A COMPARISON OF THE EFFECTS OF DIRECT VERSUS VICARIOUS INDIVIDUAL AND GROUP DESENSITIZATION OF TEST-ANXIOUS STUDENTS

by

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ABSTRACT

This study investigates within a group of junior-high-school students, referred by counselors for reported test-anxiety, differential changes in two dependent measures of the criterion behavior following (1) direct individual and group desensitization, (2) observation of desensitization of peers, or (3) no treatment.

Change was assessed by pre- and post-treatment administrations of the Test Anxiety Scale (TAS), a questionnaire; and the Comprehension subtest of the Gates-McGinitie Test of Reading, a work-sample of scholastic performance presumably susceptible to inhibition by elevated test-anxiety.

Fifty seventh-graders were assigned by stratified random sampling, based on initial TAS level, to two therapists and the following treatments: (1) direct-individual, (2) direct-group, (3) vicarious individual, (4) group-observing-group, (5) group-observing-model. Twenty-one referred eighth-graders served as no-treatment controls.

The prediction that all experimental treatments, relative to no treatment, would produce significant improvement on both dependent measures was confirmed at high confidence levels for pooled Ss, for males, and for females.
Comparisons among experimental treatments revealed no significant effects or interactions attributable to treatment group, to therapist differences, or to direct-versus-vicarious or individual-versus-group treatments. Initial mean TAS differences between experimentals and controls and males and females imposed no qualification on significant main results.
INTRODUCTION

Following the early work of Mandler, Sarason, and their associates (Mandler and Sarason, 1952; Sarason and Mandler, 1952; Sarason, Mandler, and Craighill, 1952), numerous researchers have studied the measurement and reduction of test anxiety. The problem appears to be widespread. Eysenck and Rachman (1965, p. 215) estimate that 20 percent of school children experience fear of school examinations. Furthermore, many students who appear to have the ability to do well on examinations perform poorly because of their anxiety (Alpert and Haber, 1963; Paul and Erikson, 1964). A recent study by Emery and Krumboltz (1967) indicates that the reported effects of test anxiety include: inability to organize logical and coherent answers to essay questions; impairment of normal eating and sleeping patterns on the day preceding an examination; and the experience of "going blank" when encountering a difficult mathematical problem. Furthermore, Spielberger (1962) and Spielberger and Katzenmeyer (1959) found that highly anxious students receive lower grades and sustain a higher academic failure rate than nonanxious students with equivalent IQ's.

Because of the high incidence of test anxiety among students, and its debilitating effects upon academic performance, there appears to be a strong need for preventive or remedial programs in the schools. Such
programs do not yet exist partly because, until recently, no generally effective techniques for reducing test anxiety had been devised. Furthermore, despite the evidence of recent studies (Emery and Krumboltz, 1967; Katahn, Strenger, and Cherry, 1966; Kondas, 1967; Paul and Shannon, 1966; Suinn, in press) that variants of Wolpe's (1958) systematic desensitization procedures can be used to remove or reduce test anxiety, methods of simultaneously applying the Wolpe technique to large groups would have to be devised in order to meet current needs without greatly expanding school staffs. The present study presents evidence that the principles of vicarious learning, the many varied applications of which are reported by Bandura (1965 and 1969), may be combined with desensitization in order to treat large numbers of test-anxious students effectively with a minimum expenditure of therapist time.
REVIEW OF THE RELEVANT LITERATURE

The literature relevant to the present study falls into three categories: (1) studies describing traditional methods of treating test anxiety; (2) studies describing the treatment of test anxiety by systematic desensitization; (3) studies supporting the feasibility of applying vicarious processes to the treatment of test anxiety by systematic desensitization.

Treatment of Test Anxiety by Traditional Methods

Earlier therapists, reflecting their training in insight-oriented therapy, used reassurance, interview techniques, ventilation, and counseling to treat test-anxious students. Sarason (1958) reported that reassurance apparently facilitated the verbal learning of high test-anxious subjects. Hoehn and Saltz (1956) found that interviews appeared to help certain anxious students but that those classified as "rigid" were more likely to fail if interviewed. The interaction described above occurred only when students were encouraged to complain during the interview. Discussions focusing on students' goals and interests produced no noteworthy effects.

Apparently employing the principle of ventilation, McKeachie, Pollie, and Speisman (1955) instructed half their students to "feel free to
comment" on the test questions, using spaces provided on their special answer sheets. Control subjects were given standard answer sheets. The authors reported "reliably" higher scores for the group instructed to comment. They concluded that this procedure reduced anxiety and its inhibitory effects upon performance.

Chestnut (1965) surveyed 15 studies in which counseling procedures were used to facilitate the academic performance of under-achieving college students (Anderson, 1956; Baymur and Patterson, 1960; Broedel, et al., 1960; Caplan, 1957; Clements, 1963; De Weese, 1959; Duncan, 1962; Hart, 1963; Maroney, 1962; Marx, 1959; McCarthy, 1959; Sheldon and Landsman, 1950; Speegle, 1962; Spielberger, Weitz and Denny, 1962; Winborn and Schmidt, 1962). Many of these investigators assumed that underachievement was determined by other variables as well as anxiety (e.g., aptitude, study habits, part-time work schedules, curriculum choice, intrapsychic conflicts, and low motivation). Never- theless they believed that counseling techniques would facilitate academic performance irrespective of the components contributing to individual underachievement. Chestnut found that only two studies (Hart, 1963; and Spielberger, et al., 1962) have clearly indicated that group counseling can facilitate academic achievement. Moreover, the Spielberger study reported that only a limited number of the subjects demonstrated any beneficial effects from the group-counseling procedures.
Chestnut (1965) compared the effects of structured and unstructured group counseling of underachieving college students, using pre- and post-counseling grade point averages (GPA) as a measure of outcome. Although he did not obtain significant differences between experimental and control changes in GPA following counseling, he did find significant differences between the regression coefficients relating pre- and post-counseling GPA's. Because of their ambiguity, Chestnut's results give only limited support to the efficacy of his techniques.

In summary, most investigators using reassurance, counseling, or other methods derived from insight therapies, have reported marginal and conditional changes, and their results indicate the limited effectiveness of insight-oriented techniques in reducing test anxiety.

**Treatment of Test Anxiety by Systematic Desensitization**

A growing body of research indicates that Wolpe's (1958) systematic desensitization procedures have been consistently effective in reducing or removing a variety of phobias and anxieties (Eysenck and Rachman, 1965; Grossberg, 1964). Although early studies were performed with individual subjects, Lazarus (1961) demonstrated that the therapist could broaden his effectiveness by desensitizing several people simultaneously.

Paul (1966) demonstrated the effectiveness of systematic desensitization in alleviating anxiety associated with speaking before a class,
thus establishing the applicability of the technique to social evaluative anxiety occurring in a classroom setting. Paul assigned 74 college subjects to four treatment groups: (a) modified desensitization, (b) insight-oriented psychotherapy, (c) attention-placebo treatment, (d) no treatment. Twenty-two additional subjects served as a no-treatment control. Analyses of variance and comparison of individual improvement rates found desensitization consistently superior (100 percent success); no differences were found between the effects of the insight-oriented psychotherapy and the non-specific effects of the attention-placebo treatment (47 percent success), although both groups showed greater anxiety reduction than the no-treatment controls (17 percent).

Paul and Shannon (1966) extended the earlier work of Lazarus (1961) by successfully treating fear of speaking before a class with group desensitization.

Only five studies reporting the treatment of test anxiety with systematic desensitization have to date appeared in the literature (Emery and Krumboltz, 1967; Katahn, Strenger, and Cherry, 1966; Kondas, 1967; Paul, in press; Suinn, in press). Paul's study reported a single case. Katahn, Strenger, and Cherry (1966) used the desensitization procedures to bring college students' anxiety within manageable limits and counseling (suggestion and advice) to help the students develop the necessary skills for improved academic performance. They reported that the 14
experimental subjects, in comparison to 29 control subjects, showed a
significant increase in GPA and a significant decrease in Test Anxiety
Scale scores after completion of the program. It was impossible, because
of the design of the study, to determine the differential effects of desensi-
tization and counseling in effecting change.

Investigating the effects of standard, as compared to indi-
vidualized, hierarchies in systematic desensitization of test-anxious
college students, Emery and Krumboltz (1967) randomly assigned 54
test-anxious college students to either (a) desensitization with indi-
vidualized anxiety hierarchies, (b) desensitization with a single standard
hierarchy, or (c) a no-treatment control group. Both hierarchies were
constructed from the same pool of 16 items, compiled from the individual-
ized hierarchies of 15 test-anxious subjects collected in a pilot study by
Emery. Items in the standard hierarchy were rank-ordered by the experi-
menters; whereas subjects in the individualized hierarchy group were
allowed to order the items individually. Criteria for assessing change
were self-ratings of anxiety before and during examinations, scores on a
test anxiety scale, and final examination grades. Students who received
desensitization rated themselves as significantly less anxious about
examinations both before and during their final examinations, as compared
with the no-treatment control group. Final examination grades of the
desensitization groups were slightly, but not significantly, higher than
those of the control group. No difference was found for the relative effectiveness of standardized versus individualized hierarchies.

Suinn (in press), using individual hierarchies for each subject, augmented individual treatment sessions with initial group meetings in order to speed up relaxation training, to explain the rationale of the treatment, and to begin eliciting items for hierarchies. To assess change, Suinn administered the following instruments before and after treatment: a 50-item test anxiety scale (STABS); the Sarason test anxiety scale (TAS), having a reliability of .91 (Sarason and Mandler, 1952); and a modification of the Fear Survey Schedule (Wolpe and Lang, 1964). Although both treated and untreated groups showed decreases in reported anxiety upon second testing, decreases were significantly greater on all measures for the treated group.

All the studies reported have used test-anxious college students as subjects. However, Kondas (1967) has recently studied sixth-to-ninth graders, as well as college students. Kondas employed interviews, parallel series of fear survey schedules, and a palmar perspiration test with Boymond's mixture as indicators of changes occurring after treatment. Twenty-three test-anxious sixth-to-ninth graders were assigned to three treatments: (1) group systematic desensitization (n=6), (2) group autogenic relaxation (n=6), (3) group exposure to hierarchy items without relaxation (n=5). Six subjects were assigned to a no-treatment
control group. A second sample, comprising thirteen test-anxious university students, was divided into three groups: (1) group systematic desensitization (n=6), (2) group autogenic relaxation (n=4), (3) controls (n=3). Although the small and unequal n's in Kondas's groups weaken statistical analyses, he found a highly significant difference in favor of desensitization in both samples.

Katahn (1968) mentions additional work with younger children. He states that he and his associates completed encouraging pilot work in desensitization of test-anxious seventh-graders in the spring of 1967, but he does not elaborate further.

In contrast to the inconclusive results reported for other types of treatments for test anxiety, the outcomes of desensitization studies with both group and individual methods have been highly encouraging.

Studies of Vicarious Processes

In a comprehensive review of research in vicarious learning, Bandura (1965, p. 2) notes that:

Although historically learning by vicarious experience has been generally labeled 'imitation,' in the contemporary literature essentially the same phenomena are subsumed under other terms such as 'observational learning,' 'copying,' 'social facilitation,' 'vicarious learning,' 'contagion,' 'identification,' and 'role-playing.'

He proceeds to define a vicarious learning event, as follows:

... one in which the new responses are acquired or the characteristics of existing response repertoires are modified as a function
of observing the behavior of others and its reinforcing consequences, without the modeled responses being overtly performed by the viewer during the exposure period. (p. 3)

Studies of observational learning have appeared sporadically in the literature, beginning with the early theoretical work of Morgan (1896), Tarde (1903), and McDougall (1908); however current interest in the systematic investigation of various parameters of modeling dates from the germinal studies of vicarious processes by Bandura and his associates (Bandura, 1962; Bandura and Huston, 1961; Bandura, Ross, and Ross, 1961). Since their appearance, the volume of work in this area has expanded rapidly.

Study of vicarious learning processes represents a move away from exclusive preoccupation with the operant conditioning paradigm of response acquisition; it emphasizes the mediational mechanisms and principles of social learning descriptive of human behavior in a naturalistic setting. Present work moves progressively toward the natural environment with a consequent de-emphasis of results based on conditions obtaining only in laboratory settings. Although much of the methodology and the theoretical underpinnings derive from experimental social psychology, the findings hold important implications for learning theorists, personality theorists, and clinicians.

Recent studies of vicarious processes have ranged across a broad spectrum of human learning. However, the studies dealing with vicarious emotional arousal, vicarious classical conditioning, and
extinction bear most closely on the present study, since test anxiety
is commonly conceptualized as a conditioned emotional response, and
systematic desensitization is viewed as a counter-conditioning process
(e.g., Davison, 1968).

Vicarious emotional arousal

Questioning the traditional view that the occurrence of emotional
responses requires direct experience of the affective stimulus, Bandura
(1965, p. 34) points out that "emotional responses are frequently acquired
through observation of the pain and fear reactions exhibited by other
persons exposed to aversive stimuli." He adds that most persons
exhibiting snake phobias have never had direct aversive experiences with
reptiles. Conversely, positive emotional responses also may be acquired
by observing others experiencing positive response consequences.
Dysinger and Ruckmick (1965), who measured the autonomic responses of
children and adults to films showing dangerous and erotic-romantic
sequences, submitted early evidence for vicarious affective arousal.
More recently, Lazarus, et al. (1962), using a film of penile subincision
rites among Australian aborigines, noted that the level of the subjects'
autonomic responses was correlated with the apparent intensity of the
responses manifested by the filmed characters. Speisman, et al. (1964),
by varying the explicitness of the sound track in this film, succeeded in
manipulating the subjects' level of emotional arousal.
Church (1959) found rats to be responsive to vicarious arousal of fear. Rats who were shocked while observing other rats being shocked showed a greater decrement in bar-press behavior for food than rats who were given shocks of equal intensity and frequency but who did not observe other rats being shocked. The differential decrement was attributed to an augmented level of fear arousal resulting from the observation of other rats undergoing shock. Miller, Banks, and Ogawa (1962, 1963) reported similar findings with Rhesus monkeys. Animals trained to avoid shock manifested strong avoidance responses, even after extinction to a zero level, upon seeing another monkey exhibit signs of fear.

