A COMPARISON OF THREE TREATMENTS TO
REDUCE TEST ANXIETY

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by
Anna Lee, B. A.

The Ohio State University
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Approved by

[Signature]
Adviser
Department of Psychology
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Chapter 1

INTRODUCTION

Anxiety has been a widely studied topic. In 1966, Spielberger noted that over 1500 studies were listed under the heading of anxiety in Psychological Abstracts since the 1950's, and the proliferation of studies on anxiety continues today.

More recently, researchers have focused their attention on specific anxieties such as interpersonal anxiety, public speaking anxiety, and test anxiety. Sarason (1975a) suggests that this trend is due to the inherent interest of the specific anxieties and the fact that the concept of general anxiety is so difficult to define. Of the specific anxieties, test anxiety has been among the most widely studied.

Test anxiety was a problem first noted by clinical workers. According to Spielberger (1966), an often reported complaint among college students is distress due to test anxiety. Symptoms range from slight nervousness to severe agitation, including such symptoms as nausea, headaches, and memory losses. Test anxious students report being unable to answer questions for which they know the material. They feel that test anxiety interferes with their performance to such an extent that their test results do not accurately reflect their actual preparation or abilities. Indeed, research has found modest, but significant negative correlations between high scores on paper and pencil
measures of test anxiety and performance on tests or learning tasks (Alpert & Haber, 1960; Mandler & Sarason, 1952; Paul & Eriksen, 1964). Sarason's (1958) findings that instructions which reassure subjects or minimize the evaluative conditions of a task do improve the performance of high test anxious subjects suggest the reality of the detrimental effects of test anxiety when threat of evaluation is present. It would be useful to have some way to remedy such detrimental effects of test anxiety. However, one must first define test anxiety before one can deal with it.

Alpert and Haber (1960) defined two types of test anxiety: debilitating and facilitating anxiety. Their Achievement Anxiety Test (AAT) consists of two independent scales measuring the effects of each type of anxiety. However, most definitions have focused on the debilitating effects of test anxiety. For example, Suinn (1968) defined test anxiety as "an inability to think or remember, a feeling of tension, and difficulty in reading and comprehending simple sentences or directions on an examination" (p. 385). And Sarason (1972) described test anxiety as a tendency "to emit self-centered, interfering responses when confronted with evaluative conditions" (p. 384).

It has been suggested that test anxiety consists of two major components: 1) emotionality, i.e. arousal of the autonomic system and 2) worry, i.e. cognitive concern over performance and lack of confidence (Liebert & Morris, 1967). Research seems to provide some support for such a division of test anxiety into worry and emotionality components. Research shows that high test anxious persons spend much
of their time worrying about their performance and how others are doing, ruminating over alternatives, and being preoccupied with such things as feelings of inadequacy, anticipation of punishment, loss of status and esteem, and heightened somatic and autonomic reactions (Mandler & Watson, 1966).

In comparing the worry and emotionality components, Morris and Liebert (1970) suggest that the worry component requires more of the subject's attention and causes a decrement in performance. Wine (1971) uses this to support an attentional interpretation of the debilitating effects of test anxiety. She suggests that the poor performance of high test anxious subjects is the result of attention being divided between self and task.

Sarason's (1975a) information processing model provides a more formal structure for such an attentional concept of test anxiety. According to Sarason (1975a) anxiety is the result of social learning that leads to a subset of self-preoccupations such as self-doubt, self-awareness and self-deprecation which interfere with information processing. The interference may affect a person's attentional focus and consequently his or her perception of environmental cues, the encoding and transformation of information and strategy planning, or responses. More specifically, Sarason (1975a) suggests that self-centered interfering responses are of two types: 1) autonomic reactivity and 2) cognitive events. These appear to be analogous to Liebert and Morris' (1967) emotionality and worry components.

Following the division of attention interpretation of test anxiety,
Meltznerbaum (1972) argued that the usual treatment of test anxiety via systematic desensitization treats the emotionality component, but not the worry component. Such an argument provides a possible explanation for the equivocal findings on the effectiveness of the treatment of test anxiety. Although most studies report improvement on paper and pencil measures of test anxiety, there is no consistent improvement on behavioral measures. The most effective treatments have included some form of study skills counseling in addition to the systematic desensitization (Doctor, Aponte, Burry, & Welch, 1970; Katan, Sprenger, & Cherry, 1966). A decrease in autonomic arousal would be reflected in the paper and pencil measures since some of the items refer directly to the subjects' perception of autonomic arousal. However, since systematic desensitization does not seem to deal with the worry component, the interfering cognitions continue to distract attention from the task and there is no change on behavioral measures.

In order to deal with the worry component, Meltznerbaum (1972) added a cognitive modification procedure to a modified desensitization one. The cognitive modification procedure, derived from rational emotive theory, attempted to make the subjects aware of the thoughts, self-verbalizations, and self-instructions they omitted prior to and in testing situations which contributed to poor performance. This was done by means of group discussion and modeled examples. Subjects were also taught how they might inhibit such thoughts via task-relevant self-instructions.

The results showed that subjects receiving the combined cognitive
modification and desensitization treatment showed the greatest improve-
ment, even though they were not significantly different from subjects
receiving the standard desensitization procedure. The absence of a
significant difference between the two treatment groups may have been
due to the small number of subjects used. The results were also dif-
ficult to interpret because the cognitive modification procedure com-
bined a "specific type of insight exploration and an incompatibility
response training which emphasized attentional training" (Meichenbaum,
1972, p. 318).

The present study attempted to examine the same components of
test anxiety that Meichenbaum (1972) did. The relative effectiveness
of two treatments: 1) cognitive modification without the incompati-
bility response training, and 2) relaxation training, and of an atten-
tion placebo were compared. The cognitive modification treatment was
aimed at dealing with the worry component of test anxiety. If inter-
fering thoughts distract test anxious subjects from the task of answer-
ing the examination questions, then changing such thoughts would allow
the subjects to concentrate on answering the questions. Relaxation
training was intended to relieve some of the physical symptoms of test
anxiety and therefore treat the emotionality component of test anxiety.
The attention placebo was designed to control for non-specific effects
of participating in any form of treatment.

Determining the relative effectiveness of cognitive modification
and relaxation training in reducing test anxiety would clarify the na-
ture of test anxiety and its treatment. It would lead to a better
understanding of test anxiety, particularly of the causes of its detrimental effects on performance. Much research has been done to identify the detrimental effects of test anxiety (e.g. Alpert & Haber, 1960; Mandler & Sarason, 1952) and to reduce test anxiety (e.g. Garlington & Cotler, 1968; Osterhouse, 1972; Russell, Wise & Stratoudakis, 1976), but little empirical work has been done to define test anxiety. The intention of the present study was to obtain empirical clarification of the nature of test anxiety as well as to examine the effectiveness of different procedures in reducing it.
Chapter 2

REVIEW OF THE LITERATURE

There are many views of what test anxiety is and how it works. As Sarason (1975a), points out "empirical studies of test anxiety have grown out of motivational and cognitive as well as habit and drive theoretical orientations" (p. 167). Of the various views, Sarason's learning-attentional theory is particularly pertinent to the present study.

