The Effects of Acute Exercise in Combination with Imaginal Flooding for the Treatment of Speech Anxiety

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ABSTRACT

THE EFFECTS OF ACUTE EXERCISE IN COMBINATION WITH IMAGINAL FLOODING FOR THE TREATMENT OF SPEECH ANXIETY

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The present study examined the effect, on public speaking anxiety, of physical exercise performed during imaginal flooding. Fifty-two individuals (28 females and 24 males) who met a three-part screening criterion served as subjects. The experimental conditions comprised a two by two factorial design which combined the presence or absence of exercise on a bicycle ergometer with the presence or absence of 90 minutes of flooding imagery. The outcome prediction that the groups administered flooding would show a greater reduction in speech anxiety from pre- to posttesting than the groups receiving a neutral control for flooding was supported by subjective, behavioral, and physiological indices of speech anxiety. The additional outcome prediction that subjects who received the combined exercise-flooding treatment would improve more than subjects administered flooding alone was supported by subjectively rated anxiety and skin conductance responding during the test speech and by the treatment evaluation measure. In addition to

examining outcome results, a second, theoretical, objective was to test whether a direct exposure, exhaustion, or attribution hypothesis best explained the role of the exercise in facilitating the effects of flooding. Although there is some support for each of the hypotheses, the most clear-cut finding suggests that direct exposure mechanisms are operating via increased imagery.

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The pervasiveness of both situational and chronic anxiety has led to the emergence of numerous anxiety-reduction procedures. The treatment of situational anxiety is more amenable to controlled investigation since laboratory analogues of the actual anxiety-eliciting situations can be created to assess pre- and posttreatment anxiety levels. Behavioral therapy procedures such as systematic desensitization (Wolpe, 1958) and implosive (flooding) therapy (Stampfl & Levis, 1967), which involve some form of exposure to feared stimuli, have been successful in the long term reduction of situational anxiety associated with phobias. It has also been demonstrated that a session of strenuous physical exercise temporarily reduces situational or state anxiety even though it concomitantly produces elevated physiological arousal (Andres, Metz, & Drash, 1978; Morgan, 1976). It is suggested here that simultaneously combining exercise with an exposure technique such as flooding may provide a more effective anxiety-reduction or extinction procedure.

The Components of Anxiety

Anxiety is believed to consist of three separate but interacting components: behavioral, subjective, and physiological (Lang, 1968; Rachman, 1977). The behavioral component usually refers to the many outwardly visible manifestations of anxiety such as pacing, overt avoidance behavior, and impaired performance. This component is typically rated by observing and recording the individual's

behavior. The subjective component is the person's awareness of distress such as nervousness, tension, fearfulness, and dread. This component is usually assessed by administering self-report trait or state anxiety questionnaires to the subject. The physiological arousal component, although involving many bodily systems, usually refers to heightened sympathetic activation resulting, for example, in increased heart rate and skin conductance.

Speech anxiety, in particular, appears to have a large physiological arousal component. For example, heart rates up to 170 beats per minute have been reported during actual public speaking situations (Moss & Wynar, 1970; Taggart, Carruthers, & Somerville, 1973). Borkovec (1976) reports that heart rates between 113 and 118 beats per minute are typically observed in studies of speech anxiety. Droppleman and McNair (1971) have found significant increases in both skin conductance and self-reports of general feelings of arousal during actual public speaking.

Flooding Treatment

Implosive (flooding) therapy (Stampfl & Levis, 1967) is one of the more successfully employed behavioral approaches for alleviating phobic anxiety. It is based on the principle of extinction whereby repeated presentation of the conditioned fear stimulus in the absence of primary reinforcement leads to reduction of the conditioned fear response (Levis, 1980). The flooding procedure involves immediately exposing an individual to relatively

intense anxiety-producing aspects of the phobic situation using imaginal and/or in vivo feared stimuli. Repeated unavoidable exposure to these fear cues in the absence of any physical harm results in the extinction of the fear or anxiety originally elicited by them.

Several studies have demonstrated that flooding therapy reduces anxiety in public speaking phobias. For example, imaginal flooding has been found to be superior to no treatment in reducing speech anxiety as assessed behaviorally (Mylar & Clement, 1972) and by self-report measures (Calef & MacLean, 1970). Kirsch, Wolpin, and Knutson (1975) utilized in vivo flooding (repeatedly performing a difficult speech task) to produce significant reductions in speech anxiety relative to a placebo control condition. In a recent study by Sherry and Levine (1980), speech anxious subjects who had been treated with imaginal flooding demonstrated significant reductions, as compared to controls, on both self-report and heart rate indices from just prior to just after a four-minute test speech. They also attained significantly lower scores than did controls on a speech anxiety inventory administered immediately following the test speech.

Exposure and Extinction: The Critical Variable and Process

At both the infrahuman and human levels, there is increasing evidence that fear reduction is mainly a function of the total amount of nonreinforced CS exposure (Levis & Hare, 1977; Marks, 1973; Shipley, 1974; Shipley, Mock, &

Levis, 1971; Wilson & Davison, 1971). For example, in a review of the experimental research on flooding, Levis and Hare (1977) concluded that extinction does not usually occur at the analogue level unless a minimum of 100 minutes of repeated exposure to the aversive CS is given. Reviewing the human literature on methods for treating phobic disorders, Marks (1973) has proposed that exposure of the phobic individual to the phobic situation until he gets used to it (i.e., the process of extinction) is the one important mechanism shared by many behavioral techniques including systematic desensitization and flooding. Although systematic desensitization is allegedly based on a counterconditioning rather than an extinction model (as is flooding), a critical evaluation of animal studies by Wilson and Davison (1971) provides additional support that extinction rather than counterconditioning is operating to produce the anxiety reduction. Consistent with this view, Mylar and Clement (1972) found that when scene content and actual exposure time were equated, groups receiving either systematic desensitization or flooding treatments showed equivalent significant reductions in speech anxiety.

The Question of Arousal

Although evidence seems to support the position that sufficient unreinforced CS exposure is the critical variable determining the success of flooding therapy, there is much controversy about the role played by subjective anxiety or the physiological arousal component of anxiety. It is

believed that in order for flooding to be effective, the scenes presented must lead to an increase in anxiety followed by a subsequent decrease which is associated with extinction (Levis & Hare, 1977). Furthermore, the extinction must be positively correlated with a corresponding reduction in symptoms (Levis & Hare, 1977). The extinction, and hence the reduction in anxiety responding, is supposed to be greater and more rapid when the individual is kept in a high state of arousal throughout most of the flooding session (Hogan & Kirchner, 1967; Stampfl & Levis, 1967). Thus, every effort is typically made to elicit all components of the anxiety response during treatment.

Few studies, however, have actually investigated whether arousal due to CS exposure, followed by a decrease due to extinction, occurs either within a single session or across several treatment sessions. Even fewer studies have correlated this increase and decrease in arousal with improvement in symptomatology. The few findings that do emerge in this research area seem to suggest that physiological arousal and/or subjective anxiety during exposure may be either beneficial, irrelevant, or detrimental to subsequent improvement.

Supporting the first position that arousal is beneficial, Hogan and Kirchner (1967) demonstrated a relationship between physiological arousal during flooding and subsequent improvement in symptomatology. They showed that two-thirds of a group of rat-phobics who received

imaginal flooding treatment and responded to it with elevated heart rate were able to pick up a rat at the end of a single treatment session; only nine percent of the controls, who showed little heart rate increase, were able to pick up a rat. Thus, arousal during scene presentation was associated with outcome improvement.

Several studies have established that rapid extinction of physiological arousal and subjective anxiety is also associated with posttreatment improvement. In a study utilizing patients with specific phobias (Watson, Gaind & Marks, 1972), repeated exposure to phobic stimuli in a flooding procedure produced a steady reduction in heart rate and skin conductance which was accompanied by clinical improvement (cognitive and behavioral changes). Borkovec (1972, 1974), using snake-phobic university students, showed that a rapid extinction of physiological arousal during flooding was associated with heart rate reduction on a behavioral posttest. Marks, Boulougouris, and Marset (1971) demonstrated that a decrease in maximal subjective anxiety across flooding sessions predicted clinical improvement.

Thus, it has been demonstrated that high arousal during flooding is associated with outcome improvement Hogan & Kirchner, 1967). Rapid extinction of arousal over the course of flooding has also been associated with outcome improvement (Borkovec, 1972, 1974;

Marks, Boulougouris, & Marset, 1971; Watson, Gaind & Marks, 1972). Therefore, even though these findings have occurred in separate studies, it is logically possible that high arousal during flooding followed by rapid extinction of that arousal could predict outcome improvement.

Although they investigated systematic desensitization rather than flooding, Lang, Melamed, and Hart (1970) reported relationships between the occurrence of marked physiological responding during exposure, rapid extinction of this physiological arousal, and outcome improvement. They demonstrated that snake- phobic subjects showing the greatest outcome improvement on subjective and behavioral avoidance measures had the highest heart rates during treatment and demonstrated the steepest heart rate habituation gradients with repeated presentations of a scene. Subjects showing little improvement, on the other hand, had lower heart rates across sessions and showed little or no heart rate habituation.

In contrast, several studies support the position that the subjective experience of anxiety during exposure may be irrelevant to successful outcome provided that subjects receive sufficient exposure to fear stimuli. For example, Hafner and Marks (1976) compared agoraphobic patients deliberately made anxious (arousing phobia-related comments by the experimenter) with those deliberately made relaxed (soothing comments

by the experimenter) during exposure in vivo. Although self-reports of anxiety were significantly higher for patients in the high anxiety group, the difference did not significantly affect outcome of treatment. Both groups showed similar significant improvement in anxiety and avoidance up to six-months follow-up. Hafner & Marks (1976) also compared agoraphobics deliberately made relaxed by a dose of diazepam with those given a placebo during group in vivo exposure. Again, no difference in outcome was observed even though patients given diazepam rated themselves significantly less anxious than those given the placebo during the actual exposure. Studies employing imaginal flooding (Watson & Marks, 1971) or imaginal flooding combined with in vivo flooding (Marks, Boulougouris, & Marset, 1971) have similarly failed to find any correlation between self-reports of anxiety during treatment sessions and successful flooding outcome.

Still other evidence supports the third alternative that evocation of high anxiety during exposure may be detrimental for successful phobia reduction. According to this position, flooding an individual with high intensity feared material may disrupt exposure and hence extinction. Excessive upset may lead to covert or overt escape, resulting in insufficient exposure which, in turn, might produce incubation (enhancement) rather than extinction of fear (Eysenck, 1968). This realization has led to the use of tranquilizing and sedative drugs in combination with exposure techniques for phobic

patients. For example, Hussain (1971) found that patients showed greater improvement when they received thiopental-assisted flooding than when they received saline-assisted flooding. It has been proposed in two review articles (Mathews, 1980; Marks, 1973) that the advantage of these relaxing drugs in behavioral treatments may lie not in the reduction of anxiety per se, but in facilitating exposure to a greater range and intensity of phobic stimuli, resulting in more rapid extinction. As support for this position, the tranquilizer chlorpromazine facilitated extinction of fear in rats (Nelson, 1967) only when the drug resulted in increased exposure to a fear compartment.

Thus, since different studies suggest that arousal or anxiety in response to nonreinforced CS exposure may be necessary, irrelevant, or detrimental for successful flooding, the whole issue of arousal essentially remains unresolved.

The Effects of Acute Exercise on State Anxiety

Therapists are increasingly prescribing acute physical exercise rather than a tranquilizing drug for individuals experiencing anxiety symptoms (e.g., Kostrubala, 1976). Acute exercise refers to a single session of exercise, as opposed to chronic exercise which consists of many acute sessions occurring over an extended time period. The consequences of acute exercise are immediate and transitory in nature (Morgan, 1976) as opposed to long-term adaptational effects produced by chronic exercise.

There is considerable controversy about whether acute exercise increases or decreases anxiety. This controversy is especially well illustrated by Nowlis and Greenberg's (1979) discrepant finding that a 12.5 mile run performed by experienced joggers induced self-reported decreases in anxiety, on the one hand, but also, on the other hand, self-reported decreases in relaxation post-exercise.

Pitts and McClure (1967) maintain that exercise increases anxiety because it speeds up the production of lactate, which has been shown to increase anxiety, especially when infused into anxiety neurotics. Studies reviewed by Pitts (1969) found that moderate to heavy exercise produced excessive rises in blood lactate accompanied by anxiety symptoms in anxiety neurotic patients, whereas nonpatient controls showed normal lactate elevations without any anxiety symptoms.

On the other hand, Morgan and his associates (Morgan, 1973, 1976) have consistently shown that moderate to strenuous exercise (at 50 to 80 percent of maximal aerobic power) produces significant reductions in state anxiety and identical post-exercise lactate levels in both normal individuals and anxiety neurotics. It is possible, however, that the anxiety neurotic patients employed in the experiments reviewed by Pitts were considerably more anxious than the subjects who participated in the Morgan studies.

In some of the later studies reported by Morgan (1976), anxiety levels were recorded during as well as

before and after the exercise. In these experiments, state anxiety was elevated during exhausting exercise at 80 percent of maximal oxygen uptake and then decreased rapidly following the exercise to below pre-exercise levels for both normal and anxious subjects. Unfortunately, there seems to be a gap concerning what happens to state anxiety during moderate exercise.

Bahrke and Morgan (1978) additionally demonstrated that 20 minutes of treadmill exercise at 70 percent of maximal heart rate and 20 minutes of meditation (Benson's Relaxation Response; Benson, 1975) produced equivalent significant reductions in state anxiety for subjects who initially rated themselves as either normal or high in state anxiety. This reduction in anxiety following such dissimilar procedures is theoretically important in that meditation generally reduces sympathetic arousal (Benson, 1975) whereas exercise greatly increases it (Astrand & Rodahl, 1977).

If exercise has an anxiety-reducing effect equivalent to that of meditation, it may also be as effective as some of the milder tranquilizing drugs in the temporary reduction of anxiety states for normal and moderately anxious individuals. It is interesting that while tranquilizers and meditation produce reductions in both physiological aroual and subjective anxiety, exercise produces a divergent and seemingly paradoxical pattern of elevated physiological arousal and reduced subjective anxiety. For example, Andres, Metz, and Drash (1978) demonstrated that a 20-minute treadmill exercise session at an intensity similar to

that used in the Bahrke and Morgan study produced a significant reduction in state anxiety, accompanied by a significant increase in urinary epinephrine and norepinephrine excretion.

This paradoxical aspect diminishes somewhat when one considers that undifferentiated arousal may function as an energizer (Hebb, 1955), and that cognitive labeling of the arousal may provide the steering function which makes that arousal emotionally relevant (Schachter & Singer, 1962). In this context, the increased arousal experienced during exercise is not alarming since exercise is usually regarded as an emotionally neutral event not associated with anxiety. The same arousal in the context of a situation which is perceived as threatening could be experienced as anxiety. Although the preceding argument may explain why exercise does not increase anxiety, the question which remains unanswered is why an emotionally neutral event such as exercise could actually decrease anxiety.

The Effect of Acute Exercise in Combination with Anxiety-Evoking Situations

Tranquilizers are often administered when an individual is undergoing a particular life stress so that less anxiety is experienced in the actual stress-inducing circumstance. The anxiety-reducing properties of acute exercise have thus far been discussed with respect to situations which are devoid of any anxiety-eliciting stimuli. There is, however, limited support for the possibility of using exercise in

combination with an anxiety-inducing situation in order to temporarily reduce the anxiety associated with that situation. Gal and Lazarus (1975) have reviewed studies which compare the physiological and subjective reactions of individuals engaged in either overt motoric activity or inactivity while confronting real-life stressful situations (e.g., military training or combat). They concluded that activity during stressful situations, while increasing physiological arousal, also reduced subjectively experienced anxiety and was generally preferred over remaining passive in the same situations. Although subjects in these experiments engaged in whatever activity was necessary to cope with their particular situation rather than exercise per se, these studies nevertheless suggest that exercise may play a role in coping with stressful occurrences.

In a study on aggression conducted by Zillman, Johnson and Day (1974), subjects who were deliberately angered by a confederate prior to engaging in a short bout of extremely strenuous exercise retaliated less intensely immediately following the exercise than did subjects given the same chance to retaliate six minutes later when the arousal produced by the exercise had partially decayed. Thus, if aggression is a positive function of perceived anger (Rule & Nesdale, 1976), the exercise seems to have played some very temporary but crucial role in preventing the escalation of anger. The authors concluded that subjects who had just finished exercising attributed their arousal to the exercise

rather than to the source of their anger. Thus, they displayed less aggression than subjects who attributed their (decaying) arousal six minutes later to the anger source. Since anger rather than fear was manipulated, it cannot be ascertained from this study whether exercise would have a similar effect on the emotionality associated with fear.

Two other experiments (Girodo & Pellegrini, 1976; Sime, 1977) suggest that exercise may also reduce the anxiety evoked by a fearful situation. Girodo and Pellegrini (1976) exposed subjects to an 11-minute anxiety-provoking accident film while they pedaled a bicycle ergometer at medium effort. Exercised subjects reported feeling less anxious than inactive controls during the film. The fact that both groups recalled similar amounts of film content makes it improbable that the exercise simply diverted attention from the film. Similarly, Sime (1977), utilizing 12 minutes of mild treadmill exercise within a stress manipulation involving test-induced anxiety, demonstrated a marked but nonsignificant decrease in state anxiety following acute exercise which was performed immediately prior to a written final examination.

The Effect of Acute Exercise in Combination with Exposure Techniques for Reducing Phobic Anxiety

Preliminary case studies using patients suggest that vigorous exercise performed prior to exposure to anxiety-eliciting stimuli can help eliminate long-term severe phobias. The reduction of specific phobias seems to require

only a short number of sessions. For example, Orwin (1974) successfully treated a woman with a near lifelong fear of elevated lavoratory cisterns in five sessions by having her run until breathless prior to in vivo exposure to the feared object. Upon completion of treatment, she could use lavoratories without prior running and without concern. This improvement was maintained at a five month follow-up. In a similar manner, Muller and Armstrong (1975) completely eliminated a woman's severe elevator phobia in three formal sessions, supplemented by additional outside practice sessions, so that at follow-up four months later she reported regular use of elevators with minimal fear and no avoidance.

Treatment of agoraphobia, a more general type of phobia, seems to require a greater number of treatment sessions. For example, Orwin (1973) treated eight agoraphobic patients by having them run until they reached feared areas in a breathless condition. The mild (n=1), moderate (n=3), and severe (n=4) agoraphobics were totally cured with no remaining symptoms in an average of 12, 21, and 63 sessions, respectively.

The completely successful elimination of severe phobias reported by Orwin (1973,1974) and by Muller and Armstrong (1975) encourages controlled experimental investigation of the combined use of exercise and exposure for phobic anxiety reduction. Driscoll (1976) took the first step in this direction. In a controlled laboratory study using highly test-anxious university subjects, he successfully reduced

test anxiety by using physical exertion (running in place) prior to and during presentation of anxiety-eliciting scenes. Half the subjects were also given positive imagery immediately following scene presentation. The exertion-exposure-positive images group showed significant anxiety reduction which was found to be comparable to another group given a much more prolonged taped systematic desensitization treatment. A finding of particular relevance was that the two exertion groups (with and without positive images) showed significantly greater improvement than the equivalent groups without exertion.

It must be noted, however, that the total phobic scene presentation time in the Driscoll study was only several minutes over the course of two sessions. Nevertheless, the study suggests that exercise plus exposure produces a decrease in phobic anxiety. There is clearly a need for an experimental investigation of a target fear which would involve exercise performed in combination with a bone fide flooding manipulation extending over a longer time period.

The Effect of an Exercise-Flooding Manipulation on Physiological Arousal

It has recently been shown (Schwartz, Weinberger, & Singer, 1981) that the cardiovascular pattern during fear imagery resembles that observed during exercise. It is important to consider what actually happens when these two similar sources of arousal are simultaneously elicited. "In

other words, when one is exercising, are the cardiovascular effects of emotional state redundant, additive, or, in some cases, genuinely interactive?" (Schwartz et al, 1981, p. 346).

