

COMPARATIVE EFFECTIVENESS OF
COGNITIVE MODIFICATION AND
SYSTEMATIC DESENSITIZATION IN
THE TREATMENT OF TEST ANXIOUS
HIGH SCHOOL STUDENTS

by

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ABSTRACT

Since extreme anxiety can be detrimental to test performance, measures to alleviate this problem could be beneficial to students. Cognitive modification and systematic desensitization are two procedures used to alleviate test anxiety. Cognitive modification is a technique designed to modify an individual's thoughts or self-statements during an anxiety provoking situation. Systematic desensitization focuses on relaxation procedures and imaginary exposure to anxiety eliciting situations. There is considerable controversy regarding the relative efficacy of these two treatment approaches. This study compared their relative effectiveness in reducing behavioral and self-reports of test anxiety.

From an initial screening of 122 volunteer Grade 10 students, 30 highly test anxious individuals were selected to participate in the study. They had all scored in the upper 10% of their group on the Achievement Anxiety Test, had adequate study skills (Study Habits Checklist), and did not have high levels of general anxiety (Fear Survey Schedule). Students were randomly assigned to one of three groups (6 females and 4 males in each): cognitive modification, systematic desensitization, or control. Treatment programs were six 1-hour weekly group sessions. Behavioral (Raven's and G.P.A.) and self-report (Anxiety Differential and STAI-S) measures were used to assess anxiety both pre- and posttest.

Results indicated within group differences, but no between group differences on the four experimental variables. The cognitive modification group increased its scores significantly on a self-report (STAI-S) and a performance (Raven's) measure, while the systematic desensitization group increased its scores significantly on a performance (Raven's) measure. The systematic desensitization group effect was numerically greater than (non significant) the cognitive modification group effect on the performance (Raven's) measure. The control group did not change significantly on any variable.

Results of the study were discussed in terms of theoretical and practical implications for school counselling. Suggestions for further research were indicated.

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Statement of the Problem

The general purpose of this study was to compare the effectiveness of cognitive modification and desensitization procedures in the treatment of test anxiety. Research on anxiety and academic performance generally indicates that excessive anxiety can have negative effects on learning and academic performance (Meichenbaum, 1972; Sarason, 1957; Wine, 1971). Studies have been conducted at all educational levels, but the majority of research on treatment procedures which attempt to alleviate test anxiety has been conducted in university settings with college students. Few studies have dealt with test anxious high school students. Yet, earlier intervention in the treatment of test anxiety is warranted because of the progressive nature of the problems experienced by the test anxious individual. According to Gaudry and Spielberger (1971):

Evidence suggests that negative correlations between anxiety and achievement tend to increase in size for the higher grade levels, provided that the anxiety scales are given in reasonably close proximity to the achievement test. (p. 41)

At the university level, high anxiety is associated with low performance and high dropout rates (Spielberger, 1962). Studies have also indicated that exam performance of high anxiety individuals is affected by exam format and the student's perceptions of the test-taking situation (McKeachie, Pollie, & Speisman, 1955; Smith & Rockett, 1968). While it is possible to attempt to create

a non-threatening exam situation, students with different anxiety levels tend to respond to the same conditions differently. It would be difficult to structure an exam situation to obtain optimal performance from individuals with varying anxiety levels. A more practical approach to the problem of test anxiety is to provide students with treatment programs which focus on the alleviation of specific test anxieties.

Numerous studies have assessed the efficacy of various treatments of test anxiety. Systematic desensitization and cognitive modification are two common approaches. The overall results of comparative outcome studies do not overwhelmingly support the efficacy of a particular method. In some cases, systematic desensitization is reported to be an effective means of treating anxiety (Paul & Shannon, 1966; Suinn, 1968). However, Allen (1971) indicates that a placebo procedure may have the same effect as systematic desensitization in alleviating anxiety. McReynolds, Barnes, Brooks, and Rehagen (1973) found further support for Allen's position. In a more recent study, Holroyd (1976) used a variation of the McReynold's placebo condition, cognitive modification, systematic desensitization, and combined systematic desensitization and cognitive therapy in the group treatment of test anxiety. He found that the cognitive therapy was superior to the other methods used in the study on

three measures (Grade Point Average, State-Trait Anxiety Inventory - state form, and Anxiety Differential). On the fourth measure (Digit Symbol Test) cognitive modification, and combined systematic desensitization and cognitive therapy were more effective than the other conditions. Generally, the other treatments were relatively similar to one another in their effectiveness.

Since the early 1970's, there has been a good deal of controversy regarding the relative efficacy of cognitive modification and systematic desensitization approaches in the reduction of test anxiety. Because of the fact that test anxiety management programs often combine elements from each treatment procedure (Meichenbaum, 1972; Suinn & Richardson, 1971), it is often difficult to ascertain just what components are responsible for the oft-cited positive treatment effects. Ledwidge (1978), in a review of the results of thirteen comparative studies of cognitive modification and behavioral techniques (including systematic desensitization) for a variety of problems, indicated that there was "lack of empirical support for CBM procedures" (p. 370). In looking at the studies dealing specifically with the treatment of test anxiety, Ledwidge indicated that in these four studies (Maes & Heimann, 1974; Meichenbaum, 1972; Montgomery, 1971; Suinn & Richardson, 1971), cognitive modification was superior in one study (Meichenbaum, 1972); and systematic desensitization was

more effective in the Montgomery study, but this superiority was supported only with respect to behavioral measures of anxiety, with no advantage being observed on anxiety inventories. In the other two studies (Maes & Heimann, 1974; Suinn & Richardson, 1971), neither technique was superior.

The present study examines the relative effectiveness of systematic desensitization and cognitive modification in the treatment of test anxiety in high school students. Subjects were randomly assigned to treatment groups, and pre- and post-behavioral and self-report indices of test anxiety were obtained.

Review of Relevant Literature

This chapter reviews test anxiety theories, discusses correlational studies of the relationship between anxiety and academic achievement, describes theories related to cognitive modification and systematic desensitization treatments, and indicates the results of studies which compare the effectiveness of these two treatment modalities. In addition, specific hypotheses and predictions for the present experiment, and general theoretical questions in the area of test anxiety are presented.

Before looking at the foregoing topics in detail, it is important to discuss the term anxiety. The concept of anxiety is not always clearly operationalized, nor are the effects of anxiety on the performance of individuals of varying anxiety levels always clear. No specific behavior can be labelled as anxiety, but there are physiological, verbal, and behavioral indicators which can be used to infer that anxiety exists. Further distinctions can also be made between general and specific anxiety, normal and neurotic anxiety, et cetera. While there seems to be general agreement that anxiety can interfere with cognitive functioning, there is disagreement among theorists as to the etiology of anxiety. Nonetheless, in the most general sense, I would describe an anxious individual as someone who anticipates a real or imagined event and thus experiences heightened emotional arousal. I agree with Alpert and Haber (1960) that anxiety may or may not affect subsequent performance in a

facilitative or debilitating manner. Following are some of the views of anxiety as they pertain to the test-taking situation.

Test Anxiety Theories

Drive theory has provided an explanation of anxiety by equating Hull's (1943) concept of drive with that of anxiety. Spence (1958) developed the view that performance is a function of habit strength and drive. According to his theory, performance depends on two things - 1) the predominance of a particular response tendency (correct or incorrect), and 2) the drive (emotionally based) associated with the response situation. Habit strength is the tendency of an individual to respond with a behavior which is relatively high on his/her individual response hierarchy. A response hierarchy influences the manner in which an individual responds, while drive activates the tendency for an individual to respond (Gaudry & Spielberger, 1971). If a correct response is high in a response hierarchy, increased drive strengthens the possibility of a correct response, whereas if the correct response is low in the response hierarchy, increased drive provides greater chances of the individual responding incorrectly. For instance, if drive is high, and an individual's designation of the most appropriate response differs from the "actual" appropriate response, an incorrect response occurs. In a simple task, in which there are relatively few wrong response alternatives, there is less chance of error than in a complex situation.

Complex situations may necessitate a number of responses in a particular sequence. Thus, in a complex task, incorrect responses at one stage or at a variety of stages may impair performance. Each intervening response may be critical to the following response, or at least ultimately to the final response to the stimulus situation. It is conceivable, if a high anxiety individual happens to have a strong tendency towards making a correct response, that anxiety does not necessarily interfere with performance, but in fact facilitates it (Alpert & Haber, 1960).

One problem with Spence's theory which equates anxiety with drive is that high anxiety individuals are assumed to have high drive levels while low anxiety individuals apparently do not. I think that this would be particularly so if anxiety level is considered to be trait-like and to be relatively constant within each individual - that is high, medium, or low, in intensity. According to Spence's drive theory, high anxiety individuals should consistently react with high drive. Alpert and Haber (1960) cite "evidence of intra-individual differences in anxiety both in content and intensity from one situation to another" (p. 208). In a situation in which there is no perceived ambiguity or threat, high anxiety individuals do not experience heightened emotionality (Alpert & Haber, 1960). They are not anxious all the time, but rather experience arousal under certain specific conditions. O'Neil (1969) indicates that result of classic anxiety studies do not overwhelmingly

support drive theory. Nonetheless, this position provided the basis for most test anxiety theorizing throughout the 1950s.

