles of the arms and hands, subjects are instructed to tense the muscles of the chest and back by filling the chest cavity with short, deep breaths. After the chest is filled, subjects are instructed to hold the air in for a few seconds and then part their lips slightly and exhale slowly. It is explained that use of this technique slows the bodily processes, lowers arousal, and contributes to relaxation. Subjects also are instructed to pair the words calm or relax with exhalation and, later, following relaxation.

The second variation on standard desensitization procedure concerns the hierarchy presentation. In the standard desensitization procedure the client is asked, while relaxed, to imagine scenes from a previously constructed hierarchy. If these subjects experience any anxiety, they signal the counselor, who then will instruct them to cease imagining the scene and return to relaxation.

Meichenbaum's (1972) variation involves adding a set of coping images to the densitization procedure. This modification requires subjects to visualize becoming anxious and tense and then to visualize handling and coping with the anxiety by means of slow, deep breaths and self-instructions to "relax" or "calm down."

Combined treatment procedure. The combined treatment procedure utilizes all of the procedures outlined for both the insight-oriented, cognitive-only treatment and the modified desensitization treatment. More time was spent on the cognitive procedures in the early sessions, and the modified desensitization procedure received more attention in the later sessions (Meichenbaum, 1972).

The treatment techniques are described in more detail in Meichenbaum's (Note 1) Therapist Manual for Cognitive Behavior Modification.

Study skills training was given to each treatment group. Subjects observed, and took notes on, a 40-minute videotape concerned with study techniques.
Morris scales and magnitude estimations were obtained both before and after treatment. For the posttreatment evaluation, a digit symbol performance test was added. The digit symbol test was taken from the Wechsler Adult Intelligence Scale. Subjects were given 1 minute to match the digits with the appropriate symbols and were told to work as fast as possible without making mistakes.

Boor and Schill (1967) demonstrated that anxiety interferes with performance on the digit symbol test. Further, Boor and Schill suggested that the digit symbol test may be more sensitive than scales of anxiety because highly defensive individuals may not report anxiety on self-report scales. In their study a linear relationship between anxiety and digit symbol performance was found when highly defensive subjects were eliminated from the analysis.

The pretreatment assessment package was given in a special session during the week prior to counseling. The posttreatment assessment package was administered at the final meeting of the treatment groups. The dependent variables for all of the analyses to be reported are change scores (posttreatment score minus pretreatment score) except for the digit symbol task, which is an after-only measure.

Results

The data were first analyzed using a 2 × 2 factorial analysis of variance (ANOVA). Then the groups were arranged in a 1 × 4 design so that contrasts could be calculated using the method of planned comparisons (Lindman, 1974). Analysis of variance was used to compare the four groups on the basis of pretest scores. For all dependent variables, pretreatment differences between groups were found to be statistically nonsignificant. Thus, there was no reason to believe that the groups differed prior to counseling.

The cognitive intervention was effective as assessed by several outcome measures. There was a significant main effect for the cognitive manipulation for the Liebert–Morris Emotionality scale, $F(1, 20) = 4.53$, $p < .05$. In addition, there was a significant interaction between desensitization and cognitive components of the treatment for magnitude estimations of Worry, $F(1, 20) = 4.63$, $p < .05$, and a near significant interaction for the Liebert–Morris Emotionality scale, $F(1, 20) = 4.06$, $p < .07$. The means for the Liebert–Morris Emotionality scale are shown graphically in Figure 1, and those for magnitude estimations of Worry are given in Figure 2. The relationships shown in both of these figures are essentially the same for all of the dependent variables in the experiment. The shaded bars in the figures show decreases, and nonshaded bars show increases. The largest decreases were for the cognitive-only group. The desensitization and the combined treatments showed lesser decreases, and slight increases were observed in the control group. Duncan multiple-range tests were used to help explain the interactions. For both the Liebert–Morris Emotionality scale and magnitude estimations for worry, there were significant effects.

Figure 1. Changes for Liebert–Morris Emotionality scale by group.

In a few cases the posttreatment assessment was given individually at a later time because a subject failed to attend the final treatment session.

It was necessary to make the digit symbol task an after-only measure because there are known practice effects.

Several years ago Cronbach and Furby (1970) argued that change scores are problematic for many research applications. However, these arguments are not relevant for experiments in which subjects are randomly assigned to treatment groups. Extensive mathematical proofs have now shown that change scores are the best measure in controlled randomized trials (Berry, Bush, Olshen, Smallwood, & Kaplan, in press).
for the cognitive treatment when desensitization was not given \( (p < .05) \). However, among subjects receiving desensitization, the differences between those receiving or not receiving the cognitive treatment were nonsignificant. In other words, it appears that the cognitive treatment is more effective than the desensitization treatment and that diverting half of cognitive treatment time for desensitization may yield a less than optimal outcome.