The Schwartz et al. study is the first attempt to address this issue. This study examined cardiovascular patterns following various kinds of self-generated emotional and control imagery while subjects were seated and while they exercised by walking up and down a 40-cm. high step. Heart rate increases above baseline were much greater when subjects generated fear imagery while exercising (approximately 26 bpm) than when they either generated fear imagery while seated (approximately 11 bpm) or exercised without any imagery (approximately 14 bpm). It thus appeared, at first inspection, that the effects of fear and exercise on heart rate were additive. However, since subjects worked at a faster rate while exercising during fear imagery than while exercising without imagery (pace was expressly not controlled to allow natural expression of emotions), there was no way of assessing the extent to which the harder physical work itself produced the increases in heart rate. Thus, standardization of work effort may be necessary in order to examine heart rate patterns during fear imagery and exercise, both separately and in combination.

Standardization can be achieved by having individuals exercise at the same percentage of the difference between

their resting and maximal heart rate. This method, called the "Karvonen Formula" (Karvonen, 1959) takes individual differences in resting heart rate into account. The work load can then be individualized for each subject by adjusting the load against which the subject works in order to achieve the target heart rate determined by the formula.

The Theories

Three main theories could conceivably account for the potential efficacy of a combined exercise-flooding treatment. All three theories accept that unreinforced CS exposure and hence extinction of anxiety are occurring because of the flooding component of the exercise-flooding manipulation. The theories also acknowledge that the exercise component can produce a state of heightened physiological arousal which combines in some unknown fashion with the arousal produced by the flooding. The theories, however, provide differential mechanisms concerning the role played by the exercise in the reduction of phobic anxiety.

Direct Exposure Hypothesis. The direct exposure theory involves two possible mechanisms whereby exercise could conceivably increase exposure to fear producing stimuli. The first mechanism is that exercise may produce proprioceptive cues which are similar to and perhaps more intense than those experienced during flooding. These physiological arousal cues, in combination with the physiological arousal and cognitive cues provided by the flooding scenes, directly expose the subject to a more intense version of the fear-

eliciting CS-complex than if the exercise-induced physiological arousal were deleted. Thus, by being exposed to this more intense CS-complex, extinction may proceed at a faster rate (Solomon, Kamin, & Wynne, 1953; Solomon & Wynne, 1954). The proposal that exercise provides supplementary exposure to the physiological arousal component of the anxiety response ties in with the traditional view that maintaining an individual in a high state of arousal leads to rapid extinction of conditioned fear in flooding (Hogan & Kirchner, 1967; Stampfl & Levis, 1967).

A second mechanism may be that exercise produces a more vivid imagery experience, similar to a phenomenon often reported by runners. Although there is no entirely convincing evidence that this is the case, it has been suggested, for example, that moderate exercise increases mental awareness or alertness (Gupta, Sharma, & Jaspal, 1974; Powell, 1975; Wagemaker & Goldstein, 1980). This, in turn, could render the individual more receptive to the cues used in an imaginal flooding treatment.

Exhaustion Hypothesis. The exhaustion hypothesis maintains that exercise-produced exertion and arousal rapidly extinguish anxiety as the result of physical fatigue. This exhaustion mechanism was mentioned by Driscoll (1976) as a possible rationale behind the success of an exercise-exposure approach. According to Rachman (1969), successful flooding depends on keeping the individual in a

state of emotional over-arousal until some self-limiting satiety mechanism leading to emotional exhaustion prevents further emotional reactivity from occurring. It is at this satiety point, after "the subject has been taken over the hump of maximal arousal" (Rachman, 1969, pp. 99-100) that rapid habituation or extinction occurs. As support for the importance of physical fatigue, patients in the case studies reported by Müller and Armstrong (1975) and Orwin (1973, 1974) exercised until they were exhausted before being exposed to their respective feared situations, while Driscoll's subjects performed fatiguing exercise both before and during exposure. If one does, in fact, react less emotionally when fatigued from either continued exertion or exposure-produced arousal, combining exercise and flooding may more rapidly bring the individual to that point of exhaustion where fear stimuli cease to elicit anxiety.

Attribution Hypothesis. Attribution theory (Heider, 1958; Jones & Davis, 1965; Kelly, 1967), formulated by social psychologists, is a general approach concerned with cognitive processes by which individuals search for and infer the causes of their own and other individuals' behavior. Research in self-attribution has shown that an individual's emotional experience can be influenced by the source to which he attributes his state of arousal. For example, Schachter and Singer (1962) showed that an emotional experience depends both upon a state of physiological arousal and upon an environmentally-based attribution appropriate to that state of arousal. Thus,

subjects assigned different labels to arousal produced by an epinephrine injection depending upon the environmental context in which they found themselves. The cognition determined the type of emotion experienced.

If neutral physiological arousal which is attributed to an emotionally relevant source can be perceived emotionally (Schachter & Singer, 1962), it is conceivable that the physiological arousal component of an emotional phobic response could be attributed to an emotionally irrelevant cognitive source and thus be perceived unemotionally. In this manner, the link between the physiological and cognitive factors responsible for an already existing emotional state could be altered by creating a new link between the arousal and a salient external nonemotional source. The arousal originally associated with the emotional state would thus be prevented from having emotional relevance, and the emotional attribution could be prevented or reduced.

Both Orwin (1973) and Muller and Armstrong (1975) have suggested attributional mechanisms to account for the beneficial effects of exercise combined with fear exposure. Attribution theory, as applied to exercise-exposure procedures, essentially maintains that physiological arousal resulting from and partially maintaining fear is cognitively attributed to the salient but emotionally neutral exercise. By neutralizing the emotional relevance of the physiological arousal component of the anxiety, the attribution may break

the spiral of escalating anxiety. Even if misattribution of arousal only achieves transitory anxiety reduction, this may facilitate fear exposure by preventing covert avoidance from occurring. Thus, misattribution may be a vehicle to facilitate exposure and hence consolidate extinction of conditioned fear. If this can occur, there may be a future for misattribution therapy as an adjunct to exposure techniques.

Limited support for this position comes from a study by Loftis and Ross (1974). They demonstrated that a conditioned fear response extinguished more rapidly when subjects misattributed their fear arousal to an extraneous source. During acquisition, electric shocks were paired with light, producing a conditioned galvanic skin response (GSR) to the light. During extinction trials (light only presented) subjects were exposed to continuous white noise (a source irrelevant to the CS and UCS). Subjects told that the noise would produce arousal similar to that experienced during fear misattributed their conditioned arousal to the noise and showed a more rapid extinction of GSR than did subjects given irrelevant information about the noise. If misattribution can facilitate extinction of laboratory produced conditioned fear, it could possibly hasten extinction of the already established conditioned fear in phobias.

In summary, the three hypotheses differ in terms of the role played by exercise in phobic anxiety reduction. According to the exposure hypothesis, the additional

internal cues may serve to escalate anxiety and/or mental awareness during treatment, which, in turn, leads to greater exposure and hence extinction of the conditioned fear response. According to the exhaustion hypothesis, the physical fatigue resulting from exercise hastens extinction by more rapidly bringing the individual to the point where fear stimuli are no longer capable of eliciting anxiety. According to the attribution hypothesis, focusing on one's internal state allows the individual to make a cognitive judgment that the arousal during the exercise-flooding is being caused mainly by the exercise. The reduction in alarm resulting from this cognition may, in turn, indirectly facilite exposure and hence extinction of conditioned fear.

The Present Study

Speech anxiety, one of the five most intensely reported fears in a college sample (Geer, 1965), was selected as the target behavior. In addition to its adverse effect on the performance of approximately 20 percent of university students (McCroskey, 1977), this situational anxiety, with a large physiological arousal component similar to that of exercise, has been shown to be treatable by exposure techniques. It thus seemed an appropriate situational anxiety to test the possible benefits of exercise as an adjunct to exposure in the treatment of phobic anxiety.

The present experiment examined the effect on speech

anxiety of heightened physiological arousal produced by acute physical exercise performed immediately prior to and during CS exposure. Two main issues were addressed. The first issue was concerned with outcome improvement, i.e., with the effectiveness of a combined acute exercise-flooding therapy as a treatment for speech anxiety. A second, theoretical, objective was to explore whether an exposure, exhaustion, or attribution hypothesis best explained the submechanisms of the exposure process. Speech anxious university students received one of four treatments: (1) Exercise-Flooding, (2) Flooding, (3) Exercise, (4) Placebo-Control. Changes in self-report, behavioral, and psychophysiological indices of speech anxiety from pre- to posttesting provided the main assessment of outcome improvement. Improvement was considered to be indicated by pre-to-posttest reduction in these measures.

Hypotheses

Applied (Outcome) Predictions.

(a) Based on previous findings from studies of speech anxiety (e.g., Calef & MacLean, 1970; Mylar & Clement, 1972; Sherry & Levine, 1980), it was expected that subjects receiving the flooding would show greater decrease in speech anxiety from pre- to posttesting than subjects receiving a neutral control for flooding.

(b) Based on successful case study results with divergent phobias (e.g., Muller & Armstrong, 1975; Orwin, 1973, 1974) and on the experimental reduction of test

anxiety (Driscoll; 1976), it was predicted that subjects receiving the exercise-flooding combination would show greater decrease in speech anxiety than subjects receiving flooding alone.

Theoretical Mechanisms

According to the exposure, exhaustion, and attribution hypotheses, the Exercise-Flooding group was expected to show the most improvement. The Flooding group was expected to show less improvement. All three hypotheses also predicted that the Placebo-Control group would show minimal or no improvement.

The hypotheses, however, predicted differential patterns for the Exercise group. The exposure hypothesis predicted that this group would show slight improvement since they were exposed to physiological arousal which they had learned to associate with their anxiety response and which could by itself elicit anxiety as a conditioned emotional response. In this way exercise could conceivably help extinguish part of the phobic anxiety even in the absence of actual exposure to the phobic stimuli. The exhaustion hypothesis predicted no improvement for this group since the fatigue occurred in the absence of any exposure to fear stimuli. Similarly, the attribution hypothesis predicted no improvement for this group as they were focusing on arousal which they correctly perceived to be caused by the exercise.

Apart from the limited support for the exposure

hypothesis contingent on the Exercise group improving more than the Placebo-Control group, knowledge about group improvement alone would not help differentiate among the hypotheses. Therefore, assuming that the Exercise-Flooding group showed most outcome improvement, it would be necessary to examine group differences in subjective feelings and attributions about the source of these feelings during treatment in order to help identify operating theoretical mechanisms. The direct exposure hypothesis would find support if the Exercise-Flooding group reported more anxiety and/or better imagery than did the Flooding group. Further support for this hypothesis would be provided if the Exercise group reported more anxiety than the Placebo-Control group. The attribution hypothesis, on the other hand, would be supported if the Exercise-Flooding group reported lower levels of anxiety and/or greater habituation of anxiety during treatment than did the Flooding group and attributed their physiological arousal more to the exercise than to the flooding. The best support for the exhaustion hypothesis would be provided if the Exercise-Flooding group reported greater increases in fatigue (or greater decreases in energy) over the course of a session than did either the Flooding or Exercise groups. This finding might indicate a summation of fatigue resulting from the exercise and flooding sources.

Method

Subjects

Fifty-two speech anxious subjects (24 males and 28 females) who met the following selection criteria were retained in the final sample: (a) a response of 5 (much fear), 6 (very much fear), or 7 (terror) on item 41 ("Speaking before a group") of the Fear Survey Schedule II (Geer, 1965), (b) a score of 35 or above on the S-R Inventory of Anxiousness speech items (Endler, Hunt, & Rosenstein, 1962), (c) a score of 16 or more on The Personal Report of Confidence as a Speaker questionnaire (PRCS; Paul, 1966). (These three inventories appear in Appendix A.)

Forty of the 52 subjects were recruited via advertisements posted on bulletin boards throughout the Concordia campus. These advertisements informed potential subjects that they might be able to reduce their speech anxiety in exchange for participation in the study. The remaining 12 subjects (8 males and 4 females) met the criterion for the Fear Survey Schedule during administration of a questionnaire screening session and were subsequently contacted by the experimenter.

One subject who failed to complete the experiment (after being assigned to a treatment condition) was replaced by another subject. Six individuals were disqualified from participating during the initial session because they either did not meet the experimental critera (three subjects), were

taking psychotropic drugs (one subject), or had serious emotional problems (two subjects). Three other subjects who attended the initial session decided not to continue. All subjects participated in the study on a voluntary basis.

Apparatus

The experiment was conducted in two adjoining temperature and humidity regulated rooms--an experimental room and a control room. The experimental room contained: a comfortable armchair for the subject, an intercom, a video-camera, headphones, a Bodyguard bicycle ergometer (model 990), and connectors for the physiological transducers. The control room contained: a Grass Model 7 polygraph, a tape recorder, a videotape recorder, and a video monitor.

Heart rate was recorded using Beckman Dyna/trace ECG electrodes filled with Beckman electrode electrolyte and placed on either side of the back with a ground electrode in the center. The signal was processed through a Grass Model 7P5-A preamplifier and Model 7P4-A cardiotachometer. Skin conductance was recorded via Beckman standard silver/silver chloride electrodes (#650951), filled with Unibase creme (Parke-Davis) which had been prepared following the recommendations of Lykken and Venables (1971). The electrodes were attached by adhesive collars at the medial phalanges of the second and third fingers of the non-dominant hand. These collars were further secured with tape to prevent loosening during exercise. The signal was processed via a laboratory-built circuit (Lykken & Venables,

1971) connected to a Grass low-level DC pre-amplifier (model 7P1-A) for direct measurement of skin conductance.

Design

The experimental conditions comprised a two by two factorial design which combined the presence or absence of exercise with the presence or absence of flooding treatment. This design resulted in four groups: (1) Exercise-Flooding, (2) Flooding, (3) Exercise, and (4) Placebo-Control. Thirteen subjects were randomly assigned to each group within blocks of four subjects and within sex. Subjects recruited from the questionnaire screening were equally distributed among the groups.

Procedure

The basic plan of the experiment, presented in Figure 1, was comprised of three main divisions: Pretreatment Screening and Assessment (Session I), Treatment (Sessions II and III), and Posttreatment Assessment (Session IV). Each subject was seen on an individual basis by the same experimenter for four sessions, separated by one-week intervals.

Initial contact with the subject was made by telephone. A standardized contact statement (Appendix B) explained that the purpose of the experiment was to evaluate the effectiveness of several treatment techniques for reducing speech anxiety. If the student expressed interest, a suitable appointment time was scheduled for the 90-minute pretreatment session.

(Initial Phone Contact)

PRETREATMENT SCREENING AND ASSESSMENT (1 SESSION)

1. Explanation
2. Informed Consent
3. Fear Survey Schedule II
4. S-R Inventory of Anxiousness
5. Research Participant Form
6. Structured Interview
7. Cognitive-Somatic Anxiety Questionnaire
8. Pretest Speech
   a) Baseline (10 min)
   #
   b) Instructions (75 sec)
   c) PRCS
   d) Speech Preparation (5 min)
      i) note making (3 min)
      ii) rehearsal (2 min)
   #
   e) Speech (3 min)
   #
   f) Recovery (5 min)
   #
9. Coping Style Questionnaire

TREATMENT (2 SESSIONS)

Group EX-FL	Group FL	Group EX	Group Placebo
1. Baseline (10 min) *	1. Baseline (10 min) *	1. Baseline (10 min) *	1. Baseline (10 min) *
2. Rationale Instructions (5 min)	2. Rationale Instructions (5 min)	2. Rationale Instructions (5 min)	2. Rationale Instructions (5 min)
3. Rest (5 min)	3. Rest (5 min)	3. Rest (5 min)	3. Rest (5 min)
4. Exercise/ Flood Tape (15 min) * $ %	4. No Exercise/ Flood Tape (15 min) * $ %	4. Exercise/ Neutral Tape (15 min) * $ %	4. No Exercise/ Neutral Tape (15 min) * $ %
5. Recovery (5 min) *	5. Recovery (5 min) *	5. Recovery (5 min) *	5. Recovery (5 min) *

POSTTREATMENT ASSESSMENT (1 SESSION)

1. S-R Inventory of Anxiousness
2. Posttest Speech
   (same as Pretest including PRCS)
3. Coping Style Questionnaire
4. Treatment Evaluation (including credibility rating)
5. Debriefing

Figure 1. Basic Plan of the Experiment. Note: 4 and 5 repeat three times during each treatment session. 1., 3., and 5. occur in chair; 2. and 4. occur on bike. (# = Anxiety Thermometer; * = Anxiety, Arousal, Relaxation, Fatigue, and Energy feeling scales; $ = Tape vs Bike Attribution scale; % = Imagery Rating sheet)

Pretreatment Screening and Assessment Upon arrival at the laboratory, the student was met by the experimenter and seated in the armchair. A standard five-minute explanation (Appendix B) was delivered to inform the student that the four-session experiment involved delivering a three-minute speech during the present session, two treatment sessions, and a final session requiring presentation of another three-minute speech. At the conclusion of the explanation, the student signed an Informed Consent Sheet (Appendix B) if he or she agreed to participate in the study. This sheet explained the bicycle ergometer exercise (which might be required) and audiotape components of the treatment, possible risks and discomforts involved, confidentiality of their data, as well as their freedom to withdraw from participation. The subject then completed the Fear Survey Schedule II (Geer, 1965) and the S-R Inventory of Anxiousness (Endler, Hunt, & Rosenstein, 1962) which were both immediately scored by the experimenter.

A Research Participant Form (Appendix B) was then administered to qualifying subjects in order to screen out individuals with medical or psychiatric conditions which could be aggravated by the experimental procedures. A 10-minute structured interview (Appendix B) was then conducted to assess the history, nature, and extent of the individual speech anxiety problem. Information was also gathered concerning the extent of the subject's participation in aerobic sports in order to obtain an estimate of fitness

level based on Cooper's (1977) point system. Subjects then filled out the Cognitive-Somatic Anxiety Questionnaire (CSAQ; Schwartz, Davidson, & Goleman, 1978). This inventory (Appendix A), with separate cognitive and somatic scales, was included to assess whether the exercise-flooding treatment was differentially beneficial for subjects who primarily experienced anxiety at either the cognitive or somatic level.

The pretreatment test speech was then administered. After heart rate and skin conductance electrodes had been affixed and connected to the polygraph for physiological recording, headphones were attached through which subsequent recorded information and instructions were communicated. (See Appendix E for procedural instructions transcript.)

A ten-minute baseline period followed, during which the subject was instructed to relax with their eyes open. At the end of this period, the subject was asked to fill out an 8-point Anxiety Thermometer (cf. Walk, 1956; Appendix C) rating the maximum level of anxiety experienced during the last minute of the rest. After listening to brief procedural instructions, the subject completed the Personal Report of Confidence as a Speaker questionnaire (PRCS; Paul, 1966).

A small note card was then handed to the subject. The topic of the speech, "The advantages and/or disadvantages of achieving a balance between school work and recreation", appeared on this card along with space for making notes. A

five minute preparation period consisted of three minutes of making notes on the card for later reference while speaking, followed by two minutes of quiet mental rehearsal. The purpose of the mental rehearsal was to obtain physiological measurements of anticipatory anxiety unconfounded by the movement artifacts associated with writing or speaking. At the beginning of the final minute of the rehearsal period, the subject was informed of the time remaining until speech delivery. At the end of the preparation period, immediately before giving the speech, the subject again filled out the Anxiety Thermometer, this time rating the level of anxiety experienced at that moment.

After removal of the headphones, the subject stood up and delivered the three-minute speech. There was no live audience for the speech, but the subject was informed that the performance was being videotaped for later evaluation by trained raters, a condition demonstrated to increase arousal (Cohen & Davis, 1973; Marton, Fransson, Jonsson, Klenell, & Roos, 1973; Wapner & Alper, 1952). Immediately after the conclusion of the speech, the subject was seated with headphones reattached. The Anxiety Thermometer was completed, rating the maximum level of anxiety experienced during the three minute speech. A five-minute recovery period was then initiated, at the end of which the Anxiety Thermometer was completed to indicate the level of anxiety at that moment.