Briefly, Sarason (1972; 1975a; 1975b) suggests that behavior is determined by information available to a person. The information available is determined by whether a person attends to it. And attention is in turn influenced by environmental events such as loud noises, directions and entreaties. A person's level of test anxiety then is the result of experiences that influence what he attends to in himself and in the world. The highly test anxious person's experiences lead him or her to emit self-centered interfering responses when confronted with evaluative situations. Commenting on Sarason's views, Mandler (1972) described test anxiety as self-instructions to observe one's own behavior, to examine one's failures, to ruminate about one's responses and emotional reactions, or the performance of others. It is this view of test anxiety as interfering self-instructions in which the present study is interested.
Sarason (1958; 1961) examined the performance of groups differing in test anxiety under differing instructional conditions. Subjects (college students) were administered Sarason's Test Anxiety Scale (TAS; 1957) and his General Anxiety Scale prior to the experiment (Sarason, 1961). They were given the task of the serial learning of low meaningfulness disyllable words. Half of the subjects were given neutral instructions, i.e. the instructions necessary to perform the task. Subjects in the experimental condition additionally were told that the task was a measure of their intelligence and they should try to do as well as possible. Under the neutral condition, there was no difference in performance between high and low test anxious groups. However, under the experimental condition, the performance of the high test anxiety group was inferior to that of the low test anxiety group. The results suggested that the differences in performance were due to the different instructions rather than to differences in intelligence.

In another experiment, Sarason (1958) compared the performance of high test anxious and low test anxious subjects on the serial learning of material low in meaningfulness under two conditions. Subjects in the control condition received just the instructions necessary to perform the task. The other subjects were given additional instructions that were meant to be reassuring. High test anxious subjects performed better under the reassurance condition than under the control condition. The opposite effect was found for low test anxious subjects, and the results were not replicated when the conditions were repeated with less difficult material. Sarason (1958) suggested that
the pre-performance instructions have informational, motivational and cue values. The high test anxious person searches the environment for cues concerning the task and what is expected. The reassurance instructions provided specific information not to worry but to concentrate on the task. These instructions appear to replace the high test anxious person's usual self-instructions which interfere with his or her response.

The results of these studies suggest that high test anxious subjects' performance is impaired in the presence of evaluative cues, and appear consistent with the definition of test anxiety as a tendency "to emit self-centered, interfering responses when confronted with evaluative conditions" (Sarason, 1972, p. 382).

These interfering responses have been divided into two classes: autonomic reactivity such as sweating and accelerated heart rate, and cognitive events such as saying "I am stupid," and "Maybe I won't pass" (Sarason, 1975b, p. 151). It has been suggested that it is the cognitive events which interfere with the task at hand because they distract attention. Liebert and Morris (1967) divided Mandler and Sarason's (1952) Test Anxiety Questionnaire into worry (cognitive factors) and emotionality (autonomic arousal) items, and found a negative correlation between worry and expectancy of success. Doctor and Altmann (1969) found that total worry and emotionality were correlated with decreased performance, but that it was worry which accounted for the major decrease in performance.

Mire (1970; 1971) suggested that the debilitating effects of test
anxiety are the result of division of attention between self and task. In one study, she found that subjects given six hours of attentional training, i.e. "intensive practice in dealing with tests...accompanied by instructions to focus fully on the tasks and to inhibit self-relevant thinking" (1971, p. 101) via modeling and behavioral rehearsal, improved significantly on performance and self-report measures. Subjects in the attentional training group improved significantly relative to an "insight" group that concentrated on becoming aware of the thoughts they had in evaluative or testing situations (Hine, 1970).

Meichenbaum (1972) combined a modified desensitization procedure with a cognitive modification one. In addition to teaching his subjects to self-instruct in a task-relevant manner, he also attempted to make his subjects aware of the thoughts and self-verbalizations they emitted prior to and during testing situations. The cognitive modification procedure did lead to significant improvements on both self-report and performance measures, but was not significantly different from the results obtained by the standard desensitization group. Because he combined several factors in his cognitive modification procedure, and because of the absence of significant differences between the cognitive modification and the desensitization procedures, Meichenbaum (1972) was unable to demonstrate his hypothesis that cognitive procedures deal with the worry component of test anxiety that desensitization ignores.

But the results of another study suggest that the worry com-
ponent or cognitive events may account for the distraction of attention and consequent decreased performance in test anxiety (Goldfried & Sobocinski, 1975). Positive correlations were found between the extent to which subjects held irrational beliefs and paper and pencil measures of interpersonal, test, and public-speaking anxiety.

Test anxiety is a maladaptation of attention that is induced by evaluative cues (Sarason, 1975b). Test anxiety may be due to either a lack of practice in focusing on tasks or to interfering self-preoccupations. Phillips, Martin, and Meyers (1972) found higher levels of test anxiety in students from lower socioeconomic backgrounds. But it is unclear whether the test anxiety is related to deficiencies in their attentional training or to low expectancies of success or to a combination of both.

It would be important to know whether test anxiety is related to lack of attentional training or to interfering self-preoccupations to determine what type of treatment would be most effective. If test anxiety is due to lack of attentional training or learning, these treatments that provide attentional training would be sufficient to improve performance. However, if the anxiety (poor performance) is due to worry, then changing cognitive events would be more effective in improving performance as well as reducing perceptions of anxiety.

Systematic desensitization has been one of the most popular methods to reduce test anxiety. There have been numerous studies examining systematic desensitization and test anxiety. The focus of this research can be divided into three major areas: 1) simple demon-
strations of the efficacy of desensitization, 2) systematic manipulations of the desensitization process, and 3) comparison of competing behavioral treatment studies (Allen, 1972). The following review of the desensitization literature will use this division in organizing the studies examined.

Some studies have simply attempted to demonstrate the effectiveness of systematic desensitization in reducing test anxiety by comparing it with no treatment controls. Paul (1964) in a pilot study, compared the effects of a systematic desensitization group against those of a no contact control group. Subjects consisted of students from an introductory psychology class.

Five subjects in the desensitization group and five subjects in the no contact control group were equated on TAQ scores and on the amount of disturbance from test anxiety as measured by comparisons of course exams under relaxed and under anxious conditions. Treatment subjects received desensitization from the experimenter between the first and the second course exam. The control subjects had no contact with the experimenter.

Subjects in the treatment group showed significantly greater improvement from the first class exam to the second one than did control group subjects. Eight weeks later, subjects' performance on the final exam indicated that treated subjects increased exam scores (X = +7.5) while the control subjects' scores dropped (X = -8). These results indicated a significant difference between the treatment and control groups. This study provided some cause-effect evidence for the
effectiveness of treatment. However, as Paul (1969) pointed out, it did not control for therapist characteristics and general non-specific treatment effects. In addition, post-treatment anxiety was not directly measured, and the improved performance could only be indirectly attributed to reduced anxiety (Paul, 1969).

Carlington and Cotler (1968) also compared systematic desensitization and a no contact control group. The subjects were 32 female freshmen from an introductory psychology class. They had scored in the upper 15% of the score distribution on Sarason's (1957) TAS, and had answered very much fear to item 31 (i.e. taking examinations) on Geer's Fear Survey Schedule II (FSS; 1965), and were thus defined as test anxious. They were randomly assigned to a treatment group or to a no contact control group.

Four weeks after the desensitization procedure had been completed, students from the treatment group and the no contact control group, again filled out the TAS and FSS. In addition, they took the Otis Quick Scoring Mental Ability Test (Otis, 1954). Other dependent variables that were examined were each student's final exam grade in psychology, and her overall GPA during the semester she participated in the study.

Treated students showed a significant decrease on pre-post treatment TAS scores, while control group students showed only a slight and non-significant decrease. There was a significant decrease in scores on the FSS (on item 13 and on the total score) for both groups. However, students in the desensitization group exhibited a decrease sig-
significant at $p < .01$ while control group students' score decreases were reported significant at $p < .05$. But there were no significant differences between the two groups on any of the behavioral measures, i.e. the final exam, the Otis Mental Ability Test or on GPA attained.

One explanation that Garlington and Cotler (1968) gave for the lack of significant GPA improvement was the fact that their subjects were freshmen. They suggested that freshmen, having had little experience with college examinations may attribute the many non-specific stresses of their new environment to test anxiety and may not be truly test anxious.