Vicarious classical conditioning

As has been noted, emotional responses may be elicited vicariously; experimental evidence indicates that classical conditioning may also occur vicariously. These findings broaden our understanding of the manner in which conditioned fear responses may be acquired in the natural environment and suggest the feasibility of alleviating fears by counter-conditioning. If one accepts a classical conditioning paradigm as a description of the acquisition of conditioned emotional responses, the possibilities of vicarious counter-conditioning by observation of systematic desensitization become apparent.

Barnett and Benedetti (1966) and Berger (1962) demonstrated that a subject observing the aversive conditioning of a model begins to
exhibit avoidance reactions to the conditioned stimulus alone without having had direct exposure to aversive stimulation. Berger (1962) reported another series of studies in which subjects who had been told that a model would be shocked shortly after a buzzer sounded displayed greater increments in GSR responsivity to the buzzer than subjects who thought the model would not be shocked.

An experiment by Bandura and Rosenthal (1966) provides further evidence for the vicarious acquisition of conditioned emotional responses. Arousal levels of the subjects were manipulated psychologically (a) by threat of shock; (b) by a placebo injection, the contents of which were unknown to the subjects; (c) by a combination of shock-threat and placebo injection; physiological arousal was manipulated by injection of either a small or large dose of epinephrine. All subjects then observed a model who, while performing a pursuit rotor task, feigned avoidance responses to electric shock each time a buzzer sounded. GSR responses were used as a measure of subjects' vicarious conditioning. During test trials six CS-alone trials were interspersed with 10 conjoint presentations of the CS and the model's feigned responses. If no-injection-no threat, placebo injection, placebo injection plus threat of shock, epinephrine-induced arousal (small dose), and epinephrine-induced arousal (large dose) are conditions assumed to produce incremental levels of arousal, results appear to indicate a U-shaped relationship between arousal level and vicarious conditioning. Within-treatment correlation analyses indicate that
emotionality and vicarious conditioning are essentially un-correlated at low and moderate levels of arousal, positively correlated as arousal is further increased, and highly inversely related under conditions of strong physiological arousal; these results suggest a non-monotonic relationship between level of arousal and rapidity of extinction. The authors explain failure of low-arousal subjects to exhibit much vicarious conditioning in terms of an activation hypothesis. On the basis of a post-experimental questionnaire, they conjecture that the equally poor conditioning of high-arousal subjects was due to self-generated disruptive effects (e.g., positive emotive imagery) designed to reduce the aversiveness of the vicarious instigation situation. The finding of a U-shaped relationship between arousal level and vicarious conditioning and the suggestive evidence for self-generated response inhibition emphasize the necessity for considering the effects of the patient's emotional level and possible effects of patient-generated response inhibition in clinical applications of vicarious conditioning.

Vicarious extinction

Investigators have demonstrated vicarious extinction of both instrumental and autonomic responses. The technique involves exposing observers to stimulus events in which the responses of the active subject are followed by either the omission of reinforcement or the substitution of opposing reinforcing stimuli. Early studies by Masserman (1943)
and Jones (1924) foreshadowed the current clinical use of vicarious extinction in treating phobic reactions.

In Masserman's study, cats that had been negatively conditioned to food-approach by pairing food with shock or air blast subsequently observed a cagemate that had never been conditioned obtain food with no negative consequences. Although this procedure gradually extinguished avoidance responses and facilitated reinstatement of normal approach and feeding behavior in several cats, others continued to exhibit avoidance responses after repeated exposures to the modeled fearless behavior. Furthermore, after the fearless cat was removed, several cats that had approached the food while he was present again exhibited avoidance responses. In an earlier experiment with children, Jones (1924) successfully extinguished conditioned fear responses in some, but not all, of her subjects by having them observe peers react calmly to the presence of the avoided objects.

Bandura (1965, p. 45), commenting upon the cases cited above, observes:

... the models responded to the most aversive stimulus situation at the onset, a modeling procedure that is likely to generate high levels of emotional arousal in the observers. Under these conditions any avoidance response performed by the observing subjects that serves to terminate the vicariously instigated aversive stimulation will in fact be reinforced rather than extinguished. Therefore the efficacy of vicarious extinction procedures may depend to a large extent on the care with which the modeled performances are programmed.
Bandura cites results (Kimble and Kendall, 1953) indicating that avoidance responses can be rapidly extinguished by exposing subjects to a graduated series of aversive stimuli that progressively approximate the original intensity of the conditioned fear stimulus. Vicarious application of this method involves observation of a model undergoing progressive extinction of a series of aversive stimuli presented in ascending order of intensity. After the model extinguishes to a relatively weak stimulus, he is exposed to one immediately above it in the hierarchy until all components of the stimulus configuration have been neutralized.

Melvin and Brown (1964) and Wolpe (1958) reported that extinction of conditioned fear responses could be facilitated by pairing emotion-eliciting stimuli with competing positive responses (e.g., muscular relaxation). Bandura, Grusec, and Menlove (1967) vicariously induced competing responses during group vicarious extinction of dog phobias in young children. After situational testing, subjects were grouped into stratified levels of avoidance behavior toward dogs and assigned to one of four conditions: (1) eight brief sessions observing a fearless peer modeling progressively more intimate and more active interactions with a dog, (2) eight similar sessions presented within the positive context of a party atmosphere, (3) eight party sessions with the dog present but with the model absent, (4) eight party sessions with both dog and model absent.
Decrement in avoidance behavior was measured by readministration of the situational test consisting of the graded sequence of interaction tasks with the test animal. Tasks included petting the dog, releasing her from her play pen, removing her leash, feeding her, and spending fixed periods of time alone with her. The terminal test required the children to climb into the animal's play pen to pet, and remain alone, with her.

The modeling procedure produced substantial extinction of avoidance responses, including generalization to dogs other than the test animal. The party atmosphere, designed to evoke positive competing responses incompatible with anxiety, failed to contribute significantly to the obtained outcomes.

Under the conditions of the Bandura, Grusec, and Menlove study no measurable effects attributable to the introduction of competing positive responses were found; however such effects were suggested by the Bandura and Rosenthal (1966) experiment. As previously noted, these researchers observed that high arousal subjects who reported countering anxiety with positive emotive imagery achieved rapid extinction of conditioned GSR responses. These findings suggest the necessity of discriminating between the highly anxious clinical patient who cannot inhibit avoidance responses to emotion-evoking stimuli and the less anxious experimental subject who often can dilute the effects of aversive stimulation.
He may do this by one or more of the following procedures: (1) interposing competing emotive imagery, (2) blocking aversive stimulation by non-attending, (3) changing aversive stimuli imaginally in order to lower their affective level. Exposing a highly anxious clinical patient to modeled stimuli capable of inducing high levels of arousal usually reinforces avoidance responses (Bandura and Menlove, 1968); whereas exposing a relatively non-anxious subject to comparable stimuli may evoke responses designed to counteract the effects of arousal. Because of the inability of many clinical patients to generate such responses spontaneously, self-dosing with emotion-evoking stimuli is contraindicated. In order to hold the patient's levels of arousal within manageable limits, the therapist must not only avoid prematurely exposing him to intensely aversive stimuli but must also insure induction of responses incompatible with anxiety. These considerations appear relevant to both direct and vicarious counter-conditioning procedures.

Bandura and Menlove (1968), reporting a current adaptation of symbolic modeling for the treatment of phobias in adults, cite three modifications incorporated to increase the efficacy of the method: (1) clients are taught to induce and maintain anxiety-inhibiting relaxation throughout the period of exposure, (2) the rate of presentation of modeling stimuli is controlled by the client in order that he not be compelled to confront a highly aversive stimulus before neutralizing those preceding it in the hierarchy, (3) clients who fail to attain terminal behavior are
administered a powerful live-modeling-guided-participation form of treatment, in which, after observing the most fear-provoking behavior repeatedly modeled without any adverse consequences, clients are aided through demonstration to perform progressively more threatening responses toward actual feared objects. Obviously, incorporation into Bandura's procedure of relaxation, graded exposure to stimuli, and execution of feared responses greatly increases its similarity to Wolpe's systematic desensitization, especially in vivo desensitization.

Application to snake-phobic adults of these revised procedures is reported in detail by Bandura, Blanchard, and Ritter (1968). In order to qualify for inclusion in the study, subjects who answered an advertisement offering to treat people with snake phobias were required to demonstrate inability to handle a harmless snake. Those selected were randomly assigned either to a control group or to one of four treatment conditions: (1) standard desensitization, (2) self-administered symbolic modeling accompanied by relaxation, allowing subjects to expose progressively more threatening filmed stimuli at their own rate or to back up when necessary, (3) live modeling of interaction with the snake plus guided participation. All subjects were administered a semantic differential test to assess evaluative attitudes toward snakes and a fear survey to measure transfer effects. Before beginning treatment, the male and female therapists provided all subjects with reassuring information about snakes.
They then readministered the fear survey and semantic differential test; attitude change at this point was negligible. Although all three treatment procedures produced decrements in avoidance behavior, only the live-modeling-guided-participation group unanimously achieved the criterion behavior of handling the snake. Subsequently, all partially-improved subjects were able to achieve the criterion behavior following post-experimental exposure to the live-modeling-guided-participation condition. Post-treatment readministration of the attitude scales indicated that significantly greater attitude change was affected by the behaviorally-oriented approach embodied in the actual treatment procedures than by the affect-oriented or information-oriented approaches embodied in the reassuring and informational statements made to the subjects before treatment.

As part of an ongoing program of research, Bandura and his associates continue to investigate various parameters of vicarious extinction of avoidance behavior through symbolic modeling. Bandura and Menlove (1968), working with dog-phobic children, demonstrated that avoidance behavior could be reduced or removed by exposing the children either to a graduated series of films in which a model displayed progressively more intimate interactions with a single dog or to a similar set of graded films depicting a variety of models interacting non-anxiously with numerous dogs varying in size and fearsomeness. Relative to a
no-treatment group both the single model-modeling and multiple-modeling treatments produced significant reductions in avoidance behavior; however only the children who received the multiple-modeling treatment were able to perform potentially threatening interactions with dogs.
STATEMENT OF THE PROBLEM

The evidence presented above supports the following conclusions: (1) test anxiety often inhibits performance on school examinations and may therefore depress examination grades and grade-point-average; (2) both group and individual systematic desensitization procedures have proven effective in reducing or removing test anxiety; (3) vicarious emotional arousal, vicarious emotional conditioning, and vicarious extinction of conditioned emotional responses have been adequately demonstrated.

Therefore, the following hypotheses were advanced: In comparison to untreated control subjects, subjects treated by systematic desensitization and subjects observing others receive the treatment would experience: (1) a decrement in reported anxiety as measured by readministration of a test anxiety scale, (2) an increment in test-taking facility as measured by the Comprehension section of equivalent forms of the Gates-McGinitie Reading Test, (3) an increment in second semester grade-point-average over first-semester grade-point-average.

Since the systematic desensitization procedure is conceptualized as a counter-conditioning process, and since vicarious counter-conditioning has been demonstrated, it was believed that vicarious subjects would achieve extinction of conditioned emotional responses by
observing others achieving extinction. The efficacy of vicarious desensitization may be considered to derive from actual imitation of the procedures and from following the therapist's instructions, in the same manner as the direct subjects, and also from the effects of observing fearless behavior of peers, i.e., observing peers able to imagine with equanimity items that formerly aroused fear.

This study investigated, relative to each other and to an untreated control group, three vicarious and two direct treatment procedures: (1) individual subjects directly desensitized paired with (2) individual observing subjects, (3) five-person groups of directly desensitized subjects paired with (4) five-person groups observing, (5) five-person groups of vicarious subjects observing the individual desensitization of a peer model.

One might argue that direct practice gives better, more precise response-production than does indirect, vicarious practice; one might also argue that the increased proportion of therapist attention, and opportunity to guide and correct a client, should render individual treatment superior to group procedures. At the same time, evidence on systematic desensitization suggests that therapist effects are minimal (Paul and Shannon, 1966), that both individual and group desensitization techniques have accomplished equivalent decreases of conditioned fears, and that observation of extinction has produced effects comparable to undergoing the extinction procedures. Therefore, it is logically and
empirically possible to hypothesize that no significant differences would be found in effectiveness among the five treatment procedures described above. These questions of relative efficacy of methods were considered issues for empirical investigation. Consequently, no specific predictions were advanced regarding the relative efficacy of the five treatment procedures described, under the particular conditions of the present experiment.
METHOD

Subjects

The subjects were 32 boys and 39 girls in the seventh and eighth grades of a junior high school in Tucson, Arizona. The 50 experimental Ss were seventh-graders whose ages were all 12-to-13 years; the 21 untreated controls came from the eighth grade and were all 13-to-14 years old. Family backgrounds of all Ss were, predominantly, middle-class, Caucasian, and "Anglo" (non-Mexican-American) with no discernible difference between experimental and control groups.

School counselors referred each S after they had counseled him for reported test-anxiety on at least one occasion. Public relations considerations imposed the agreement to handle all students of a given grade level as either experimental or control Ss; this constraint was required to forestall parental criticism anticipated by school authorities, if some members of a given class had been randomly selected while others had been temporarily by-passed. Seventh-graders rather than eighth-graders were designated as experimental Ss because it was assumed that most seventh-graders would be students in the same school the following year; therefore their progress could be readily assessed. Eighth-graders, on the other hand, would have graduated and would have
transferred to several different high schools. It was further agreed, however, that eighth-graders comprising the untreated controls would be placed on a waiting list for treatment subsequent to the completion of the study.