After removal of headphones and electrodes, a Coping Style Questionnaire (Appendix A), adapted from one developed

by Billings and Moos (1981), was administered.

An appointment was then arranged for the first treatment session. The subject was issued a card which specified the date and time of the appointment, instructions to bring running shoes and shorts, and restrictions to avoid the intake of food, caffeine, nicotine, and alcohol for two hours prior to the session.

Treatment (two sessions). Following the pretreatment session, subjects were randomly assigned, within sex to one of the four treatment groups. Subjects in all groups received two 2-hour sessions of their respective treatment at one week intervals, beginning one week after the pretreatment session.

The treatment procedures across the four groups and the two treatment sessions followed a standard parallel format. This format and the procedures associated with each time period of the treatment session are displayed in Figure 1. As can be seen, each session sequentially comprised: a 10-minute baseline rest period (in the chair), a 5-minute rationale/procedural explanation (on the bike), a 5-minute rest period (in the chair), and three consecutive 20-minute treatment blocks. Each of the 20-minute treatment blocks included a 15-minute treatment period, followed by a five-minute recovery period (in the chair). The treatment period was comprised of a presentation of a 15-minute audiotape with either flooding or neutral imagery content, while the subject concurrently either simply sat on or pedaled the bicycle ergometer. Thus, over the two sessions

(six treatment blocks) each subject received a total of 90 minutes of flooding or neutral imagery and a total of 90 minutes of concurrent exercise or no exercise.

Since the basic structure of the treatment sessions was parallel across groups, a complete account of the procedure will be provided for the Exercise-Flooding group, followed by supplementary descriptions of the procedural aspects specific to the other three groups.

Exercise-Flooding. Upon arrival at the laboratory, the subject was briefly interviewed to make sure that no adverse consequences had resulted from the previous session and that the restrictions (food, caffeine, nicotine, alcohol) had been followed. After changing into shorts, running shoes, and a loose shirt, the subject was seated in the armchair with heart rate and skin conductance electrodes affixed. A clipboard holding Subjective Rating Sheets (Appendix C), specifically designed for this experiment, was placed on the subject's lap. The sheets consisted of five 8-point feeling scales labeled "Anxiety-Tension", "Energy-Liveliness", "Relaxation-Calmness", "Fatigue-Tiredness", and "Physiological Arousal". The first four scales were conceptually based on the four identified factors of the Activation-Deactivation Adjective Check List (Thayer, 1978), while the "Physiological Arousal" scale was broadly based on the anxiety section of the Autonomic Perception Questionnaire (Mandler, Mandler, & Uviller, 1958). Subjective Rating Sheets administered

following the imagery periods also contained five 8-point "Tape vs Bike" attribution scales (one accompanying each scale) which assessed the degree to which the subject attributed each of the feelings to the imagery tape or the exercise.

The experimenter provided the subject with detailed instructions for completing these sheets. It was emphasized that "Physiological Arousal" could consist of feelings of increased heart rate, rapid breathing, muscular tension, stomach sensations, etc., experienced either singly or in various combinations. Subjects were to rate their physiological arousal with reference to the system or systems that seemed most prominent to them. Several examples (using a sample Subjective Rating Sheet) were then given so that the subject became familiar with the rating scales and could quickly complete them.

A 10-minute baseline rest period followed, during which the subject was instructed to relax with eyes open. At the end of this baseline period, the subject filled out the first Subjective Rating Sheet (feelings only) rating the maximum level of feelings experienced during the past minute. The subject was then helped onto the bicycle ergometer with seat height adjusted and headphones attached. A tape recording explained the origin and nature of speech anxiety, provided a treatment rationale for its reduction, and delivered instructions for the flooding and exercise procedures. (Tape transcripts of these

explanations, rationales, and instructions for all four groups appear in Appendix E.) It was attempted to make the four treatment rationales equally logical and convincing so that the expectation for improvement might be comparable across groups.

The instructions for the flooding imagery emphasized the importance of taking an active involved role in order to experience all the feelings described by the tape as fully as possible. The subject was then shown how to pedal the ergometer at 50 revolutions per minute paced by a metronome set at 100 beats per minute. The subject pedaled against progressively increasing workloads (ranging from 150 to 750 KpM/min) until a predetermined target heart rate (HR) was reached. This target HR, monitored by the cardiotachometer, was maintained for two minutes by adjusting the load against which the subject pedaled. The load required to maintain target HR at the end of this two-minute period was recorded and used as the load against which the subject pedaled during all subsequent 15-minute exercise-flooding treatment periods. Since the metronome would not be used during actual treatment, the subject was shown how to maintain the established rate of pedaling relative to a gauge on the ergometer.

A target heart rate was determined for each subject by adding 25 percent of their heart rate range (i.e., the difference between resting HR and age-adjusted maximum HR) to their resting HR according to the following formula

(Karvonen, 1959): Target HR = Resting HR + .25(Maximum Heart Rate - Resting HR). Resting HR was determined by averaging the HRs achieved during the last two minutes of the baseline period. Age- and fitness-adjusted maximum HR was determined according to values in a table formulated by Cooper (1977, p. 253). Fitness level had been determined in the first session according to Cooper's (1977) point system. Thus, the target HR for a non-fit 21-year old with a resting HR of 70 BPM and a maximum HR of 199 BPM would be 102 BPM (70 + .25(199 - 70)).

Following the rationale and instruction period, the subject was helped to dismount from the bicycle ergometer and was reseated in the armchair for a five-minute rest. The subject was then helped back onto the ergometer for the first exercise-flooding treatment period. After one minute of practice, the subject pedaled at the predetermined workload without a break for 15 minutes. The 15-minute flooding tape was played concurrently.

The flooding scene consisted of a detailed description of one of two public speaking situations which concentrated on difficulties encountered either during the actual speech (situation 1) or during the question period following the speech (situation 2). Transcripts of the two flooding tapes appear in Appendix F. One half of the subjects in each group were exposed to situation 1 during this first treatment session and were then exposed to situation 2 in the second session. The reverse order was used for the other half of each group.

Scenes were developed to include cues from the first three categories described by Levis and Hare (1977) with special emphasis on the response aspects (Lang, 1977). The scripts described both the stimulus cues present in the speech situation (e.g., the faces of the audience) and the 'person's cognitive, physiological, and behavioral reactions to the situation (e.g., feeling nervous and shaky). They also included periodic instructions for the subject to focus, or concentrate, as intensely as possible on the unpleasant emotional or physiological sensations evoked by visualizing the scenes. The scripts were matched paragraph by paragraph such that the subject entered the classroom, viewed the audience, ran into a series of difficulties, and experienced embarrassment, fear, and loss of control during the same time period on both tapes. Similarly, all instructions to focus on feelings of anxiety and on physiological arousal were arranged to occur at equivalent times during the two situations. Each scene concluded with the person being praised for their persistence and courage.

Both the exercise and the flooding tape stopped at the end of the 15-minute treatment period. At the conclusion of the exercise-flooding period, the subject was helped back into the chair and completed the second Subjective Rating Sheet (feelings and attributions) in terms of maximum level of feelings experienced during the preceding 15-minute period. The subject also completed an Imagery Rating Sheet (Appendix C), which assessed image clarity,

difficulty in maintaining clarity, and amount of time clarity was actually maintained on three 8-point scales.

The first five-minute recovery period was then initiated. At the end of this recovery period, the third Subjective Rating Sheet (feelings only) was completed in terms of maximum levels of feelings experienced during the past minute.

The 15-minute exercise-flooding/5-min recovery blocks were repeated two more times during the session. A Subjective Rating Sheet (feelings and attributions) and an Imagery Rating Sheet were completed after each exercise-flooding period; a Subjective Rating Sheet (feelings only) was completed after each recovery period.

After the subject showered and changed, an appointment was arranged for the second treatment session. A card with instructions identical to those given in the preceding session was given to the subject.

The second treatment session was a replication of the first except that the rationale and instructions were shortened and the alternate flooding situation was employed.

Flooding. The procedure for this group differed from that of the Exercise-Flooding group in that 15-minute periods of sitting on the bicycle ergometer without pedaling (control for exercise) replaced the exercise periods and a different rationale and instructions were provided. Instead of receiving instructions on how to pedal the ergometer, the subject was given an explanation of how better physiological measures could be obtained when sitting

on the ergometer than when in the chair. The 15-minute flooding tapes and all remaining aspects of the procedure were identical and, therefore, will not be repeated.

Exercise. The procedure for this group differed from that for the Exercise-Flooding group in that 15 minute periods of neutral imagery (control for flooding) replaced the 15 minute flooding imagery periods and a separate rationale and explanation were provided. Instructions stressed the importance of taking an involved role, just as for the flooding imagery. The exercise and all remaining aspects of the procedure were identical.

The neutral scene consisted of a detailed description of one of two light exercise situations which concentrated on events encountered either during a walk down a street (situation 1) or during a bicycle ride on a country road (situation 2). Transcripts of the two neutral tapes appear in Appendix G. As with the flooding tape, one half of each group was exposed to situation 1 during the first treatment session and to situation 2 in the second session (and vice versa).

The scripts described both the stimulus cues present in the light exercise situation (e.g., the face of a member of a snow removal crew) and the person's cognitive, physiological, and behavioral reactions to the situation (e.g., being aware of the rhythmic movement of leg muscles). They also included periodic instructions for the subject to focus, or concentrate, on internal sensations evoked by

visualizing the scenes. The scripts were matched paragraph by paragraph such that the subject left home, arrived at the scene, exercised lightly, stopped for a while, and experienced various kinds of feelings during the same time period on both tapes. Similarly, all internal focusing instructions were arranged to occur at equivalent times not only during the two neutral situations but also during the two flooding situations.

Both tapes were neutral only in that they described stimuli expressly designed not to elicit any anxiety. No reference was made to public speaking situations or any event that could be associated with such situations (e.g., an audience or classroom). The scenes were not actually intended to be overly relaxing, but rather to portray an activity level comparable to that in the Flooding scenes.

Placebo-Control. This group sat on the ergometer without pedaling while simultaneously being exposed to the neutral imagery as previously described. They thus constituted the true placebo control group since they received neither the exercise nor the flooding component.

Posttreatment Assessment. The 90-minute Posttreatment Assessment took place during the fourth session, one week after the final treatment session. It consisted of a second administration of the speech anxiety inventories, a posttreatment test speech, the Coping Style Questionnaire, treatment evaluation by the subject, and debriefing. The posttreatment test speech sequence and

dependent measures were identical to the pretreatment speech except that the topic of the speech was entitled "The advantages and/or disadvantages of obtaining a college degree."

The subject's perceived effectiveness of treatment in lowering anxiety in the speech situation and other related areas was assessed with a Treatment Evaluation Sheet (Appendix C) which included a credibility rating. During the subsequent debriefing, the subject was thoroughly informed concerning aspects of the procedure which they experienced (e.g., measures used). Subjects (regardless of group assignment) were also offered the opportunity to attend group sessions to learn and practice public speaking skills. Interested subjects were informed that they would be contacted by phone to arrange these meetings. Although concern about bias necessitated temporarily withholding information about specific hypotheses, subjects were contacted and provided with summary information of the results at the end of the experiment. The purpose for inclusion of each of the four treatment groups was then explained.

Dependent Measures

Self-Report

Outcome indices. All the following measures were taken during both the pretreatment and posttreatment sessions at corresponding times. The "Speech before a large group" subtest of the S-R Inventory of Anxiousness (Endler, Hunt, &

Rosenstein, 1962) asked subjects to rate their expected level of anxiety on each of 14 items on a five-point scale as if they were "getting up to give a speech before a large group." Eight of the items focus on physiological reactions experienced while speaking. This scale was administered prior to the test speech procedure.

The Personal Report of Confidence as a Speaker (PRCS; Paul, 1966) is a 30-item true-false questionnaire measuring subjective levels of anxiety experienced during public speaking situations in general. It was administered immediately prior to the preparation period during the test speech procedure. Both these inventories appear in Appendix A.

An eight-point Anxiety Thermometer (Appendix C), assessing amount of anxiety experienced by the subject (1=none, 3=some, 6=much, 8=extreme), was administered at the following four times during the test speech procedure:

(1) The end of the baseline period--Subjects rated the maximum level of anxiety experienced during the past minute.

(2) The end of the preparation period--Subjects rated their level of anxiety at that moment.

(3) The end of the speech--Subjects rated the maximum level of anxiety experienced during the speech.

(4) The end of the recovery period--Subjects rated their level of anxiety at that moment.

Treatment process indices. A Subjective Rating Sheet (Appendix C) consisted of five 8-point feeling scales labeled "Anxiety-Tension", "Energy-Liveliness", "Relaxation-Calmness", "Fatigue-Tiredness", and "Physiological Arousal".

Accompanying each scale was an eight-point "Tape vs Bike" attribution scale representing various degrees of attribution of subjective reactions to the imagery or the exercise. The Subjective Rating Sheet was administered at the following seven times during each treatment session.

(1) The end of the baseline rest period. (feelings) Subjects rated the maximum level of each feeling experienced during the past minute.

(2) The end of the treatment period in block 1. (feelings and attributions) Subjects rated the maximum level of each feeling experienced during the preceding 15 minutes.

(3) The end of the recovery period in block 1. (feelings) Subjects rated the maximum level of each feeling experienced during the past minute.

(4) The end of the treatment period in block 2. (feelings and attributions) Subjects rated the maximum level of each feeling experienced during the preceding 15 minutes.

(5) The end of the recovery period in block 2. (feelings) Subjects rated the maximum level of each feeling experienced during the past minute.

(6) The end of the treatment period in block 3. (feelings and attributions) Subjects rated the maximum level of each feeling experienced during the preceding 15 minutes.

(7) The end of the recovery period in block 3. (feelings) Subjects rated the maximum level of each feeling experienced during the past minute.

An Imagery Rating Sheet (Appendix C) was administered following the treatment periods in blocks 1, 2, and 3.

A 17-item Coping Style Questionnaire, adapted from one developed by Billings and Moos (1981) was administered at the end of the test speech procedure during both the pre- and posttreatment sessions.

Behavioral Outcome Indices

The pretreatment and posttreatment test speeches were scored from videotape in terms of three behavioral indices of anxiety and one index of public speaking skill. Raters recorded the presence of overt manifestations of anxiety during six succcessive 30-second periods of the speech using a shortened 12-item form of the Timed Behavioral Checklist (TBCL; Paul, 1966) (Appendix D). Eight items (e.g., face pale) were excluded from the original 20-item version because they could not be adequately assessed from videotape. During each separate 30-second period a qualifying behavior was recorded only once regardless of how many times it occurred. The scores from the six 30-second periods were summed to obtain a TBCL score. The sum of the two TBCL scores arrived at by two raters was used as the final TBCL score for that speech.

Four raters comprising six rater pairs were trained for approximately eight hours by viewing, rating, and discussing videotaped sample speeches to help them reach a a consensus of the meaning and range of the behaviors constituting each item on the checklist. The definition of each target response was strictly delineated in advance. Raters were blind as to which treatment the subject had

received and to whether they were rating the pretreatment or posttreatment test speech. Raters also made an Overall-Estimate of Anxiety and speech Skill on two separate eight-point scales for each speech (see Appendix D).

The third behavioral index of anxiety was a record of total silence duration obtained by scoring the cumulative duration of silences longer than two seconds from the videotaped speeches. This measure has been found to be associated with the presence of anxiety (Mahl, 1956; Murray, 1971).

Psychophysiological

The number of heart beats recorded during one minute periods was used as the HR index. Two parameters of the skin conductance measure were scored. Level (SCL) was the average of six minimum conductance values from consecutive 10 second segments during one minute periods. The second index was frequency of responses (SCR) exceeding 0.2 micromhos during one minute periods.

Outcome indices. The minute intervals scored for the psychophysiological measures during both the pretreatment and posttreatment test speech procedures were:

(1) The end of the baseline period.

(2) The end of the preparation period.

(3) A floating min. with the maximal value during the speech.

(4-5) Min. 1 and 5 of the recovery period.

Treatment process indices. The minute intervals scored for the psychophysiological measures during each of the two treatment sessions were:

(1) The last min. of the baseline period.

(2) A floating minute with the maximal value during the treatment period in block 1.

(3) The last min. of the recovery period in block 1.

(4) A floating minute with the maximal value during the treatment period in block 2.

(5) The last min. of the recovery period in block 2.

(6) A floating minute with the maximal value during the treatment period in block 3.

(7) The last min. of the recovery period in block 3.

RESULTS

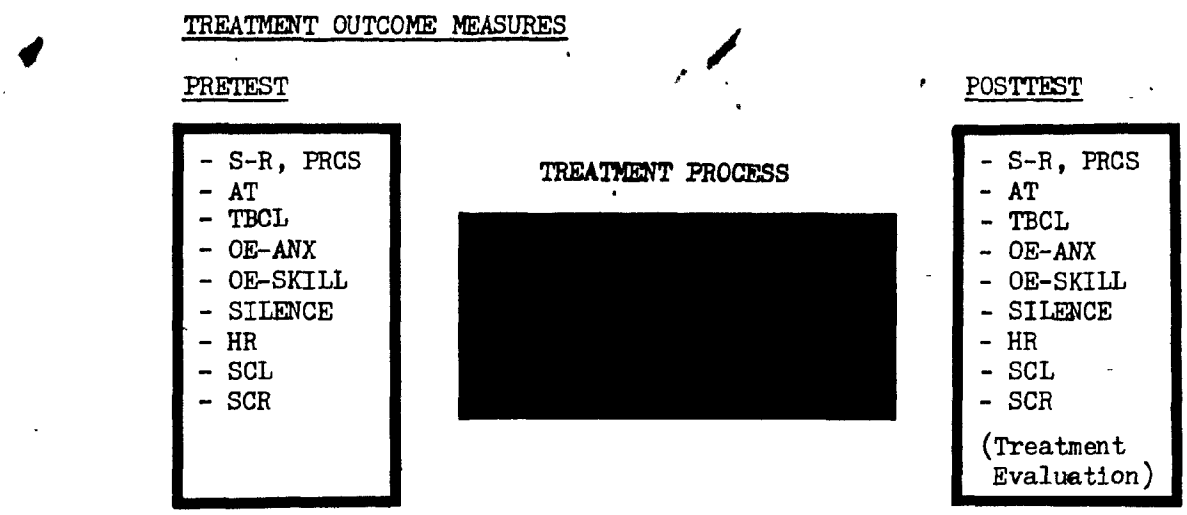
The overall plan for the data analysis involved four main steps. First, the pretest performance of the subjects recruited via advertisement was compared with that of subjects recruited from the screening questionnaire. Second, self-report, behaviorial, and psychophysiological outcome measures were examined to determine the changes from pre- to posttesting associated with the experimental manipulation. Third, self-report and psychophysiological process measures were examined in order to assess their strength and pattern during the two treatment sessions. Finally, correlations were calculated for the relationships among outcome measures, among process measures, and between process and outcome measures. Figure 2 helps clarify the plan of the data analysis.

Advertisement-Recruited vs Questionnaire-Selected Subjects

The pretest measures for the 40 subjects recruited by advertisement and the 12 subjects recruited on the basis of questionnaire screening were compared by way of *t* tests. There were no significant differences on any of the self-report, behavioral, and psychophysiological measures, except one coping factor (Active Support/Information Seeking) and baseline SCL (both $p < .05$). The two groups were, therefore, not considered different and were collapsed together for all subsequent analyses.