Another study in which a desensitization group was compared with a no treatment control group was one done by Suinn (1968). Both treated and control subjects showed decreased scores on Suinn's Test Anxiety Behavior Scale (STABS; 1969), the TAS (1957), and the FSS (1965). However, decreases of subjects in the desensitization group were significantly greater than that of subjects in the control group. So far, we have seen that desensitization treatments generally show significantly greater decreases on self-report measures of test anxiety, than no treatment controls, and results on behavioral measures have been inconsistent.

Other studies have examined the efficacy of various components of the desensitization process such as the relaxation and the visualization components (Freeling & Shemberg, 1970; Johnson & Sechrest, 1968; Laxer & Walker, 1970). For example, Freeling and Shemberg (1970) compared the effectiveness of the total desensitization procedure with
the effectiveness of the individual components of the procedure, i.e. relaxation, and visual imagery.

Thirty test anxious subjects were randomly chosen from a group of undergraduates who had scored at or above the 30th percentile of the obtained distribution on Sarason's TAQ. All subjects met in one group where they were given a series of 13 anagrams to solve. Subjects were then placed in one of three groups: 1) a systematic desensitization group, 2) a visual imagery group, and 3) a relaxation group.

Students in the visual imagery group imagined the items from the test anxiety hierarchy without relaxing. They were yoked to the desensitization group so that the number and duration of presentations of hierarchy items were equal for both groups. Students in the relaxation group were trained to relax and were also told to practice relaxing 15-30 minutes each day. They began each session with relaxation exercises as did the desensitization students, but imagined neutral nature scenes instead of items from the test anxiety hierarchy. The number and duration of presentations were equal to those in the other groups. Only the items differed.

One week after treatment was completed, the subjects again filled out Sarason's TAQ and were given a second series of 13 anagrams to solve. Of the three groups, only the desensitization group showed a significant decrease in self-reported test anxiety from pre- to post-treatment. Planned orthogonal comparisons showed that the desensitization group had significantly greater decreases on TAQ scores at
post-treatment that did the visual imagery group. But the comparison between the desensitization and the relaxation groups was not significant, and the effectiveness of relaxation alone was not disproved. The three groups did not differ on the behavioral measure, the number of anagrams solved.

The effectiveness of relaxation alone was compared with that of systematic desensitization by Johnson and Sechrest (1968). Subjects were students who had a score of 19 or more out of 30 on the debilitating scale of Alpert and Haber's AAT and a residual score (i.e. the debilitating score minus the facilitating score) of 10 or more. In addition, all subjects had scored below the 85th percentile on their midterm exam in an introductory psychology class.

Students in the desensitization group began each session with an abbreviated form of Jacobson's relaxation training which was followed by the presentation of graded stimuli, i.e. the test anxiety hierarchy. However, subjects went through two separate hierarchies (a 7 item quiz hierarchy and an 11 item major exam hierarchy), whereas most desensitization treatments for test anxiety only go through one hierarchy.

In the relaxation group, the relaxation training was followed by 15-20 minutes of continued relaxation without the therapist. In addition, there was a no contact control group.

The study reported that students in the desensitization group obtained significantly higher grades on a standardized multiple choice final exam than students in the relaxation or control groups. But
there was no significant difference among the groups on pre- and post- treatment test anxiety scales. However, the post-treatment anxiety scale was obtained several months after treatment and was not immediately related to the final examination.

The authors suggested that a possible explanation for the apparent lack of improvement on the self-report measures may be that the verbal labeling of the anxiety may be better established than the actual referent behavior and therefore more difficult to change. But such an argument does not explain the results of other research where improvement was obtained on self-report measures, but not on behavioral ones (Garrington & Cotler, 1968; Laxer & Walker, 1970).

The results of this study suggest some cause-effect relationships for systematic desensitization and improved target behavior. However, the lack of significant improvement on the self-report measures and the fact that the test anxiety scale was not given prior to the final examination, limit the conclusions one can make (Ferguson, 1974). Moreover, as Ferguson (1974) pointed out, although the relaxation group partially controlled for therapist characteristics and non-specific treatment effects, the amount of attention and ritual was not controlled adequately. The relaxation group appeared to spend a great deal of time relaxing on their own without a therapist, and probably received less attention than the desensitization group. Such problems make the results difficult to interpret.

A third study which examined the effectiveness of the components of the desensitization process was done by Laxer and Walker (1970).
The subjects were 119 test anxious secondary school students from Ontario. They were randomly assigned to one of six conditions: 1) systematic desensitization, 2) relaxation alone, 3) simulation alone (i.e. taking practice tests), 4) relaxation simulation, 5) attention control (group discussions of daily life not related to test anxiety), and 6) no treatment control to test the possibility that the efficacy of systematic desensitization may be attributed to general reduction in anxiety as a result of relaxation training, to simple extinction of non-reinforced fear responses, or to placebo factors rather than to counter-conditioning.

The only significant difference among the groups was the Alpert-Waber AAT differential score (debilitating score minus facilitating score); the desensitization group and the relaxation alone group differed significantly from the control groups. There were no significant differences among the groups on the NAES or the two behavioral measures, STEP 1 (math & science) and STEP 2 (reading and writing).

With the exception of Johnson and Sechrest's (1968) findings, the research so far, suggests that desensitization and relaxation may both be effective in reducing some self-report measures of test anxiety, but do not have much consistent effect on behavioral measures.

Other studies have examined the effectiveness of variations of the systematic desensitization procedure such as individual vs group treatment and standard vs individualized hierarchies. Although these studies were not directly intended to assess the effectiveness of the desensitization process itself, their results do provide some informa-
tion about such effectiveness.

Emery and Krumholz (1967) compared systematic desensitization using individual test anxiety hierarchies, with systematic desensitization using a standard test anxiety hierarchy, and with a no treatment control.

Of 96 test anxious Stanford freshmen who responded to a letter offering treatment, 54 were randomly selected and assigned to one of the two treatment groups or to the no treatment control.

Subjects in the standard hierarchy group were given a standard 16 item spatial-temporal hierarchy, while subjects in the individual hierarchy group were given the same hierarchy items but were allowed to determine the order of the items on their own.

Following treatment, treated subjects rated themselves significantly less anxious before and during examinations than subjects in the control group. However, although final examination grades were higher for treated subjects than for control subjects, the difference was not significant.

There was no difference between the standard hierarchy and the individual hierarchy groups. But because of 60% overlap of items on the hierarchies, in order and common items, the study did not provide evidence for the hypothesis that there is no difference between the effectiveness of using a standard or individualized hierarchy. Paul (1966) suggested that there was cause-effect evidence for the effectiveness of treatment. However, because of intraclass confounding, effects could not be attributed to desensitization per se.
Ihli and Garlington (1969) also compared the effectiveness of standard and individualized hierarchies. In addition, they examined the effectiveness of group versus individual desensitization.

Subjects were female freshmen and sophomores who had responded positively to the "fear of tests" item on the Fear Survey Schedule (FSS) and at least 9 of 16 items on Sarason's TAS. Subjects were randomly assigned to one of three groups: 1) group desensitization with a standard hierarchy, 2) group desensitization with individualized hierarchies, and 3) individual desensitization with individualized hierarchies.

Ihli and Cotler reported that scores on the "fear of tests" item on the FSS and on the TAS significantly decreased across all groups. It was suggested that significant decreases on total scores on the TSS were indicative of generalization effects from test anxiety to other fears. In addition, small but significant increases were reported in facilitating anxiety on the Alpert-Haber AAT.

Scissors and Njaa (1973) also found no difference between individual and group desensitization. However, their desensitization procedure differed from the usual procedure in that it was carried out in two massed 3-hour sessions on two consecutive evenings. The sessions consisted of multiple pairings of half hour relaxation training exercises with half hour periods of hierarchy concentration exercises. Subjects were administered Suinn's Test Anxiety Behavior Scale (STABS; 1969) pre- and post treatment; the post-treatment measure was taken within one week of the completion of treatment. Results reported a
significant decrease in STAJS scores for the treated subjects as opposed to the subjects in the control group. No differences were reported between the individual and group desensitization scores. The study did not include any behavioral measures.