While Mandler and Sarason (1952) incorporated drive into their theory of test anxiety, their predominant focus was that anxiety scales should be situationally specific in recognition of intra-individual differences in anxiety from situation to situation. They specified two major categories of drives relevant to a test situation - learned task drives and learned anxiety drives. They assume that the intervening responses elicited by drive can be task relevant or task irrelevant. An individual's pattern of responding has a great deal to do with the final responses made, and with overall test performance. Mandler and Sarason further assume that learned task drives elicit intervening responses which are compatible with the task and thus conducive to task completion. Learned anxiety drive elicits two types of general responses - task relevant and task irrelevant. If the individual's intervening response is not relevant to the task, the resulting response(s) will interfere with task completion. In this case, the individual must deal with his anxiety as well as the task at hand, and his performance suffers since his focus is divided between task and task irrelevant demands. Task irrelevant responses are evoked from a response repertoire which the individual has evolved through generalizations from previous test-taking situations. These responses often focus on self-

disparagement.

In looking at the effects of anxiety, it appears (from the Mandler and Sarason position) that on the positive side, anxiety can result in task completion, leading to anxiety alleviation. On the negative side, it can arouse irrelevant responses which interfere with the task at hand. Anxiety may evoke feelings of inadequacy and confusion. When both positive and negative responses are elicited, they can often compete with one another and lead to inadequate performance. In describing task irrelevant responses, Mandler and Sarason (1952) state:

These responses...may be manifested as feelings of inadequacy, helplessness... these responses are self rather than task centered. (p. 166)

In order to measure debilitating anxiety, Mandler and Sarason (1952) constructed the Test Anxiety Scale. This was the first inventory developed to measure test anxiety specifically (Levitt, 1967). Other measures developed around this time assessed anxiety as a general trait (eg. Taylor, 1953).

Alpert and Haber (1960) presented a theory of test anxiety which was based on whether or not anxiety facilitated or debilitated performance in the test situation. They felt that Mandler and Sarason's (1952) theory of test anxiety failed to properly consider individual differences in the relationship between anxiety and performance. The items on the Test Anxiety Scale measure only whether anxiety is debilitating. An alternative possibility suggested by Alpert and Haber (1960) is that anxiety may be facilitative.

They constructed the Achievement Anxiety Test (AAT) as a measure of both debilitating and facilitating anxiety. According to their position, facilitating anxiety is characterized by task relevant responses, and task irrelevant responses are evoked by debilitating anxiety. Alpert and Haber (1960) found a correlation of .64 between the Achievement Anxiety Test debilitating scale and the Test Anxiety Scale.

The responses which the individual makes in the test situation may also be dependent upon cue utilization. Easterbrook (1959) indicated that anxiety reduces the number of cues an individual attends to. On some tasks in which only a few cues are necessary, reduction in cue utilization is not considered to be a problem, as the assumption is that irrelevant cues are eliminated. Some tasks however (such as performance on academic tests) require that many cues be used. In these situations, anxiety (or emotion) is often found to be disorganizing and counterproductive. Wine (1972) cites extensive research which is supportive of Easterbrook's conclusions regarding cue utilization.

Liebert and Morris' (1967) delineation of the components of test anxiety suggests that anxiety is made up of both worry and emotionality. According to their description, it is not emotion which is the primary consider-

ation. Worry is a cognitive concern about task performance, while emotionality is described as being physiological arousal. Liebert and Morris (1967) indicate that it is the worry aspect of anxiety which appears to affect performance adversely and autonomic arousal does not noticeably affect task performance. They found no significant relationship between how well students expected to do on an exam and the amount of emotional arousal they expressed, but they found a significant relationship between how well students judged that they would do on an exam and their concern or worry.

Wine (1971) concurs with the view that worry is detrimental to an individual's performance. In an extensive literature review of test anxiety she indicates that a highly anxious individual divides his/her attention between task relevant and task irrelevant cognitive functioning and thus does not perform as well as would be possible if the cognitive focus was on task relevant responses alone.

In summing up historical and current conceptions of the test anxious individual and his responses to anxiety, the test anxious person may be described as:

One who is prone to emit self-centered interfering responses when confronted with evaluative conditions. Two response components have been emphasized by writers who espouse this view...One is emotional and autonomic reactivity...The other concerns cognitive events. (Sarason, 1975, p. 175)

Since, in theory, it is clear from the foregoing views that test anxiety can both positively and negatively affect the final results of the test or exam

completion, it is important to determine the nature of the relationship between test anxiety and academic performance on directly empirical grounds.

Empirical Studies: Test Anxiety and Performance Relationship

Yerkes-Dodson's Law (1908) states that the relationship between anxiety and learning forms an inverted U-curve. High anxious and low anxious individuals do not perform as well as individuals with a moderate amount of anxiety in an exam situation. Low anxiety has little or no facilitative effect on learning and high anxiety interferes with learning. The relationship between drive and performance depends on task difficulty. In a simple task, optimal arousal may be higher than it would be in a more complex task. Many studies of test anxiety have examined the relationship between anxiety and test or academic performance, at both public school and university levels. Results of studies generally indicate that high test anxiety is associated with low performance (Frost, 1968; Gaudry & Bradshaw, 1970), and that this negative relationship increases with grade level. This pattern suggests the desirability of counselling interventions prior to the university level.

Some of the studies reviewed by Gaudry and Spielberger (1971) are particularly noteworthy. Lunneborg (1964) tested 213 children in Grades 4-6, ranging in age from 8 to 12 years, on three anxiety measures and correlated these scores with reading and arithmetic achievement scores. Correlations were negative and statistically significant

(at .05 and .01 levels) for all levels and increased with grade level. A study by Stevenson and Odom (1965) of 318 grade 4-6 students found significant negative correlations for 15 of 20 measures of anxiety and general achievement, but no increase with grade level.

Walter, Denzler, and Sarason (1964), in two studies involving high school students, related anxiety to intellectual performance. In one study, they found that test anxiety related negatively to performance more consistently than did general anxiety. In the second study, there was a sex difference in the results obtained. Test anxiety was negatively related to grades and performance for girls, but not to grades for boys. Differing socio-economic backgrounds of the two groups were used to explain the results obtained in the two studies.

At the college level, intellectual measures correlate negatively and significantly with test anxiety. Interestingly enough, at this same level, correlations between other personality measures (such as general anxiety, need for achievement, and defensiveness) and achievement show no consistent pattern (Sarason, 1960).

The effects of anxiety at the university level can also be seen in the dropout rate of high anxiety individuals. Spielberger (1962), in a study of university students, found that dropout because of poor academic performance was about three times greater for high anxiety students than for low

anxiety students. Classification into different levels of intellectual functioning made little difference to this observed failure pattern.

Treatment of Test Anxiety

Given the generally inverse relationship between anxiety and achievement, it is not surprising to find a number of different approaches which attempt to reduce test anxiety and thus increase academic achievement. Two of the most frequently employed techniques are systematic desensitization and cognitive modification.

Cognitive Modification. While cognitive modification is a relatively recent addition to the existing clinical treatment techniques, its basic tenets go back to the late 1950s. Ellis' (1962) theory of personality provides the basis for cognitive modification techniques. His view that faulty or irrational thoughts form the basis for many of the problems individuals encounter may be seen as congruent with Mandler and Sarason's (1952) position with respect to cognitive responses which are task relevant or irrelevant. Irrational thoughts would undoubtedly fall into the category of task irrelevant responses.

If what an individual says to himself affects what his feelings and behaviors are, the primary task of the counsellor-therapist is to help the client alter disruptive

cognitive patterns and thus bring about desired changes in responding. According to Ellis' rational-emotive therapy, it is not the stimulus of the exam which causes the anxiety, but the student's interpretation of the situation, or what the student says or thinks to himself about the situation, which creates the problem.

Rational-emotive theory assumes that cognition and emotion are interrelated processes and that one can change one's emotional response by altering one's thinking. Thought and emotion are manifested in self-talk or internalized statements. Such statements activate emotional arousal. Much of this self-talk evolves around illogical ideas about human functioning and worth which have been instilled early in life. Ellis (1972) describes rational-emotive therapy (RET) as follows:

Cognitively, RET teaches clients the A-B-C's of personality formation and disturbance-creation. Thus, it shows people that their emotional Consequences (at point C) do not directly stem from the Activating events (at point A) in their lives, but from their Belief Systems (at point B) about these Activating events. Their Belief systems, when they feel disturbed, consist of, first, a set of empirically-based rational Beliefs (rB's)... To make themselves feel inappropriately or neurotically, they add the nonempirically-based, irrational Beliefs (iB's)...Then they feel anxious, depressed, or worthless.