Outcome Measures

Multivariate analysis of variance was performed on sets of variables that were both conceptually and statistically



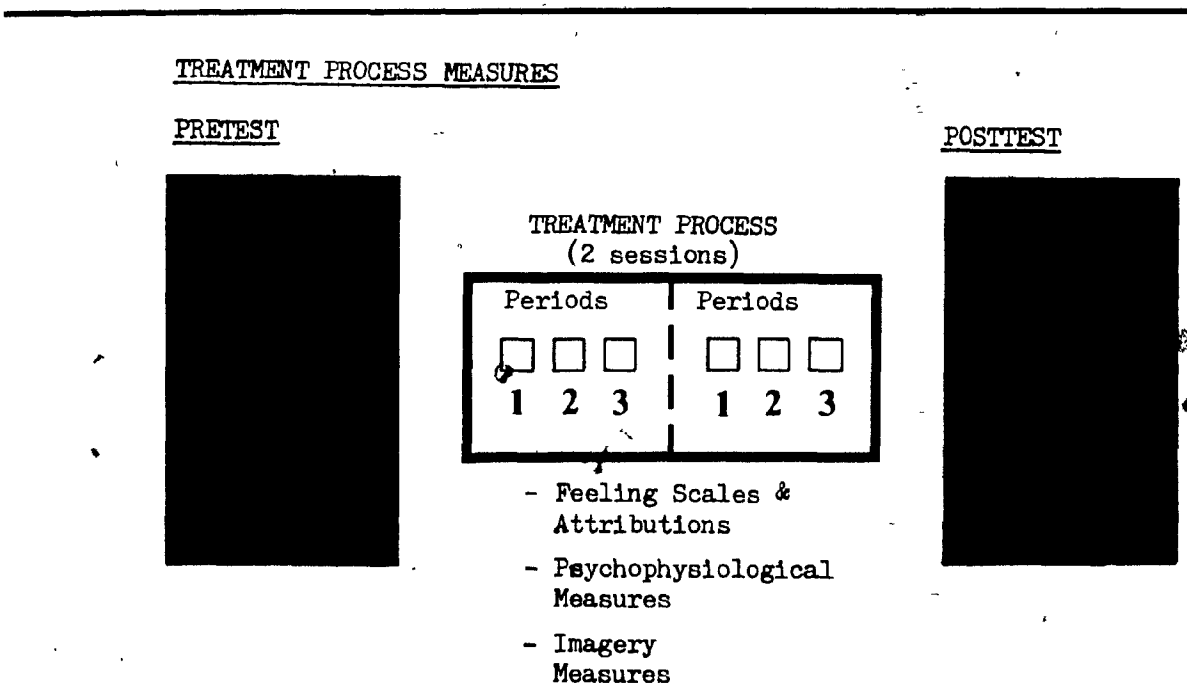


Figure 2. Plan of the data analysis

related. Analyses which revealed significant multivariate effects were followed by separate univariate analyses of the component measures in order to determine the source(s) of the effect. Variables that were either unrelated and/or of individual interest were analyzed completely within a univariate context.

In order to examine the changes in responding from pre- to posttesting, a three step analytic approach was employed. First, a 2 x 2 x 2 (Flooding x Exercise x Sex) univariate or multivariate analysis of variance (ANOVA or MANOVA) was conducted on pretest measures to determine whether chance differences between groups existed at that point. Second, the slopes of the covariates of the four groups were tested for equality. If the assumption of homogeneity of regression could be supported, a 2 x 2 x 2 (Flooding x Exercise x Sex) univariate or multivariate analysis of covariance (ANCOVA or MANCOVA) was applied. The posttest measure(s) served as the dependent variable(s) and the corresponding pretest measure(s) served as the covariate(s). Covariance analysis was preferred because it statistically adjusts for chance pretest differences among treatment groups and reduces error variance (Keppel, 1973). If the assumption of homogeneity of regression was not met, a 2 x 2 x 2 (Flooding x Exercise x Sex) univariate or multivariate analysis of variance was conducted on change scores derived by subtracting the pretest value of a variable from its posttest equivalent. In this form, negative change scores indicated reduction in

responding. The treatment evaluation measures which were administered only at posttesting were analyzed using 2 x 2 x 2 (Flooding x Exercise x Sex) univariate and multivariate analyses of variance.

Self-Report Measures

Anxiety Thermometer. A preliminary one-way repeated measures ANOVA was conducted on the four Anxiety Thermometer ratings taken at the ends of the baseline (M = 2.5), preparation (M = 5.1), speech (M = 5.6), and recovery (M = 2.5) periods of the pretest session to verify the adequacy of the speech stressor manipulation. This analysis was significant, F (3,153) = 136.44, $p < .001$, and follow-up Tukey tests revealed significant differences between baseline and preparation, baseline and speech, and speech and recovery periods ($p < .05$). Self-reports of anxiety were significantly elevated above baseline values during both the preparation and speech periods, and then significantly decreased from speech levels to original baseline values by the end of recovery.

The preliminary analyses for the baseline Anxiety Thermometer revealed no pretest differences between groups, but the homogeneity of regression assumption was not supported. The ANOVA conducted on change scores was nonsignificant. The preliminary analyses for the preparation Anxiety Thermometer revealed no pretest differences and supported the homogeneity of regression assumption. The ANCOVA conducted on the posttest measure was nonsignificant.

The preliminary analyses for the speech period Anxiety

Thermometer yielded no pretest differences, but failed to support the homogeneity assumption. The ANOVA conducted on change scores yielded a significant main effect for flooding, F (1,44) = 7.85, $p < .01$. The left-hand side of Figure 3 displays the mean Anxiety Thermometer change scores for the four experimental conditions during this period. Visual inspection indicates that both groups who were administered the flooding tapes showed decreases in self-reported anxiety from pre- to posttesting whereas groups administered the neutral tapes either showed no change (the Exercise group) or reported increased anxiety (the Placebo-Control group). Comparisons using the common mean square error term revealed that only exercise combined with flooding was significantly more effective than either exercise alone or the placebo control condition in reducing self-reported anxiety during the speech (both $p < .05$).

Even though sex did not interact with the Flooding or Exercise factors, inspection of group means for females and males (center and right-hand side of Figure 3) suggested that females benefited considerably more from the combined exercise-flooding treatment than from flooding alone, whereas males did not. Separate 2 x 2 (Flooding x Exercise) ANOVAS were therefore conducted on the change scores for the female and male subgroups. The ANOVA conducted on females revealed significant main effects for both flooding, F (1,24) = 12.37, $p < .01$ and exercise, F (1,24) = 7.92, $p < .01$; the analysis for males revealed no significant

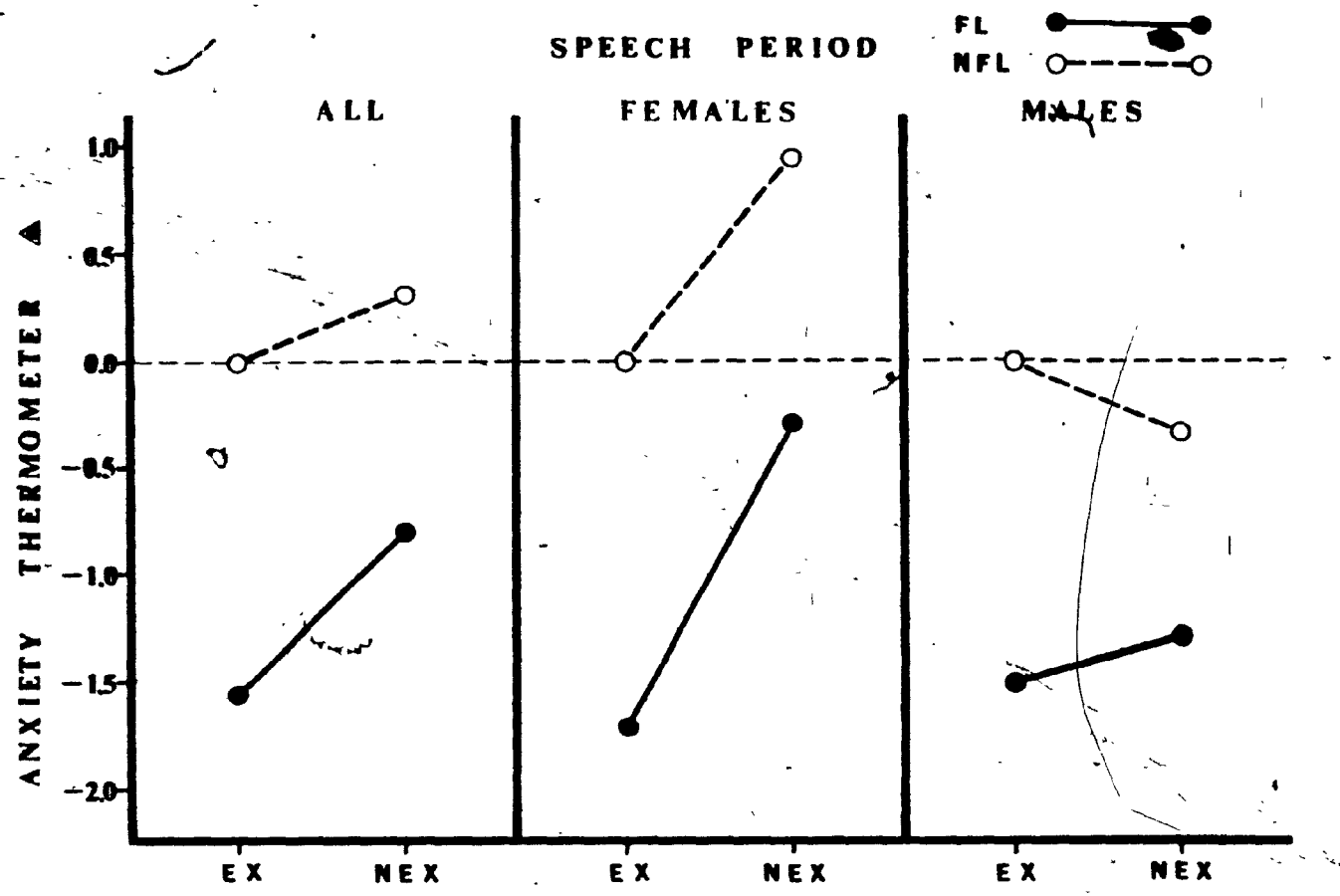


Figure 3. Mean Anxiety Thermometer change scores during the speech period.
EX = exercise; NEX = no-exercise; FL = flooding; NFL = no-flooding

differences. As can be seen from the center section of Figure 3, the nature of the flooding effect for females was similar to that seen for the whole sample. In addition, the combined exercise groups had significantly greater self-reported anxiety reduction from pre- to posttesting than the combined no exercise groups. Comparisons using the common mean square error term revealed that exercise in combination with flooding was significantly more effective for females in reducing self-reported anxiety than was flooding alone, exercise alone, or the placebo control condition (all $p < .05$.

The preliminary analyses for the recovery Anxiety Thermometer revealed no pretest differences and supported the homogeneity of regression assumption. The ANCOVA conducted on the posttest scores revealed a significant main effect for flooding, F (1,43) = 4.58, $p < .05$ and a significant Flooding x Exercise x Sex interaction, F (1,43) = 7.90, $p < .01$. Figure 4 displays the adjusted Anxiety Thermometer group means for entire sample and for males and females separately. As can be seen in the left-hand section, subjects administered the flooding tapes had significantly lower posttest Anxiety Thermometer ratings by the end of recovery than did subjects administered the neutral tapes. Visual inspection of the center and right-hand sections of the figure helps clarify the nature of the Flooding x Exercise x Sex interaction. Whereas exercise combined with flooding resulted in lower self-reported anxiety than flooding alone for females, it resulted in higher self-

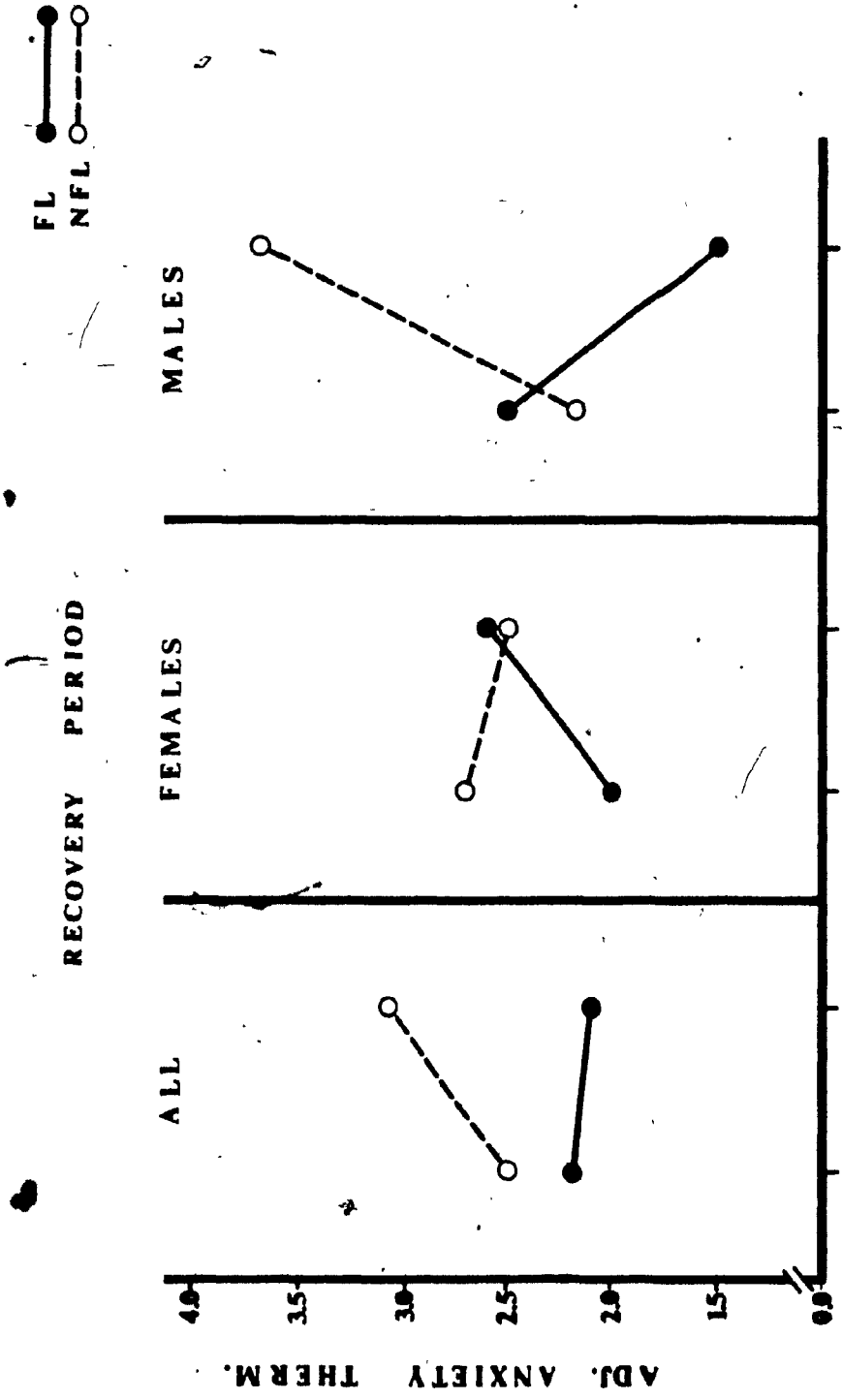


Figure 4. Adjusted mean Anxiety Thermometer scores during posttest recovery period.
EX = exercise; NEX = no-exercise; FL = flooding; NFL = no-flooding

reported anxiety than flooding alone for males. While exercise alone did not appear to have any effect on females, it resulted in lower anxiety ratings for males than the placebo control condition. Tests for simple effects revealed that flooding administered alone resulted in significantly lower self-reported recovery anxiety for males than for females ($p < .05$).

PRCS and S-R Inventory. The MANOVA conducted on the PRCS and S-R Inventory pretest scores revealed a significant Flooding x Sex interaction, F (2,43) = 3.43, $p < .05$, with a significant univariate interaction on the S-R Inventory, F (1,44) = 6.19, $p < .05$. The homogeneity of regression assumption was supported. No significant differences emerged from the MANCOVA applied to the posttest scores.

In order to determine whether these measures were sensitive to change, a one-way repeated measures MANOVA was conducted on the pre- and posttest scores. This analysis was significant, F (2,50) = 12.16, $p < .001$, as were follow-up univariate analyses for both the PRCS and S-R Inventory, both F (1,51) $\geq$ 13.00, $p < .001$. The entire sample, collapsed across treatment groups, showed significantly decreased scores (i.e., less anxiety) from pre- to posttesting on both measures. The mean pre- and posttest PRCS scores were 23.3 and 21.1, respectively, while the mean pre- and posttest scores on the S-R Inventory were 46.9 and 41.8, respectively.

Treatment Evaluation. The ANOVA conducted on subjects' ratings of the logic of their treatment for reducing speech anxiety was nonsignificant, suggesting no differences among the groups (all $F < 1.00$). The ANOVA conducted on subjects' ratings of the experimenter's consideration for their safety and well-being also revealed no significant group differences (all $F < 1.7$). Subjects' evaluations of treatment effectiveness comprised three measures which assessed 1) the helpfulness of the treatment in reducing target speech anxiety, 2) the helpfulness of the treatment in reducing anxiety in other areas (general anxiety), and 3) their confidence in recommending the treatment to a friend with a similar problem. The MANOVA conducted on these measures revealed a significant main effect for flooding, F (3,42) = 4.59, $p < .01$, a marginally significant main effect for exercise, F (3,42) = 2.76, $p < .06$, and a significant Exercise x Sex interaction, F (3,42) = 3.24, $p < .05$.

Only the univariate analysis on the effectiveness of the treatment in reducing target speech anxiety revealed a significant main effect for flooding, F (1,44) = 7.22, $p < .05$. As can be seen in the upper section of Figure 5, subjects who were administered the flooding tapes clearly rated their treatment as more effective in reducing their speech anxiety than subjects administered the neutral tapes. Since none of the three univariate analyses revealed even a trend toward a significant Exercise x Sex interaction, it was decided to focus on the multivariate main effect for exercise instead. The univariate ANOVA on treatment

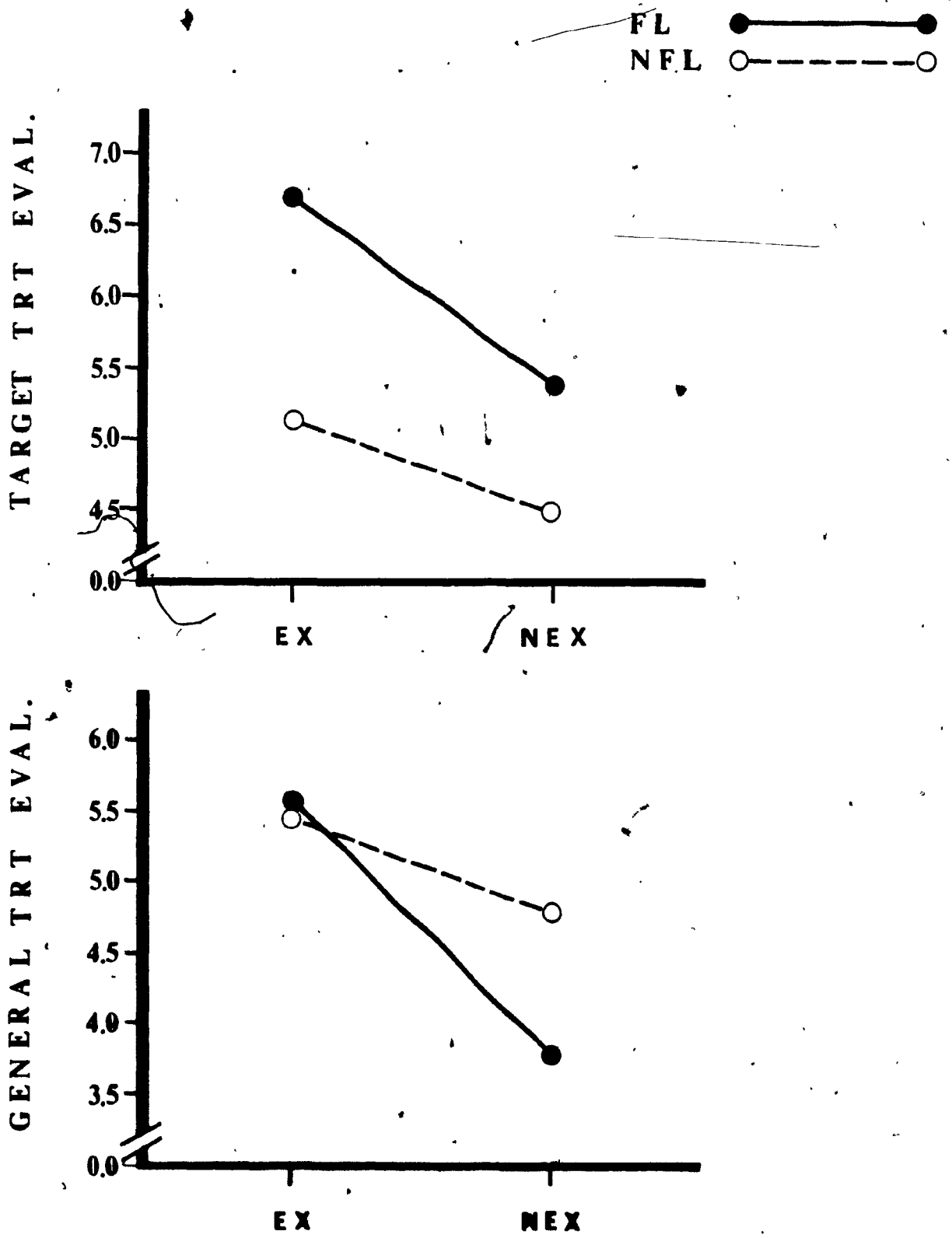


Figure 5. Mean Treatment Evaluation ratings for target speech (upper section) and general (lower section) anxiety.