Pretreatment Assessment

Pretreatment assessment was conducted nine weeks before the end of the spring semester. Treatment was begun within one week thereafter. After seating all subjects side-by-side at long tables in the cafeteria, E presented the following instructions:

This morning you are going to take a test in order to show how quickly and accurately you can read. This test will be timed. Before you begin the test, however, we would like you to answer a few questions concerning the way you feel about taking tests in general. Remove from the test booklet in front of you the dittoed sheet marked 'Test Anxiety Scale.' You will notice that alongside each question are the letters RIOFA. R stands for Rarely or Never; I stands for Infrequently; O stands for Often; F stands for Frequently; A stands for Almost Always or Always. For each question draw a circle around the letter that describes how you feel or act. For example, if you feel that, as far as you are concerned, the answer to Question 1—'I do poorer on examinations because I am nervous,'—should be 'Often,' you would circle the letter 'O.' All answers will be kept confidential. They will not be seen by anyone connected with the school or by your parents. No grades will be recorded, and there are no right or wrong answers. Just answer in the way that you feel accurately describes your feelings or actions. Put your pencils down when you have finished. When everyone has finished we shall begin the timed test. Please answer each item. Are there any questions? Please begin.
The Test Anxiety Scale (TAS), which is presented in Appendix A, is almost identical with one used by Emery and Krumboltz (1967). No changes were made beyond substituting high-frequency words for lower-frequency ones, e.g., "nervous" for "anxious." Emery and Krumboltz describe their scale as "a refinement of a scale previously constructed by Emery that contains 18 items known to discriminate between a group of Stanford undergraduates who called themselves 'test-anxious' and another group containing a random sample of Stanford undergraduates." Emery and Krumboltz stated that those who called themselves test-anxious scored significantly higher \((p \leq .05)\) on all items.

Responses were treated as Likert-type scores; Rarely or Never = 1 and Always or Almost Always = 5. The control group scores ranged from 23 to 68; \(\bar{X} = 48.5238\). The experimental group scores ranged from 23 to 91; \(\bar{X} = 53.8800\). Four control Ss and 23 experimental Ss endorsed Item 19: "I feel that I get overly nervous about taking examinations." Low-scorers were included in both samples as a consequence of counselors' referrals based on prior counseling for reported test anxiety, and on the school authorities' request that all seventh-graders designated test anxious by counselors be treated. Implications of low scores will be discussed subsequently.

After completing the TAS, Ss were given the following instructions:
I shall now give you instructions for the reading speed and accuracy test. Please leave your test booklets closed until I tell you to open them.

This test measures how well you understand what you read. Remove your answer sheet from the booklet and turn it over. Find the place on your answer sheet where it says 'Comprehension.' You will be marking your answers in this section.

Now turn to page 6 of your test booklet and fold your booklet back like this, so that only page 6 is showing. (Demonstrating) Find the place where it says 'Directions.' (Pointing to own copy) I will read these directions to you while you read them to yourselves.

Read the sample paragraph below. It has numbered blanks in it. The first blank is number C1. Look below the paragraph at the line of words with C1 in front of it. Find the word in line C1 that makes the best sense in blank C1. The word direction from line C1 makes the best sense in blank C1. The word direction has the letter B above it. B is the answer to number C1. Now find number C1 on your answer sheet. Space B is already marked. Go over this mark with your pencil. Make a solid black mark but don’t go beyond the space.

Now look at the words in line C2. Find the word in line C2 that makes the best sense in blank C2. Mark the answer to C2 on your answer sheet.

The word home makes the best sense in blank C2. The word home has a J above it. You should have marked space J in row C2 on your answer sheet.

Now find the best word for each of the blanks that follow on this page and on the next two pages. Mark on your answer sheet the space for the letter of the best word. Be sure the number on the answer sheet is the same as the number of the blank in the paragraph. If you can't choose the best word for a blank, don't spend too much time on it. Leave its place on the answer sheet empty and go on to the next one.
Do you all understand how to mark your answers to this test?

Put your pencils down and look at my booklet, please. There are three pages of Comprehension questions. (Illustrating with own copy of the test.) You should keep your booklet folded back so that only one page shows at a time. (Illustrating with own booklet.) If you finish all three pages before I say 'Stop,' you should go back and check your work. Do not go back to either of the other tests.

Mark all your answers on the answer sheet. The answer space for the first exercise is right below the box in which you marked the answers to the sample exercise. Make no marks in the test booklet. If you wish to change an answer, erase your first mark completely, then mark the answer you want.

If you have a question, or if you need a new pencil during the test, raise your hand. Do you have any questions before we begin?

Begin work.

The Gates-McGinitie Reading Test (Form C) was administered initially in order to obtain an index of Ss' pre-treatment ability to take a timed test approximating a school examination. Post-treatment administration of an alternate form (Form E) was intended to provide an index of change in test-taking ability following desensitization of the experimental Ss or eight weeks on the waiting list for the controls. The instrument was selected because it related to a skill, reading, presumed to be of general importance and because supposedly equivalent alternate forms for group administration are available for the age-range of our subject-sample. If alternate forms of a test designed to measure a
variety of skills at the age level of our subject-sample, e.g., the Otis, had been available, it would probably have been administered instead.

Scores on the TAS and the Gates-McGinitie Reading Test, as well as fall-semester grade-point averages (GPA) were recorded for all Ss. GPA was obtained by calculating to two decimal places the mean of each S's semester grades in English, Mathematics, Reading, and Social Studies.

Treatment Conditions

The 50 experimental Ss were ranked according to their TAS scores. Each was then assigned by means of stratified random sampling to one of ten subgroups, pairs of which comprised each of the five treatment groups: (1) Individual Direct Desensitization, (2) Individual Vicarious Desensitization, (3) Direct Group Desensitization, (4) Vicarious Group Desensitization (observing a direct-treatment group), and (5) Vicarious Group Desensitization (observing the direct treatment of an individual peer model). Stratified sampling made possible approximate matching of TAS scores for members of individual-vicarious dyads and approximate matching of mean TAS scores for yoked groups. Twenty-one eighth-graders were placed on a waiting list for treatment subsequent to completion of the study.

The writer and a 24-year-old female student, completing her second year of graduate training in clinical psychology at The University
of Arizona, served as Es. The writer, at the beginning of the study, had
completed approximately 100 hours conducting systematic desensitization
at a community mental health center. His colleague, who had no
previous experience with the technique, received five one-hour
training sessions from the writer, during which she alternately served as
therapist and subject. The writer is 23 years older than the other
therapist; furthermore he differs from her quite markedly in a number of
behavioral dimensions. If personal characteristics of the therapists might
possibly constitute a crucial variable, the differences between therapists
were assumed to be sufficiently great to elicit therapist effects. How­
ever, earlier evidence underscores the diminished importance of therapist
differences in systematic desensitization as compared to their
importance in insight-oriented therapies (Paul and Shannon, 1966).

One sub-group (n=5) in each of the five treatment conditions was
randomly assigned to each therapist. Individual treatment was adminis­
tered by each therapist to each S in one sub-group of the Individual
Direct condition (n=5) in the presence of one S of equivalent TAS rank
from one sub-group of the Individual Vicarious condition (n=5); pairs
remained unchanged throughout the study. Each therapist administered
group desensitization to 5 Ss in the Direct Group condition in the presence
of 5 Ss in the Vicarious Group condition. Paired groups remained
unchanged throughout the study. Each therapist administered individual
desensitization to a peer model (male therapist with female model;
female therapist with male model) in the presence of five Ss in the second Vicarious Group condition. These Ss observed the same model throughout the study.

Individual treatments were conducted in the school building, one E using a windowless storeroom, approximately 8 feet by 14 feet in size, the other E using a counselor's office, approximately 6 feet by 8 feet in size. During the sessions with paired dyads, E and the two Ss sat in ordinary straight-backed school chairs. Each direct S was seated so that he faced the therapist. Each vicarious S was seated perpendicular to the therapist so that he could freely observe both therapist and direct S. Therapist could not readily observe the vicarious S without turning his head. Individual Ss were released from one fifty-minute class per week for eight consecutive weeks in order to receive desensitization.

Group treatments were conducted in a large psychodrama room at The University of Arizona. Ss reported for a 50-minute treatment session immediately after their last class one day a week for eight weeks.

Direct Ss were seated on the elevated stage facing the therapist; vicarious Ss sat facing the stage, as represented schematically in Figure 1. In the group-observing-model condition, the model occupied position 3, alone on the stage facing the therapist.
Fig. 1. Seating arrangement for group desensitization
The following instructions were given to both direct and vicarious Ss in all treatment conditions at the beginning of the initial session:

You have been selected to learn certain procedures that will help you to feel less tense and nervous about taking school tests. Other students who have learned these procedures thoroughly have been able to improve their grades on school tests and, as a result, to raise their course grades. If you concentrate on following instructions and learning the procedure well, you should be able to do likewise. You (indicating the direct Ss or Ss) will be considered the direct subjects, and most of the time I shall demonstrate the procedures and speak directly to you. The better you learn the procedures, the more confident you should become about taking tests.

There is one thing you should remember, however. There are two kinds of nervousness about taking tests. One is the kind you feel when you have not prepared yourself by careful studying. That is realistic nervousness. It comes because you know that by failing to study enough you have cut down your chances of doing well. In order to avoid this kind of nervousness, a student should prepare carefully for each exam. Then there is the other kind of nervousness, the kind that bothers you even though you have studied the work and know it well. The procedure you are going to learn will help you overcome this kind of nervousness. So, the combination of careful study by you before each exam and the training in relaxation that you will get during the next eight weeks—these two things should help you to become much more confident about taking tests than you have ever been before.

Now, even though I shall be talking directly to the direct subject(s) sitting over there, the observer(s), sitting here, will have an equal chance to learn the procedures and should benefit every bit as much. You all know that people learn things in different ways. How many of you can ride a bike? Raise your hands. Well, when you were learning, nobody told you, 'Put your foot on the pedal, just like this. Now push down at this angle, and raise your leg at this
angle.' That's not the way people learn to ride a bike. They learn by watching others do it. The same holds true for many other things we learn. Now, you observer(s) will have the chance to watch the direct subject(s) going through the procedures. How much you learn is up to you. I am not going to tell you what to do. But, remember, the better you learn, the more you will benefit. There are several things I can suggest to help you learn, and you can probably think of several more. First, you can do exactly what you see the direct subject(s) doing. As the direct subject(s) run through the exercise, you can do them also, just the way you see them being done. You may also practise them at home. Secondly, you can pretend that you are sitting where the direct subject(s) is(are) sitting and you can imagine that you are experiencing just what he is(they are) experiencing. Thirdly, and most important of all, you can listen carefully to what I say and carefully observe what the other subject(s) is(are) doing. Now I shall explain the procedure itself. We are going to run through it once, and if there are any questions, please save them until the end of the session, at which time I shall answer them.

E then gave relaxation instructions to the direct Ss.

Appendix B presents a verbatim transcript of these directions.

After two sessions devoted to learning the relaxation procedures (as described in Appendix B), all Ss had demonstrated adequate facility in relaxing; therefore an abbreviated procedure was initiated at the beginning of the third session. Appendix C presents a verbatim transcript of the relevant instructions. The abbreviated procedure induced adequate relaxation in all Ss and was used thereafter. Following induction of relaxation at the beginning of the third session, E began presentation to Ss of the lowest items in the 16-item hierarchy, which is identical to that used by Emery and Krumboltz (1967) and which
is presented in Appendix D. Emery and Krumboltz, who compiled the hierarchy from a pool of items submitted by 15 test-anxious students in an earlier pilot study by Emery (1967), found that there was no difference between the relative effectiveness of the standardized hierarchy and hierarchies resulting from each S's individually rank-ordering the same component items.

After relaxation the following instructions were given to both individual and group direct Ss:

Now that you are relaxed, I am going to ask you to imagine some scenes dealing with common test-taking situations. First, I shall describe the scene, asking you to raise one finger, like this (demonstrates), when you have it firmly in your imagination. Try to imagine the scene vividly in all details. It often helps to pretend that there is a movie projector in your mind that shows the scene upon a large screen and that you are watching yourself and other characters taking part in the action. For example, if you imagine a scene in a schoolroom, try to see the details of the room and the people's faces around you just as in real life. After you have raised a finger to signal that you are vividly imagining a scene, I shall tell you to keep on imagining it. After a few seconds, I shall tell you to switch it off. When I do, blot the scene entirely out of your mind. Go back to relaxation and calm thoughts. If necessary, in order to remain calm, concentrate on imagining the peaceful scene you imagined when you were practising relaxation. If at any time you feel your nervousness increasing noticeably, raise two fingers, like this (demonstrates). It is very important to do this as soon as you feel your nervousness increasing. Please do not try to be brave and tough it out. That will only work against the success of the procedure. I repeat--raise two fingers the very instant you feel your nervousness rising. If you do not do so, I shall assume that you are still calm. Now we shall begin.

Imagine that you are sitting in your room reading a popular book or magazine for pleasure. As soon as you can
vividly imagine that, lift one finger. (S lifts finger.) All right. Keep on imagining that. (15-second pause) Stop imagining that and return to complete relaxation. If you are still reasonably calm, raise one finger (S raises one finger.) All right. Continue to relax.

The same basic instructions were used throughout item presentation, with only minor variations in wording to avoid monotony. If no anxiety was signalled, a 60-second pause was allowed between the end of one presentation and the beginning of another. If anxiety was signalled, E usually allowed a 90-second pause, during which he urged S to relax and think of a peaceful scene. E did not rely entirely on Ss' voluntary report of rising anxiety. Instead, after every second item, E asked Ss to indicate by raising one finger that anxiety level was still reasonably unchanged.