In RET, the therapist or teacher shows people how to vigorously challenge, question, and Dispute (at point D) their irrational Beliefs.
(p.19)

- The work of Ellis has more recently been extended

by Meichenbaum (1972) who has focused on client thinking styles as revealed by self-statements. This approach differs slightly from Ellis' focus on irrational beliefs in that the client is urged to recognize his particular thinking style and make changes to it instead of being urged to accept a common (rational) belief system. The recognition of the factors which maintain an individual's test anxiety is essential to the change process. Once the individual notices his characteristic anxiety pattern emerging he can be taught to actively counter it. He learns to emit behaviors and coping self-statements which are incompatible with those which previously characterized him. To assist the client in recognizing his characteristic anxiety pattern, the therapist uses a variety of assessment techniques to get at the client's feelings, thoughts, and images which proceed, accompany, and follow his situational performances. Recognition cues the individual to actively engage in changing his self-statements in order that he may be more able to cope with the task at hand. In Wine's (1970) words, individuals learn to view signs of anxiety as facilitating in that they are alerted that it is time to respond with coping mechanisms rather than becoming immobilized as they were when they viewed anxiety as debilitating.

Empirical support for the cognitive therapist's focus on anxiety engendering self-statements comes from a

variety of sources. Liebert and Morris (1967) investigated the relationships among worry (cognitive component), emotionality (autonomic arousal), and performance expectancy. They hypothesized that there would be an inverse relationship between worry and expectancy performance, i.e. worry would be minimized in a situation in which a person expected to do well, and that worry would be maximized in a situation where the individual did not expect to do well. Fifty-four undergraduate psychology students were divided into high, medium, and low expectancy groups on the basis of their indication of the probability of whether they would do as well as they had hoped on a major exam. Individuals were classified into high (.7-1.0), medium (.4-.6), and low (0-.3) expectancy groups. They were also given part of Mandler and Sarason's (1952) Test Anxiety Questionnaire (TAQ) in a format containing five worry items and five emotionality items. Emotionality was relatively stable across expectancy levels, but there was an inverse relationship between worry and performance expectancy.

Further studies have supported the view that worry, or cognitive concern, interferes with test performance. Doctor and Altman (1969), in a study similar to that of Liebert and Morris, looked at the worry and emotionality components of test anxiety in relation to success expectancy, time lapse, and exam performance. Emotional level decreased significantly following exam completion regardless of

initial anxiety or expectancy level. Worry correlated more with expectancy for success than did emotionality; but there was a differential decrease in worry following exams, with high worry subjects decreasing significantly in post-assessments and low worriers remaining relatively stable on pre- and post-exam measures.

Wine (1971), in discussing the cognitive component of anxiety (i.e., worry), concluded:

Emotional arousal appears to bear no consistent relationship to performance on intellectual or cognitive tasks while worry is consistently and negatively related to performance...The worry component seems closely related to an attentional interpretation of test anxiety, which proposes that the adverse effects of test anxiety are due to attention being divided between self and the task. (pp. 99-100)

Emphasis on the cognitive component of anxiety provided the impetus for more recent studies comparing the effectiveness of cognitive modification techniques with other treatments of test anxiety (Holroyd, 1976; Meichenbaum, 1972). These studies will be examined more thoroughly later in this chapter.

Systematic Desensitization. Wolpe (1958) based his approach to psychotherapy on learning theory. He was interested in the learning processes involved in behavioral changes of organisms, particularly the elimination of neurotic behavior through "unlearning". Wolpe indicated three categories of conditioning operations which bring about change - counterconditioning, positive reconditioning,

and experimental extinction.

Jones (1924) paired feeding with gradual introduction of a feared object to reduce "neurotic anxiety" in children. Wolpe (1958) used a similar technique in an experimental laboratory with cats. From his experimental induction and elimination of neuroses in cats, Wolpe concluded "that fundamental psychotherapeutic effects follow reciprocal inhibition of neurotic responses" (Wolpe, 1958, ix). He arrived at his principle of reciprocal inhibition by combining a construct of Sherrington (1947) and a concept of Hull (1943). Hull's concept of conditioned inhibition is that when a competing response forces another response to stop, the stimuli associated with this occurrence operate as conditioned inhibitors. Sherrington's construct of reciprocal inhibition reflects his neurological emphasis. He indicates that "inhibition of one spinal reflex by another, (such as) occurs when stimulation of an ipsilateral afferent nerve causes relaxation of a vasocrureus muscle contracting to a contralateral stimulus" (Rychlak, 1973, p. 344). Wolpe extended this usage to encompass any situation in which one response is weakened by introduction of a new one.

In adapting his experimental findings to a clinical situation, Wolpe (1958) modified Jacobson's (1938) progressive relaxation techniques and employed imaginal anxiety hierarchies in developing the therapeutic process of systematic desensitization. The main assumption of desensi-

tization is that a particular response (A) can be inhibited by classically conditioning a new antagonistic response (B) to the stimulus setting associated with A. The individual is desensitized or counter-conditioned so that anxiety (typically, response A) is obstructed. The process consists of presenting a series of controlled imaginal exposures to a graduated series of anxiety provoking situations or objects, moving from least to most anxiety-engendering. The graded hierarchy of anxiety stimuli is typically associated with the antagonistic response (B) of deep muscle relaxation. If the client experiences anxiety because the visualized item is too stressful, the therapist instructs the client to stop imagining the stressful item, represents it, and does not proceed to the next item until the client can visualize the scene without feeling anxious.

In systematic desensitization, clients are systematically trained to relax the various body muscle groups to attain reduced physiological arousal. Wolpe's idea of reciprocal inhibition was that if the individual can make an inhibitory response to an anxiety provoking stimulus, the anxiety stimulus will cease to be linked with an anxiety response. Systematic desensitization concentrates on an individual's autonomic reactions, rather than on thought patterns, during the treatment procedures. Wolpe (1958) assumes that the process of systematic desensitization involves anxiety reduction through reciprocal

inhibition at the subcortical autonomic level. Bandura (1969) indicates that reciprocal inhibition occurs in the brain.

Several studies have investigated the components of systematic desensitization to ascertain the effective mechanisms of this approach. Rachman (1965) used subjective reports, avoidance tests, and fear estimates to assess the effects treating spider-phobic individuals with systematic desensitization. The groups were desensitization with relaxation (N=3), desensitization without relaxation (N=3), relaxation alone (N=3), and a no treatment control (N=3). Treatment consisted of 10 bi-weekly sessions. A three month follow-up was conducted in addition to pre-posttest measures. From the results obtained, Rachman concluded that assessment of the separate effects of relaxation and desensitization indicated that the combined effect of the two procedures was greater than the separate effects of each. He indicates that "the learning process involved is probably conditioned inhibition rather than extinction" (Rachman, 1965, p. 250).

London's (1964) interpretation of systematic desensitization focuses on cognitive factors. He indicates that following systematic desensitization treatment an individual's thinking and expectancies about the anxiety-provoking stimulus alter. In a similar vein, Wilkins (1971) states that neither relaxation or a graded hierarchy are necessary components in systematic desensitization; rather,

effectiveness is due to cognitive and social variables.

Davison and Wilson (1973), in assessing cognitive and social variables in systematic desensitization, indicate that there are inadequacies in Wilkins' "evidence" favoring a cognitive explanation of systematic desensitization. They say that Wilkins' (1971) conclusion that the efficacy of systematic desensitization stems from:

social variables involved in the patient-therapist relationship and cognitive variables involving expectancy of therapeutic gain, information feedback of success, training in the control of attention, and vicarious learning of the contingencies of behavior through instructed imagination (p. 311)

is logically and empirically deficient. They state that Wilkins does not support his claim that the cognitive component of "instructed visualization" of anxiety provoking scenes is adequate for change to occur. Furthermore, Davison and Wilson (1973) state that expectancy gain and social reinforcement from the therapist are minimal in systematic desensitization; information feedback can be explained in conditioning terms, and the explanation of vicarious learning and the explanation of attentional control are incompatible when considered together.

In another appraisal of the mechanics underlying desensitization, Lang (1969) concluded that neither a graded hierarchy, nor anxiety-competing responses were essential for anxiety reduction, thus contradicting Wolpe's theory of reciprocal inhibition. Lang theorized that the

primary therapeutic factor in systematic desensitization is the systematic exposure to anxiety arousing situations during which escape or anxiety reactions go unreinforced. In other words, once individuals can successfully confront anxiety evoking situations or events, without anxiety or escape behavior, the situations or events cease to elicit anxiety as a result of operant extinction.