EX = exercise; NEX = no-exercise; FL = flooding; NFL = no-flooding

effectiveness in reducing target speech anxiety yielded a significant main effect for exercise, F (1,44) = 5.06, $p < .05$, while the ANOVA on treatment effectiveness in reducing general anxiety revealed a trend for this effect, F (1,44) = 3.36, $p < .08$. As can be seen in Figure 5, the combined exercise groups rated their treatment as more effective in reducing both target speech anxiety (upper section) and general anxiety (lower section) than did the combined no exercise groups.

The means for the Exercise-Flooding, Flooding, Exercise, and Placebo-Control groups on the effectiveness of the treatment in reducing target speech anxiety were 6.7, 5.4, 5.2, and 4.5, respectively. Comparisons using the common mean square error term confirmed that the Exercise-Flooding group rated their treatment as significantly more effective in reducing target speech anxiety than did each of the other three groups (all $p < .05$).

Coping Factors. Principle components analysis (unities on the diagonal; no iteration) was applied to the pretest item scores (0 or 1) from the 17-item Coping Style Questionnaire. The posttest coping data were not used for this analysis because of the potentially confounding effects of the experimental manipulation. Factor rotations were accomplished through the varimax (orthogonal) method. The criterion for inclusion of an item in a factor was a factor loading of 0.49, and item inclusion on only one factor was allowed. A five-factor rotation was selected as the final

solution which allowed for the inclusion of all items except for item 11. The five factors accounted for 54.5% of the total item variance, and all communality values were 0.43 or greater except for items 6 and 11. The resulting factors are presented in Table 1 along with descriptive factor labels. Since these labels were assigned on the basis of subjective examination of the items, care should be exercised in attaching any inferential significance to them. Scores were calculated by dividing the number of items correctly endorsed on a factor by the total number of items included in the factor. These proportional values, calculated separately for the pretest and posttest, were then used as factor scores. Factor scores of this type have been found to serve as suitable approximations of scores derived through the application of factor score coefficients (Kaloupek, Peterson, & Levis, 1981).

The preliminary analysis of the Rational Cognition factor revealed no pretest differences and support for the homogeneity of regression assumption. The ANCOVA conducted on the posttest scores revealed a significant Exercise x Sex interaction, $\underline{F}$ (1,43) = 4.85, $\underline{p} < .05$. Females who exercised had lower adjusted posttest scores than did nonexercising females. Males who exercised, on the other hand, had higher adjusted posttest scores than did nonexercising males.

There were no pretest differences on the Passive Support Seeking factor, but the homogeneity of regression assumption was not supported. The ANOVA conducted on the change scores revealed a marginally significant Flooding x

Table 1

Composition of Factors Derived from Principle Components Analysis of the Coping Style Questionnaire

---

Factor 1 Rational Cognition

1. I tried to see the positive side (yes)

4. I took things one step at a time (yes)

12. I tried to reduce the tension and relax by imagining pleasant events either in the past or future (yes)

13. I prepared for the worst (no)

14. I found myself feeling angry and/or hostile about the situation even though I knew it was because I was really afraid (no)

17. I didn't worry about it; figured everything would probably work out fine (yes)

Factor 2 Passive Support Seeking

2. I tried to step back from the situation and be more objective (no)

3. I prayed or hoped for guidance or strength (yes)

8. I asked the experimenter for specific advice about how to handle the situation (yes)

Factor 3 Active Support-Information Seeking

7. I tried to find out more about the situation (yes)

10. I talked with or confided in the experimenter in order to make myself feel better (yes)

15. I kept my feelings to myself (no)

Factor 4 Self-reliant Problem Solving

5. I considered several alternatives for handling the problem (yes)

6. I drew on my past experiences; I was in a similar situation before (yes)

16. I tried to get busy and concentrate on other things (yes)

Factor 5 Behavioral Action

9. I took some positive action (e.g., concentrated on making good notes and reviewing them as much as possible) (yes)

Exercise x Sex interaction, $\underline{F}$ (1,44) = 3.57, $p < .07$. The upper section of Figure 6 displays the mean Passive Support Seeking change scores for males and females. It can be seen that females who were administered the combined exercise-flooding treatment decreased their passive support seeking from pre- to posttesting whereas females administered flooding alone showed no change. Males who exercised during flooding, on the other hand, increased their passive support seeking from pre- to posttesting while males administered flooding alone showed a decrease in this measure.

The preliminary analyses performed on the Active Support/Information Seeking factor and the Self-reliant Problem Solving factor revealed no pretest differences and supported the homogeneity of regression assumption. No posttest differences resulted from the ANCOVAS conducted on these factors.

The ANOVA conducted on the pretest scores for the Behavioral Action factor showed a significant Flooding x Exercise x Sex interaction, $\underline{F}$ (1,44) = 5.39, $\underline{p} < .05$. The homogeneity of regression assumption was not supported. The ANOVA on the change scores revealed a significant main effect for flooding, $\underline{F}$ (1,44) = 4.92, $\underline{p} < .05$ and a significant Flooding x Exercise x Sex interaction, $\underline{F}$ (1,44) = 4.92, $\underline{p} < .05$. The main effect for flooding is depicted in the lower section of Figure 6 which displays the mean change scores for the four treatment conditions. Although all groups showed increased Behavioral Action scores from pre-

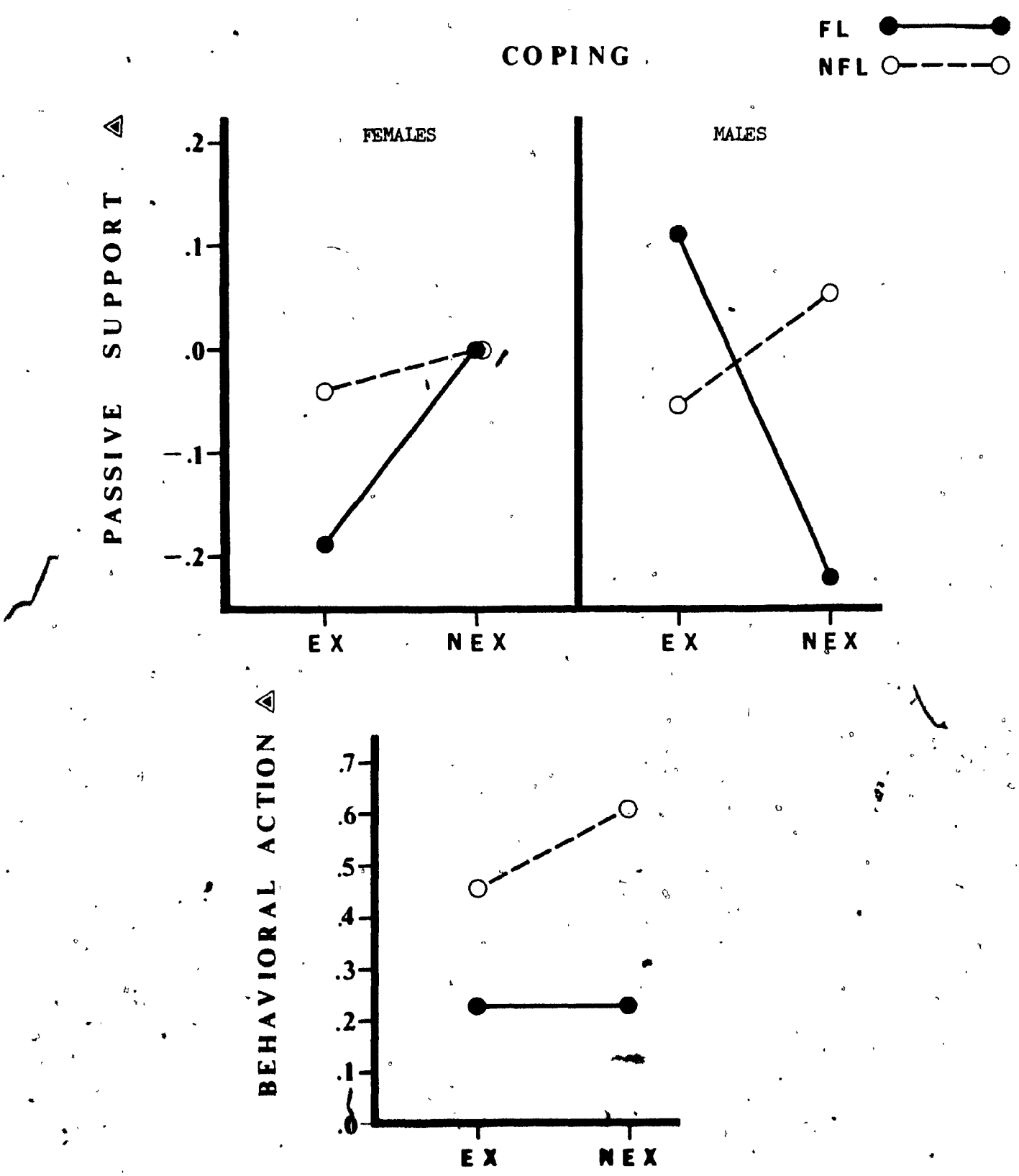


Figure 6. Mean Passive Support Seeking (upper section) and Behavioral Action (lower section) change scores.

EX = exercise; NEX = no-exercise; FL = flooding; NFL = no-flooding

to posttesting, the two flooding groups showed significantly less of an increase than the two no-flooding groups. The posttest Flooding x Exercise x Sex interaction appeared to be attributable to the three-way interaction which existed at pretesting.

Behavioral Measures

The interrater reliabilities for the behavioral ratings of the test speeches were computed by Pearson product-moment coefficients. The range of correlations between pairs of raters was .77 to .90 (average r = .85) for the Timed Behavioral Checklist, .22 to .92 (average r = .58) for the Overall-Estimate of Anxiety rating and .62 to .80 (average r = .72) for the Overall-Estimate of Skill rating. The interrater reliability between the two raters for the Silence measure was r = .99 with a mean absolute difference between raters of 3.4 seconds.

Timed Behavioral Checklist (TBCL). The preliminary analyses of the TBCL indicated no pretest differences and support for the homogeneity of regression assumption. The ANCOVA conducted on the posttest scores revealed a significant main effect for flooding, F (1,43) = 8.20, $p < .01$ and a significant Flooding x Exercise interaction, F (1,43) = 12.91, $p < .001$. The adjusted posttest group means describing this interaction are displayed in the upper panel of Figure 7. Tests for simple effects revealed that exercise combined with flooding was not as effective in reducing behavioral manifestations of anxiety as flooding alone ($p < .05$), but that exercise alone was significantly more

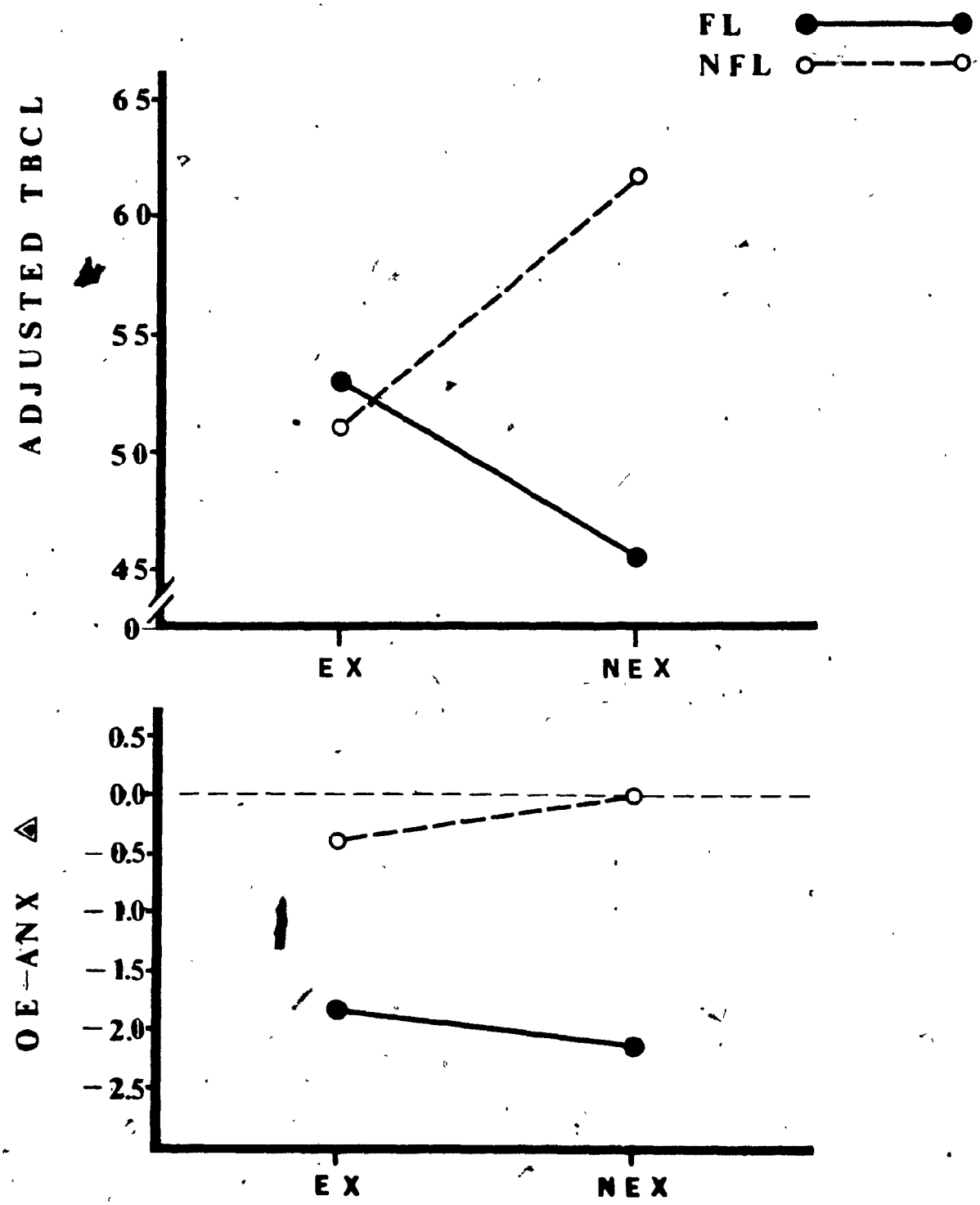


Figure 7. Mean adjusted posttest TBCL scores (upper section) and Overall-Estimate of Anxiety change scores (lower section) during the speech period.

EX = exercise; NEX = no-exercise; FL = flooding; NFL = no-flooding

effective than the placebo control condition ($p < .01$).

Overall-Estimate of Anxiety. There were no pretest differences on the Overall-Estimate of Anxiety ratings, but the homogeneity of regression assumption was not supported. The ANOVA conducted on the change scores revealed a significant main effect for flooding, F (1,44) = 5.02, $p < .05$. Inspection of the group mean change scores, displayed in the lower panel of Figure 7, shows that subjects administered flooding were rated as significantly less anxious from pre- to posttesting than were subjects administered the neutral tapes.

Overall-Estimate of Skill. The preliminary analyses of the Overall-Estimate of Skill ratings revealed no pretest differences and supported the homogeneity of regression assumption. No posttest differences emerged from the covariance analysis on the posttest scores. A one-way repeated measures ANOVA conducted on the pre- and posttest scores was significant, F (1,51) = 23.92, $p < .001$, indicating that the sample as a whole showed significantly increased skill.

Silence. The preliminary analyses on the silence measure revealed no pretest differences and supported the homogeneity of regression assumption (although the support was limited, $p < .06$). The ANCOVA conducted on the posttest scores revealed a significant Flooding x Exercise interaction, F (1,43) = 4.31, $p < .05$. As was the case for the TBCL, exercise combined with flooding was not as

effective in reducing silence during the speech as was flooding alone, while exercise alone was more effective than the placebo control condition.

Psychophysiological Measures.

All analyses on HR, SCL and SCR used difference scores (rather than raw scores), derived by subtracting baseline values from the preparation, speech, and recovery scores of the same session. Difference scores were used to reflect change in responding (as opposed to absolute magnitude). In order to avoid confusion, the term "difference scores" will be used for this within-session case, while the term "change scores" will be retained for the between-session case where the pretest value of a variable is subtracted from its posttest equivalent.

Initial analyses revealed that the homogeneity of regression assumption was supported for all measures. Therefore, covariance analysis was uniformly employed with the difference scores from the posttest session serving as dependent variable(s) and the corresponding difference scores from the pretest session serving as covariate(s). Thus, with the exception of using difference scores rather than raw scores, the method of analysis was identical to that employed for all the other outcome measures. Univariate analyses of the HR measure and multivariate analyses of the SC measures were employed because of the lack of relationship between HR and either SC measure and because of a moderate relationship between the two SC measures.

Heart Rate (HR). The only pretest difference between

groups which emerged from the ANOVAS conducted on HR was a Flooding x Sex interaction for Min. 5 of recovery, F (1,44) = 4.25, $p < .05$. The ANCOVAS applied to the posttest difference scores revealed a significant main effect for flooding during the speech and during Min. 1 and Min. 5 of the recovery, all F (1,43) $\geq$ 4.76, $p < .05$. Figure 8 displays the mean adjusted HR difference scores for the posttest speech period and for Min. 1 of recovery. It can be seen that the two flooding groups showed less of an increase in HR during the speech than did the two no-flooding groups. During Min. 1 (and Min. 5) of recovery, the flooding groups also showed a greater decrease in HR than did the no-flooding groups.

Skin Conductance Level (SCL) and Responses (SCR). The MANOVAS conducted on the pretest scores yielded a marginally significant multivariate Flooding x Sex interaction for the preparation period, F (2,43) = 3.16, $p < .06$ (with univariate support on the SCR measure, F (1,44) = 6.24, $p < .05$), and a multivariate main effect for exercise during Min. 1 of recovery, F (2,43) = 3.67, $p < .05$ with no univariate support.

MANCOVAS applied to the SCL and SCR posttest difference scores employed both the SCL and SCR pretest difference scores as covariates. Follow-up univariate ANCOVAS, however, used only the single covariate appropriate for the measure in question.