Planned comparisons were used to test the linear hypothesis that the cognitive-only treatment would be most successful followed by the combined, desensitization, and control groups, respectively. This contrast was significant for all of the self-report variables (Liebert–Morris Emotionality, \( t = 3.30, p < .01 \); Liebert–Morris Worry, \( t = 2.47, p < .05 \); Emotionality ratings, \( t = 2.32, p < .05 \); Worry ratings, \( t = 3.42, p < .01 \)). The quadratic and cubic contrasts, which were orthogonal to the planned linear comparison, were nonsignificant for all variables. The omnibus \( F \) ratios for the Liebert–Morris Worry scale and the Emotionality rating were not statistically significant.

There were no main effects associated with the desensitization variable. The digit symbol scores correlated substantially \( (r = .35) \) with the Liebert–Morris Emotionality scores, and the outcomes for the digit symbol task were in the same direction as for the other measures. However, large within-group variability on the digit symbol task precluded statistically significant differences.

**Discussion**

The major finding of the present study is that the cognitive component of Meichenbaum's (1972) cognitive–behavior modification treatment for test anxiety is more effective than the desensitization component or the combination of cognitive and desensitization. Although these data appear to contradict Meichenbaum’s (1972) earlier pronouncement, they are consistent with a variety of other findings. For instance, Holroyd (1976) also found that a cognitive-only treatment was more effective than a relaxation treatment and a combination cognitive–relaxation approach. In the Meichenbaum test anxiety study, a cognitive-only treatment was not included for comparison. However, in an earlier study on speech anxiety, a cognitive-only treatment was found to be superior to a form of counseling that combined the cognitive component with desensitization (Meichenbaum, Gilmore, & Fedoravicius, 1971). The results are also consistent with several very recent studies (McCordick, Kaplan, Finn, & Smith, 1979; McCordick, Kaplan, Smith & Finn, Note 2) which show that the effectiveness of Meichenbaum's treatment can be enhanced by building upon the cognitive component.

The results of this and other studies tend to support the test anxiety theory formulations of Liebert and Morris (1967), Sarason (1975), Mandler and Sarason (1952), and
Wine (1971). However, they conflict with Spielberger's (1972) trait–state anxiety theory. Since Spielberger assumes that the arousal or emotionality component is the defining characteristic of test anxiety, his predictions would have favored the desensitization-only treatment. The present results suggested just the opposite. Counseling that helps a client alleviate worry and change cognitive/attentional style appears more effective than counseling that affects only arousal.

Ledwidge (1978) suggests that studies on test anxiety are unrepresentative of other types of anxiety because they do not use real clinical populations. Although no definitive evidence exists concerning the similarity of test anxiety to other prevalent forms of anxiety, we question the assertion that this study and the majority of other test anxiety studies represent artificial analogues. The subject population is exactly the population to which we wish to generalize; the setting in which the sessions were conducted (a university psychological clinic) is very similar to the treatment facilities where test-anxious clients usually seek counseling; and the treatments were based on descriptions in a clinical manual.

There are several potential limitations of the present study. One is that we used a waiting-list rather than an expectancy control group. Unfortunately, human subjects regulations at our university forbid giving subjects false expectations. However, expectancy should have been equal for all treated groups, and the differences among these three groups suggest that the results cannot be explained by expectancy alone. Another difficulty was that students with Ds or Fs during the previous semester were not included in the study. This decision may have restricted the ability range for participants and may have attenuated the effects for the performance measure. In previous research (McCordick et al., 1979) we observed that students with very poor grades had multiple personal and academic problems and had erratic attendance records for counseling sessions. Future research might consider D and F students after careful screening to eliminate those whose academic failure is produced by causes other than test anxiety.

The most convincing evidence for the effectiveness of the cognitive–only counseling was for the Liebert–Morris scales. Although this is a self-report measure, previous research has documented the relationship between the Liebert–Morris scales and academic performance (Doctor & Altman 1969). It can be argued that the cognitive–only intervention produced changes on the Liebert–Morris scales because the counseling sessions gave subjects practice in rehearsing self-statements that are similar to the scale items. We find this argument unconvincing. If it were correct, then the greatest change should have been for the Liebert–Morris Worry scale, since the cognitive intervention was designed to deal with worry. The results demonstrate that the greatest change was for the Emotionality scale, which is made up of items quite unlike statements in the cognitive intervention.

The research does call into question the independence of the two components of the Liebert–Morris scales. Several contemporary theories suggest that test anxiety results from two independent processes: emotionality and worry (Doctor & Altman 1969; Liebert & Morris, 1967), and popular interventions are designed to treat these two components separately (Meichenbaum, 1977; Spielberger et al., 1976; Wine, 1971). These approaches have been questioned by Finger and Galassi (1977), who treated the emotionality and worry components both separately and in combination. Contrary to their predictions, all three treatments affected both emotionality and worry. In concert with Finger and Galassi, our results question whether emotionality and worry operate as distinct processes in test anxiety. Indeed we found Emotionality and Worry scores to be substantially correlated ($r = .68$). This position is also supported by a recent factor analysis of the Liebert–Morris scale (Richardson, O'Neil, Whitmore, & Judd, 1977). In contrast to the two process theories and the original Liebert–Morris factor analysis, the items appeared to form one general factor rather than two specific factors. Future research is needed to determine whether the two-process theory is inadequate or if the Liebert–Morris scale is incapable of distinguishing between the two processes.
Reference Notes


References


Received November 13, 1978