The foregoing views are reflective of ongoing cognitive/behavioral controversies. There is differential emphasis on what process or processes are involved in therapeutic change - cognitive versus autonomic reconditioning. Brewer (1974) takes the position that if conditioning exists, it may not be applicable to humans at all. Rachlin (1977) indicates that cognitive behavior therapy techniques can best be described in the terminology of the behavioral therapist, and questions the efficacy of an approach which views thoughts as reinforcing or punishing. Cognitive behavior therapists tend to deemphasize conditioning (i.e., Beck & Mahoney, Lazarus). Franks and Wilson (1978) suggest that less emphasis be placed on whether cognition or autonomic reconditioning are primary in the change process and advocate an interactional or reciprocal view of the process. In spite of the fact that theoretical explanations for the efficacy of systematic desensitization vary, the technique appears to be effective for various problems (Rimm & Masters, 1974).

Variations of Wolpe's techniques have been used in the treatment of test and speech anxiety. Paul and Shannon (1965) indicated that a modified form of Wolpe's (1961) systematic desensitization treatment was more effective than other procedures (insight and attention placebo) in reducing anxiety in a short-term individual program. A further study (Paul & Shannon, 1966) used modified systematic desensitization in the treatment of speech anxiety. Results again favoured the desensitization approach.

The procedures used by Paul and Shannon (1966) have provided the basis for the modified desensitization treatment procedures used in studies by Meichenbaum (1972) and Holroyd (1976), and were used as guidelines for the group systematic desensitization treatment in the present study.

Results of Comparative Studies

The results of test anxiety studies comparing the effects of cognitive modification and systematic desensitization treatments are not consistently supportive of either approach. Table I summarizes the three major experimental studies of cognitive modification and systematic desensitization treatments of test anxiety which have been published to date. All three studies employed university students as subjects. The Maes and Heimann study (1970) referred to in Chapter I was not included since the

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only available documentation of this study is a government publication which does not give an adequate account of the methodology employed. Detailed information for the Montgomery (1971) study was not readily accessible since the study does not appear in journal form, and the Dissertation Abstract was not detailed enough for the purposes of this review. It was excluded from Table I. The third study included in the Table (Holroyd, 1976) was omitted from the Ledwidge article.

Table I

Three Studies Comparing Cognitive Modification Techniques with Systematic Desensitization Techniques

Study	Treatment Groups	Experimental Variables	Outcome Effectiveness
Suinn & Richardson (1971)	CM(AMT) N=13 SD N=11	MARS DAT STABS	CM=SD CM=SD CM=SD
Meichenbaum (1972)	CM N=8 SD N=8	Digit Symbol Test Raven's G.P.A. AD AAC	CM=SD CM=SD CM>SD CM>SD CM>SD
Holroyd (1978)	CM N=10 SD N=12 Comb. N=9	Digit Symbol Test G.P.A. STAI AD	CM & Comb.>SD CM>SD & Comb. CM>SD & Comb. CM>SD & Comb.

Note: only results pertaining to comparisons between cognitive and systematic desensitization approaches are recorded on the table, although all three studies involved other groups.

AAC - Anxiety Adjective Checklist
 AD - Anxiety Differential
 DAT - Differential Aptitude Test
 MARS - Mathematics Anxiety Rating Scale
 STABS - Suinn Test Anxiety Behavior Scale
 STAI - State-Trait Anxiety Inventory (State form)

CM - Cognitive Modification
 Comb. - Combined
 SD - Systematic Desensitization

The comparisons in Table I show cognitive modification to be superior to systematic desensitization in two of the three studies on both behavioral and self-report measures. While studies on one or the other of these two treatment techniques are extensive, there are relatively few comparative studies. Even within the three comparative studies summarized in Table I, various methodological problems exist which prevent 1) a clear categorization of treatments as cognitive modification or systematic desensitization, and 2) entirely valid experimental comparisons.

Suinn and Richardson (1971) compared a cognitive modification technique with systematic desensitization in the treatment of "math-anxious" university students. There were 11 subjects in the systematic desensitization group, 13 subjects in the anxiety management training group, and 119 subjects in the control group. Subjects were screened to ensure that they experienced anxiety rather than lack of ability or some other problem. Assignment to groups was roughly on the basis of order of response to an announcement about the program. The first 5 subjects were assigned to the systematic desensitization group, the next 13 subjects were assigned to the anxiety management training group, and the last 6 subjects were placed in the systematic desensitization group. The control group was made up of 119 students in an introductory psychology course.

Systematic desensitization consisted of half an hour of audiotaped relaxation training and two 2-hour audio-

taped systematic desensitization sessions. (The taped systematic desensitization program consisted of the following procedures: exposure to a previously constructed standard anxiety hierarchy (mathematics examination stimuli), counter-conditioning, and progression from the least threatening to the most threatening items on the anxiety hierarchy.) Anxiety management training (AMT) consisted of deep muscle relaxation training ($\frac{1}{2}$ -hour audiotape), training by therapist in visualization of anxiety provoking scenes (1 hour), and visualization and termination of anxiety provoking scenes (1 hour, audiotaped session).

The Mathematics Anxiety Rating Scale (MARS), the Differential Aptitude Test (DAT), and the Suinn Test Anxiety Behavior Scale (STABS) were employed as pre- and posttreatment experimental measures. Results of the study indicated that the anxiety management training group and the systematic desensitization treatment group were similar to one another with respect to pre-posttest improvement on both a performance measure (DAT), and on self-report measures (STABS and MARS). There were no significant differences between treatment groups on performance or self-report measures of therapeutic change. Analyses of the DAT improvement scores indicated that only the systematic desensitization group improved significantly from pretest to posttest. Pre-to-posttest reductions on the STABS were significant for both treatment groups, but differences between the posttest means of the treatment groups and control group were nonsignificant.

Analyses of response reductions to the MARS indicated that both treatment groups were significantly better than the control group. There were no significant differences between the groups on posttest MARS scores.

A number of problems are apparent in careful analysis of the Suinn and Richardson study. While MARS data were available for all 119 control subjects, DAT data were presented for only 44 control subjects. To further complicate the matter, STABS control group data were actually taken from another study (Suinn, 1969) of 158 students tested over a different time period (4 weeks vs. 14 days). In short, control group data for different measures were from different sources.

More serious problems arise from obvious confounds and overlaps in treatment procedures. In this study, the anxiety management training (cognitive) involved training in deep muscle relaxation, one of the major components of systematic desensitization. In fact, the main difference between systematic desensitization and anxiety management treatments in the study concerned the omission of an anxiety hierarchy in the anxiety management training treatment. Treatment sessions varied nonsystematically in length within and between experimental groups. Treatments were conducted at different points during the academic semester - a fact which has obvious bearing on the level of expressed anxiety of the treated subjects.

On the basis of the numerous methodological problems associated with the Suinn and Richardson study (all of which threaten its internal validity), legitimate inferences about the relative efficacy of cognitive modification and systematic desensitization approaches in reducing mathematics examination anxiety and improving mathematics performance are almost impossible.

Meichenbaum (1972) assessed the efficacy of test anxiety treatment procedures by comparing a cognitive modification treatment group (N=8) with a desensitization group (N=8), and a waiting list control group (N=5). His subjects were university students. The cognitive modification group was made aware of anxiety and ways of reducing it. The treatment technique consisted of two aspects - cognitive coping training and a modified desensitization procedure. Group systematic desensitization followed Paul and Shannon's (1966) group desensitization procedures consisting of progressive relaxation, group hierarchy construction, and imagery training. The waiting-list control group simply completed pre- and posttreatment variable measures. Dependent measures were divided between performance measures (Digit Symbol Test, Raven's, and G.P.A.) and self-report measures (Anxiety Differential and Anxiety Adjective Checklist).

Intergroup comparisons of pre- to posttest improvement on performance measures indicated that while the cog-

nitive modification group improved most on the Digit Symbol Test and the systematic desensitization group improved most on the Raven's, improvement differences between cognitive modification and systematic desensitization groups were not significant on these two variables. The cognitive modification group did improve significantly more on G.P.A. than did the systematic desensitization group.

On the self-report measures of anxiety (Anxiety Differential and Anxiety Adjective Checklist), the cognitive modification group produced significantly greater change on both variables than did the systematic desensitization group.

Since Meichenbaum's cognitive modification treatment combined both cognitive and modified desensitization elements, it is unclear to what extent the cognitive component alone accounted for the efficacy of the approach.

Holroyd (1976) makes a clear distinction between systematic desensitization and cognitive modification treatment approaches in a study assessing the comparative efficacy of cognitive modification and systematic desensitization (on self-report measures and academic performance) in the treatment of test anxious university students. Forty-eight test anxious students were randomly assigned to cognitive therapy (N=10), group systematic desensitization (N=12), combined cognitive therapy and systematic desensitization (N=9), a pseudo-therapy control group (N=10), and a waiting-list control group (N=12). The cognitive therapy group focused on facilitating students' awareness of anxiety,

and helping subjects learn alternate ways of interpreting and labelling anxiety. Students were encouraged to learn to control their anxiety so that it was not disruptive to them in the stress situation of writing an exam.