The MANCOVAS revealed a significant multivariate main

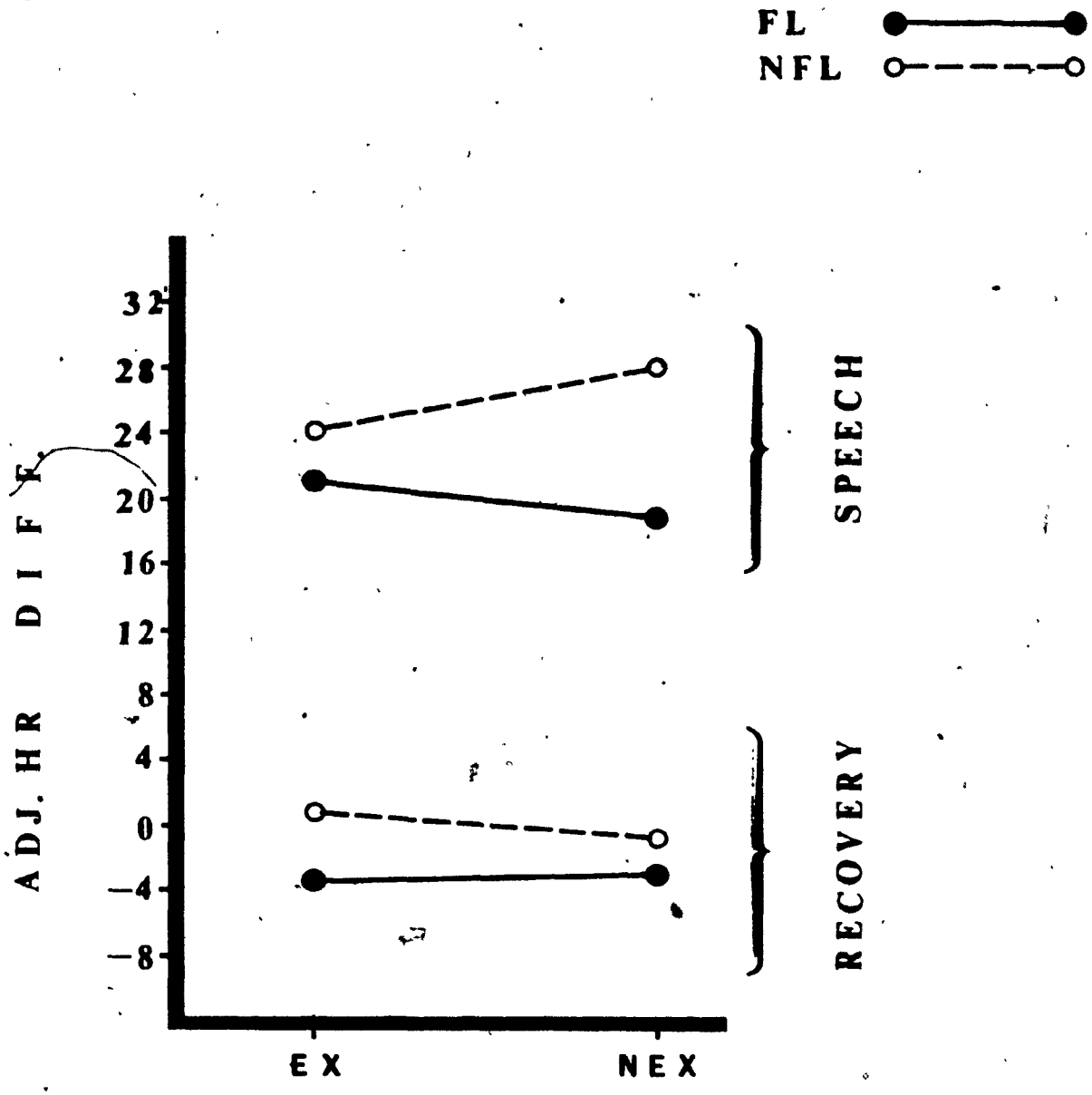


Figure 8. Adjusted mean HR difference scores during the posttest speech and recovery periods.

EX = exercise; NEX = no-exercise

FL = flooding; NFL = no-flooding

effect for sex during the speech and during Min. 1 and Min. 5 of the recovery period, all F (2,41) $\geq$ 3.69, $p < .05$. Significant univariate support for this effect was provided by the SCL measure during the speech and Min. 1 of recovery, both $F \geq 6.72$, $p < .05$. Females generally showed greater increases in SCL than did males.

The multivariate main effect for sex was qualified by a multivariate Flooding x Sex interaction which was significant during the preparation and Min. 1 of recovery, both F (2,41) $\geq$ 4.47, $p < .05$. Significant univariate support for the Flooding x Sex interaction was provided by the SCL measure during the preparation period and by both SC measures during Min. 1 of recovery, both F (1,43) $\geq$ 6.30, $p < .05$. The nature of these Flooding x Sex interactions for both SCL and SCR was that females in the flooding conditions showed greater SC elevations than did females in the no-flooding conditions, whereas males in the flooding conditions showed smaller elevations than did no-flooding males.

The analyses also revealed a significant multivariate Exercise x Sex interaction during the speech, F (2,41) = 4.02, $p < .05$. This was qualified by a marginally significant Flooding x Exercise x Sex interaction, F (2,41) = 3.24, $p < .06$ with a marginally significant univariate interaction on the SCR measure, F (1,43) = 3.24, $p < .08$.

Figure 9 displays the adjusted group mean SCR difference scores for females and males which describe this Flooding x Exercise x Sex interaction for the speech period.

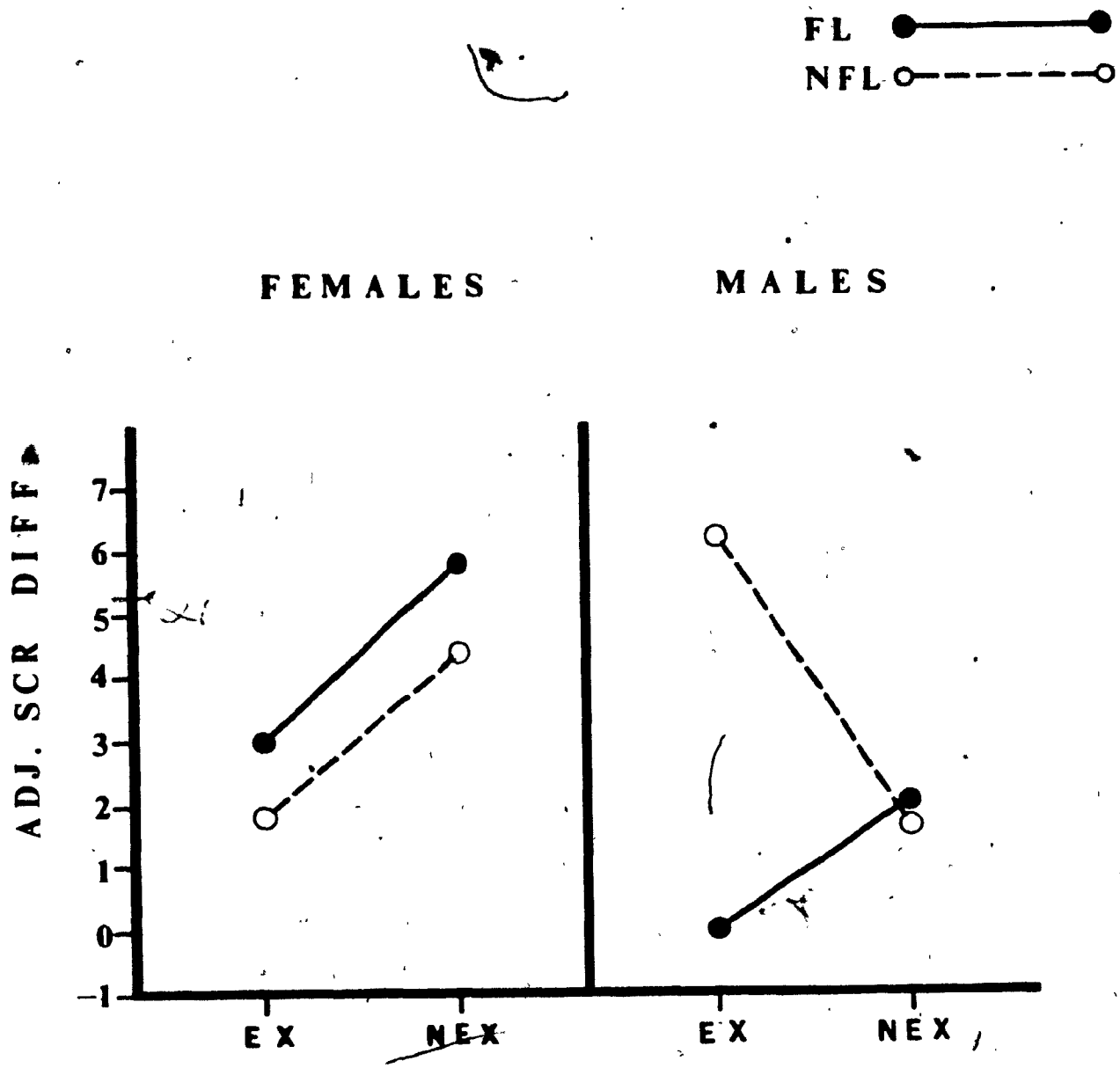


Figure 9. Adjusted mean SCR difference scores for females and males during the posttest speech period.

EX = exercise; NEX = no-exercise

FL = flooding; NFL = no-flooding

Visual inspection of these means prompted separate 2 x 2 (Flooding x Exercise) ANCOVAS for the female and male subgroups. The ANCOVA conducted on females revealed a significant main effect for exercise, $\underline{F}$ (1,23) = 5.45, $\underline{p} < .05$. During the posttest speech, the two exercising groups showed significantly less increase in SCR frequency above baseline levels than did the two nonexercising groups. The ANCOVA conducted on the males revealed a marginally significant main effect for flooding, $\underline{F}$ (1.19) = 4.06, $\underline{p} < .06$, qualified by a significant Flooding x Exercise interaction, $\underline{F}$ (1,19) = 5.40, $\underline{p} < .05$. During the speech, males who were administered exercise combined with flooding showed no increase in SCR frequency above baseline values, whereas males administered flooding alone showed elevations above baseline. Exercise alone was associated with greater elevations in SCR frequency during the speech than the placebo control condition. Thus, for both females and males, the Exercise-Flooding group showed less increase in SCR frequency during the speech than did the Flooding group.

The Flooding x Exercise x Sex interaction was also marginally significant during Min. 5 of the recovery period, $\underline{F}$ (2,41) = 3.19, $\underline{p} < .06$, with no univariate support.

Process Measures

The presentation of the process results is divided into the following four sections: 1) feeling scale ratings (with accompanying attributions), 2) psychophysiological measures, 3) hypothesis-specific comparisons of feeling scale and psychophysiological measures, and 4) imagery ratings.

Feeling Scale Ratings (with accompanying attributions)

A five step analytic approach was employed for each of the five feeling scales assessed during the two treatment sessions. First,. 2 x 2 x 2 (Flooding x Exercise x Sex) ANOVAS were conducted on the baseline scores of the first treatment session to determine whether differences existed at that point. Second, three imagery period difference scores were calculated for each session by subtracting the baseline scores from the raw scores obtained during the three imagery periods of the same session. The resulting six difference scores (3/session) were then analyzed using 2 x 2 x 2 x 2 x 3 (Flooding x Exercise x Sex x Session x Period) ANOVAS with repeated measures on the last two factors. Significant effects emerging from these analyses are reported and briefly described. In addition, graphs depicting these imagery period difference scores are presented for each group to provide a sense of the original data.

Inclusion of the two repeated measures factors of Period and Session is the approach usually taken to address the issues of within-session and between-session change in responding, respectively. However, the complexity of effects

that emerged from the five-way analyses was such that it was often difficult to interpret the effects. In order to better examine theoretical process mechanisms, the third step, therefore, involved conducting 2 x 2 x 2 (Flooding x Exercise x Sex) ANOVAS on three composite variables created to specifically assess peak response and within- and between-session habituation of responding. These three process variables, based on the same difference scores used in the five-way ANOVAS, were computed for each feeling scale measure.

The peak response variable was computed by taking the highest imagery period score from each of the two treatment sessions, summing these two scores, and then dividing by 2 to obtain a mean for the two sessions. The within-session habituation measure was arrived at by subtracting the first imagery period score from the third imagery period score, separately for each of the two treatment sessions, summing these two obtained difference scores, and then dividing by 2 to obtain a mean for the two sessions. The between-session habituation measure was derived by taking a mean of the three imagery period scores, separately for each treatment session, and then subtracting the mean obtained for the first treatment session from the mean obtained for the second treatment session. For the within- and between-session habituation measures, negative scores indicated habituation or decreased responding, while positive scores indicated increased responding.

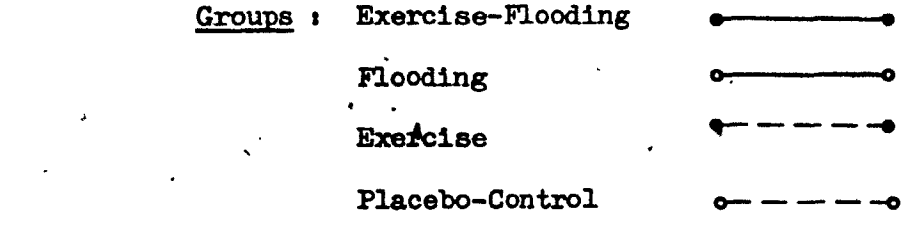
In order to examine the extent to which subjects attributed each of the five rated feelings to the "tape" or "bike", the fourth step involved conducting 2 x 2 x 2 (Flooding x Exercise x Sex) ANOVAS on the attribution rating associated with the highest feeling scale rating (in each of the five categories) of the session. Attributions of peak ratings were used in order to ensure an adequate level of the feeling in question to justify attribution to any source. Separate ANOVAS were performed for each treatment session in order to see whether subjects' attributions changed over sessions. Raw scores, rather than difference scores, were used for these attribution ratings since they were obtained only for the imagery periods. Scores ranging downward from 4.5 (the midpoint of the scale) to 1 indicated increasingly greater attribution of the feeling to the bike and correspondingly less to the tape, while scores ranging upward from 4.5 to 8 indicated increasingly greater attribution to the tape and correspondingly less to the bike. The results of the attribution analyses are presented immediately following the results for the peak response composite measure.

The final step in the analysis of the feeling scales involved performing 2 x 2 x 2 (Flooding x Exercise x Sex) ANOVAS on the average of the six recovery period difference scores (i.e., recovery period minus the baseline of the corresponding session). Five-way ANOVAS were not employed because the focus of interest for recovery was on group differences rather than on change over time.

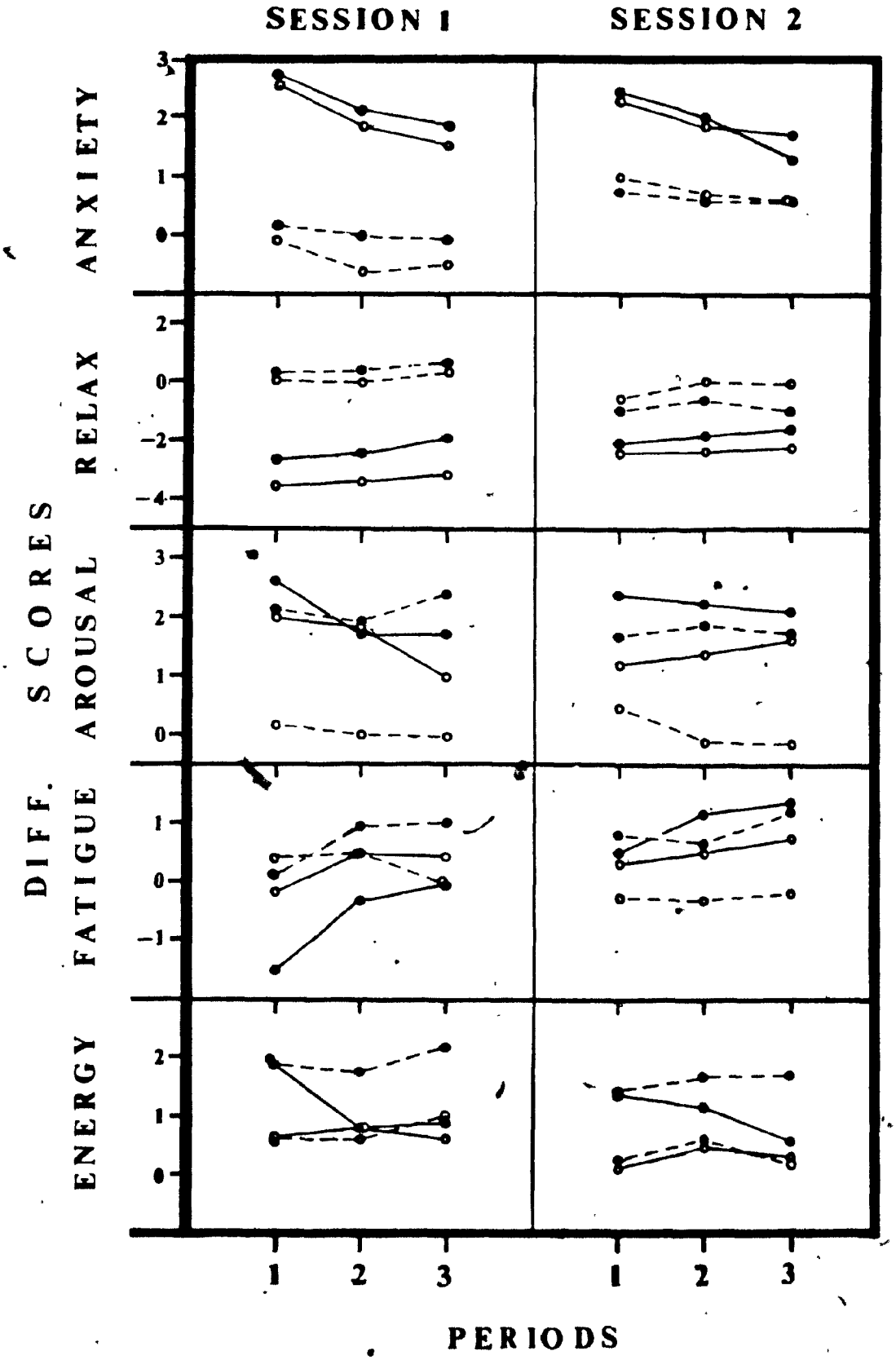
Anxiety. The preliminary analysis of the baseline anxiety ratings revealed significant interactions of Flooding x Sex and Flooding x Exercise x Sex, both F (1,44) $\geq$ 4.32, $p < .05$. The top panel of Figure 10 displays the group mean anxiety difference scores for the three imagery periods of both sessions. The five-way ANOVA conducted on these imagery period scores revealed a significant main effect for flooding, F (1,44) = 26.51, $p < .001$, qualified by interactions of Flooding x Sex and Session x Flooding, both F (1,44) $\geq$ 4.35, $p < .05$. Although both females and males administered flooding reported more anxiety than did no-flooding females and males, the Flooding x Sex interaction was attributable to the fact that this difference was much more pronounced for females. The Session x Flooding interaction was primarily due to no-flooding subjects who reported more anxiety during the second treatment session than during the first. In addition, a significant period effect, F (2,88) = 7.74, $p < .001$ reflected the fact that anxiety ratings, collapsed over sessions, decreased for the sample as a whole over the three imagery periods.

The ANOVA conducted on the peak response variable yielded a significant main effect for flooding, F (1,44) = 24.28, $p < .001$. As can be seen in the upper left section of Figure 11, both groups administered flooding reported significantly greater increases in peak anxiety than did the no-flooding groups (respective means approximately 3.0 vs

Figure 10: Mean feeling scale difference scores for all imagery periods of both treatment sessions.



Note. Five-way ANOVAS are based on these scores.