One of the few studies which reported improvement on performance as well as on self-report measures was one by Donner and Guarney (1969). They compared the effectiveness of desensitization without a therapist: using taped instructions, desensitization with a therapist, and a waiting list control. Forty-two female upper classmen were assigned to three groups which were matched by the previous quarter's GPA. A questionnaire combining Zuckerman's AACL (1960), Taylor's MAS (1953) and Sarason's TAQ (1957) was filled out by the subjects when they applied for treatment, before final exams after treatment, and after final exams.

The experimenters reported a significant difference between the treated and control subjects' increased GPA's, and a significantly greater increase for subjects with a therapist than for subjects who used taped instructions. After final exams, created subjects reported greater decreases on the self-report measures than control subjects did; treated subjects' scores on the AACL, TAQ, and MAS all decreased, but only the decrease on the AACL was significant.

Up to this point, the studies discussed have compared systematic desensitization with no treatment controls or with variations of the desensitization process, and appear to provide some evidence that desensitization is effective in reducing test anxiety. The actual
results are, however, rather inconsistent, especially when behavioral measures are involved. A few studies report both decreased test anxiety on self-report measures and improvement on behavioral measures such as GPA (Donner & Guerney, 1969). However, many studies have reported improvement on self-report measures or on performance measures, but not both (Emery & Krumholz, 1967; Carlington & Cotler, 1968; Johnson & Sechrest, 1968).

There are several reasons for such inconsistencies. First, the studies appear to use various measures and criteria to determine test anxiety; the measures have also been administered at different times during or after the treatment process. For example, some studies have administered self-report measures just before an examination, immediately after completion of the treatment program, whereas other studies did not administer such measures until much later, and still others administered such measures after the examination. Some studies compared pre-treatment GPA's with attained GPA during the term the students underwent treatment, while others compared them with GPA's of the term following treatment. Such differences may account for the variance in results among different studies.

In general, the results appear to indicate that desensitization leads to more consistent decreases on self-report measures of test anxiety than improvement on behavioral measures. Two explanations are possible. One argument has been that measures such as GPA and exam scores attained during the term of treatment do not reflect actual effectiveness since it does not allow enough time for the ef-
fects to be seen, or that some behavioral measures are just too resis-
tant to change. An alternative argument is that desensitization
treats only the emotionality component of test anxiety which is re-
flected in the self-report measures, but neglects the worry component
which interferes with performance. Consequently there is no improve-
ment on behavioral measures with desensitization.

Let us now examine studies that compare the effectiveness of de-
sensitization in reducing test anxiety with that of other treatment
paradigms. Crighton and Jehu (1969) compared desensitization with
relaxation and what they termed psychotherapy of a non-directive type.
The psychotherapy appeared to be a form of study skills training, with
emphasis on discussion of approaches and techniques for study and ex-
aminations. But no details were given of the relaxation or the treat-
ment.

The subjects were 17 students who had complained of test anxiety
to the school health service. They were paired based on clinical judg-
ment of the severity of their test anxiety, and one member of each
pair was then randomly assigned to the desensitization or psychother-
apy group. In addition, 11 of the 17 subjects were matched by grades,
subjects and year of study with students who had never complained of
test anxiety. This latter group of students served as a control group.

Six dependent variables were examined: 1) Zuckerman's AAQL
(1960), 2) a sleep disturbance questionnaire, 3) amount of psycho-
tropic drugs prescribed, 4) examination grades of the subjects and a
matched control on preceding and current year examinations, 5) FSS
(Wolpe & Lazarus, 1966), and 6) patient self-reports and therapists' clinical observations during the treatment period.

Following treatment, both desensitization and psychotherapy subjects showed significantly less distress on the AAOL, significantly less disturbance on the sleep questionnaire, and had significantly less drugs prescribed than for the same period the preceding year. Results on examination grades, the FSS, and patient self-reports were non-significant. There were no significant differences between the desensitization and the psychotherapy subjects on any of the measures.

These results are difficult to interpret for several reasons. As the authors pointed out, the measures that showed significant changes were subjective in nature; in addition, the amount of psychotropic drugs prescribed may have been influenced by the provision and policy of group treatment, and not just by the subjects' anxiety levels. Lack of an appropriate control group makes it difficult to determine whether the results were actually due to treatment or to extratherapeutic factors, such as subject expectancy or therapist specificity.

Osterhouse (1972) also compared systematic desensitization with a study-skills training treatment, but included a no contact control group. Subjects were introductory psychology students who had scored in the top quartile of the Inventory of Test Anxiety (Osterhouse, 1969) which had eight emotionality items and eight worry items, and obtained extreme scores on the emotionality or the worry scale. There were 10 high emotionality and 10 high worry subjects in each group.
Osterhouse hypothesized that desensitization would be more effective for high emotionality subjects and study skills would be more effective for high worry subjects.

Subjects in the study-skills group were given the rationale that the better prepared they were, the less anxious they would be during an examination. They worked on topics such as time management, the SQ3R study method—applying it to a chapter from their psychology text, and ways of predicting examination questions. In addition, they spent the final session considering techniques for remaining calm during examinations, but the author did not specify what the techniques were. Desensitization subjects underwent the standard desensitization procedure.

Following treatment, subjects were given the Inventory of Test Anxiety again, immediately after their final examination in psychology. Their post-treatment scores on the Inventory and their final examination grade were the dependent variables.

There was no difference between high emotionality and high worry subjects. Systematic desensitization subjects reported significantly less anxiety during the final examination than did control subjects; study-skills subjects and control subjects were not significantly different on the self-report measure of test anxiety. Surprisingly, the control group subjects had significantly higher grades on the final than did study-skills subjects; there was no significant difference between the desensitization and study-skills subjects' final exam grades. The author was unable to explain the superior performance of
the control group. Once again desensitization appears to be effective on self-report measures but not on behavioral ones.

Mitchell and Ng (1972) compared desensitization with a counseling treatment and with a no treatment control. They also included two groups that combined desensitization and counseling. Thirty sophomore university students were subjects.

The counseling treatment was described as a re-educative counseling experience that focused on the academic weaknesses of the subjects, and included discussions on topics such as study methods and habits, and the role of self-feelings in interfering with scholastic aims. A serial desensitization-counseling group had three sessions each of relaxation, desensitization, and then counseling, and a combined desensitization counseling group went through the same three procedures within each session.

Only the groups with some form of desensitization showed any significant decrease on test anxiety. Groups given some combination of desensitization and counseling showed improvement on study skills as well as reduction of test anxiety. Academic achievement as measured by course average, number of subjects receiving passing grades, and pre-post treatment change in achievement score, was significantly greater for the combination treatments than for desensitization or counseling alone. Again it appears that desensitization leads to decreased test anxiety, but does not significantly improve performance.

In general, the studies comparing desensitization to study-skills training type treatments suggest that desensitization is effective in
reducing test anxiety on self-report measures, but relatively ineffective in improving behavioral measures. One problem in comparing desensitization with study-skills training is that study-skills training confounds test anxiety with lack of study skills that lead to poor performance.

Cue-controlled relaxation and anxiety management are two other treatments of test anxiety that have been compared with systematic desensitization. We will examine cue-controlled relaxation first. Cue-controlled relaxation is based on a stimulus-response conditioning of a relaxed state to a self-induced cue word. Subjects are trained in relaxation, followed by a pairing of the relaxed state with a cue word such as "calm" or "control" (Russell, Wise, & Stratoudakis, 1976). Russell et al. (1976) compared cue-controlled relaxation with standard group desensitization, and a no treatment control. Twenty-three students who had responded to a notice in the campus newspaper served as subjects. Subjects were assigned by stratified blocks on the basis of pre-treatment TAS scores to one of the three experimental conditions.