Group systematic desensitization followed Paul and Shannon's (1966) procedures of progressive relaxation training and hierarchy presentation. The systematic desensitization group in this study was thus similar to that in Meichenbaum's (1972) experiment. The combined cognitive therapy and systematic desensitization group used systematic relaxation and cognitive coping methods designed to deal with the "worry" and "emotional" components of anxiety. The combined group in the Holroyd study was thus directly comparable to Meichenbaum's (1972) cognitive modification group. The pseudotherapy/group meditation procedure focused on meditation exercises developed by McReynolds et al. (1973). It emphasized heightened body and mental awareness and control. The waiting-list control group was given the pre-post assessment measures as were all the treatment groups. Dependent measures were self-report (Anxiety Differential and STAI-S) and performance (G.P.A. and Digit Symbol Test).

Results indicated that the cognitive therapy treatment group was superior to the other treatment groups with respect to pre-posttest improvement on the G.P.A., STAI, and Anxiety Differential measures. The other treatment groups

had relatively similar outcomes to one another. Analyses of the Digit Symbol Test improvement scores indicated that the cognitive modification and combined groups were similar to one another and significantly better than the systematic desensitization, pseudotherapy, and control groups.

Using procedures similar to Holroyd (1976), the present study endeavours to distinguish between the effects of cognitive modification and systematic desensitization approaches in the treatment of the test anxiety of high school students. The central hypothesis is that both approaches will be effective in the treatment of test anxiety, but that the cognitive modification treatment will be superior on both behavioral (performance) and on self-report measures. These predictions are consistent with the results of previous studies (Table I), and reflect the theoretical notion that the cognitive approach focuses on both changing anxiety-provoking cognitions and the production of task-relevant self-statements to facilitate performance.

A further hypothesis is that the desensitization treatment will be more effective on behavioral than on self-report measures. Results of anxiety reduction studies indicate that following desensitization, an individual may still "feel" anxious in test situations, although he may behave "non-anxiously" (Davison, 1968; Paul, 1966). Results from Meichenbaum's (1972) study further support the greater efficacy of systematic desensitization treatment on per-

formance (Raven's) as opposed to self-report measures.

Two general theoretical questions which relate to the present experiment and its hypotheses are:

- 1) What are valid explanations for the relative efficacy of cognitive, behavioral, or combined cognitive/behavioral treatment approaches on performance and self-report measures of anxiety?
- 2) What is the general relationship between performance and cognitive/emotional aspects of anxiety?

The first of these issues is the focus of a recent controversy over whether or not cognitive therapy procedures produce significant increments in the empirical treatment effects generally associated with behavioral treatments (Beck & Mahoney, 1979; Ellis, 1979; Lazarus, 1979; Ledwidge, 1978; Wolpe, 1978). Ledwidge (1978) has recently stated:

The evidence from comparative studies... does not favor CBM procedures...the more cognitive the technique, the less effective it is. (p. 370)

Results of the studies indicated in Table I conflict with Ledwidge's remark and are supportive of a cognitive emphasis in the specific area of anxiety treatment.

The second theoretical issue concerns the extent to which performance and cognitive/emotional aspects of anxiety are correlated. If the processes are interactive, treating either component should affect the other, whereas if the processes are separate they would have to be treated

individually. For instance, if there is no interaction, we might expect a behavioral treatment to be necessary for the improvement of performance, and a cognitive treatment to be necessary for the alteration of cognitions. Results from the present study should provide a basis for further consideration of these issues as they relate to test anxiety.

Method

Setting & Subjects

The study took place in a secondary school (Grades 8-12), with a total enrolment of approximately 750 students. Students were from a large urban center, and also from an outlying rural area.

From an initial group of 122 volunteers (Grade 10 students) assessed on level of anxiety, study habits, and specificity of anxiety, 30 subjects (18 females, 12 males) were selected for the study (see Design section for specific selection criteria). Student volunteers participated as subjects in the study on the basis of information about the project provided to them by regular school counsellors. The information given to the students included the time schedule, format of the program, and goals of the sessions.

Ten individuals (4 males and 6 females) were randomly assigned to each of the groups - cognitive modification, systematic desensitization, and waiting-list control. To insure equivalent sex composition across groups, all females were assigned prior to the random assignment of the male subjects. All subjects were relatively similar on anxiety level (upper 10% of test anxious students tested).

Instruments

The screening instruments used in the study were the Achievement Anxiety Test (Alpert & Haber, 1960), the Fear Survey Schedule (Wolpe, 1969), and the Study Habits Checklist (Preston & Botel, 1967). The instruments used for the measurement of dependent variables were the Anxiety

Differential (Husek & Alexander, 1963), the Raven's Standard Progressive Matrices (Raven, 1956), and the State-Trait Anxiety Inventory - State form or STAI (Spielberger, Gorsuch, & Lushene, 1969). The instruments are described below.

Achievement Anxiety Test (AAT). Alpert and Haber (1960) found that specific anxiety scales correlate more significantly with performance than do general anxiety scales. On the basis of their findings they constructed the Achievement Anxiety Test, consisting of 19 items rated on a five-point scale, to measure two independent constructs, i.e. facilitating and debilitating anxiety in academic situations. Test-retest reliability over 8 months on the AAT was .75 on the facilitating scale and .76 on the debilitating scale (Alpert & Haber, 1960). Over a shorter time interval of 10 weeks test-retest reliabilities are somewhat higher: .83 and .87 respectively. The AAT facilitating scale correlates -.40 with the Test Anxiety Scale and the AAT debilitating scale correlates .64 with it (Alpert & Haber, 1960). In the present study, the AAT was used to assess achievement anxiety of the subjects for screening purposes.

Fear Survey Schedule. The Fear Survey Schedule is a 108 item questionnaire which uses a five-point rating scale to assess fear of things or events (Demaree, 1972). Test-retest reliability over five weeks was .72 (Suinn, 1969). A validity study by Geer (1966) indicated that individuals classified as a high-fear group, on the basis of scores on the Fear Survey Schedule, had a more elevated GSR than a control

group when exposed to a fear situation. The Fear Survey Schedule was used as a screening instrument in the present study to ensure that test anxiety, rather than general anxiety was what the subjects were experiencing.

Study Habits Checklist. The Study Habits Checklist (Preston & Botel, 1967) can be used for Grades 9 to university. It consists of 37 questions rated on a five-point scale. The test has ten sections related to study and exam preparation. Norms based on public and private schools in Pennsylvania, are available for grades 9-12. A validity study by Brown (1964) indicated that four of sixteen variables distinguished between over- and underachievers. Reliability as ascertained by split half correlations for Grades 9 - 12 is .91. The Study Habits Checklist was used in the present study for screening purposes because if students are anxious due to poor study skills, a test anxiety treatment program may not be as appropriate for them as a study program would be.

The foregoing has outlined the screening instruments which were used in the study. The measures which were used during the experimental test situation were the Anxiety Differential, the Raven's Standard Progressive Matrices, and the State-Trait Anxiety Scale (STAI-S). They are described below.

Anxiety Differential. The Anxiety Differential measures situational anxiety using a seven-point semantic differential scale for rating 18 items. Data on reliability indicated that alpha coefficients of internal consistency

yielded median reliabilities of .65 and .68 in two separate studies (Alexander & Husek, 1962; Husek & Alexander, 1963). Husek and Alexander (1963) state that: "the majority of items on the AD tests are sensitive to bodily harm and examination anxiety" (p. 316). Concurrent validity studies (Alexander & Husek, 1962) indicate that the AD correlates significantly with the Nowlis-Green Check List at .001 level. The Nowlis-Green Check List is a measure of temporary mood state. The Anxiety Differential was used in the present study as a measure of anxiety in test-taking situations.

Raven's Standard Progressive Matrices. The Raven's Standard Progressive Matrices is a multiple choice 60-item test. The manual indicates internal consistency coefficients of approximately .90 on split-half measures of reliability; short term test-retest reliability of .91 (7-10 days); long term test-retest reliability of .78 (3 yrs.); and correlations with the WAIS (.85). Scores for ages 14-24 years remain relatively constant (manual). In the present study, the Raven's was used as a measure of performance to assess the effects of anxiety in the test situation.

State-Trait Anxiety Inventory (STAI-S). The State-Trait Anxiety Inventory is a self-evaluation questionnaire consisting of 20 items rated on a four-point scale. Test-retest stability coefficients tend to be low (median $r=.32$) which is expected since situational factors influence state measures (Spielberger, Gorsuch, & Lushene, 1970). Internal consistency is high, with alpha reliability coefficients ranging from .83 to .92 (Spielberger, Gorsuch, & Lushene,

1970). Evidence for construct validity in a normal and exam condition is available for 977 undergraduate college students. Mean scores for state anxiety were "considerably higher in the EXAM condition than in the NORM condition for both males and females" (Spielberger, Gorsuch, & Lushene, 1970, p. 11).