The procedure was basically the same for both individual and group Ss, except that, in the group condition, Es geared their instructions to the responses of the slowest group member. Thus, E would not instruct group Ss to continue to imagine an item until all members of the group had signalled that they were imagining it. If no anxiety was signalled, E would review the item for one 15-second and one 20-second exposure, and then present a new item. As higher items in the hierarchy were reached, each was exposed twice for 15 seconds and twice for 20 seconds before advancing. If any direct S signalled anxiety, E would re-expose the last successfully-imagined item and proceed to the next item.
If anxiety was again signalled, the procedure would be repeated until the anxiety-evoking item could be imagined with equanimity. Sometimes a 3- to 4-minute period of complete relaxation and imagination of a peaceful scene would be interspersed in order to facilitate mastery of a difficult item. When any direct group signalled anxiety after exposure of an item, E backed up the entire group until the most anxious member had mastered the item. Two models with a level of reported anxiety close to the mean were selected for the Vicarious Group (observing model) condition. Failure to use high anxiety models probably accelerated the progression through the hierarchy and may have increased the likelihood of advancing too quickly to permit the more anxious Ss to fully neutralize each item before advancing to another. This risk was offset by the possibility of losing the attention of the vicarious Ss if the model moved very slowly through the hierarchy. It was felt that vicarious Ss could subjectively dilute the anxiety-evoking effects of an item when necessary. Furthermore, Es planned to review the hierarchy a second time in order to permit neutralization of any items that had not been adequately dealt with during the first exposure.

The entire 16-item hierarchy was mastered by all subjects somewhere between the third and sixth sessions. A maximum of five items and a minimum of three were completed in any given session. If Ss were able to rapidly complete five items, the session was terminated
early. Otherwise a session ran for the entire fifty minutes. Sessions seven and eight were devoted to a review of the upper part of the hierarchy at a rate of six items per session. All Ss successfully completed the second presentation of the hierarchy.

**Post-treatment Assessment**

Within three days following completion of treatment sessions, the TAS and the Comprehension section of an alternate form (Form E) of the Gates-McGinitie Reading Test were administered to all experimental and controls simultaneously. Conceivably the conditions and instructions obtaining during pretreatment assessment facilitated anxiety; therefore, in order to attempt to produce comparable arousal during post-treatment assessment, identical conditions and instructions were employed. Since time pressures necessitated scheduling of post-treatment assessment during final-examination week, however, this contingency may have additionally facilitated anxiety and thus may have provided a more stringent test of the efficacy of treatment.

**Exclusion of grade point average (GPA) data**

Inspection of means revealed negligible pre-to-post-treatment changes in GPA for both experimental and controls; therefore GPA data were not analyzed. Although post-treatment GPA's were derived from grades achieved during the 18-week spring semester, intervention did not
begin until eight weeks before the end of that period. As a result, improvements attributable to treatment may well have been obscured by the effects of grades achieved during the ten weeks preceding intervention. In order to obtain more accurate estimates of the effects of treatment upon GPA, it was decided to compare grades achieved by both experimentals and controls during the first 18-week grading period of the following school year with those recorded for the 18-week period before intervention. Consequently, no detailed GPA results will be reported in the present study.
RESULTS

Before analyzing the differences between change scores achieved by the experimental and control groups, it is first necessary to determine if significant changes occurred within these groups between pre- and post-treatment assessments. Table 1 presents initial means and change scores for the Test Anxiety Scale (TAS) and the Gates-McGinitie Test of Reading (G-M), grouped by treatment. Negative changes on the TAS signify a reduction of reported anxiety; positive changes on the G-M indicate improvement on this timed test of reading comprehension. Pooled experimental groups changed in the predicted direction on both variables; in contrast the controls increased in reported anxiety and declined in G-M performance.

Analyses of pre-to-post-treatment changes on the TAS and G-M variables indicated that the experimental group exhibited a highly significant decrease in anxiety level, as measured by the TAS (t=7.26, p <.001); in contrast, the control group exhibited a non-significant increase. Since possible scores on the TAS span a range of 76 points, it

1All significance tests reported in this study are based on two-tailed probability estimates. Analyses of variance and t-tests are based on procedures presented in B. J. Winer, 1962; analyses of covariance are based on procedures presented in H. E. Garrett and R. S. Woodworth, 1965.
Table 1. Initial Means and Mean Changes by Treatment

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may be readily seen that the experimental group's mean decrease of 16 points represents a substantial reduction of reported anxiety. The contrasting increment of 1.3 points exhibited by the controls is so negligible as to represent almost no change.

As predicted, the experimental group improved on G-M, although their increment of 1.92 points, when analyzed independently, failed to attain significance. The control group's pre-to-post-treatment decrement of 5.29 points (within a 52-point range of possible scores) proved significant at the .05 level ($t = 2.28$). Presumably the conditions that influenced the decline in control group scores should have exercised a comparable effect upon the experimentals. The finding that, instead, experimentals actually improved on G-M provides evidence for the efficacy of treatment in counteracting the variables producing the negative changes displayed by the controls.

Before considering the effects of the several behavioral treat­ments studied, it is necessary to demonstrate that, as a group, experimental Ss achieved more reduction of test anxiety than did the untreated control group. One-way analyses of variance for experimental and control group changes revealed that the experimental Ss improved very significantly on both variables relative to the controls. These re­sults, presented in Tables 2 and 3, indicate that the difference between experimentals and controls on TAS change was significant at the .0002
Furthermore, despite the failure of the experimentals to attain significant gain on G-M when analyzed independently, comparison of their increment with the decrement exhibited by the controls yielded significance at the .001 level.

Table 2. Analysis of Variance for Experimental and Control Groups' TAS Change

<table>
<thead>
<tr>
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<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>301.3521</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>4484.3012</td>
<td>1</td>
<td>18.628</td>
<td>.0002</td>
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<tr>
<td>Error</td>
<td>240.7297</td>
<td>69</td>
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<td></td>
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</tbody>
</table>

Table 3. Analysis of Variance for Experimental and Control Groups' G-M Change

<table>
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<th>F</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>89.9380</td>
<td>70</td>
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<td></td>
</tr>
<tr>
<td>Groups</td>
<td>986.0963</td>
<td>1</td>
<td>12.815</td>
<td>.0010</td>
</tr>
<tr>
<td>Error</td>
<td>76.9502</td>
<td>69</td>
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<td></td>
</tr>
</tbody>
</table>

Analyses of variance for experimental Ss by therapist failed to approach significance on either variable. As may be noted in Tables 4 and 5, the two therapists achieved remarkably similar results.

School authorities had stipulated that all seventh-graders referred by counselors be treated and that all eighth-graders referred be
Table 4. Analysis of Variance by Therapist for Experimental Groups' TAS Change

<table>
<thead>
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</thead>
<tbody>
<tr>
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<td></td>
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<tr>
<td>Groups</td>
<td>0.0000</td>
<td>1</td>
<td>0.000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Error</td>
<td>250.1183</td>
<td>48</td>
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<td></td>
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</table>

Table 5. Analysis of Variance by Therapist for Experimental Groups' G-M Change

<table>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>62.3527</td>
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<td></td>
</tr>
<tr>
<td>Groups</td>
<td>5.1200</td>
<td>1</td>
<td>0.081</td>
<td>.7745</td>
</tr>
<tr>
<td>Error</td>
<td>63.5450</td>
<td>48</td>
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<td></td>
</tr>
</tbody>
</table>

placed on a waiting list for subsequent treatment. This constraint prevented the equalization of the proportions of males to females within the experimental and control groups. Since the proportion was .85 for the experimentals (females, n = 27; males, n = 23) and .75 for the controls (females, n = 12; males, n = 9), the significance of the difference between proportions was tested. Results of this t-test did not begin to approach significance; accordingly one may assume that the sexual compositions of experimental and control groups were adequately comparable.
To investigate possible sex effects, analyses of variance by sex were performed for the total sample on both variables. These results, presented in Tables 6 and 7, revealed a significantly greater reduction on TAS for females ($p < .03$) and no significant difference between females and males on G-M change.

Table 6. Analysis of Variance by Sex for Total Sample's TAS Change

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Total</td>
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<td></td>
</tr>
<tr>
<td>Groups</td>
<td>1397.7817</td>
<td>1</td>
<td>4.897</td>
<td>.0284</td>
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<tr>
<td>Error</td>
<td>285.4618</td>
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<td></td>
</tr>
</tbody>
</table>

Table 7. Analysis of Variance by Sex for Total Sample's G-M Change

<table>
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</thead>
<tbody>
<tr>
<td>Total</td>
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<td></td>
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<tr>
<td>Groups</td>
<td>.5562</td>
<td>1</td>
<td>.006</td>
<td>.9359</td>
</tr>
<tr>
<td>Error</td>
<td>91.2334</td>
<td>69</td>
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</tbody>
</table>

Because of the significant difference between females and males on TAS changes, results for each sex were subjected to separate analyses of variance in order to rule out the possibility that main effects resulted from one, and not both, sex-groupings. Tables 8, 9, 10, and 11 present the results of these analyses. Experimental females improved
significantly on both measures relative to control females ($p = .0083$ for the TAS variable and $p = .0415$ for the G-M). Males in the experimental group improved significantly relative to control males, ($p = .0006$ level for TAS and $p = .0064$ level for G-M). Despite the fact that within the total sample females improved significantly more than males on TAS, it is noteworthy that experimental males attained a higher level of significant improvement on this variable, relative to control males, than did experimental females relative to control females.

Table 8. Analysis of Variance for Experimental and Control Females' TAS Change

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Total</td>
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<tr>
<td>Groups</td>
<td>2141.5641</td>
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<td>7.736</td>
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<td>Error</td>
<td>276.8198</td>
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</tr>
</tbody>
</table>

Table 9. Analysis of Variance for Experimental and Control Females' G-M Change

<table>
<thead>
<tr>
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<tr>
<td>Groups</td>
<td>218.6011</td>
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<td>4.352</td>
<td>.0415</td>
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<td>Error</td>
<td>50.2332</td>
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Table 10. Analysis of Variance for Experimental and Control Males' TAS Change

<table>
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<tr>
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<th>p</th>
</tr>
</thead>
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<tr>
<td>Total</td>
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<td></td>
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<tr>
<td>Groups</td>
<td>2543.9349</td>
<td>1</td>
<td>16.003</td>
<td>.0006</td>
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<tr>
<td>Error</td>
<td>158.9678</td>
<td>30</td>
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</tbody>
</table>

Table 11. Analysis of Variance for Experimental and Control Males' G-M Change

<table>
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<tbody>
<tr>
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<tr>
<td>Groups</td>
<td>942.0296</td>
<td>1</td>
<td>8.627</td>
<td>.0064</td>
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<tr>
<td>Error</td>
<td>109.1948</td>
<td>30</td>
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</tr>
</tbody>
</table>

Although the greater improvement exhibited by females relative to males did not impair the significant effects in the present study, it was decided to analyze this phenomenon in greater detail. Separate means for initial score and subsequent change on each variable were computed for control and experimental Ss by sex. Initial TAS level for experimental females was 57.9 in contrast to an initial mean TAS level of 51.8 for control females. By comparison, initial TAS level for experimental males was 48.0 in contrast to 40.8 for control males. Experimental females, whose scores were highest, exhibited the greatest reduction in
anxiety (19.8 points); experimental males, despite an initial TAS level lower than that of the control females, ranked second in anxiety reduction (11.6 points); control females exhibited a mean decrease of 3.8 points; and control males, whose initial scores were lowest, showed an increase of 8.2 points. Although for the experimental males the effects are confounded by treatment, one may observe what appears to be a positive relationship between initial TAS level (room to change) and accomplished change. Since separate analyses by sex had yielded significant main effects for both males and females, it was not considered necessary to compensate for initial score differences between the sexes.

Having established that, relative to the control group, the experimental group had achieved significant improvement on both variables, one may next consider the relative efficiency of the several treatment procedures employed. One-way analyses of variance were first applied to the five experimental groups, comparing these with each other. Tables 12, 13, 14, 15, 16, and 17 present these results. These analyses revealed no significant differences among groups, based either on the total sample or on separate analyses by sex.

Mean changes, presented in Table 1, were then compared for the several groups. Inspection revealed that all treated groups exhibited substantial decrease in test-anxiety, ranging from 12.6 points for the direct-individual condition to 20.0 points for the group-observing-group
Table 12. Analysis of Variance for TAS Change Among Treatment Groups

<table>
<thead>
<tr>
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<th>p</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>124.9700</td>
<td>4</td>
<td>.489</td>
<td>.7466</td>
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<tr>
<td>Error</td>
<td>255.6844</td>
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</table>

Table 13. Analysis of Variance for G-M Change Among Treatment Groups

<table>
<thead>
<tr>
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<td></td>
</tr>
<tr>
<td>Groups</td>
<td>12.9200</td>
<td>4</td>
<td>.194</td>
<td>.9386</td>
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<tr>
<td>Error</td>
<td>66.7467</td>
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Table 14. Analysis for Variance for TAS Change Among Treatment Groups for Females

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<tbody>
<tr>
<td>Total</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>85.6899</td>
<td>4</td>
<td>.243</td>
<td>.9097</td>
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<td>Error</td>
<td>352.6321</td>
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</table>
Table 15. Analysis of Variance for G-M Change Among Treatment Groups for Females

<table>
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<tr>
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<tr>
<td>Groups</td>
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<td>.338</td>
<td>.8501</td>
</tr>
<tr>
<td>Error</td>
<td>28.7344</td>
<td>22</td>
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<td></td>
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</tbody>
</table>

Table 16. Analysis of Variance for TAS Change Among Treatment Groups for Males

<table>
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</thead>
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<tr>
<td>Total</td>
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<tr>
<td>Groups</td>
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<td>4</td>
<td>.599</td>
<td>.6706</td>
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<tr>
<td>Error</td>
<td>149.7083</td>
<td>18</td>
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<td></td>
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</table>

Table 17. Analysis of Variance for G-M Change Among Treatment Groups for Males

<table>
<thead>
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</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>Groups</td>
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<td>4</td>
<td>.564</td>
<td>.6947</td>
</tr>
<tr>
<td>Error</td>
<td>115.2833</td>
<td>18</td>
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</table>

condition. Improvements in G-M ranged from 1.7 for the group-observing-model condition to 4.1 for the vicarious-individual condition. Direct-group Ss, exhibiting a 1.0 point decrease in G-M, were the only
experimentals to display negative change. Thus, although no specific predictions had been made about the relative efficacy of the five treatment procedures, it would appear that under the conditions of the present study, all five produced highly comparable reductions in anxiety, as measured by TAS and G-M.