Systematic desensitization subjects demonstrated significant pre-post treatment reductions on all three of the self-report measures of test anxiety, while the cue-controlled relaxation subjects only showed reductions on two of the measures. The measures of state anxiety (AD$_1$ and AD$_2$) also showed significant reductions. But the no treatment subjects showed no reductions on any of the measures.

There were no significant differences among the three conditions
on the behavioral measures. The improvement on the self-report measures of test anxiety for the desensitization and cue-controlled relaxation subjects were not accompanied by improvement on behavioral measures.

Anxiety management or self-control training is another major treatment that has been compared with desensitization in reducing test anxiety. It is actually a modified form of systematic desensitization, but differs from it in rationale and procedure. Anxiety management teaches relaxation as a coping skill subjects should actively use when they become anxious, whereas standard desensitization assumes that the pairing of incompatible responses (relaxation and anxiety provoking scenes) will lead to an automatic reduction in anxiety. This difference in rationale accounts for the procedural difference between standard desensitization and anxiety management. With standard desensitization, when a subject signals the presence of anxiety, he is instructed to terminate the scene. On the other hand, anxiety management procedure has the subject continue imagining the scene and attempt to relax away the anxiety. Goldfried (1971) first discussed systematic desensitization as training in self-control with the above modifications. Zemore (1975) and Denney and Rupert (1977) compared the effectiveness of Goldfried's (1971) modified desensitization procedure with that of standard desensitization in reducing test anxiety.

Zemore (1975) reasoned that if modified desensitization taught relaxation as a general anxiety reducing skill, then its effects
should be general and anxieties other than the one that is actually treated should be reduced as well. Following this reasoning, he chose subjects who manifested both high test anxiety and high speech anxiety on the FSS. Subjects were then randomly assigned with some adjustment to equalize the number of male and female subjects in each group, to one of five groups. There were two standard desensitization groups, one focusing on test anxiety and the other focusing on speech anxiety. There were two modified desensitization groups with the same difference in focus of treatment, and there was a no treatment control.

The results indicated significant treatment main effects on six of seven anxiety measures. Each treatment group, with the exception of the modified desensitization group, showed significantly greater decreases on measures of public speaking anxiety than the control group; the modified desensitization group showed no significant reduction in public-speaking anxiety on the AAACL.

Of the three test anxiety measures, only the FSS reflected a significant treatment effect, but each treatment showed significant decreases in test anxiety over the control group.

With the exception of significantly greater reduction in public-speaking anxiety as measured by the FSS, when the focus of treatment was public speaking anxiety, there were no significant differences that could be attributed to the method of treatment or to its interaction with the focus of treatment. The hypothesis that modified desensitization might be more effective in providing skills for general anxiety reduction was not supported. The study provided some
evidence that both modified and standard desensitization procedures lead to reduction of both test anxiety and speech anxiety. Results on the self-report measures of test anxiety were inconsistent, with significant reductions on the FSS but not on the STABS or the AACL.

And as Zemore (1975) pointed out, one limitation of the study was the absence of a behavioral measure of test anxiety. There is also the problem of counselor specificity since only a single therapist was used.

Denney and Rupert (1977) in addition to comparing the effectiveness of standard and modified desensitization, attempted to distinguish the contributions of the rationale and procedural modifications to the modified treatment. Students from an introductory psychology class, who had scored in the upper 15% of the distribution of Sarason's TAQ (1957) were invited to participate in the study.

Ninety-eight subjects were randomly assigned to one of six groups: four treatment groups, a control, and a placebo group. There were two standard desensitization groups and two modified desensitization groups. Subjects in each treatment group were given either an active coping or a passive reciprocal inhibition rationale. Placebo subjects were trained in progressive relaxation and formulated an 18 item fear hierarchy as did the desensitization subjects. However, during the treatment period, the placebo subjects simply visualized scenes from their hierarchy and described them to the therapist. Each placebo subject was paired with a subject in the standard procedure so that the number of scene exposures and of treatment sessions were equated
for both groups.

Debilitating test anxiety was measured by the STABE and the debilitative test anxiety scale of the Alpert-Haber AAT. All the treatment groups were equally effective in reducing test anxiety, and each treatment group differed significantly from both the placebo and the untreated control on the STABE and the AAT. However, only the self-control desensitization group that received the active rationale and the self-control procedure, differed from all other groups on the facilitative anxiety scale of the Alpert-Haber AAT, and did better on the Wonderlic-Anagrams Test. Subjects's grades in general psychology and their GPA for the semester during which they participated in the study did not appear to be affected by the treatment programs. However, GPA's for the first semester following treatment were significantly higher for subjects who had received an active coping rationale than for those who had received the passive reciprocal inhibition rationale. GPA's for all semesters following the study also were higher for the active coping rationale subjects, but were not significantly so. This appears consistent with previous findings that desensitization is effective in reducing self-report measures of test anxiety, but does not improve behavioral measures.

Another development in the treatment of anxiety is systematic rational restructuring (Goldfried, Decenteceo, & Weinberg, 1974), a self-control technique that parallels Goldfried's (1971) self-control variation of systematic desensitization. The major difference is that rational reevaluation replaces relaxation as the active coping
skill. The rationale for rational restructuring is based on the assumption that the way in which a person labels situations determines his or her maladaptive emotional response and concomitant ineffective behavior. The goal of rational restructuring then, is to train the individual to modify the anxiety producing set with which he or she approaches situations.

Meichenbaum (1972) used rational restructuring as a part of a treatment program to reduce test anxiety. He compared standard desensitization with a cognitive modification procedure. The cognitive modification procedure was actually a combination of rational restructuring and Goldfried's (1971) self-control variation of desensitization.

Twenty-one volunteer subjects were randomly assigned to one of three groups: a waiting-list control group, a standard desensitization group, and a cognitive modification group.

Pre and post treatment measures of test anxiety were assessed by the Alper-Haber AAT (1960), Zuckerman's AACL (1960), and Husak and Alexander's AD (1963), and two performance measures, a digit symbol task (Brown, 1969) and the Raven's Matrices test (Raven, 1956). Post treatment GPA's were another dependent variable.

The results showed that the cognitive modification group had the most improvement on the performance measures, but it was not significantly different from the standard desensitization group. The waiting-list control group subjects showed significantly less improvement on the digit symbol task and on GPA than did the two treatment groups,
but did show comparable improvement on the Raven's Matrices test. And the cognitive modification group showed the most significant (p < .05) performance improvement on GPA.

Both treatment groups showed a comparable significant decrease on the debilitating anxiety subscale of the Alpert-Haber AAT at post treatment and at the one month follow-up, while waiting-list control subjects reported an increase in debilitating anxiety at follow-up. Only the cognitive modification group reported a significant increase in facilitating anxiety. These results are consistent with Denney and Rupert's (1977) finding that significantly higher GPA's were attained by subjects receiving the active coping rationale, and only subjects receiving an active coping rationale and a self-control procedure showed a significant difference in facilitating anxiety.

The cognitive modification appeared to be at least as effective as standard desensitization in reducing test anxiety. However, the cognitive modification procedure combined a rational restructuring procedure with a modified self-control desensitization, and it is difficult to determine what accounted for the reduced test anxiety. As with most of the studies reviewed, there is some evidence for the effectiveness of the treatment involved. But the effectiveness of a treatment in reducing test anxiety and in some cases improving performance does not clarify the nature of test anxiety.

The present study attempted to identify the effectiveness of the separate components of Meichenbaum's (1972) cognitive modification procedure, in order to clarify the nature of test anxiety and its
treatment. It was intended to examine the proposition that it is the worry component of test anxiety that distracts attention from the task at hand and leads to decreased performance.