SESSION 1
SESSION 2
DIFF. SCORES
ANXIETY
RELAX
AROUSAL
FATIGUE
ENERGY
PERIODS
1
2
3

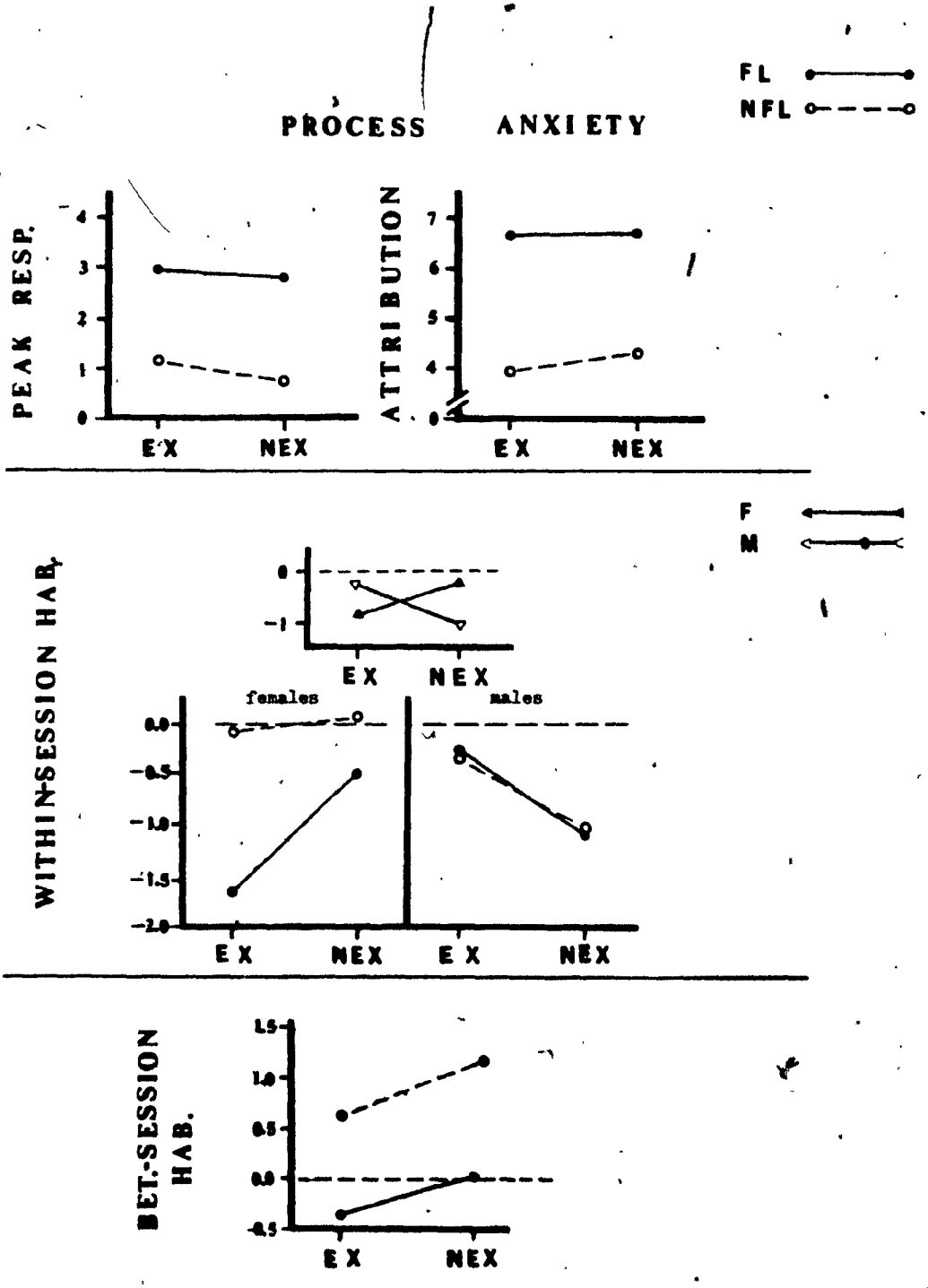


Figure 11. Mean scores for process anxiety composite measures.
EX = exercise; NEX = no-exercise; FL = flooding; NFL = no-flooding

1.0). The ANOVAS conducted on the anxiety attribution ratings yielded a significant flooding effect for the first treatment session, F (1,44) = 8.63, $p < .01$ and a more pronounced flooding effect for the second treatment session, F (1,44) = 27.81, $p < .001$. The upper right section of Figure 11 presents the group mean attribution ratings for the second treatment session. As can be seen, subjects administered flooding attributed their anxiety more to the tape than to the bike, while no-flooding subjects attributed their anxiety slightly more to the bike than to the tape.

The ANOVA conducted on the within-session habituation measure yielded a significant Exercise x Sex interaction, F (1,44) = 4.17, $p < .05$ which is depicted in the middle section of Figure 11. Females who exercised appeared to demonstrate greater within-session habituation of anxiety than nonexercising females while the reverse pattern occurred for males. Examination of the group means for females and males (middle section of Figure 11), however, reveals that only exercise in combination with flooding (M = -1.6) and not exercise alone (M = -.07) produced this within-session habituation of anxiety for females. Additional inspection of the group means for females suggested that females administered flooding showed greater within-session habituation of anxiety than no-flooding females. This observation was confirmed by the significant main effect for flooding, F (1,24) = 4.73, $p < .05$ which emerged from a 2 x 2 (Flooding x Exercise) ANOVA applied to

females.

The ANOVA conducted on the between-session habituation measure revealed a significant main effect for flooding, F (1,44) = 6.76, $p < .05$. The combined flooding groups showed a decrease in anxiety over sessions while the combined no-flooding groups showed a between-sesssion increase. Inspection of the group means (lower section of Figure 11) reveals, however, that only group Exercise-Flooding (M = -.4) actually showed a between-session decrease of anxiety.

The ANOVA conducted on the anxiety difference scores during recovery revealed no significant group differences.

Relaxation. The preliminary analysis of the baseline relaxation ratings revealed a significant main effect for flooding, F (1,44) = 4.98, $p < .05$; subjects administered flooding reported greater relaxation than no-flooding subjects. The second panel of Figure 10 displays the group mean relaxation difference scores for the three imagery periods of both sessions. The five-way ANOVA conducted on these scores revealed a significant period effect, F (2,88) = 3.47, $p < .05$, indicating that the sample as a whole reported increased relaxation across imagery periods. A significant main effect for flooding, F (1,44) = 27.72, $p < .001$, indicating less relaxation for flooding than for no-flooding subjects, was qualified by a significant Session x Flooding interaction, F (1,44) = 7.35, $p < .01$. Subjects administered flooding reported being more relaxed during the second treatment session than they were during the first,

while the reverse pattern occurred for no-flooding subjects.

The significant flooding effect which emerged from the ANOVA conducted on the peak response measure, F (1,44) = 30.57, $p < .001$ essentially matched the previously described main effect for flooding in the five-way ANOVA. The ANOVAS conducted on the relaxation attributions for both treatment sessions revealed significant main effects for flooding and exercise, all F (1,44) $\geq$ 7.60, $p < .01$. Subjects administered flooding and subjects who exercised attributed their relaxation more to the bike than did no-flooding subjects and nonexercising subjects, respectively. A significant Flooding x Sex interaction for the first treatment session, F (1,44) = 9.90, $p < .01$ indicated that this difference between flooding and no-flooding subjects was more pronounced for females. A significant main effect for sex for the second treatment session, F (1,44) = 6.94, $p < .05$ indicated that females attributed their relaxation more to the tape than did males.

No significant differences emerged from the ANOVA conducted on the composite within-session habituation measure. The ANOVA on the between-session habituation measure revealed a significant main effect for flooding, F (1,44) = 7.35, $p < .01$ which matched the previously described Session x Flooding interaction in the five-way ANOVA.

The ANOVA applied to the relaxation recovery scores revealed a significant main effect for flooding, F (1,44) = 4.43, $p < .05$, indicating that subjects administered

flooding were less relaxed during the recovery periods than were no-flooding subjects.

Arousal. The preliminary analysis of the baseline arousal ratings revealed a significant main effect for sex and significant interactions of Flooding x Sex, Flooding x Exercise, and Flooding x Exercise x Sex, all F (1,44) 4.08, $p < .05$. The third panel of Figure 10 displays the group mean arousal difference scores for the three imagery periods of both sessions. The five-way ANOVA conducted on these scores revealed significant main effects for flooding, exercise, and sex, F (1,44) = 4.61, $p < .05$, F (1,44) = 11.53, $p < .01$, F 1,44) = 5.80, $p < .05$, respectively. Greater elevations in physiological arousal were reported by subjects administered flooding than by no-flooding subjects, by exercising than by nonexercising subjects, and by females than by males.

The ANOVA conducted on the peak response measure matched the main effects for exercise and sex, F (1,44) = 10.76, $p < .01$, F (1,44) = 6.19, $p < .05$, respectively, and also revealed a significant Flooding x Exercise interaction, F (1,44) = 4.34, $p < .05$. As can be seen in the left-hand section of Figure 12, this interaction was due to all three treated groups reporting significantly greater elevations in physiological arousal than did the placebo controls (all $p < .01$).

The ANOVA conducted on the arousal attributions during the first treatment session revealed a significant main

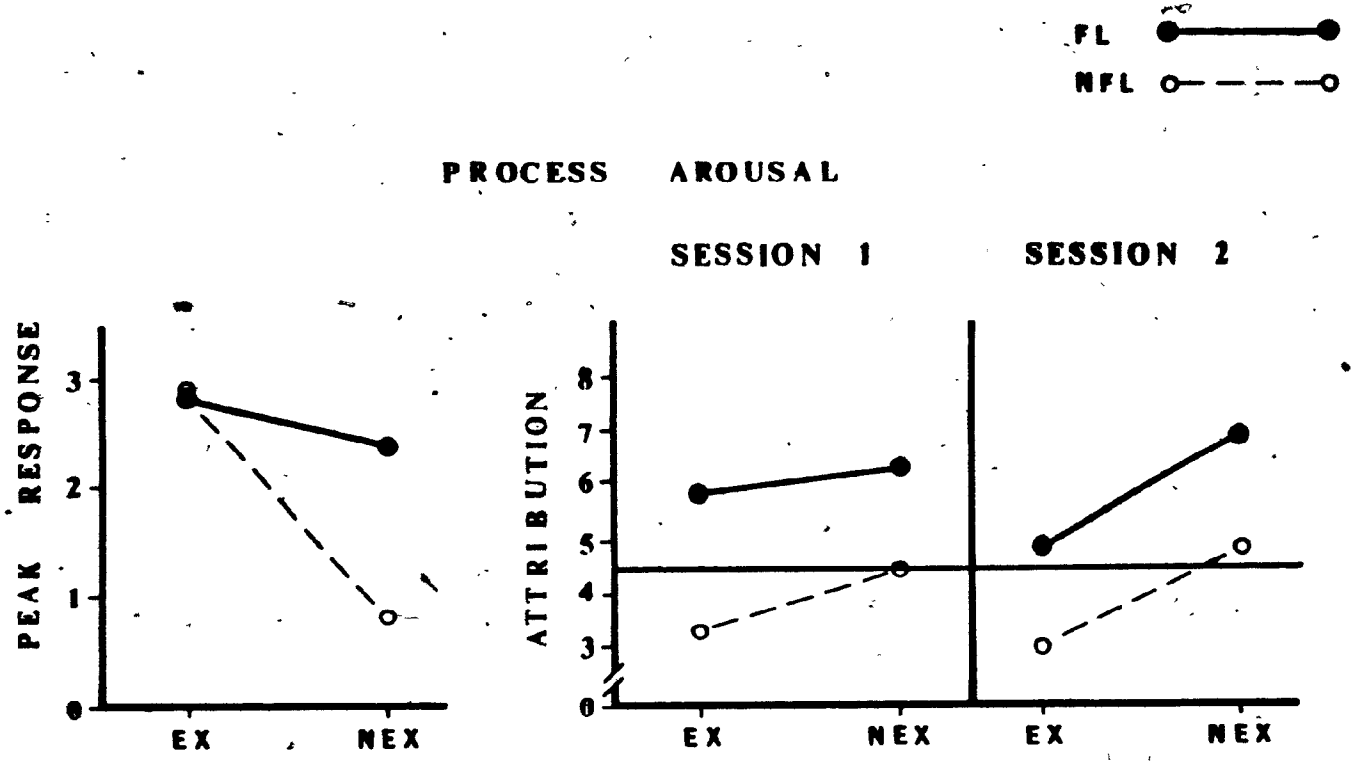


Figure 12. Mean Peak Response and Attribution scores for process arousal.
EX = exercise; NEX = no-exercise; FL = flooding; NFL = no-flooding

effect for flooding F (1,44) = 14.17, $p < .001$. As can be seen in the center section of Figure 12, subjects administered flooding (combined M = 6.1) attributed their arousal more to the tape than did no-flooding subjects (combined M = 3.9). A significant Flooding x Sex interaction, F (1,44) = 4.85, $p < .05$ indicated that this difference was more pronounced for females. The ANOVA conducted on the arousal attributions during the second treatment session revealed significant main effects for flooding and exercise and a significant Flooding x Exercise x Sex interaction, F (1,44) = 17.45, $p < .001$, F (1,44) = 17.79, $p < .001$, F (1,44) = 6.73, $p < .05$, respectively. As can be seen in the right-hand section of Figure 12, subjects administered flooding attributed their arousal significantly more to the tape than did no-flooding subjects, while subjects administered exercise attributed their arousal significantly more to the bike than nonexercising subjects. The Flooding x Exercise x Sex interaction was due to the fact that females in the Exercise-Flooding group attributed their arousal significantly more to the tape than did females in the Exercise group ($p < .01$) while the difference between these two groups was indistinguishable for males.

No significant effects emerged from the ANOVAS applied to the within- and between-session habituation measures.

The ANOVA conducted on recovery arousal revealed a significant main effect for exercise, F (1,44) = 4.74, $p < .05$, qualified by a significant Flooding x Exercise interaction, F (1,44) = 5.75, $p < .05$. The latter

interaction was due to the Exercise group reporting more arousal than they did during baseline and the Placebo-Control group reporting less arousal.

Fatigue. The preliminary analysis on the baseline fatigue ratings revealed a significant sex effect, F (1,44) =8.92, $p < .01$, indicating that males reported less initial fatigue than females. This was qualified by a significant Flooding x Exercise x Sex interaction, F (1,44) = 5.44, $p < .05$. The fourth panel of Figure 10 displays the group mean fatigue difference scores for the three imagery periods of both sessions. The five-way ANOVA conducted on these scores revealed a significant period effect, F (2,88) = 5.38, $p < .01$, reflecting an overall rise in fatigue over successive tape periods. A significant main effect for sex, F (1,44) = 23.58, $p < .001$ indicated that males reported greater elevations in fatigue than did females.

A main effect for sex was also revealed by the ANOVA conducted on the peak response measure, F (1,44) = 24.60, $p < .001$. The ANOVAS conducted on the fatigue attribution scores revealed a significant main effect for flooding for the first and second treatment sessions, both F (1,44) 7.11, $p < .05$. Subjects administered flooding attributed their fatigue more to the tape than did no-flooding subjects. A main effect for sex during the first treatment session, F (1,44) = 5.10, $p < .05$ reflected the fact that males attributed their fatigue more to the bike than did females. In addition, a main effect for exercise during the

second treatment session, F (1,44) = 6.67, $p < .05$ resulted from exercising subjects attributing their fatigue more to the bike than nonexercising subjects.

The ANOVA conducted on the within-session habituation measure revealed a significant main effect for exercise, F (1,44) = 4.46, $p < .05$; exercising subjects reported significantly greater within-session increases in fatigue than nonexercising subjects. No significant group differences were revealed by the ANOVA conducted on the between-session habituation measure.

The ANOVA conducted on recovery fatigue revealed a significant main effect for sex, F (1,44) = 10.44, $p < .01$. During recovery, females reported less fatigue than during baseline, whereas males reported more fatigue.

Energy. The preliminary analysis of the baseline energy ratings revealed a significant main effect for sex, F (1,44) = 5.30, $p < .05$, indicating that males reported more initial energy than did females. The fifth panel of Figure 10 displays the group mean energy difference scores for the three imagery periods of both sessions. The five-way ANOVA conducted on these scores revealed a significant main effect for exercise, F (1,44) = 5.95, $p < .05$, with exercising subjects reporting greater elevations of energy than nonexercising subjects.

A significant main effect for exercise also emerged from the ANOVA conducted on the peak response measure, F (1,44) = 6.85, $p < .05$. As can be seen in the upper section of Figure 13, elevations of approximately 2.3 and 1.2 points

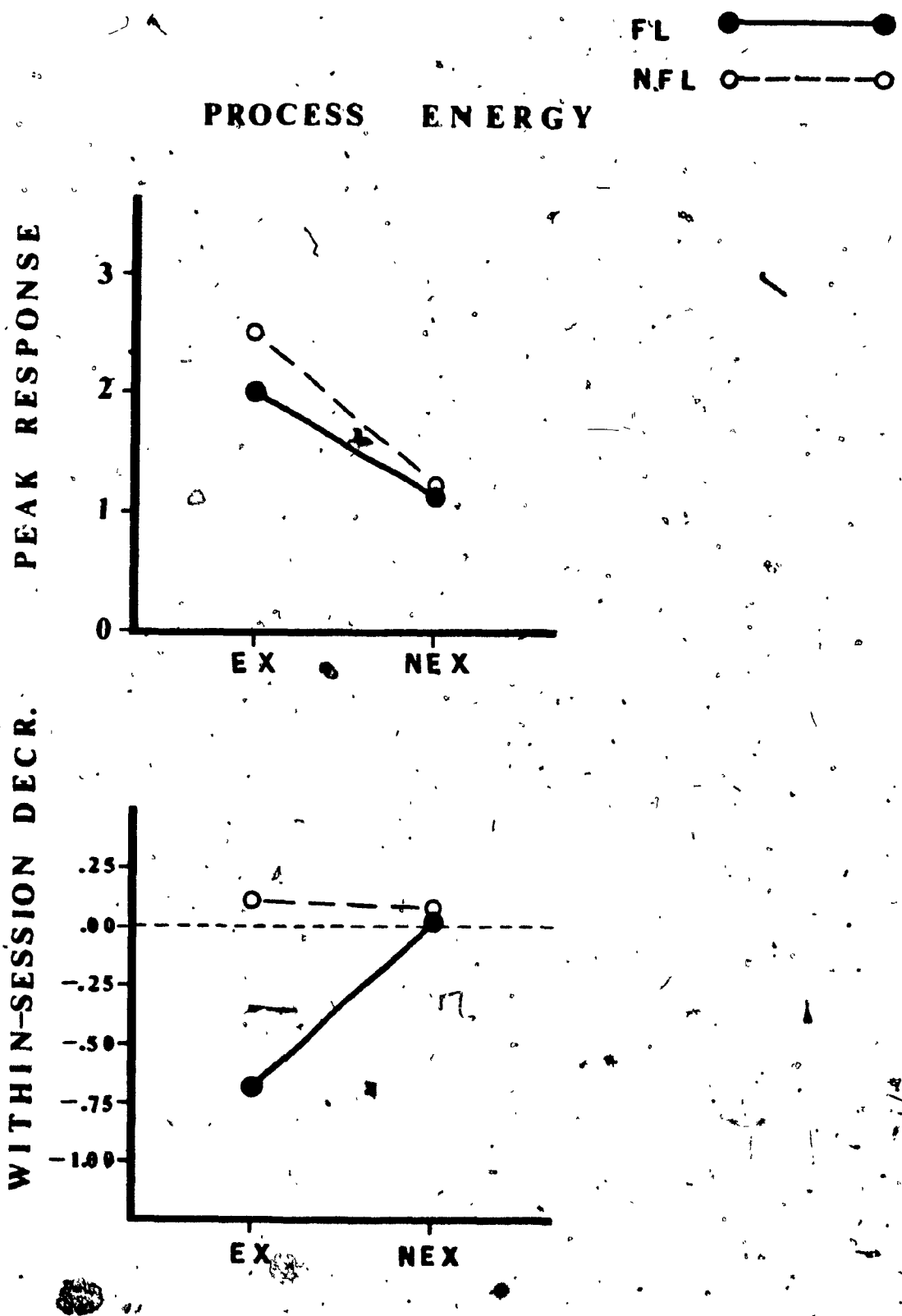


Figure 13. Mean Peak Response (upper section) and Within-session Decrease (lower section) in process energy.
EX = exercise; NEX = no-exercise
FL = flooding; NFL = no-flooding

were reported by exercising and nonexercising subjects, respectively. The ANOVAS conducted on the energy attribution ratings yielded a significant main effect for exercise for both treatment sessions, both F (1,44) $\geq$ 7.42, $p < .01$. Subjects who exercised attributed their energy more to the bike than to the tape while nonexercising subjects attributed their energy more to the tape.