Design

The study employed a single factor pretest-posttest control group design. Levels of the treatment factor were cognitive modification, desensitization, and waiting-list control. Ten subjects were assigned to each level. Pre- and posttest measures of anxiety (Anxiety Differential and State-Trait Anxiety Inventory) and performance (Raven's Standard Progressive Matrices and G.P.A.) constituted the dependent variables in the study.

As previously mentioned, the three screening instruments used in the study were the Achievement Anxiety Test, the Fear Survey Schedule, and the Study Habits Checklist. Individuals scoring under 34 on the Achievement Anxiety Test were excluded from the study because a pilot study indicated that this procedure would insure that only the upper 10% of test anxious students in the school would be sampled. From an initial 42 students selected on the basis of their scores on the Achievement Anxiety Test, 29% did not meet selection criteria set for the Study Habits Checklist and Fear Survey Schedule, or did not care to participate, leaving 30 students to take part in the study. The cutoff level for selection on

the Study Habits Checklist was a raw score of not less than 62, thus eliminating individuals with very poor study habits. (This procedure eliminated the bottom 20% of scores obtained by the original 42 students). The cutoff level on the Fear Survey Schedule was a raw score of no more than 187, which excluded students scoring in the top 20% of Fear Survey Schedule scores obtained from the original 42 students. The cutoff criteria on these measures were employed to ensure that subjects were primarily test anxious rather than generally anxious, and that their anxiety was not due to study problems. Thus, a student had to "qualify" on all three measures in order to participate in the study.

Prior to commencing the treatment phase of the study, the Raven's Standard Progressive Matrices were administered to each subject in a simulated stress situation. The subject was told:

This test tells a lot about your efficiency as a learner. Good learners tend to do very well on this test. It is sometimes said that you can tell how much people know from their performance on this test.

The State-Trait Anxiety Scale and the Anxiety Differential were administered following completion of the Raven's Standard Progressive Matrices. The evaluative situation was expected to be anxiety eliciting and similar to regular testing conditions. The validity of this assumption was apparent in expressed verbal concerns by some subjects about finding out what marks they obtained. Subjects were desensitized to the stress instructions at the end of the experiment. They

were told that tests, such as the one they had taken, were not totally reliable measures of their efficiency as learners, and that the test (Raven's) was used only to get a general measure of performance under artificially induced stress conditions.

Grade point average was obtained from the school records prior to and following the test anxiety management programs. G.P.A. was calculated on all subjects taken by the student during Grade 9, and for the September to January period for Grade 10 for pre- and posttest scores. Thus, the pretest G.P.A.'s covered a longer period than the posttest G.P.A.'s. G.P.A. was converted from letter grades to numbers as follows: A=6.00, B=5.0, C+=4.0, C=3.0, D=2.0, and E=1.0. G.P.A. constituted an achievement measure to supplement the Raven's Standard Progressive Matrices scores.

Two graduate students in educational counselling conducted the study. One student administered the cognitive modification program, and the other student conducted the modified systematic desensitization program. Each therapist followed a manual detailing the treatment procedures step-by-step. The therapists were trained in the specific procedures for the sessions which they conducted, and they rehearsed sessions prior to treatment sessions. All groups met for six 1-hour weekly sessions.

Following the completion of the test anxiety programs, subjects again performed on the Raven's Standard Progressive Matrices in the simulated stress situation and completed the Anxiety Differential and State-Trait Anxiety

Inventory.

Treatments

Cognitive modification (n=10). This procedure was based to a large extent on Ellis' rational-emotive therapy. Techniques are similar to those used by Meichenbaum (1972) and Holroyd (1976). Anxiety was explained to the subjects as resulting from their thoughts and self-statements occurring before and during exams. Subjects were told that an awareness of these thoughts and self-statements was necessary so that they could actively engage themselves in creating incompatible responses to the anxiety engendering ones. Subjects learned to label emotional arousal, learned to recognize inappropriate responses, and also to become aware of ways of replacing self-defeating thoughts and self-statements with more viable and positive alternate self-statements.

The first session of cognitive modification began with personal introductions and with individuals giving a brief description of their test anxiety; that is, how long they had had it, what happened when they got anxious, how pervasive was the anxiety, when did it occur, and so forth. This took about 20 minutes. Then the therapist gave the subjects an explanation of the treatment rationale and the procedures, explaining emotional and worry components of anxiety (Liebert & Morris, 1970), and describing on-task and off-task attentional foci (Wine, 1971). This took about 5 minutes. Following this, time was spent on an analysis of thoughts which typically occur during test situations (25

minutes). The session closed with group discussion and a homework assignment (recording anxiety-provoking self-statements made during the week) - 10 minutes.

Session two began with a discussion of the homework assignment. This further clarified any anxiety-provoking thoughts typical of an individual, and emphasized the nature of the program (10 minutes). Following this, coping self-statements were generated by group discussion (20 minutes). Since the treatment procedure was based on changing cognitions, it was important to note the pattern of thoughts of the test anxious subjects. Through a review of the pre-experimental test situation, the group members were encouraged to determine which of their distracting thoughts were more recurrent or typical of their anxiety. It was sometimes necessary to cue or prompt the subjects in order to get information from them concerning their self-statements. The session then proceeded with instruction in the use of alternate self-statements (20 minutes), followed by group discussion of the session and homework assignment - practising anxiety reducing self-statements in appropriate situations, and so forth (10 minutes).

Sessions three to five followed the format below. Discussion began and ended each session. The initial discussion dealt with anxiety problems and concerns related to procedures or session homework assignments (10 minutes). Most of the time was spent on individual subject-therapist interaction, which focused on the generation of anxiety coping

self-statements (40 minutes). Ten minutes of group discussion and homework assignment ended each session.

Session six consisted mainly of a review of the various areas covered in previous sessions:

- a) rationale and counselling procedure (10 minutes)
- b) anxiety provoking self-statements (10 minutes)
- c) anxiety coping (10 minutes)

Individual subject-therapist interaction lasted for 20 minutes, and 10 minutes of group discussion ended the hour.

Modified desensitization (n=10). Group rather than individual modified desensitization was used. Paul and Shannon (1966) indicate that the group procedure works as well as individually administered anxiety programs. In this procedure, deep muscle relaxation is paired with presentation of imaginary anxiety provoking scenes. The pairing is meant to inhibit autonomic arousal and to elicit an alternate response pattern to the stimulus of the exam situation. While the subject is in a relaxed state the therapist has the individual imagine test related situations which are mildly anxiety provoking. Eventually the therapist instructs the subject to imagine situations closely approximating an immediate test situation while still endeavouring to remain relaxed. Procedures used in the present study were a modified version of those used by Holroyd (1976) - with instructed relaxation training and visualization of an anxiety hierarchy being the two major features which define the approach.

The initial session of the group modified desensitization program began with personal introductions and a

brief history of each individual's experiences of test anxiety - length of problem, manifestations, pervasiveness, and so forth (20 minutes). Next, the treatment rationale and procedures were explained to the subjects (5 minutes). Following this, the therapist trained the subjects in progressive relaxation (25 minutes), after which the session ended with group discussion and assignment of homework (practice relaxation each day) - 10 minutes.

Session two commenced with a discussion period to deal with any problems with or misconceptions about the modified desensitization procedures (10 minutes). A pre-constructed temporal hierarchy of 15 items was introduced and students were encouraged to include individual items. On the basis of group discussion, a final hierarchy of 13 items was decided upon for subsequent sessions (20 minutes). This was followed by instructed relaxation (20 minutes). The session ended with a 10 minute group discussion and homework assignment (practicing relaxation, revising hierarchy, and so forth).

In sessions three to five the group started with a discussion of session, or session format (10 minutes). This was followed by 40 minutes of relaxation and hierarchy presentation. The sessions closed with group discussion and homework assignment (practicing relaxation, visualization of hierarchy, and so forth).

The final session consisted mainly of a review in which the rationale and treatment format (10 minutes), and

modified desensitization techniques were discussed (20 minutes). The therapist then interacted individually with subjects to suggest any particular alterations to their hierarchy or relation sequences which might prove useful to them (20 minutes). The session ended with a group discussion (10 minutes).

For a more detailed account of treatment sessions, refer to Baxter (1979) which contains the manuals used for the cognitive modification and systematic desensitization programs.

Results

In this chapter reliabilities of both screening and experimental instruments used in the study are reported, descriptive statistics (means and standard deviations) for all treatment groups on each experimental variable at both pretest and posttest are summarized, inferential tests of between group and within group experimental differences are documented, and an overall summary of between and within group findings is presented.