A major goal of the present study was the investigation of the relative effectiveness of direct-versus-vicarious, and individual-versus-group, desensitization procedures in alleviating test-anxiety. Therefore, comparisons of direct-individual (n = 10), vicarious-individual (n = 10), direct-group (n = 10), and vicarious-group (n = 20) conditions were made by a series of treatment-by-levels analyses of variance. Tables 18 and 19 present the results for pooled experimentals. Tables 20 and 21 present separate results for females, and Tables 22 and 23 present

Table 18. Analysis of Variance for TAS Change

<table>
<thead>
<tr>
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<tr>
<td>Between</td>
<td>119.645</td>
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<tr>
<td>Individual vs. Group (A)</td>
<td>306.064</td>
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<td>1.2054</td>
<td>.2775</td>
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<tr>
<td>Vicarious vs. Direct (B)</td>
<td>6.007</td>
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<td>.8730</td>
</tr>
<tr>
<td>A X B</td>
<td>46.864</td>
<td>1</td>
<td>.1846</td>
<td>.6731</td>
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<tr>
<td>Within</td>
<td>253.910</td>
<td>46</td>
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Table 19. Analysis of Variance for G-M Change

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<tr>
<td>Between</td>
<td>30.429</td>
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<tr>
<td>Individual vs. Group (A)</td>
<td>27.457</td>
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<td>.3943</td>
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<td>Vicarious vs. Direct (B)</td>
<td>63.114</td>
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<td>.9062</td>
<td>.6518</td>
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<tr>
<td>A X B</td>
<td>.714</td>
<td>1</td>
<td>.0103</td>
<td>.9165</td>
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<tr>
<td>Within</td>
<td>69.643</td>
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Table 20. Analysis of Variance for Females' TAS Change

<table>
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<tr>
<td>Between</td>
<td>93.196</td>
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<tr>
<td>Individual vs. Group (A)</td>
<td>73.143</td>
<td>1</td>
<td>.2161</td>
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<tr>
<td>Vicarious vs. Direct (B)</td>
<td>133.303</td>
<td>1</td>
<td>.3939</td>
<td>.5430</td>
</tr>
<tr>
<td>A X B</td>
<td>73.143</td>
<td>1</td>
<td>.2161</td>
<td>.6507</td>
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<tr>
<td>Within</td>
<td>338.402</td>
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Table 21. Analysis of Variance for Females' G-M Change

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<tr>
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<tr>
<td>Between</td>
<td>14.498</td>
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</tr>
<tr>
<td>Individual vs. Group (A)</td>
<td>3.772</td>
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<td>0.1372</td>
<td>0.7150</td>
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<td>Vicarious vs. Direct (B)</td>
<td>36.483</td>
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<td>1.3274</td>
<td>0.2602</td>
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<tr>
<td>AX B</td>
<td>3.238</td>
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<td>0.1178</td>
<td>0.7338</td>
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<tr>
<td>Within</td>
<td>27.485</td>
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Table 22. Analysis of Variance for Males' TAS Change

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</tr>
<tr>
<td>Between</td>
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<td></td>
</tr>
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<td>71.148</td>
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<td>0.4918</td>
<td>0.5019</td>
</tr>
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<td>1.5116</td>
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<tr>
<td>AX B</td>
<td>13.068</td>
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<td></td>
</tr>
<tr>
<td>Within</td>
<td>144.679</td>
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Table 23. Analysis of Variance for Males' G-M Change

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<td></td>
</tr>
<tr>
<td>Between</td>
<td>60.876</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual vs. Group (A)</td>
<td>11.041</td>
<td>1</td>
<td>.0968</td>
<td>.7566</td>
</tr>
<tr>
<td>Vicarious vs. Direct (B)</td>
<td>144.321</td>
<td>1</td>
<td>1.2658</td>
<td>.2742</td>
</tr>
<tr>
<td>A X B</td>
<td>27.265</td>
<td>1</td>
<td>.2391</td>
<td>.6353</td>
</tr>
<tr>
<td>Within</td>
<td>114.019</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Since neither main effects nor interactions were found, it was concluded that the four major treatment variations (individual versus group X direct versus vicarious) had resulted in approximately equivalent improvement. These results are consistent with

2Results for Ss in the group-observing-group condition and the group-observing-model condition were initially pooled for the purposes of the treatment X levels analyses. Thus, in contrast to the individual-direct, individual-vicarious, and group-direct conditions, each of which contained 10 Ss, the group-vicarious condition contained 20. Inspection of the mean changes for the two group-vicarious treatments revealed greater apparent improvement on both variables for the group-observing-group treatment (TAS = 5.9 points, G-M = 1.0 point). Therefore, in order to rule out significant differences between the two group-vicarious treatments, they were compared by a one-way analysis of variance. Additionally, a treatment-by-levels analysis was performed, eliminating the group-observing-model data and comparing only the four other (symmetrical) groups, each of which contained equal numbers of Ss. These analyses all failed to approach significance. Therefore the results for the two group-vicarious conditions were considered statistically equivalent, and the initial analyses based on pooled group-vicarious data were accepted as not requiring qualification.
the finding yielded by the one-way analyses of variance that no significant differences occurred among the five treatment groups.

The pre-treatment mean of TAS proved to be 5.36 points higher in the experimental than in the control group. Since prior research on behavior change (e.g., Hovland and Pritzker, 1957; Zimbardo, 1960) has indicated a positive relationship between initial extremity (room for possible change to occur) and accomplished change, it appeared germane to determine that these differences in initial TAS level had not, to an important degree, accounted for the differential improvement observed between the experimental and control groups. Accordingly, in order to analyze the apparent relationship between initial anxiety level and direction and magnitude of change, Pearson r's were computed between initial TAS level and changes on TAS and G-M. A positive correlation of .55 ($p < .001$) was found between initial level of anxiety and magnitude of subsequent anxiety reduction. All cases that displayed 31 or more units of anxiety reduction ($n = 9$) originally had scored above the TAS median. Eight out of ten cases that showed increase or no change in anxiety originally had scored below the TAS median. A positive correlation of .29 ($p < .05$) was found between initial TAS and improvement on G-M.

On the strength of these significant correlations, analyses of covariance were performed, adjusting change scores to compensate for
the initial TAS level differences. Tables 24 and 25 present the results of these analyses, which revealed that, with initial differences controlled, the experimental group continued to exhibit highly significant changes both on the TAS variable ($p < .001$) and the G-M variable ($p < .02$). The original analysis of the difference between experimental and control TAS change yielded an F-ratio of 18.9; in contrast, the analysis of covariance, with initial TAS differences controlled, yielded a somewhat reduced F-ratio of 14.7. The relative drop in F-ratio was more marked in the G-M change analyses. On the G-M variable, initial analysis of the difference between experimental and control group changes yielded an F-ratio of 12.8, compared to the adjusted F-ratio of 6.9. Although partialling out the effects of initial TAS level obviously influenced the magnitude of observed differences, it imposed no reason to qualify the main results.

Table 24. Analysis of Covariance of Initial TAS Level and TAS Change

<table>
<thead>
<tr>
<th>Source</th>
<th>MS_y.x</th>
<th>df</th>
<th>F_y.x</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Among Means</td>
<td>2610</td>
<td>1</td>
<td>14.688</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Within Groups</td>
<td>177.93</td>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>69</td>
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<td></td>
</tr>
</tbody>
</table>
Table 25. Analysis of Covariance of Initial TAS Level and G-M Change

<table>
<thead>
<tr>
<th>Source</th>
<th>MS_yx</th>
<th>df</th>
<th>F_yx</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Among Means</td>
<td>546.16</td>
<td>1</td>
<td>6.973</td>
<td>&lt; .02</td>
</tr>
<tr>
<td>Within Groups</td>
<td>78.32</td>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A Pearson r, computed in order to ascertain the degree of correlation between TAS and G-M changes, failed to approach significance. Therefore, one may conclude that the dependent measures employed assessed essentially independent behavioral domains.
DISCUSSION

At this point, it may be helpful to bring together the main findings of this study.

(1) As predicted, all experimental groups, relative to controls, exhibited a highly significant reduction of anxiety level on the TAS. In contrast, controls reported an increase in anxiety level. The pooled treatment groups achieved a small increment on G-M reading scores, which, when compared with the decrement displayed by the controls, proved highly significant.

(2) Neither significant main effects nor interactions attributable to therapist differences were found.

(3) No significant differences were found among the five experimental groups in terms of changes on either variable.

(4) Treatment-by-levels analyses of direct-versus-vicarious and individual versus group treatments yielded no significant effects; however a non-significant tendency toward greater anxiety reduction was found for the vicarious, relative to the direct, condition and for the group, relative to the individual, condition.

(5) Within the total sample, although females improved significantly more than males on TAS, both male and female experimental
Ss improved significantly more than did male and female controls on both dependent measures.

(6) Although significant positive correlations were found between initial TAS level and post-treatment improvement on both dependent measures, analyses of covariance controlling for initial TAS differences between experimental and controls did not materially qualify statistical confirmation of the main effects reported.

Measures of Change

Previous studies of the application of systematic desensitization to test-anxiety (Emery and Krumboltz, 1967; Katahn, Strenger, and Cherry, 1966; Kondas, 1967; Suinn, in press) have relied principally upon score decrements on self-report test-anxiety questionnaires to support the efficacy of their procedures. In addition, Kondas (1967) used a palmar perspiration test, which indicated that four out of six Ss showed some decrement in perspiration while taking an examination after having completed treatment. Because of his small number of cases, and because of his failure to specify the magnitude of the decrement and to cite evidence that decreases in perspiration are quantitatively related to decreases in anxiety level, the results of the latter test must be regarded cautiously. Emery and Krumboltz (1967) attempted to use final examination grades as a measure of change, but results failed to attain significance. Katahn and his associates (1966) are the only previous
researchers to report significance on a measure other than a self-report questionnaire. They found a significant increase in grade-point-average (GPA) for treated Ss relative to controls. The present results are based not only on self-report measures of test anxiety, but also on performance improvements on a timed test of reading, which provides a work-sample of the criterion behavior under study and assesses the extent of its inhibition by test-anxiety. This research appears to be the first test-anxiety study to report significant improvement in a specific behavioral test of examination-taking, as well as in level of subjective anxiety.

Effects of Treatment Upon Performance

Prior research findings would lead one to expect controls to exhibit lower anxiety scores when retested with the same instrument. Suinn (in press) reported that untreated controls, when retested with three separate test-anxiety inventories, decreased in reported anxiety level on all three. Furthermore, one would expect respondents to move in the direction of social acceptability when retested on a self-report inventory. In view of these considerations, one would have expected the controls in the present study to report decreased anxiety levels on readministration of the TAS. Unspecified factors inhibited this tendency. The negligible increase which controls displayed instead could be

3 As mentioned above, in the present study GPA proved non-discriminating, with negligible change noted for both experimentals and controls.
interpreted as indicating no effective change. Failure of the controls
to achieve the anticipated reduction in anxiety level may well have
resulted from the scheduling of the retest during final examination week,
at which time test-anxious students presumably would report elevated
anxiety levels. By comparison, the substantial decrease reported by the
experimental group emphasizes the apparent effectiveness of the treat­
ment in counteracting the stressful influence of impending final
examinations. One might surmise that similar factors affected the
changes in G-M. If time limitations had allowed retesting during a
reasonably stress-free period instead of during final-examination week,
one might expect the experimental Ss, as a result of their post-treatment
reduction in anxiety, to improve markedly on this test. Instead they
exhibited an improvement of only 1.92 points. Controls, on the other
hand, who presumably should have displayed no change when retested on
an equivalent G-M form, actually decreased by almost six points.
Again, one might explain these results in terms of elevated anxiety
associated with approaching final examinations. It appears logical to
assume that experimentals, responding to elevated anxiety, would have
decreased in score level as much as did the controls, if treatment had not
effectively reduced their test-anxiety. One might also conjecture that
the alternate forms of the G-M are perhaps not really equivalent. If this
were the case, the failure of experimentals to improve significantly on
retest might be attributed to the greater difficulty of the second test,
consistent with the significant decrement in the performance of controls. However, significant group differences could still be attributed to the facilitating effects of anxiety-reduction upon the experimental group.