If this is so, rational restructuring that reduces worry, i.e. cognitive concern over performance by changing irrational self-statements, would lead to improved performance as well as decreases on self-reports of test anxiety. Meichenbaum (1972) argued that standard desensitization is less effective in improving behavioral measures because it deals with the emotionality component and not the worry component of test anxiety. In order to examine the effects of dealing with the emotionality component alone, a relaxation training group was included in the present study. Previous research has suggested that relaxation training is as effective as desensitization in reducing test anxiety (Denney, 1974), and appears to deal specifically with the physiological arousal aspect of test anxiety. In addition, the present study included an attention placebo group.
Chapter 3

METHOD

Subjects

Subjects were test-anxious (scoring 24 or above on Sarason's Test Anxiety Scale (TAS; 1972) during screening) volunteers from the psychology 100 subject pool and volunteers who responded to a newspaper advertisement offering an experimental program to reduce test anxiety. Subjects from the psychology 100 pool received credit for their participation. All participants were undergraduate students at Ohio State University during spring and summer quarters, 1977.

Seven psychology 100 students and three respondents to the newspaper advertisement served as subjects during spring quarter. During summer quarter, six of the subjects were students from the psychology 100 subject pool and five were students who had responded to the newspaper advertisement. A total of 11 students participated in the experiment.

Independent Variables

The independent variables were: (1) type of treatment, and (2) counselors. There were three treatments: cognitive restructuring, relaxation training, and an attention placebo. There were two counselors, one male, one female. Both counselors were graduate
students in the counseling psychology program at Ohio State University. One was a first year student and the second counselor was a fourth year student. Both counselors had had little or no previous experience with cognitive restructuring or relaxation training.

Dependent variables

There were six dependent variables. Four of the dependent variables were self-report measures of test anxiety pre and post treatment: the TAS (Sarason, 1972), the State-Trait Anxiety Inventory—Trait Form (STAI-T; Spielberger, Gorsuch, & Lushene, 1969), the S-R Inventory of Anxiousness (Exam Form; Endler, Hunt, & Rosenstein, 1962), and the Anxiety Differential (AD; Husek & Alexander, 1963).

These measures have been commonly used as dependent variables in previous test anxiety research. The TAS is intended to discriminate between people who exhibit task-relevant responses and those who exhibit task-irrelevant responses in testing situations. It has a test-retest reliability of .78 (Sarason, 1958b). The STAI-T measures relatively stable differences between people in the tendency to perceive situations as threatening and to respond to such situations with anxiety-state responses. Test-retest reliability ranges from .78 to .86 (Spielberger et al, 1969). The Exam Form is a self-report measure of physiological arousal. The AD measures state anxiety. It is "a semantic differential instrument designed to assess cognitively experienced anxiety" (Russell, Wise & Stratoudakis, 1976, p. 564).

Since previous research (Sarason, 1961; 1958) has suggested that
test anxiety interferes with performance, two pre and post treatment performance measures were also included, a digit symbol task similar to the one included in the WAIS (Brown, 1969) and the Wonderlic Personnel Test (Wonderlic, 1977).

The digit symbol task was chosen because it measures sustained attention and is "relatively unaffected by intellectual prowess, memory, or learning" (Murstein & Leipold, 1961, p. 214). Because timing is very obvious and stressed, the digit symbol task may be more sensitive than other behavioral measures to anxiety effects.

The Wonderlic Personnel Test is a 12 minute test of general learning ability. Each form consists of 50 verbal, numerical and spatial test items arranged in spiral omnibus format. "Validity coefficients between mean and median test scores and years of education range from .850 to .996" (Wonderlic, 1977, p. 4). The different forms of the test are described as highly similar, with reliability coefficients between the various forms of the test ranging from .87 to .99 (Wonderlic, 1977).

Treatments

Cognitive restructuring

The cognitive restructuring treatment attempted to help the subjects become aware of and change self-preoccupying thoughts that distracted their attention from the test-taking task. Goldfried's (1967) guidelines for systematic rational restructuring were used. Four major areas were included: (1) presentation of the rationale, (2) overview of irrational assumptions, (3) analysis of the client's problems
in rational terms, and (4) teaching the client to modify his or her internal sentences.

The subjects were given the rationale that what they believed about a situation affected their reactions to the situation. Ellis' (1962) list of ten basic irrational ideas were discussed to illustrate some of the irrational beliefs that people hold and how holding such beliefs affects people's feelings and behaviors. The discussion helped subjects to see that they held some of the same beliefs and that their feelings and behaviors were affected by them.

Then subjects were helped to identify other irrational beliefs they held that were more specifically related to their test anxiety, e.g. "I must get an 'A' on this test." Once the subjects identified such irrational beliefs, they were taught to modify or replace them with more rational statements such as "I would be nice to get an 'A', but I will be all right if I do not get an 'A'."

The subjects learned to rate their anxiety in testing situations, on a scale of one to ten, identify the irrational belief that causes the anxiety and replace it with a more rational one, and then rate their anxiety again.

All of this was done in group discussions of three to four people; in addition to group discussion, techniques such as role-playing and behavioral rehearsal were used to help the subjects to identify and change their irrational beliefs that led to their anxiety, and to help them learn to rate their anxiety.
Relaxation training

Subjects in the relaxation training group were taught a modified Jacobsonian relaxation technique (Jacobson, 1938) in which they alternately tensed and relaxed major groups of muscles. They progressively learned to combine the individual muscle groups until by self-report they were able to relax entirely by tensing and relaxing only four combined muscle groups. They were instructed to practice the relaxing technique between sessions, and the subjects reported doing so.

One session was spent teaching the subjects slow and deep breathing to help them relax. The relaxation training was done in groups of three to four people. Sometimes a subject was seen individually to make up a missed session. Only three of the seven subjects missed any sessions. No subject missed more than three of the treatment sessions, and all missed sessions were made up.

Attention placebo

Subjects in the attention placebo group were told that they had learned negative associations with tests or testing situations in the past. These negative associations caused their test anxiety even though the associations had become so automatic that the subjects were probably unaware of them. In order to reduce their test anxiety, the treatment program would teach them positive new associations with tests.

These "new associations" would be presented on slides at such a rate and brightness that the subjects would be unable to make out
what was on the screen. Because the negative associations were held at a subconscious level, the new associations were being presented directly to the subconscious.

During the first part of each session, the rate of presentation and the brightness of the slides were adjusted until each of the subjects reported that he or she could no longer make out what was on the screen. A slide of a neutral word such as "sun" was used during the adjustment period. Slides of nonsense syllables that the subjects believed to be positive new associations with tests were projected for the duration of the sessions once the subjects reported they could no longer make out what was on the screen during the adjustment period. The slides were shown for five to six millisecond exposures, the rate at which the subjects were unable to make out what they saw.

Subjects viewed the slides in groups of two to four people. However, one subject viewed the slides alone because of scheduling problems.

Procedure

Subjects from the psychology 150 subject pool signed up for an experiment on test anxiety and intelligence. Subjects responding to the newspaper announcement were told they had to go through a screening session to determine if they were test anxious and to see how they responded in actual testing situations. Both types of subjects were screened together. The screening was done either individually
or in groups of up to eight people. During the screening session, subjects were informed that the experimenter was interested in gathering information about how they reacted in testing situations and that they would be asked to fill out some questionnaires and to take two intelligence tests.