Reliability of Instruments

Screening Instruments. Cronbach alphas were calculated as an index of the reliabilities of the three screening instruments - Study Habits Checklist, Fear Survey Schedule, and Achievement Anxiety Test - using scores from the entire study population (N=122). The overall alpha for the Study Habits Checklist was .85 with a median on the subscales of .59. The Fear Survey Schedule overall alpha was .96 with a subscale median of .84. The Achievement Anxiety Test (1 scale) had an overall alpha of .84. The internal consistency of all three screening instruments was thus fairly high indicating that the screening decisions made on the basis of responses to these instruments were potentially valid.

Dependent variables. Overall alphas were calculated on three experimental variables (STAI-S, Anxiety Differential, and Raven's) using both pretest and posttest scores for the entire experimental group (N=30). The overall alphas on the pretests were: STAI, .84; Anxiety Differential, .74; and

Raven's, .87. Each of the three tests consisted of one scale only. Overall alphas on experimental posttests were as follows: STAI, .83; Anxiety Differential, .69; and Raven's, .86. Internal consistency of the three tests was generally good. There was little fluctuation in alphas from pre- to posttest administration, with the largest variation occurring on the Anxiety Differential. As indicated by the overall alphas on both the screening and on the experimental instruments, the tests used in this experiment were generally reliable.

Descriptive Statistics

From an examination of Table II, it is apparent that all three experimental groups were relatively similar on performance measures (Raven's and G.P.A.) prior to the experiment. On the self-report measures (STAI and Anxiety Differential) the cognitive modification and systematic desensitization groups indicate a higher level of anxiety than the control group on the pretest STAI scores; while on the Anxiety Differential, the cognitive modification and control groups report higher average scores than the systematic desensitization group. Overall, on the self-report measures, the cognitive modification group indicates a slightly higher level of anxiety than does the systematic desensitization group. Differences on all measures are slight and appear to indicate that the random assignment procedures employed in the study did ensure equivalent groups for each of the three experimental procedures.

With respect to pre- to posttest changes, self-reports of anxiety (STAI and Anxiety Differential) decreased for the cognitive modification group, and stayed about the same for the systematic desensitization and control groups. On performance measures (G.P.A. and Raven's), the systematic desensitization group improved on both. The cognitive modification group increased its score on the Raven's, but decreased its score on the G.P.A. measure. The control group remained about the same on the Raven's and decreased slightly on G.P.A.

Overall, trends indicate that the systematic desensitization group consistently increased its scores on performance measures from pre- to posttest, while remaining relatively unchanged on the self-report measures. The cognitive modification group improved on both self-report measures and on one of the performance measures (Raven's) while declining slightly on the other performance measure (G.P.A.). The control group remained very consistent from pre- to posttest measures (with the exception of G.P.A.).

Table II

Means and Standard Deviations of Treatment Groups on All
Dependent Variables Both Pretest and Posttest

Measures	Treatment Group	Pretest		Posttest	
		\bar{X}	S.D.	\bar{X}	S.D.
STAI	CM	42.00	8.87	35.20	7.90
	SD	39.40	4.81	40.10	8.25
	CO	35.10	9.87	35.40	9.66
Raven's	CM	40.40	4.58	43.90	3.64
	SD	40.80	11.74	45.00	9.01
	CO	41.70	4.83	41.30	6.95
AD	CM	52.20	12.63	46.10	10.02
	SD	46.20	10.96	45.50	9.95
	CO	54.00	6.62	53.70	7.86
G.P.A.	CM	3.22	.48	3.02	1.40
	SD	3.32	.70	3.43	1.03
	CO	3.25	1.00	2.75	1.12

N=10 for all groups

AD - Anxiety Differential

G.P.A. - Grade Point Average

STAI - State-Trait Anxiety Inventory (state form)

CM - Cognitive Modification

CO - Control

SD - Systematic Desensitization

Between Group Inferential Tests

To ensure that the treatment groups did not differ in degree of anxiety, or on performance prior to the experiment, one-way ANOVA's (using treatment groups as the independent factor) were performed on each of the pretest variables (STAI, Anxiety Differential, Raven's, and G.P.A.). No significant differences were found, thus confirming random assignment procedures - i.e. the treatment groups were similar on all experimental variable measures prior to treatment.

To test between group treatment effects, similar one-way ANOVA's were performed on the posttest variable scores (STAI, Anxiety Differential, Raven's, and G.P.A.). No significant differences between group treatment effects were apparent from these analyses. Therefore, trends in the posttest scores in Table II, while favoring cognitive modification over systematic desensitization and control on anxiety measures, and systematic desensitization over cognitive modification and control on performance measures (G.P.A. and Raven's) were not significant.

To further ascertain treatment differences on posttest variables, ANCOVA's on adjusted postscores were attempted using pretest scores as covariates. Unfortunately, when tests were conducted (through multiple regression analyses) to determine the statistical appropriateness of the ANCOVA procedures, it was found that interaction effects between covariates and treatment effects were significant

for all four experimental variables. Thus, data did not meet assumptions of equal covariance between the covariate and dependent variable across treatments. ANCOVA procedures were therefore abandoned. ATI (Aptitude Treatment Interaction) analyses were not pursued since sample sizes were too small to permit statistically powerful and substantially meaningful interpretation (Cronbach & Snow, 1977).

Within Group Inferential Tests

In order to initially examine experimental changes from pretest to posttest, two-way ANOVA's (Treatments x Trials) were conducted on the dependent variable scores (see Appendix A). Results of these analyses indicated that there were significant treatment by trial (pretest-posttest) interaction effects on the STAI ($F_{(2,27)}=4.70, p<.05$) and on the Raven's ($F_{(2,27)}=3.65, p<.05$), while main effects for treatment (in all cases) were not statistically significant. Main effects for trials were significant only on the Raven's ($F_{1,27}=10.55, p<.01$). Thus, there were improvements within groups on the STAI and the Raven's over the course of the experiment.

To further clarify within group effects on the STAI and on the Raven's, dependent t-tests were conducted comparing pretest to posttest means on these variables for all three treatment groups (see Table III).

Table III

Summary of t-test results between pretest and posttest means for all treatment groups on STAI and Raven's

	STAI	Raven's
CM	t=2.61*	t=2.47*
SD	t= .37	t=3.21*
CO	t= .28	t= .35

* $p < .05$
df=9

As indicated in Table III, the cognitive modification group improved significantly on the STAI ($t=2.61$, $p < .05$) and Raven's ($t=2.47$, $p < .05$). The systematic desensitization group improved significantly on the Raven's ($t=3.21$, $p < .05$), but not on the STAI ($t=.37$, $p > .05$). The control group did not show significant changes from pre- to posttest on either the Raven's or the STAI. Cognitive modification was effective on a self-report and a performance measure, whereas systematic desensitization only enhanced performance.

In summary, the between and within group findings indicated that while there were no between group differences for the treatment groups on any of the four experimental variables, there were within group differences. The cognitive modification group showed significantly increased performance on two of the four variables - STAI (self-report measure) and Raven's (performance measure); and the systematic desensitization group showed a significant increase on the

Raven's (performance measure). On the only variable on which both systematic desensitization and cognitive modification produced significant positive effects (i.e., the Raven's), the systematic desensitization group effect was numerically greater than the cognitive modification group effect, but no statistical significance was attached to this difference. The control group showed no significant changes on any measures.

Discussion

This chapter discusses the results of the study and examines the theoretical and practical implications of the findings. Overall, the results indicate that, while there were no significant differences between the three groups on anxiety and performance measures (at both pre- and posttest), the two treatment groups were effective in producing some clinically important and statistically significant improvements in the measured test-anxiety of the high school student subjects. Cognitive modification led to decreased anxiety (STAI) and somewhat improved performance (Haven's), while systematic desensitization significantly increased performance (Raven's). In contrast, the control group showed no positive improvement, remaining relatively unchanged from pre- to posttest. The prediction that the cognitive modification treatment would be superior on both performance and self-report (anxiety) measures was partially supported by within group improvement analyses, but was not evidenced in the results of between group comparisons: with respect to performance, the systematic desensitization treatment was at least as effective as the cognitive modification group.

The results of the study do not directly concur with Holroyd's (1976) findings, even though the methods employed in the two studies were similar. Holroyd found that cognitive modification was consistently more effective on both performance and anxiety measures. Meichenbaum's (1972) findings support the greater efficacy of cognitive modifi-

cation compared to systematic desensitization on anxiety measures, but the findings for performance measures are less clear, with the two treatments having similar effects on two of the three performance measures employed. Lomont and Sherman (1971) indicate that in five studies comparing systematic desensitization with a nontreatment control group, three of the studies found that systematic desensitization had no effect on performance, while the two other studies found systematic desensitization effective in improving scores on performance measures. There thus appears to be little consistency in the literature relating to the relative effects produced by cognitive and systematic desensitization treatment approaches with regard to performance measures.