Comparison of Direct and Vicarious Treatments

The finding that the vicarious groups surpassed (if not significantly) the direct groups in magnitude of improvement warrants further investigation. One might have expected the direct treatment to be more effective for a number of reasons. The therapist focused his efforts directly on the direct Ss; therefore they received more attention than vicarious Ss. The therapist paced his techniques (e.g., item exposure) to the observed responses and reported changes in anxiety levels of direct Ss. Vicarious Ss, on the other hand, received almost no therapist attention; they were not specifically compelled to participate in the treatment procedures, and they were constrained to progress through the hierarchy at a pace geared not to themselves but to the Ss they were observing. Indeed, one might well ask how vicarious Ss managed to exhibit at least as much improvement as did direct Ss. If one regards the desensitization procedures as learning trials (Davison, 1968), and treats perception of progress through the hierarchy and therapist attention and approval as reinforcers, one may find a plausible explanation in prior research. Hillix and Marx (1960), Kanfer and Marston (1963), and Craig (1967) have reported that Ss who observe in learning situations perform
better than Ss who are directly reinforced for their own performance. Hillix and Marx (1960) suggest that this differential influence of vicarious and direct reinforcement may occur because the error-making activity of performers, or the necessary, but additional, activity of making decisions, produces interference with the retention of correct responses. Since vicarious Ss were not asked to report changes in their own anxiety levels, and since they could observe the procedure without having to respond to therapist instructions, they may have experienced less interference with important inputs and thus have learned the procedures better than did the direct Ss.

It seems relevant to examine in some close detail the specific differences obtaining among the treatment procedures employed. How did the behavior of the vicarious Ss in the present study differ from the behavior of direct Ss? In the direct-individual-condition, Ss displayed at least token compliance with the therapist's instructions. The dimensions along which direct Ss may most plausibly have varied among themselves included the depth of relaxation attained, the vividness with which they imagined items, and the alacrity with which they signalled rising anxiety. The experimental procedures imposed certain constraints upon direct Ss (e.g., all were required to raise a finger when requested to do so or to close their eyes when requested to do so). The vicarious-individual Ss were freed from these constraints; however their close physical juxtaposition to the therapist and to the direct S tended to encourage them to
participate fairly actively in the procedures. Often, a vicarious S appeared to be executing the procedure step by step, simultaneously with his direct counterpart. Perhaps, of all the conditions, the individual was most conducive to active participation by the observing S. Interestingly enough, the direct-individual condition produced the least TAS change; in contrast, the vicarious-individual condition fell only two-tenths of a point behind the condition that produced maximum change.

Of course, one cannot ignore the effects of observation by peers upon the responses of direct Ss. In the direct-individual treatment, each direct S sat only a few feet from his peer-observer and was, except for the therapist, the sole object of the observer's attention. In contrast, direct-group Ss were less likely to be affected by the presence of peer observers because of the physical distance between observers and direct Ss and the diffusion of attention resulting from group, rather than individual, participation. However, in attempting to gauge the degree to which observation by peers affected responses of direct Ss, one must take into account the occurrence of some observation (by the therapist) in all treatment conditions. Therefore, one may logically view the effects of additional observation by peers in terms of adaptation-levels determined by therapist observation and may thus conjecture that no excessive additional effects were likely to have resulted from observation by peers. Furthermore, since direct Ss held their eyes closed throughout the session
and since they were paired throughout the entire treatment with the same observer or observer group, one may assume that direct Ss readily became habituated to observation by peers. Conceivably if the effects had not been attenuated by these considerations, the consciousness of being observed by peers might have produced some adverse effects (e.g., encouraging direct Ss to appear fearless before their peers and, thus, to refrain from signalling anxiety), and, indeed, such effects may have occurred on occasion. However, since group treatments did not produce significantly more improvement than the individual and since all experimental treatments produced significant improvements relative to no-treatment, one may conclude that the effects of being observed by peers did not negate the efficacy of direct treatment. It would be of interest, in a future study, to compare the differential effects of direct treatment without observation by peers with direct treatment under peer observation.

Vicarious-group Ss, in contrast to vicarious-individual Ss, displayed a much more varied range of behaviors. Some Ss appeared to be concentrating assiduously on the procedures, following them step by step, simultaneously with the direct Ss. Others executed them sporadically. Still others merely observed, earnestly in some cases, casually in others. Some variation in the attentiveness of direct-group Ss was also noted. It is obviously more difficult for a therapist to hold the attention of a quintet of seventh-graders than it is for him to hold the
attention of an individual. It may be readily seen that differences between vicarious and direct Ss tend to diminish in the group treatment condition. Although a direct S is so defined because he is interacting with the therapist, he is also observing the responses of his fellow group-members and learning from them. Thus he learns both directly and vicariously.

It should be noted that, in the present study, the responses of vicarious Ss did not always strictly conform to Bandura's (1965) paradigm of vicarious learning cited previously (p. 9). Although some of the vicarious Ss performed very few of the responses executed by direct Ss, others practically imitated them. Of course, the direct Ss performed the responses in interaction with the therapist; in contrast, the vicarious Ss, even though they may have performed essentially the same responses, did so within a context freed of the direct influence of the therapist and the necessity of executing his instructions. One might argue, then, that they were, in fact, under the control of differential stimuli, even when apparently imitating the behavior of the direct Ss. For the purposes of this experiment, Ss could not be designated as vicarious on the basis of overt execution or non-execution of responses. They differed from the direct S by virtue of their defined role as observers, their freedom from compliance with the therapist's instructions, and their removal from the direct focus of the therapist's attention. The
non-significant tendency toward superiority displayed by the vicarious procedure in the present study raises a question. What are the really crucial parameters of desensitization techniques? Clinicians generally regard induction of adequate relaxation and presentation of items at a rate dictated by $S$ as requisites to successful treatment. Under the conditions of this investigation, it is questionable that vicarious $S$s uniformly attained an adequate relaxation level. As noted, the degree of attention with which they followed the procedures varied widely. Furthermore, no attempt was made to fit the rate of item presentation to their level of tolerance. In view of these deviations from the customary procedures, one would expect less successful outcomes for the vicarious $S$s. The finding, instead, of tendencies toward superior outcome underscores the necessity for further study of the components of desensitization techniques. On the strength of the present results, it would appear possible under certain conditions to vary the procedures without impairing the efficacy of treatment. Indeed, Rachman (1968), in an as yet unpublished paper, conjectures that (as opposed to a state of calmness) muscular relaxation may not be prerequisite to counterconditioning by desensitization procedures. Additional empirical investigation is needed to ascertain the nature and magnitude of other possible modifications in technique.
Comparison of Individual and Group Treatments

Statistical comparison of group and individual treatments revealed that both produced almost equal reductions in anxiety.

Obviously each procedure has its advantages. The individual procedure allows the therapist to gear progression through the hierarchy to the pace of each direct S. The individual is thus subjected neither to boring, repetitive exposures of an item already mastered nor to premature exposure of an item before mastery of its predecessors. He is freed of the distractions inherent in the group situation. The vicarious, as well as the direct, individual S learns under conditions of minimal distraction. However, he must proceed at the pace set by an individual direct S. In this respect he runs a higher risk of premature exposure to a stressful item than does the vicarious S in the group-observing-group condition. Obviously, item exposure geared to the pace of the most anxious of five Ss has a greater probability of proceeding gradually than does item exposure geared to the pace of an individual S. As previously suggested, the probability of boredom from overexposure of items increases as the probability of premature exposure decreases, and with boredom the likelihood increases that S will fail to attend to subsequent items in the hierarchy and will thus disrupt the efficiency of counterconditioning. Of course, premature exposure need not inevitably obstruct the success of the procedure; for example, Bandura and Rosenthal (1966) have reported
that Ss exposed to stressful stimuli may be able to inhibit the effects of abrupt rises in anxiety by generating competing responses. Possibly the greatest advantage of the group condition over the individual is the benefit derived from observing modeling of criterion behaviors by a group of peers. This effect was maximized by Ss in the group-observing-group condition, who achieved the greatest mean change in anxiety reduction. Because of the necessity of gearing rate of item-presentation to the tolerance of the most anxious direct-group member, Ss in this condition witnessed a greater mean number of exposures per item than Ss in any other condition.

One might thus conjecture, once more, that the resulting boredom would encourage inattention to subsequent items. However, an alternative hypothesis seems tenable. If one regards Ss' perception of the social context within which the procedures are conducted as a mediating mechanism, then one might predict that overlearning, rather than boredom would occur as a result of additional exposures. Ss observing the compliance of fellow group-members and the control imposed by therapist instructions would be constrained to respond appropriately to the demand characteristics of the situation and thus attend to and follow the procedures. Indeed, the hypothesis that overlearning may have contributed to successful outcome is especially plausible in view of the finding that Ss in the group-observing-model condition displayed a
smaller mean improvement than Ss in the group-observing-group condition. It will be recalled that model observers witnessed fewer exposures per item than Ss in the group-observation condition, because models with anxiety levels approximating the mean of the sample had been selected; in contrast direct groups contained some high-anxiety Ss. Further, vicarious Ss appeared to execute the procedures much more consistently when they were imitating a group of peers involved in a treatment procedure than when they were essentially cast in the role of observers witnessing a demonstration. Although the differences in anxiety-reduction between the two treatment conditions were not significant, they were sizable enough to warrant further study of the effects upon outcome of these two contrasting sets of demand characteristics.

**Clinical Implications**

Given that, by reference to the untreated controls, all experimental groups displayed significant improvement, it is important to emphasize the practical meaning of the failure to find significant differences among the experimental procedures. If a group therapeutic procedure yield results comparable to an individual procedure, it is to be preferred on the grounds of economy. Similarly, if vicarious methods give results comparable to direct methods, economic considerations would argue that investment in therapeutic films, or closed-circuit television
facilities, would permit quite large numbers of patients to benefit from observing the treatment of patient models. Although further study is needed to determine the boundary conditions within which the present results apply, the fact that actual clinical procedures producing actual and measurable clinical benefit did not differ among themselves, provides a very strong argument for the programmatic utility of multiple and observational treatment methods.

Therapist Effects

It has been noted that prior research suggests desensitization procedures are relatively unaffected by therapist differences; thus, no significant differential therapist effects were anticipated at the inception of the study. However, as research progressed, differences in therapist-subject interaction were noted. The writer, being a mature male, appeared to impress the Ss as a benevolent despot; therefore he did not need to devote much time or effort to maintaining order. The younger female co-therapist, on the other hand, frequently reported having to admonish Ss for minor infractions. Furthermore, partly because of individual differences among sub-groups within treatment conditions, and partly because of small differences in therapist technique, minor procedural variations were inevitable (e.g., the number of exposures per item varied from group to group). Yet, the present results also support the
conclusion that desensitization treatment methods appear relatively unaffected by small variations in technique or by therapist variables. This finding holds important implications for the training of sub-professionals, e.g., school counselors, in the use of desensitization procedures. If individual therapist differences do not materially influence treatment-outcome, one might expect that many school counselors could readily master the desensitization procedures for treating test-anxiety. Such an enterprise would both serve a preventive function for the children, and reduce the demands upon limited highly-skilled clinical time. Its relative imperviousness to therapist variables, the ease with which it can be taught, and its demonstrated effectiveness, point to systematic desensitization as a most appropriate treatment for test-anxiety.

**Effects of Initial Differences in TAS Level**

The necessity for accepting all referred students, whatever their initial TAS score, created two problems: (1) the statistical problem of controlling for initial differences in analyzing results; (2) the conceptual problem of including in the sample some Ss who, on the basis of initial TAS scores, would usually not qualify as test-anxious. The statistical problem was resolved by analyses of covariance, which indicated that initial differences in anxiety level did not materially diminish the obtained high significance levels for main effects. The conceptual problem
is somewhat more baffling. Since all Ss had been referred by counselors on the basis of at least one previous interview for reported test-anxiety, one can assume that in each case either the counselor judged the student to be test-anxious or the student described himself in these terms. It is possible that counselors could have erred in individual judgments and that particular students could have inadvertently or purposely misrepresented the nature of their problem. Obviously, not every student who performs poorly on examinations does so because of test-anxiety. Other factors can depress performance on tests. Therefore, it is conceivable that some Ss included in the sample indeed may not have experienced more than minimal test anxiety. Another possible explanation for the presence of low-scorers among the students referred involves the TAS instrument itself. High scores are achieved by those respondents who endorse a large proportion of the symptoms described in the questionnaire. Conceivably, a student might experience high levels of test-anxiety manifested in only a few of the symptoms cited in the TAS. This situation might result in a score lower than that which might be expected, given the degree of distress experienced by the individual. Additionally, the conditions known to influence scores on any self-report inventory (e.g., response sets) may depress scores below the level of accurate reporting. Males, especially, might in their answers tend to minimize their actual anxiety, since endorsing anxiety is not considered male-appropriate or
desirable behavior. This fact could also account for the lower mean TAS scores initially achieved by males. In any case, inspection of the TAS change scores indicates that experimental Ss at all initial TAS levels exhibited post-treatment anxiety-reduction. Only seven of the 50 experimental Ss exhibited increments in anxiety on retest and two of these achieved only one-point increases. Two cases that failed to respond were among the low-scokers on initial TAS; the other five were among those who scored initially in the middle range. Thus, it would appear that even students who usually would not be defined as test-anxious on the strength of initial TAS scores exhibited a reduction in reported anxiety following treatment.

It is of interest that improvement on G-M, a performance test, seemed relatively more restricted by initial level of TAS than was improvement on TAS, which is a self-report measure. Although this finding requires further study, one might surmise that, given an initially high level of anxiety, an individual might report a reduction in subjective anxiety before effects of this reduction had generalized extensively to the performance skills that covary with anxiety level. The extent of subsequent generalization of reported anxiety-reduction to performance skills could be investigated by retesting all Ss on G-M several months after completion of treatment. Since, as has been noted above, a low initial self-report score makes improvement more difficult to detect because it restricts room
to change, a behavioral measure such as G-M becomes an important means of assessing change. Nevertheless, one is led to conjecture about the limitations of this particular reading test. At this point, we need to give further attention to the development of behavioral tests that will enable us to assess change in various areas of performance with greater precision. Such tests would expedite, for both researchers and clinicians, the study and measurement of human behavioral changes and would provide quantitative description of an individual's repertoire of behavioral skills.