Subjects first filled out Sarason's TAS (1972). While it was being scored, they filled out the STAT-T (Spielberger et al, 1969) and the Exam Form (Endler et al, 1962). They were then given ego-involving, stress-inducing instructions about the Wonderlic Personnel Test (Wonderlic, 1977) and the digit symbol task (Brown, 1969), e.g., "the next two tasks measure such intellectual abilities as cognitive reasoning and problem solving and your performance on them will be an indication of your general intelligence". The subjects then filled out the AD (Husek & Alexander, 1963) just before taking the Wonderlic Personnel Test and the digit symbol task. Those receiving scores of 24 or above on the TAS were asked to remain and were invited to participate in the experimental treatment program to reduce test anxiety. They were informed that such participation was on a voluntary basis.

Those who chose to participate, then signed up for one of three time slots. The two treatments and the attention placebo were randomly assigned to the time slots during spring quarter. During summer quarter, the two treatments and the attention placebo were randomly assigned to the time slots, and some subjects were then reassigned to provide an equal number of subjects in each group.

There was a total of seven subjects in each treatment group.
across counselors, each counselor having two to five subjects in each treatment. The attention placebo group had four subjects who had responded to the newspaper advertisement and three subjects from the psychology 100 pool. The cognitive restructuring group and the relaxation group each had five subjects from the psychology 100 pool and two respondents to the newspaper advertisement.

Each group met twice a week for two and a half weeks for a total of five 45 minute sessions. The first year graduate student ran the treatment groups during spring quarter, and the fourth year student ran the treatment groups during summer quarter.

At the end of the two and a half week treatment period, all subjects again filled out the TAS, the STAI-T, the Exam Form, and took alternate forms of the Wonderlic Personnel Test and the digit symbol task in the same order that they had during the screening session.

Design and Hypotheses

The experimental design was a 3 x 2 x 2 repeated measures design. There were three levels of treatment, two levels of counselor, and pre and post treatment assessment.

The hypotheses were derived from Meichenbaum's (1972) explanation for the lack of consistent improvement on performance measures with desensitization as a treatment for test anxiety. He argued that it is the worry component of test anxiety that distracts attention from the test-taking task and leads to the poor performance of high test anxious subjects. Since desensitization deals with only the
emotionality component, it produces improvements on self-report mea-
sures of test anxiety, but not on behavioral measures.

Hypothesis 1. The cognitive restructuring treatment should lead
to a decrease on the self-report measures of test anxiety and improve-
ment on the two performance measures.

Hypothesis 2. Relaxation training should lead to decreases on
self-report measures of test anxiety but not affect the performance
measures.

Hypothesis 3. The attention placebo should not have any effects
on either self-report or performance measures.

If a subject replaces irrational self-statements about tests
with more rational ones, his or her perception of anxiety should de-
crease, and the distracting influence of the worry component should
be removed, leading to improved performance. Self-report measures
should decrease too since responses to the worry items will be chan-
ged, and changing irrational self-statement may also change the la-
beling of emotionality items as anxiety.

Relaxation training should reduce physiological arousal. Conse-
quently it should reduce self-report measures of test anxiety since
such measures have items that refer directly to physiological arousal.
However, relaxation does not deal with the worry component and per-
formance should remain the same.
Chapter 4
RESULTS AND DISCUSSION

Results

Table 4.1 shows the pre and post treatment means and standard deviations of each dependent variable within each treatment group. A three-way repeated measures analysis of variance and a three-way multivariate analysis of variance were performed on the data. Tables 4.2 through 4.7 summarize the results of the analyses.

Tables 4.2 through 4.5 indicate significant time effects on the TAS, STAI-T, the Exam Form, and the AD. Of these four self-report measures, only the TAS showed significant ($F = 5.004$, df 1/15, $p < .04$; $F = 7.886$, df 1/15, $p < .01$) time x treatment and time x treatment x counselor interaction effects. The two performance measures, the Wonderlic Personnel Test and the digit symbol task showed no significant main effects, and only a single significant ($F = 5.652$, df 1/15, $p < .03$) time x treatment x counselor interaction effect on the Wonderlic Personnel Test (see Figure 4.3).

The hypotheses

Hypothesis 1. The cognitive restructuring treatment should lead to a decrease on the self-report measures of test anxiety and improvement on the two performance measures.

44
<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Co 1 M</th>
<th>Co 1 SD</th>
<th>Co 2 M</th>
<th>Co 2 SD</th>
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<tr>
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<td>5.41</td>
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**TABLE 4.1**
Means and Standard Deviations of Three Treatment Groups on Six Dependent Variables

**AP = Attention Placebo  CR = Cognitive Restructuring  RT = Relaxation Training**
### TABLE 4.2

Analyses of Variance of TAS Scores

<table>
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<th>Source of Variance</th>
<th>MS</th>
<th>df</th>
<th>F</th>
<th>p</th>
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</thead>
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<td><strong>Repeated Measures Analysis of Variance</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>22.49</td>
<td>2</td>
<td>.48</td>
<td>.63</td>
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<td>Counselor</td>
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<td>.08</td>
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<td>.83</td>
<td>.45</td>
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</tr>
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<td>30.86</td>
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AP = Attention Placebo  
CR = Cognitive Restructuring  
RT = Relaxation Training
### TABLE 4.3
Analyses of Variance of STAI-T Scores

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AP = Attention Placebo  
CR = Cognitive Restructuring  
RT = Relaxation Training
TABLE 4.4
Analyses of Variance of Exam Form Scores

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AP = Attention Placebo  CR = Cognitive Restructuring
RT = Relaxation Training
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AP = Attention Placebo  CR = Cognitive Restructuring  
RT = Relaxation Training
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AP = Attention Placebo  CR = Cognitive Restructuring
RT = Relaxation Training
### TABLE 4.7
Analyses of Variance of Digit Symbol Task Scores

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#### Multivariate Analysis of Variance

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</table>

AP = Attention Placebo  CR = Cognitive Restructuring  RT = Relaxation Training
The $F$ ratios testing this hypothesis were for the time x treatment interaction effects for each of the dependent variables (see Tables 4.2 through 4.7). The time x treatment interaction $F$ ratio is the equivalent of that for a gain score and would reflect any improvement from pre to post treatment due to the treatments.

Of the four self-report measures, only the TAS showed a significant ($F = 5.004$, df 1/15, $p < .04$) time x treatment interaction effect. The two performance measures showed no significant time x treatment interaction.

The multivariate analysis (see Figure 4.1 and Table 4.2) showed that the significant time x treatment interaction effect on the TAS was the result of a significant difference between the attention placebo and the cognitive restructuring and relaxation training combined. There was no significant ($F = 0.130$, df 1/15, $p < .72$) difference between cognitive restructuring and relaxation training.

The simple main effects test on the time x treatment interaction on the TAS (see Figure 4.4) did not indicate any significant improvement from pre to post treatment as a result of cognitive restructuring. No support was obtained for hypothesis 1.

Hypothesis 2. Relaxation training should lead to decreases on self-report measures of test anxiety, but not affect the performance measures.

The same time x treatment interaction $F$ ratios for each of the dependent variables that were used to test hypothesis 1, were used to test hypothesis 2.
Figure 4.1 Time x Treatment Interaction Effects on the TAS
Figure 4.2 Time x Treatment x Counselor Interaction Effects on the ZIS
Figure 4.3 Time x Treatment x Counselor Interaction Effects on the Wonderlic
Figure 4: Simple Main Effects Test on Time x Treatment Interaction on the TAS

AF = Attention Placebo  CR = Cognitive Restructuring
RT = Relaxation Training
The simple main effects test on the time x treatment interaction on the TAS (see Figure 4.4) for the relaxation training was not significant, indicating no significant improvement from pre to post treatment as a result of relaxation training.

The lack of significant time x treatment interaction effects for the self-report measures failed to support the first half of hypothesis 2; the second half of the hypothesis was not disproved.

Hypothesis 3. The attention placebo should not have any effects on either self-report or performance measures.

The same time x treatment interaction F ratios for each of the dependent variables that were used to test hypotheses 1 and 2 were used to test hypothesis 3.