The prediction that both approaches would be effective in the treatment of test anxiety was partially supported. Within group results indicate that there were significant differences on two of the four experimental variables. The cognitive modification group improved on a self-report (STAI) and a performance (Raven's) measure: while the systematic desensitization group showed significant improvement on a performance (Raven's) - this latter improvement being, in fact, numerically greater (but not statistically significant) than that shown by the cognitive modification group. The control group remained relatively unchanged. Comparisons within the groups suggest that the cognitive modification treatment altered both anxiety-provoking cognitions, and test-taking performance. The results for the systematic desensitization

group seem to indicate that subjects "felt" anxious, even though their test-taking performances improved. This latter interpretation concurs with the conclusion of at least some previous studies (Davison, 1968; Paul, 1966).

Overall, the results of the present study do not generally support a particular approach as being more effective than another. Empirical changes indicated that both treatments were effective on specific measures. It appears however, that if a counselling intervention is required which deals effectively with the problem of test anxiety as assessed by both performance and self-report measures, the cognitive modification approach may be preferable to the systematic desensitization approach.

In considering performance, it should be remembered that results were not significant on G.P.A. measures for any of the experimental groups. G.P.A. reflects performance in exam or test-taking situations. It is thus a conglomerate variable which might very well be expected to be unaffected by specific improvement in test anxiety. The reliability and validity of the grades used in the calculation of G.P.A. can also vary considerably across individual teachers and curriculum areas. The failure of the counselling interventions employed in this study to significantly impact G.P.A. is thus not a serious experimental failing. Nonetheless, since G.P.A. is the result of the evaluation procedures commonly used in schools, increasing performance on other measures may be of less practical importance in

obtaining support for test anxiety programs among teachers, parents, and school officials.

With regard to the relative efficacy of various treatment approaches, results of the present study indicate that Ledwidge's (1978) statement "...the more cognitive the technique, the less effective it is" was not supported. Meichenbaum's (1972) results indicate that a combined treatment deals with both performance and self-report (anxiety) concerns, but Holroyd's (1976) findings suggest that a combined treatment is not as effective as a cognitive approach. The present study did not have a combined group, and results were not clearly supportive of the overall efficacy of either a systematic desensitization or cognitive modification approach.

In considering whether or not therapeutic changes in⁷ performance and cognitive/emotional aspects of anxiety are correlated, results of the present study suggest that the processes are separate rather than interactive. Results from the systematic desensitization group clearly indicate that it is possible to affect performance without producing a correlated effect on the cognitive/emotional dimension. The fact that the cognitive modification group changed on both a performance and a self-report measure is not surprising since the cognitive modification approach contains specific treatment elements for both the production of self-statements facilitative to task attendance and performance, and the combatting of cognitive/emotional aspects of anxiety.

The failure of the systematic desensitization

approach to produce positive change on the self-report (cognitive/emotional) measures of anxiety is interesting in that desensitization techniques are theoretically designed to attend to emotional fear responses. One might speculate that a specific cognitive component (self-talk) is more critical to reducing "felt" anxiety, than is the imaginal form of "coping" with anxiety emphasized by systematic desensitization. It may be that systematic desensitization does not provide subjects with alternate ways of interpreting and labelling their anxiety. If it is true that cognitions are inextricably tied up with emotions (Ellis, 1963; Meichenbaum, 1977), failure to include a cognitive component may explain the failure of systematic desensitization to change "felt" anxiety.

Turning to the more applied question of implications for school counselling practice stemming from the present study, a number of points should be noted. An obvious advantage of group anxiety management programs, such as the ones utilized in this study, is that several students can be seen at the same time, thus making it possible for many individuals to benefit under what is often a very high pupil to counsellor ratio. To maximize accessibility to counselling services, programs such as these can be taped, if necessary, to be used on individual or group basis. The counsellor can act as a consultant for any problems experienced with such programs. Donner and Guerney (1971) indicated that automated group treatment of test anxiety

can be effective. Availability of self-study manuals and/or tapes outlining effective test anxiety management procedures should be of practical benefit to school counsellors and their clients.

School counsellors should focus on on-going counselling services in those problem areas where they know they can be effective. Test anxiety management training can also be supplemented with reading and study skills training, exam writing techniques, and so forth, if there are apparent deficits in these latter areas. Research and evaluation of program effectiveness can be incorporated into the counselling setting to ensure that students are benefiting from counselling services. Any strengths or weaknesses in a particular program should be ascertained and changes made accordingly.

In considering implications for accountability, presumably a counsellor is concerned with the efficacy of counselling programs, and will maximize efforts to ensure that these programs meet specified objectives. When using "new" counselling programs the counsellor may have to contend with varied reactions from parents, teachers, and school officials. If the test anxiety program is based on, and supplemented by, supportive research data, incorporation of the particular approach into the school counselling setting may be facilitated as the practical benefits of the programs can be clearly demonstrated.

Further research replicating the present study on a

larger and perhaps more diversified sample of test anxious high school students should undoubtedly be undertaken. Any inconsistencies in findings among such studies would further extend our knowledge of the active ingredients in test anxiety treatments. Additional research and follow-up data may suggest alterations to the cognitive modification and systematic desensitization approaches employed in this study.

A problem for further research is that the effectiveness of test anxiety procedures may vary with treatment length. Systematic manipulation of treatment intervention time-frames may well indicate an optimal program length. While both the systematic desensitization and cognitive modification approaches emphasize a practice component, there may be a stage at which continued practice yields diminishing returns in terms of therapeutic change. Additional empirical consideration should be given to the ability level and motivation of the students involved in test anxiety programs. Since high school students, such as those in the present study, would presumably be more heterogeneous in terms of such individual differences than would university students typically involved in test anxiety research, one might expect to discover differential treatment effects across ranges in individual aptitudes.

Finally, since results from the current study were generally consistent with previous studies - i.e., the cognitive modification group indicated a trend towards greater

overall improvement than did the systematic desensitization group - it might appear that any therapist effects were minimal. To control for therapist effects, there were rigorous boundaries and time slots for different instructional strategies and individual focus across parallel sessions of the two treatments. Extensive practice of the treatment procedures prior to the experimental sessions (by the two therapists) further insured that the therapists were actually behaving in accordance with the prescribed treatment procedures. However, additional precautionary measures such as expert rating of videotapes and/or audiotapes of the treatment sessions, crossover of therapists, et cetera, would have ensured a greater degree of experimental control for unintended therapist effects.

To summarize the results of this study, the cognitive modification approach was effective in reducing high school students' self-reports of anxiety (STAI) and improving performance (Raven's) in analogue test-taking situations. The systematic desensitization approach resulted in greater numerical increases in performance (Raven's), but had no effect on self-report measures of anxiety (STAI and Anxiety Differential). Thus, since the cognitive approach both improved performance and alleviated felt anxiety, it would appear, on the basis of this study, to be better suited to the overall treatment of test-anxious high school students than would systematic desensitization.

APPENDIX A
2-WAY REPEATED MEASURES ANOVAS
FOR DEPENDENT VARIABLES

Table 1

2-Way Repeated Measures ANOVA
on Anxiety Differential Scores

Source	SS	df	ms	F	p
Between subjects					
Treatments	646.55	2	323.28	2.40	.110
Error _b	3635.14	27	134.64	-	-
Within subjects					
Trials	84.02	1	84.02	1.40	.248
Trials x treatments	104.93	2	52.47	.87	.430
Error _w	1625.55	27	60.21	-	-
Total	147708.13	1	147708.13	1097.10	.000

Table 2

2-Way Repeated Measures ANOVA
on G.P.A.

Source	SS	df	ms	F	p
Between subjects					
Treatments	1.48	2	.74	.48	.622
Error _b	41.35	27	1.53	-	-
Within subjects					
Trials	.58	1	.58	1.28	.269
Trials x treatments	.95	2	.48	1.05	.365
Error _w	12.28	27	.46	-	-
Total	600.02	1	600.02	391.76	.000

Table 3
2-Way Repeated Measures ANOVA
on Raven's

Source	SS	df	ms	F	p
Between subjects					
Treatments	19.63	2	9.82	.10	.907
Error _b	2693.85	27	99.77	-	-
Within subjects					
Trials	88.82	1	88.82	10.55	.003 *
Trials x treatments	61.43	2	30.72	3.65	.040 *
Error _w	227.25	27	8.42	-	-
Total	106765.56	1	106765.56	1070.09	.000

* significant

Table 4
2-Way Repeated Measures ANOVA
on STAI-S

Source	SS	df	ms	F	p
Between subjects					
Treatments	218.62	2	109.31	0.90	.420
Error _b	3296.30	27	122.09	-	-
Within subjects					
Trials	56.07	1	56.07	2.96	.097
Trials x treatments	178.03	2	89.02	4.70	.018 *
Error _w	511.90	27	18.96	-	-
Total	86032.63	1	86032.63	704.69	.000

* significant

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