**Effects of Sex Differences**

The finding that females, relative to males, reported higher initial TAS levels coincides with evidence from prior research, e.g., Rosenthal (1963), who further cites several studies reporting tendencies for females to give higher mean scores than males on anxiety questionnaires. This tendency appears to be related to Ss' conceptions of what constitutes sex-appropriate behavior. Furthermore, previous research findings suggest that, in addition to initially higher levels of reported anxiety (whose effects upon magnitude of change have been discussed), another factor may have influenced the greater improvement exhibited by females. King (1959) made the very reasonable assumption that females are subjected to differential sex-role pressures toward accepting social influence. Beloff (1958), Janis and Field (1959), and Lesser and Abelson
(1959), who concur with King's position, found a more restricted range of individual differences among females than among males in the acceptance of social influence. They argue that because of the greater emphasis on "docility" and "femininity" in sex-role training of females, individual-difference factors are curtailed. Furthermore, in the present study, tendencies toward docility appeared to influence the behavior of females during desensitization sessions. Generally, they seemed more attentive and receptive to instructions than did the male Ss; as a result, one would expect them to derive greater benefit from the procedures.

The not unexpected present finding of differences between the sexes both in pre-treatment level of reported anxiety and in magnitude of change emphasizes the necessity for regarding sex as a crucial variable requiring control in research dealing with anxiety. Exact matching of males to females within each treatment group was prevented in the present research by two constraints: (1) school authorities referred a greater number of females than males, with the stipulation that all referred students be treated; (2) it was difficult to match groups on initial anxiety level without simultaneously assigning unequal numbers of males and females to each treatment group. As a result, two groups contained five males and five females; one contained four males and six females; one contained six males and four females; and one contained seven females and three males. This unequal sex ratio within the treatment
groups did not significantly influence the main results, since separate analyses of the data by sex yielded outcomes parallel to those derived from the analyses of pooled experimental Ss. In a future study, it might be instructive to compare response of all-male and all-female treatment groups to groups containing equal numbers of males and females. Within the present design, such effects cannot be determined because it is not possible to distinguish the effects of sex composition apart from the effects of initial TAS level. In view of the efficacy of modeling procedures in facilitating learning in the present study, one is impelled to question the extent to which sex and personal characteristics of peer models influence the observers' acquisition of criterion behaviors. Although perhaps masked by the overall power of the desensitization procedures in producing change such effects appear to merit more precise study in their own right. Furthermore, in the behavioral treatment of other sorts of deviations than that herein investigated, the sexual composition of treatment groups and the sexual composition of observers and models might prove of greater theoretical, and of crucial practical, importance. This assertion is obvious in the case of sexual deviations. The effects of sexual composition are less obvious, but presumably quite pertinent, in cases in which one wishes to train (by group and vicarious procedures) patients to negotiate employment interviews, to improve their social functioning with peers and spouses, or to assert themselves more effectively in their milieu.
Some Methodological and Practical Considerations

The present study varied in several ways from previous research on desensitization. First, although Kondas (1967) worked with a few sixth-to-ninth graders and Katahn (1968) mentions that he and his associates performed a pilot study with seventh-graders, no detailed studies of desensitization using sizable samples of test-anxious children have been previously reported.

In the present study, the therapists noted several differences between seventh-graders and college students and other adults. The writer, having previously performed desensitization only with adult clinical patients, was amazed to discover how rapidly the child Ss learned to relax. Both in the individual and group conditions, students arrived for a session filled with high spirits and chattering volubly, and quickly achieved an apparent state of deep relaxation which they maintained throughout the session. Even when a slight delay in beginning a group session provided an opportunity for active and boisterous behavior, subjects readily made the transition to relaxation. The abbreviated procedure, relying only on verbal instructions after initial training, appeared to induce as deep a state of relaxation as the more elaborate procedure involving overt movements. Often Ss would fall asleep briefly and would have to be aroused in order for item presentation to proceed. It appears plausible that children would experience less
difficulty than adults in relaxing, since presumably, they would be less restricted by overlearned motor habits than are adults. Although it was initially assumed that the constant spontaneous activity and distractability characteristic of children would interfere with relaxation, this proved not to be the case. For the most part, the students appeared to enjoy the procedures and to maintain interest in them throughout most of the eight weeks. Some diminution of enthusiasm was noted during the last two sessions, and conceivably the procedure might have been completed in six sessions without appreciable loss of effectiveness. There were no dropouts however, and attendance at sessions, both in school and away from school, was generally good.

A second unique aspect of this study was its locale. The literature reveals no other report of desensitization procedures conducted in a public school (as opposed to a university) setting and during school hours. Although finding space in which to work initially presented some difficulty, working in the school itself proved to be quite advantageous. Since individual Ss were already in school and since they were released from class at designated times to attend sessions, therapists encountered practically no problems in the individual treatment groups in regard to scheduling or regular attendance. Interspersing desensitization sessions with regular class sessions apparently created no difficulties for Ss, although some reported slight temporary drowsiness which lasted for a few minutes after the end of a session.
A third atypical feature of the present research was the involvement of the parents and school personnel. Two orientation sessions were held, one at the beginning of treatment and one near the end, during which procedures were explained and demonstrated and questions were answered. These sessions, plus written communications sent to parents on a few occasions throughout the study, helped to elicit very gratifying cooperation and interest from parents and school staff members and maintained unruffled relations between them and the investigators. Parents of subjects formed a car pool in order to bring to the University those children who were involved in group treatments. In order for research and treatment considerations to be served simultaneously and for meaningful investigations to be carried out in the natural environment the practical aspects of maintaining rapport with parents, school personnel, and others in the milieu become crucial. Furthermore, the present research indicates that maintaining good communications between investigators and parents may encourage parents to report information of an anecdotal nature that might suggest directions for future research.

One mother reported that her asthmatic son was successfully inhibiting asthma attacks by employing the relaxation technique learned during the study. Other mothers informed the writer of a variety of effects that included using relaxation: to reduce anxiety before a dental examination, to reduce anxiety before a piano recital, and to reduce
anxiety before class recitations or examinations. Several of the children themselves reported feeling generally less anxious in classroom or social situations. These observations appear to corroborate further the efficiency of the procedures studied and to indicate that treatment-based effects, in some cases, were generalized to spheres of behavior not specifically counter-conditioned.
APPENDIX A

TEST ANXIETY SCALE

Name _________________________________ Sex ______ Age ______ Grade ______

Although most students experience nervousness before and during tests, some become nervous more often than others. Please indicate how often each of the following statements applies to you. Use the following scale for all questions:

Rarely or Almost Always
Never Infrequently Occasionally Frequently or Always

Please circle the response that best describes your reactions.

1. R I O F A I do poorer on examinations because I am nervous.
2. R I O F A I feel nervous when the teacher announces the date of an examination.
3. R I O F A While taking an important examination, I perspire a great deal.
4. R I O F A When I have trouble answering a question on a test, I find it hard to concentrate on the questions that follow.
5. R I O F A I get depressed after taking a test.
6. R I O F A I feel nervous when I am studying for an examination.
I get to feeling very panicky when I have to take a surprise examination.

During an important examination, I experience a feeling of helplessness building up inside me.

The more important the examination in determining my grade, the more nervous I am.

During tests, I find myself thinking of the consequences of failing.

Getting a good grade on one test doesn't seem to increase my confidence on the next test.

I have trouble falling asleep the night before an important examination.

When taking a test my emotional feelings interfere with my performance.

I am still nervous for a least an hour after taking an examination.

I feel my heart beating very fast during important tests.

I feel that my nervousness on tests comes from not knowing good methods of taking examinations.

I feel nervous while the test is being handed out.
18. RIOFA During a course examination, I get so nervous I forget facts I really know.

19. RIOFA I feel that I get overly nervous about taking examinations.
APPENDIX B

INITIAL RELAXATION PROCEDURE

When you feel nervous or jumpy about something, your muscles are tense and tight. Many of the unpleasant sensations that you feel at such times could not be felt if your muscles were relaxed. If a person has learned to associate exams with tense feelings he is likely to experience many unpleasant sensations when he has to take an exam. He describes himself as 'scared' or 'nervous.' If he would pay careful attention to the sensations in his body during these periods he would notice that his muscles are tightly contracted.

People are not born worrying about exams. Somewhere along the line they learn to connect taking an exam with feeling worried. Fears that have been learned can also be unlearned. A person who has learned to connect taking an exam with sensations of tenseness can also learn to connect the experience with feelings of relaxation. Many people have learned to overcome their fears merely by making new connections between an experience and the sensations it arouses. In the next few weeks I am going to teach you how to connect your feelings about taking exams with sensations of calmness and muscular relaxation. If you pay careful attention and follow instructions you should be able to
take exams much more calmly than you were able to do before. The changes will take place gradually, but by the end of the eight-session training program you should be able to notice a decided difference in your feelings about tests and exams.

If you have any questions about the procedure I shall answer them at the end of the hour. First, I want to teach you how to relax your muscles. When you have learned this, we shall begin by imagining a series of scenes concerning taking exams. We shall at first imagine very mild ones and shall not imagine more difficult ones until you can imagine the early scenes without feeling nervous.

Now, settle yourselves comfortably in your chairs and listen carefully to what I am about to tell you. Even though you are sitting in a more-or-less relaxed position, there is still plenty of tension in your muscles. You are so used to having your muscles partly tensed at all times that you do not even notice it. Today I am going to show you how to recognize this tension and how to get rid of it. Rest your arms on your thighs like this. Now—when I give the signal, clench your right fist—tighter and tighter. When I say, 'Off,' just let your hand flop open. Do not open it slowly, but just turn loose so that it falls open by itself. Then continue letting go until all the tension flows out of your arm and hand. All right—'On,'—tighter and tighter, 7-second (pause), 'Off!'
It's just like turning on an electric switch to start the current flowing and turning it off to stop the current. Notice the difference in your arm and fingers after you relax your clenched fist. Now when I say, 'On,' clench your fist again—tighter and tighter. 'On!' Tighter and tighter. 'Off!' Feel the difference as the tension flows from your arm.

Now, even though you have relaxed many of the muscles in your arm and hand, there are still many more that are tense. We shall relax these as we go along. First, just a few general instructions. When I want you to tense a particular set of muscles, I shall first describe the exercise. Listen carefully but do not tense your muscles or begin the exercise until I tell you to. You will tense the particular muscles we are working on when I say, 'On!' or, 'Lift!' or, 'Point!' depending on the exercise we are doing. Contract your muscles crisply, using only those muscles we are working on at the moment. It is unnecessary to strain. Just contract your muscles crisply so that there is a noticeable difference in tension. When I say, 'Off!' or, 'Flop!' let go completely, allowing your muscles to become loose and relaxed.* Try to think about letting go—just releasing all control of the muscles so that they lose all their tightness. Remember, listen carefully to the instructions for each exercise, but do not begin it until told to do so. Then tense your

*Note: Contractions were held for 7 seconds and an interval of at least 20 seconds was allowed between contractions.
muscles crisply and hold the contraction. When told to turn loose, relax your muscles crisply and let go completely. Here is an example of the wrong way to let go (opening hand slowly) and here is an example of the right way (opening hand crisply). The release of the muscles should happen by itself—without effort—merely as a result of your letting go.

**Hands**

Now, with your arms still resting on your thighs, when I give the signal, tense your right fist again. 'On! Off!' Once again--'On! Off!'

**Arms**

(1) Now, when I give the signal, stiffen your right arm at the elbow and raise it, palm down, pretending that when you raise it to about here (parallel to floor) a pair of hands is pushing against it and preventing it from rising higher. While your arm muscles are contracted, you will be pushing against these invisible hands. Remember, use only the muscles needed to raise your arm. Let the rest of your body remain relaxed. When I say, 'Off!' let your arm fall back in your lap like dead weight. Just turn loose completely. "Raise! Off!' Just let it flop and let all the tension flow out of your arm. Just relax and breathe deeply and rhythmically—in through your nose and out through your mouth and notice how more and more of your body is getting relaxed. Now let's
repeat the arm-raising exercise—but not before I give the signal. 'On! Off!' Just let it go and relax completely.

(2) Now, when I say, 'Raise!' lift your right arm with elbow stiffened just as you did a moment ago. Only this time imagine that you are pushing down against a hand that is pushing upward against yours. 'Raise!' Keep pushing down. 'Flop!' Now, once again, 'Raise! Flop!' Now, if you can feel a difference in tension between the right arm and the left, raise a finger. Good. Now, we shall relax the left arm. With your arms resting easily on your thighs, when I give the signal, tense your left fist—(repeat procedure used with right hand and arm).

Legs

(1) When I say, 'Point!' point the toes of your right foot downward. 'Point! Off!' Now, once again, 'Point! Off!' Just relax and let go completely. (2) Now we shall do the same thing with our right heel. 'Point! Off!' (3) When I say, 'Raise!' stiffen your right knee and raise your leg a few inches, pushing against an imaginary hand that prevents it from rising higher. When I say, 'Flop!' just let it flop limply back, releasing the muscles completely. 'Raise! Flop!' Now, repeat, 'Raise! Flop!' (4) This time we are going to raise our right leg in the same manner but instead of pushing up against imaginary
resistance, we are going to push down. Also when I say, 'Raise!' take in a deep breath when you raise your leg. When I say, 'Flop!' exhale completely at the same time that you let your leg fall. 'Raise! Push down. Flop!'

Now, if you can feel a difference between your right leg and your left, lift a finger. Good. Now we shall relax your left leg. First, when I give the signal, point your toes as before--(repeat 1 through 4, as above).