With the exception of the TAS there were no significant time x treatment interaction effects on either the self-report or performance measures. The simple main effects test on the time x treatment interaction on the TAS (see Figure 4.4) was not significant for the attention placebo, indicating no significant improvement from pre to post treatment as a result of the attention placebo. Hypothesis 3 was not disproved.

Although the time x treatment x counselor interaction effects do not directly test the hypotheses, the TAS and the Wonderlic Personnel Test did show significant ($F = 7.886$, df $1/15$, $p < .01$; $F = 5.653$, df $1/15$, $p < .03$) time x treatment x counselor interaction effects and they need to be examined (see Tables 4.2 and 4.6).

The multivariate analysis (see Table 4.2) showed that the signi-
significant time x treatment x counselor interaction effects on the TAS were the result of a significant difference between the attention placebo and cognitive restructuring and relaxation training combined.

The simple simple main effects tests on the TAS (see Figure 4.5) showed that subjects of counselor one (male, spring quarter) had significantly lower TAS scores at post treatment in the attention placebo group than did subjects of counselor two (female, summer quarter).

The simple simple main effects tests on the Wonderlic Personnel Test (see Figure 4.6) showed that the significant time x treatment x counselor interaction effect was the result of significantly different scores at pre treatment for each counselor in the attention placebo group. The attention placebo did not lead to improved performance on the Wonderlic Personnel Test.

Discussion

The only significant effects were unexpected, and did not support the hypotheses of the study.

The TAS was the only dependent variable that showed a significant time x treatment interaction effect that would reflect any pre-post treatment improvement attributable to treatment. The multivariate analysis showed the interaction to be the result of a significant difference between the attention placebo and cognitive restructuring and relaxation training combined. However, the simple main effects tests on the time x treatment interaction indicated no significant pre-post treatment improvement for any of the treatments, including the atten-
Figure 4.5 Simple Main Effects Tests on Time x Treatment x Counselor Interaction on the TAS
tion placebo. The apparently significant time x treatment interaction effect was probably a reflection of the significant time x treatment x counselor interaction effect.

The multivariate analysis showed the time x treatment x counselor interaction to be the result of a significant difference between the attention placebo and the cognitive restructuring and the relaxation training combined. The simple simple main effects tests indicated that the lower TAS score of the attention placebo group was specific to counselor one (see Figure 4.5). With an N of seven per treatment cell, it would be inappropriate to generalize about the total test anxious population from these results because there were only two subjects in the attention placebo group with counselor one.

However, it is an important observation that the attention placebo can be effective even if only for a limited number of subjects with one particular counselor. It would be important to know that placebo effects do exist. And it raises the question of whether previous positive results in the treatment of test anxiety with treatments such as systematic desensitization may be attributed to placebo effects. Many previous studies lacked adequate placebo controls.

The Wonderlic Personnel Test also showed a significant time x treatment x counselor interaction effect. The multivariate analysis showed the interaction to be the result of a significant difference between the attention placebo and cognitive restructuring and relaxation training combined, with no significant difference between cognitive restructuring and relaxation training. However, the simple
simple main effects tests on the interaction showed that the interaction effect was due to significant pre treatment Wonderlic score differences for the subjects of each counselor in the attention placebo group (see Figure 4.6), rather than the result of greater improvement by any of the treatment groups. A significant improvement as a result of any of the treatments across counselors would have been reflected in a significant time x treatment interaction effect and no such interaction was obtained.

The significant time effects indicate a decrease on the four self-report measures between pre and post treatment assessment, independent of the treatment groups. In other words, all subjects showed decreased anxiety regardless of which group they were in. The absence of a time x treatment interaction effect indicates that no effects were attributable to the treatments.

One possible conclusion is that the decrease is due to the passage of time. Another conclusion is that all treatments were equally effective. In the absence of significant time x treatment interaction effects, this conclusion is difficult to test. But the simple main effects tests on the time x treatment effect on the TAS (see Figure 4.4) and the simple main effects tests on the time x treatment x counselor effects of the TAS and the Wonderlic Personnel Test (see Figures 4.5 and 4.6) did not support the possibility of equal improvement across the treatment groups.

A third possible conclusion is that the treatments, including the attention placebo, may have prevented increases in test anxiety even
though they have not reduced it. A waiting-list control would have been useful in determining this. It may be that test anxious subjects may become increasingly test anxious with the passage of time, and the treatments may have done some good even though they do not appear to have reduced the test anxiety. Previous research has indicated that waiting-list control subjects have increased test anxiety without treatment (Meichenbaum, 1972).

The two performance measures, the Wonderlic Personnel Test and the digit symbol task showed no significant main effects and only a single significant time x treatment x counselor interaction effect that was the result of pre treatment differences on the Wonderlic Personnel Test. These results conform with previous research where positive results were obtained on self-report measures but not on performance ones.

One must be cautious in the conclusions one makes because of the limitations of the study. In addition to the small number of subjects involved, there is a question of whether five sessions over a two and a half week period were adequate in bringing about the changes that the treatments intended to bring about. It appears that changing a person's thinking habits may take a little longer than five sessions. One may help a person become aware of the types of cognitive things that he or she does, and perhaps even teach him or her how to go about changing them. However, it may take much practice for him or her to be able to implement the changes skillfully enough to improve his or her performance. Probably until he or she becomes skilled at ques-
tioning and changing irrational self-talk, the process is as distracting of attention as the test anxiety. Such a need for practice in using the new skills may account for the absence of immediate performance improvement but its presence at follow-up in studies such as Denney and Rupert's (1977).

A similar argument may be made for the absence of significant results with the relaxation training, although the relaxation may seem easier than cognitive restructuring to implement. Again there is the question of how well the subjects were able to use the relaxation in the test-taking situation.

An alternative explanation for the general absence of significant results is that neither cognitive restructuring nor relaxation training are effective treatments in reducing test anxiety. However, considering the limitations of the present study and previous support for the effectiveness of relaxation training and cognitive restructuring, at least on self-report measures in reducing test anxiety, such a conclusion may not be totally accurate (Denney, 1974; Meichenbaum, 1972). The results of the present study do not allow any conclusions in either direction, but do suggest that further research is needed.

Implications for future research

Although the absence of significant results precluded any definitive conclusions, the limitations of the study and the issues the study addressed may have implications for future research. One question is whether the treatments actually did what they intended to, e.g.
did the cognitive restructuring really change the irrational self-
statements of the subjects? Future research might include a question-
naire such as that used by Goldfried and Soborski (1975) to measure
the subjects’ irrational beliefs pre and post treatment. Direct mea-
sures of physiological arousal may be included to determine the ef-
fects of the relaxation training.

In addition to the immediate post treatment measures, a longer
term follow-up measure seems needed. It seems that the effects of
treatment are not always immediate. Especially with a treatment
such as cognitive restructuring, the subjects may need some time to
learn to use their new skills effectively. Life-long thinking habits
may not be quickly changed.

The study addressed itself to defining test anxiety as well as
to treating it. The study attempted to clarify the causes of the
detrimental effects of test anxiety as well as to alleviate such ef-
fects. Clarifying the nature of test anxiety may lead to more precise
and therefore, more effective treatment of the problem.

Perhaps as Sarason (1975b) suggested, there are two kinds of test
anxiety, Type A test anxiety that is a circumscribed problem and Type
B test anxiety that is part of a more general problem involving anxiety
and worry in other areas too. Different treatments may be more effec-
tive for each kind of test anxiety. Systematic desensitization or
relaxation training may be effective for Type A test anxiety, but cog-
nitive restructuring may be more effective for Type B test anxiety.

If there is more than one type of test anxiety, then research is needed
to distinguish between people with the different kinds of test anxiety. A major task for future research is to obtain a clear definition of test anxiety.
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