Now let yourself relax completely. Let all the tension run out of your muscles. Close your eyes gently and imagine that you are lying in a grassy meadow with wild flowers blowing all about you in the soft spring breeze. You look lazily up at the fleecy white clouds floating slowly by. Imagine that you are gazing at the edges of the clouds, where faint sunlight tinges the corners. You feel very calm and peaceful and completely relaxed. When you have that scene firmly fixed in your mind, lift a finger. Good. Now, keep on imagining that scene, while you concentrate on the feelings of peace and relaxation in your body. Just relax. Breathe deeply--in through your nose and out through your mouth. Just float along, imagining the peaceful scene. Now, stop imagining that scene, but still hang on to the feelings of relaxation and calm in your body. Just relax and continue breathing rhythmically--in through
your nose and out through your mouth. Deeply and rhythmically. Relax and let your muscles get all loose and floppy so that you feel just like a rag doll.

Torso

(1) Now, when I give the signal, raise the upper part of your body to an upright position without moving your legs. When I say, 'Flop!' just let your upper body fall back into its present position. 'Raise! Flop!' Now, again, 'Raise! Flop!'

(2) Now imagine that there is a round pole running down the center of your body from just under your chin to your waist and that your body is hinged on both sides of the pole so that it can fold inward like this (demonstrate). Lift a finger if you can imagine that. Good. Now when I say, 'Fold!' fold the two halves of your body inward around the pole. 'Fold! Flop!' Good. Just let your body relax and continue letting go. (20-second pause) Once again, 'Fold! Flop!' Just keep on relaxing deeper and deeper, letting go more and more.

(3) Now imagine that a similar round pole runs down your spine from neck to waist and that your body is hinged so that it folds backward, like this (demonstrate). Now, if you can imagine that, lift a finger. Good. When I say, 'Fold!' fold your body backward around the pole. 'Fold! Flop!' Just relax and let your muscles get limp and loose and
floppy, like a rag doll. Once again, 'Fold! Flop!' Let all the tension out.

(4) Now when I say, 'Push!' I want you to force your stomach muscles outward against imaginary pressure. Like this (demonstrate). When I say, 'Off!' just let them relax crisply and completely. 'Push! Off!' Now once again, 'Push! Off!'

(5) This time when I say, 'Pull!' I want you to pull in your stomach muscles, away from imaginary pressure. When I say, 'Off!' let them relax completely. 'Pull! Off!' Just let them go and relax.

Now go back to imagining the peaceful scene you imagined before. (Repeat instructions for scene, including instructions to stop imagining.)

Shoulders, Neck, and Head

(1) Now imagine that hands are resting on your shoulders, pushing them down. When I say, 'Shrug!' you will shrug your shoulders, pushing them up against the pressure of the imaginary hands. 'Shrug! Off!' Relax crisply, letting your shoulders flop. Once again, 'Shrug! Off!' Relax completely and breathe deeply and rhythmically—in through your nose, out through your mouth. Enjoy the feelings of peace and calmness in your body.

(2) This time, still imagining that the hands are pushing on your shoulders, when I say, 'Shrug!' shrug your shoulders downward,
away from the pressure of the imaginary hands. When I say, 'Off!' let your shoulders spring back into their natural position. 'Shrug! Off!' Once again, 'Shrug! Off!'

(3) Now imagine that a hand is pushing against your forehead. When I say, 'Push!' bring your forehead forward against the pressure of the imaginary hand. When I say, 'Flop!' just let your head fall back. 'Push! Flop!' Once again, 'Push! Flop!'

(4) Now this time, when I say, 'Push!' push your head backward so that your forehead moves away from the imaginary hand. When I say, 'Off!' let your head spring back to a natural position. 'Push! Off!' Now, once again, 'Push! Off!' Just let your head and neck relax more and more.

(5) Now this time, when I say, 'Arch!' I want you to arch your neck so that there is a hollow under it. When I say, 'Flop!' let it fall back into natural position. 'Arch! Flop!' Now once again, 'Arch! Flop!'

(6) Now imagine that there is a hand resting under your chin. When I say, 'Push!' push your head downward so that your chin is forcing against the imaginary hand. When I say, 'Off!' let your head return to natural position. 'Push! Off!' Now once again, 'Push! Off!'

(7) This time when I say, 'Pull!' move your head so that you are pulling your chin away from the imaginary hand. When I say, 'Off!'
let your head return to the natural position. 'Pull! Off!' Now, once again, 'Pull! Off!'

(8) Now imagine that there is a hand pushing against your right cheek. When I say, 'Turn!' I want you to turn your head so that your cheek is pushing against the imaginary hand. When I say, 'Off!' let your head return to its natural position. 'Turn! Off!' Now, once again, 'Turn! Off!'

(9) This time, imagine that the hand is pushing against your left cheek. 'On! Off!'

(10) Now, when I say, 'Bite!' I want you to clench your teeth firmly together, noticing the contraction in the muscles of the jaw. When I say, 'Off!' let the muscles relax completely. 'Bite! Off!'

(11) Now, when I say, 'Frown!' wrinkle your forehead like this—downward from your scalp. 'Frown! Off! Frown! Off!'

(12) Now, do the same thing but wrinkle your brow upward like this—when I give the signal. 'Frown! Off! Frown! Off!'

(13) Now, when I say, 'Press!' press your tongue against the inside of your teeth. 'Press! Off! Press! Off!'

If there is any part of your body that is less relaxed than the others, lift a finger; and I will check with you one at a time. (Ask each in turn.) Using as little effort as possible, tell me where it is. (Then
do exercises as needed for each S in order to relax.) Now, I am going
to count, and every time I say a number I want each of you to let go
more and more, letting your bodies become relaxed—deeper and
deeper—sinking down into the chair. 'One!' Let go completely,
relaxing more and more. 'Two!' Deeper and deeper. Let all the tension
go. 'Three!' Now just relax absolutely and completely. Let your
body become as limp and floppy as a rag doll and feel calm and safe
and secure.
APPENDIX C

MODIFIED RELAXATION PROCEDURE

Now that you have learned how to relax your bodies by contracting and releasing the various muscle groups and now that you are accustomed to the feel of these groups as they tighten up and relax, I am going to show you a brief and simple method of relaxing that you can use on yourselves. Not only can you use it during our sessions but you can also use it to make yourself feel more relaxed while sitting in a classroom, waiting in the dentist's office, or getting ready to take part in a piano recital. Just pay careful attention and try to follow my instructions.

What I am going to teach you to do is to send mental messages to each part of your body, telling it to relax. You will find that if you concentrate on one group of muscles at a time, mentally telling it to relax, you can become just as relaxed as you did by the method we used in previous sessions.

First, settle yourself comfortably in your chair, lean back, and relax your entire body as much as possible. Now close your eyes gently and imagine a peaceful scene. Think of yourself as relaxed and completely carefree and at ease in the middle of that scene. As soon as you have
begun imagining the scene lift a finger. (After the finger is lifted) Good. Now go on imagining the scene. (150-second pause) All right. Still keep your eyes gently closed and hang on to the feelings of relaxation you had while imagining the scene but stop imagining it and pay careful attention to what I say.

Start with the large toe on your right foot. Tell it to relax. Just turn loose until it becomes all limp and floppy. Flip the switch and let all the tension out. Now let the relaxation spread muscle by muscle, joint by joint, to the second toe. Let it relax completely. Now the third, the fourth, and, finally, the little toe—until all your toes hang limp and slack, almost as though they weren't part of your foot. And now the relaxation spreads to your instep, the arch of your foot, the ball of your foot, all the way back to your heel. Your foot becomes completely relaxed and just hangs limply. Just concentrate on letting all the tightness out of your foot—letting it all go.

You loosen up your ankle next, letting it go all limber and flexible. It just flops around as though it were made of water. Now the muscles of your right calf. First the inner surface, then the muscles along the bottom, the outer surface, and then the shin muscles, letting them get as soft and loose as ribbons. Then the knee—loosening it up until it wobbles and becomes watery. The thigh muscles are next. Inner surface first. Then the muscles along the bottom, the muscles on the
outer surface, and the muscles along the top—all the muscles of the thigh from knee to hip—just loose and relaxed and slack. Now your entire leg feels as though it has no tightness in it anywhere. It just hangs calmly, relaxed, and limp.

Now we shall repeat the procedure with the left leg. (Repeat procedure.)

Now let the tightness go out of your right thumb so that it completely relaxes. Now your index finger, your middle finger, your ring finger, and finally, your little finger. Just concentrate on loosening them all up—every muscle and joint so that you can feel them softening up like melted wax. Let all the tightness out until your fingers just hang. Now let the relaxation spread back through the palm of your hand and through your knuckles and the back of your hand—all the way to the wrist until your hand is slack and relaxed. Now let your wrist become limber, watery and floppy—all loose and flexible. The relaxation spreads through your forearm, loosening all the muscles of the inner surface, the bottom surface, the outer surface and the top surface, spreading slowly and steadily up to the elbow. Now your forearm is completely relaxed. Let your elbow become like your wrist—flexible and limber. Let all the small muscles in the elbow joint loosen and hang slack and soft as ribbons. Now the upper arm. All the large and small muscles letting go
and becoming relaxed. First the outer surface, then the bottom, then the inner surface, and, finally, the top surface. The large bicep and all the small muscles in the upper arm become loose and slack. Now your whole right arm is soft and relaxed.

Now we shall repeat the process with the left arm. (Repeat process.)

Now that both arms and both legs are soft and relaxed, we shall start relaxing the hip muscles. Begin at the front of the right hip joint and relax all the muscles there. Now let the relaxation spread to the side and back of the right hip joint, moving slowly and steadily across the small of the back until it reaches the left hip joint—back and sides and front. Both your hips droop and sag as the tightness goes out of them.

Now we shall relax the front of your body, starting with the right side. The muscles that connect with your hips begin to soften as you send them messages to relax, and the relaxation moves through the lower abdomen, the waist—slowly and steadily—to the midsection and the chest until it reaches the shoulders. Now the whole right side of the front of your body is relaxed.

Let's repeat the process with the left side. (Repeat process.)

Now we shall relax the muscles of the back. Begin with the right side. Starting at the hipline the muscles on the right side of your
lower back soften and relax. Now the relaxation spreads slowly and steadily upward from the lower back, following the line of the spinal column and branching outward. Relaxation reaches the middle back, the right shoulder blade, and finally, the shoulder. Your back muscles sag and droop until the right side of your back is completely relaxed.

Now let's repeat the procedure with the left side. (Repeat procedure.)

Now we shall relax your shoulders. Start with the muscles on the front of the right shoulder, letting them loosen up completely, then the other muscles of the right shoulder--side, back, and top, until your right shoulder muscles sag and droop. Now the relaxation spreads across the back of your body--just at the base of the neck--until it reaches the back of the left shoulder. All the left shoulder muscles soften as the relaxation spreads from the back of the shoulder to the side, top, and front of the left shoulder. Now both shoulders sag and droop. From the base of your neck to the tips of your toes, your body is relaxed and slack and limber--all soft and loose and at ease.

Now let's relax the muscles of your neck. First the right side, then the front, then the left side, and, finally, the back--all the muscles of the neck loosening up and drooping. Your neck becomes as limber as a stalk of grass, barely able to support your head.
Now the muscles of your face. First the jaw, loosening and sagging—both right and left. Then the muscles around the mouth and the muscles inside the mouth—the muscles that work your tongue and teeth and lips—that help you chew and smile. All loosening and relaxing—all the tightness draining out. Now your cheeks—both right and left—the muscles around your eyes—that work your eyelids, eyebrows, and the pupils of your eyes. Finally, the muscles of your forehead and scalp—right and left—front and back.

Now that you have relaxed your muscles, we shall quickly run through the various muscle groups once again. If there is any tightness left anywhere, as I mention the muscle group, just let it all go.

The toes of your right foot. Your right foot. Your right ankle, right calf, right knee, right thigh. (Repeat for left foot and leg.) The fingers of your right hand. Your right hand. The right wrist, right forearm, right elbow, right upper arm. (Repeat for left hand and arm.) Now the right hip—and the left hip. The right side of the front of your body from hip to shoulder—lower abdomen, waist, midsection, chest—up to the shoulder. (Repeat for left front.) Now the right side of your back. Starting at the hips and moving up to the shoulder. Now the left side of your back—the same way. The right shoulder, front, side, top, and
back—and the left shoulder, front, side, top, and back. Now the neck, the jaw, the muscles of the face and forehead and scalp.

By now you should have thoroughly relaxed all the muscles of your body. Now as I count to three I want you to sink down into deeper and deeper relaxation, sending yourself messages to relax more and more. One—settle down deeper and deeper. Two—more and more relaxed. Three—absolutely and completely relaxed. Now before we begin imagining anything else, I want you to imagine a peaceful scene, with yourself in it, completely relaxed. As soon as you have the scene in mind, lift a finger.
APPENDIX D

TEST ANXIETY HIERARCHY

0. Sitting in your room reading a popular book or magazine for pleasure.
1. The teacher announces and discusses a course examination (to be held in three weeks) with the class.
2. Studying for an important examination that is two weeks away.
3. Studying for an important examination that is one week away.
   (Beginning of dead week.)
4. Studying for an important examination that is two days away.
5. Studying for an important examination that is the next day.
6. Discussing an important exam with friends, the night before the exam is given.
7. Going to sleep, the night before an important exam.
8. It is the day of the exam—-one hour left until exam time.
9. Leaving your room at your living quarters to go to the important exam.
10. Entering the room where the exam is being given and sitting down.
11. The exam is being handed out—you receive a copy.
12. Reading over the instructions to the final exam and surveying the test.
13. Taking a final exam and working on a question to which you know the answer.

14. While trying to think of an answer to an exam question you notice everyone around you writing very rapidly.

15. Taking an exam and working on a question to which you do not know the answer.

16. Having thirty minutes left to complete an exam and an hour's worth of work to do.


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