The ANOVA applied to the within-session habituation measure revealed a marginally significant main effect for flooding, F (1,44) = 3.82, $p < .06$. Inspection of the group means (lower section of Figure 13) reveals that this flooding effect was caused by subjects in the Exercise-Flooding group which was the only group reporting decreases in energy over imagery periods. The ANOVA on the between-session habituation measure was nonsignificant.

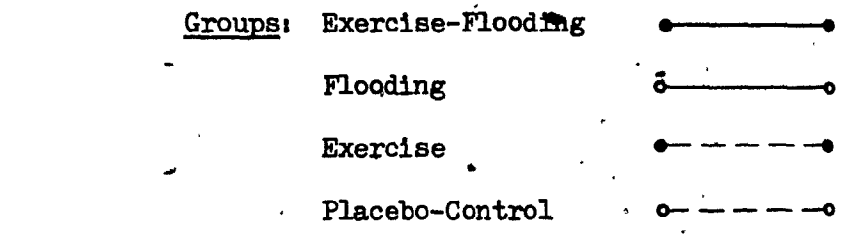
No significant effects emerged from the ANOVA conducted on the energy difference scores at recovery.

Psychophysiological measures.

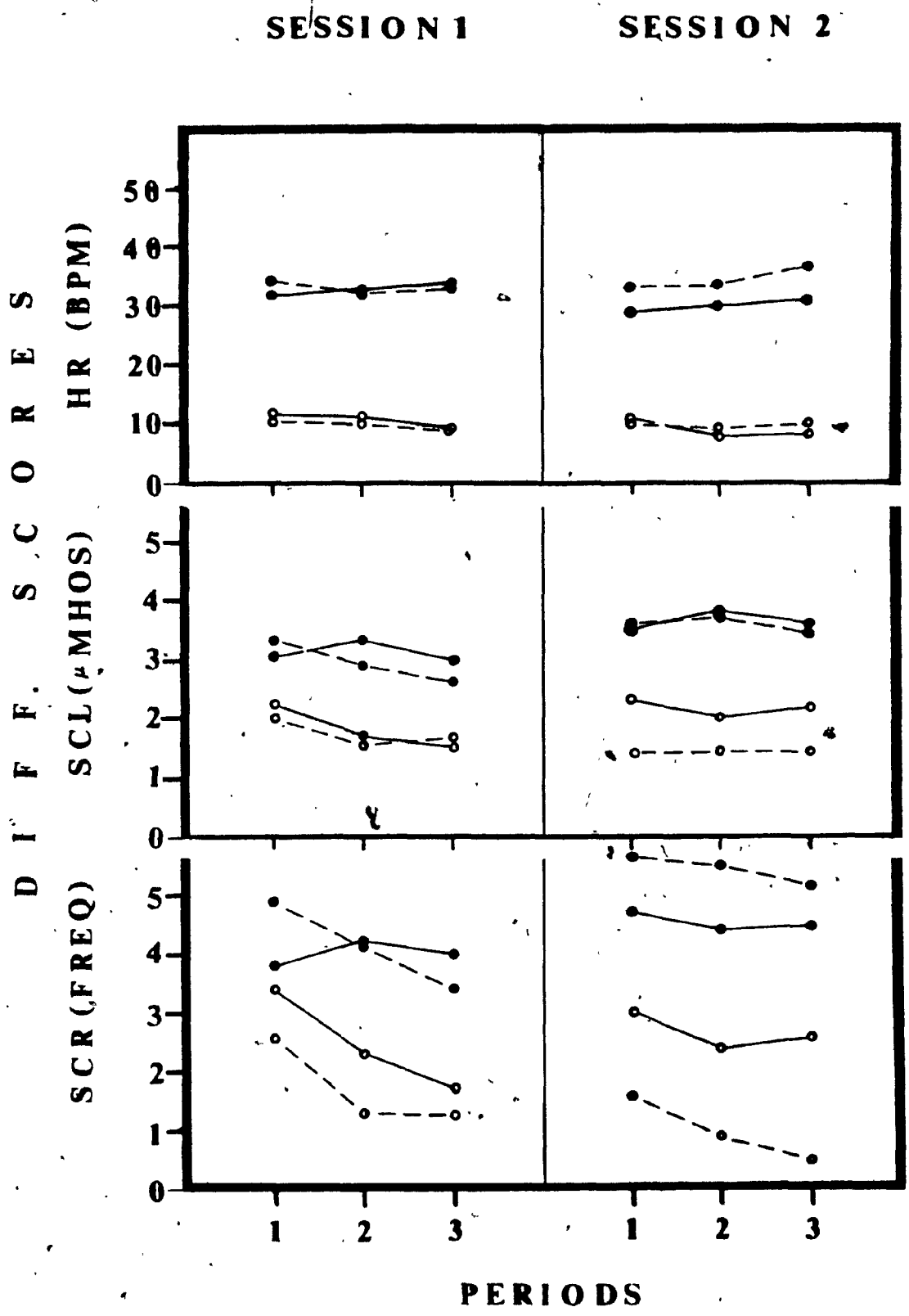
The same analytical approach was employed for the psychophysiological measures as was used for the feeling scale measures. The only exception was that there were no accompanying attribution ratings.

Heart rate (HR). The preliminary analysis on baseline HR revealed no significant group differences. The upper panel of Figure 14 displays the group mean HR difference scores for the three imagery periods of both sessions. The five-way ANOVA conducted on these scores revealed a

Figure 14. Mean psychophysiological difference scores for all imagery periods of both treatment sessions.



Note. Five-way ANOVAS are based on these scores.

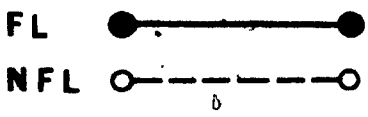

SESSION 1
SESSION 2
DIFF. SCORES
HR (BPM)
SCL (μMHOS)
SCR (FREQ)
0
10
20
30
40
50
1
2
3
4
5
1
2
3
PERIODS

significant main effect for exercise, $F(1,44) = 159.02$, $p < .001$ and a significant Period x Exercise interaction, $F(2,88) = 9.28$, $p < .001$. As expected, subjects who exercised demonstrated significantly greater increases in HR than did nonexercising subjects. They also showed increases in HR over successive imagery periods while nonexercising subjects showed decreases.

The ANOVA conducted on the peak response measure revealed a significant main effect for exercise, $F(1,44) = 152.36$, $p < .001$. As can be seen in Figure 15, the mean peak increase in HR was 35.4 bpm for exercising subjects and 12.2 bpm for nonexercising subjects. THE ANOVA applied to the within-session habituation measure revealed a significant main effect for exercise $F(1,44) = 12.64$, $p < .001$, which is equivalent to the previously reported Period x Exercise interaction. Both groups who exercised showed slight within-session increases in HR (combined $M = 1.8$ bpm) whereas both nonexercising groups showed slight within-session decreases or habituation of HR (combined $M = -1.7$ bpm). The ANOVA applied to the between-session habituation measure was nonsignificant.

No significant group differences emerged from the ANOVA conducted on the recovery HR scores.

Skin conductance level (SCL). The preliminary analysis on baseline SCL revealed a significant main effect for sex, $F(1,41) = 11.32$, $p < .01$ with males showing higher initial SCL than females. The middle panel of Figure 14 displays the group mean SCL difference scores for the three imagery



PROCESS PEAK PHYSIOLOGICAL RESPONSE

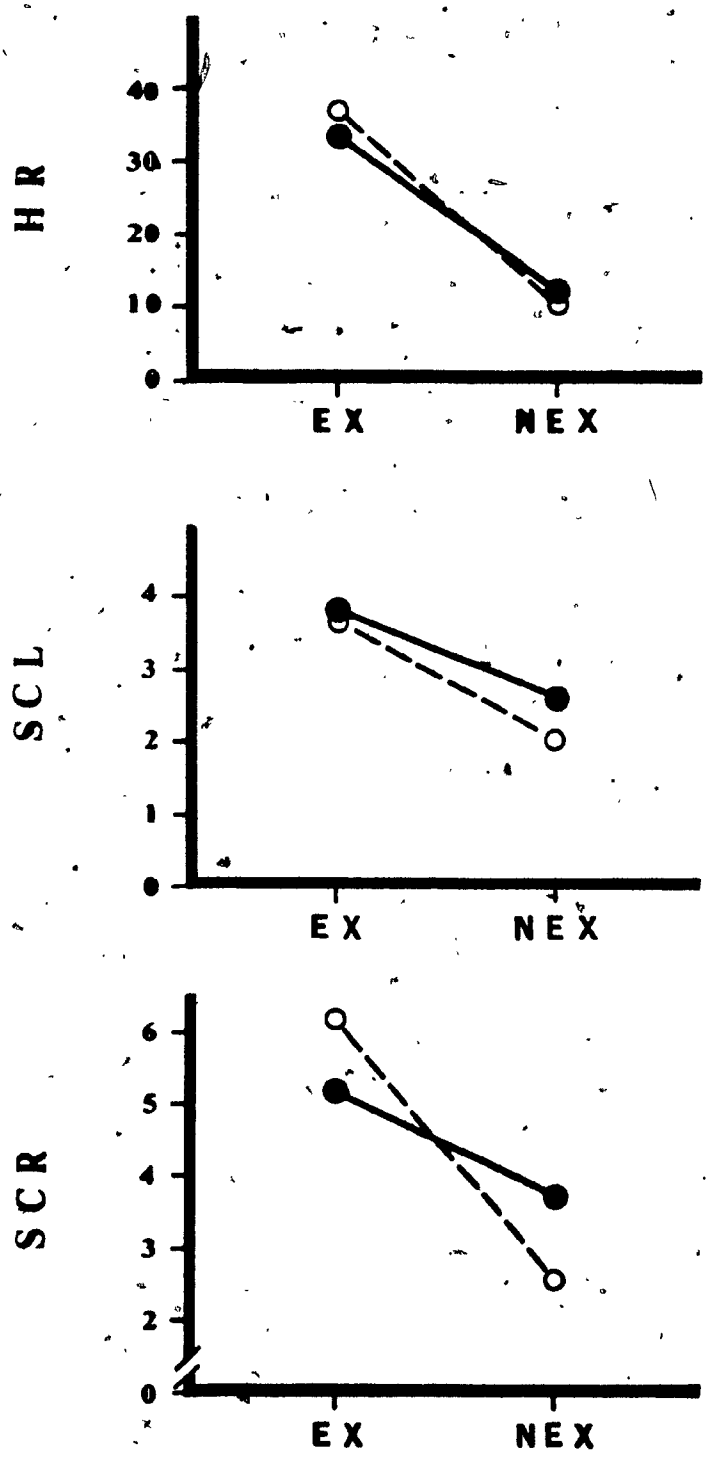


Figure 15. Mean Peak Response for process HR, SCL and SCR.

EX = exercise; NEX = no-exercise
FL = flooding; NFL = no-flooding

periods of both sessions. The five-way ANOVA conducted on these scores revealed significant main effects for exercise and period as well as a significant five-way interaction of all factors, F (1,41) = 7.65, $p < .01$, F (2,82) = 4.01, $p < .05$, F (2,82) = 3.45, $p < .05$, respectively. Exercising subjects demonstrated significantly greater SCL increases than did nonexercising subjects. The period effect simply reflected a within-session decrease in SCL for the sample as a whole.

The ANOVA applied to the peak response measure (Figure 15) repeated the main effect for exercise, F (1,41) = 6.67, $p < .05$ and also revealed a significant Flooding x Sex interaction, F (1,41 = 4.41, $p < .05$. Males administered flooding had higher SCL difference scores than no-flooding males, whereas females administered flooding had lower SCL scores than no-flooding females. No significant group differences emerged from the ANOVAS conducted on the within- and between-session habituation measures.

The ANOVA applied to the recovery SCL scores revealed a significant main effect for exercise, F (1,41) = 4.52, $p < .05$; exercising subjects maintained higher SCL during the recovery periods than did nonexercising subjects.

Skin conductance response (SCR). The preliminary analysis on baseline SCR revealed no significant group differences. The lower panel of Figure 14 displays the group mean SCR difference scores for the three imagery periods of both sessions. The five-way ANOVA applied to these scores

revealed significant effects for exercise, period, and the five-way interaction, F (1,41) = 19.44, $p < .001$, F (2,82) = 8.65, $p < .001$, F (2,82) = 4.28, $p < .05$, respectively. These were the same three effects which emerged from the ANOVA on SCL. Once again, exercising subjects demonstrated greater SCR increases than nonexercising subjects and the sample as a whole showed a within-session decrease.

The ANOVA conducted on the peak response measure (Figure 15) repeated the main effect for exercise, F (1,41) = 17.65, $p < .001$. ANOVAS applied to the composite within- and between-session habituation measures were nonsignificant.

No significant group differences emerged from the ANOVA conducted on the recovery period difference scores.

Table 2 presents a summary of the significant effects emerging from the ANOVAS conducted on the preceding process and recovery measures.

Additional Comparisons of Feeling Scales and Psychophysiological Measures

Two additional issues which could not be entirely answered by examining the main effects and interactions emerging from the ANOVAS were addressed by way of planned comparisons using the common mean square error term. The first issue was concerned with whether responding to phobic stimuli differed from that to nonphobic stimuli. The focus for this set of comparisons was on the two nonexercising groups (the Flooding and Placebo-Control groups) in order to remove the confounding effects of the

Table 2

Significant Process Effects

Process Variables	FL	EX	SEX	FE	FS	ES	FES
Anxiety							
Peak Resp	X						
Within Hab						X	
Between Hab	X						
Recovery							
Relaxation							
Peak Resp	X						
Within Hab							
Between Hab	X						
Recovery	X						
Arousal							
Peak Resp		X	X	X			
Within Hab							
Between Hab							
Recovery		X		X			
Fatigue							
Peak Resp			X				
Within Hab		X					
Between Hab							
Recovery			X				
Energy							
Peak Resp		X					
Within Hab	(X)						
Between Hab							
Recovery							
HR							
Peak Resp		X					
Within Hab		X					
Between Hab							
Recovery							
SCL							
Peak Resp		X			X		
Within Hab							
Between Hab							
Recovery		X					
SCR							
Peak Resp		X					
Within Hab							
Between Hab							
Recovery							

potent exercise manipulation. The second issue was mainly concerned with whether the addition of exercise to flooding (the Exercise-Flooding group) resulted in differential responding as compared to the administration of flooding alone (the Flooding group). Only the composite process variables were used for these two sets of comparisons.

Comparisons between Flooding and Placebo-Control groups. Self-reports of anxiety and physiological arousal (with their accompanying attributions), as well as objectively assessed HR, SCL, and SCR were the variables of interest for this set of comparisons.

The Flooding group reported significantly greater elevations in peak anxiety than did the Placebo-Control group (respective mean increases were 2.9 vs .8, $p < .001$). In both sessions, subjects in the Flooding group also attributed this anxiety significantly more to the tape than did the controls. (e.g., respective means for the second treatment session were 6.8 vs 4.4, $p < .01$). The Flooding group also reported significantly greater elevations in peak arousal than did the Placebo-Control group (respective mean increases were 2.3 vs .8, $p < .01$) and attributed this arousal significantly more to the tape than did the Placebo-Control group during both sessions (e.g., respective means for the second treatment session were 6.9 vs 4.9, $p < .01$).

However, despite the difference in self-reported arousal, the two groups showed virtually identical peak increases in HR (respective mean increases were 12.3 vs 12.1

bpm). Although the Flooding group showed greater elevations in SCL and SCR than the placebo controls (respective mean increases were 2.6 vs 2.0 micromhos for SCL and 3.7 vs 2.5 responses for SCR), these differences were also nonsignificant.

There were no significant differences between the Flooding group and the Placebo-Control group with respect to either within- or between-session habituation for any of the five measures considered.

Comparisons between Exercise-Flooding and Flooding groups. The same set of variables, with the addition of within-session habituation of fatigue and energy, were used for this second set of comparisons. Within-session habituation of both fatigue and energy were examined in order to determine if a summation of fatigue occurred over the course of a session when exercise and flooding were combined.

The Exercise-Flooding group and the Flooding group reported virtually the same increase in peak anxiety during the imagery periods (respective mean increases were 3.0 vs 2.9). There was, similarly, no difference in the attribution of this anxiety, with both the Exercise-Flooding group and the Flooding group primarily attributing it to the tape during both sessions (e.g., respective means for the second treatment session were 6.7 vs 6.8).

As can be seen in the middle section of Figure 11, females and males appeared to demonstrate very different patterns of within-session habituation of anxiety. Females

in the Exercise-Flooding group ($\underline{M}$ = -1.6) showed more than three times greater (but not significantly different) within-session habituation of anxiety than females in the Flooding group ($\underline{M}$ = -.5). Males, on the other hand, showed greater (but not significantly different) within-session habituation of anxiety when flooding was administered alone ($\underline{M}$ = -1.1) than when it was combined with exercise ($\underline{M}$ = -.3).

Inspection of the lower section of Figure 11 reveals that while the Exercise-Flooding group showed between-session habituation of anxiety ($\underline{M}$ = -.4), the Flooding group showed no change over sessions ($\underline{M}$ = .03). This difference, however, was not statistically significant.

The HR of subjects in the Exercise-Flooding group were artificially adjusted at the start of the treatment. Therefore, it is not surprising that their peak HR response was significantly greater that that for the Flooding group (respective mean increases were 33.8 vs 12.3 bpm, $\underline{p} < .001$). They also showed greater (but not significantly different) elevations in SCL and SCR than did the Flooding group (respective mean increases were 3.9 vs 2.6 micromhos for SCL and 5.3 vs 3.7 responses for SCR).

In spite of the large HR differences, the Exercise-Flooding group reported experiencing elevations in perceived physiological arousal which were not significantly greater than those reported by the Flooding group (respective mean increases were 2.8 vs 2.3). There was little difference

between the two groups in the attribution of this arousal during the first treatment session (respective means for group Exercise-Flooding and group Flooding were 5.8 vs 6.3). However, during the second treatment session group Exercise-Flooding attributed their arousal significantly more to the bike than did group Flooding (respective means were 4.9 vs 6.9, $p < .01$).

Finally, analysis of the within-session habituation of energy measure revealed that the Exercise-Flooding group (M = -.9) showed a significantly greater within-session decrease in energy than did either group Flooding (M = .04) or group Exercise (M = .3) (both $p < .05$). This suggests that exercise and flooding combined in some manner to reduce subjects' energy over time even though each component failed to do so when administered alone. The comparisons on the within-session habituation of fatigue measure were nonsignificant.

Imagery Ratings

All analyses performed on the imagery measures employed raw scores since these ratings were obtained only for the imagery periods. A 2 x 2 x 2 x 2 x 3 (Flooding x Exercise x Sex x Session x Period) MANOVA with repeated measures on the last two factors was applied to the three imagery measures assessing clarity, difficulty in maintaining the image, and amount of time during which the image was maintained. Since this analysis resulted in no greater understanding of the imagery process than an analysis of an imagery composite measure, the reader is referred to Appendix M for

presentation of the MANOVA and follow-up ANOVA summary tables. Instead, attention is focused on the creation and analysis of the imagery composite measure.

A composite variable, which took into account both clarity and maintenance of imagery across both treatment sessions, was calculated for each subject in the following manner. First, the mean of the six clarity ratings (three per session) was calculated to arrive at an index of average clarity. Second, an estimate of average amount of time the image was maintained was arrived at in the same manner. Third, average amount of time was multiplied by .125 (since the scale had 8 points) to convert it to an average percentage of the time. Finally, the average percentage of the time the image was maintained was multiplied by average clarity to achieve a final composite measure called Imagery.

Figure 16 displays the group means for Imagery. The 2 x 2 x 2 (Flooding x Exercise x Sex) ANOVA conducted on this composite measure revealed significant main effects for flooding, exercise, and sex, F (1,44) = 21.04, $p < .001$, F (1,44) = 7.76, $p < .01$, F (1,44) = 5.99, $p < .05$, respectively. Whereas subjects administered flooding reported significantly poorer imagery than no-flooding subjects, exercising subjects reported significantly better imagery than nonexercising subjects. In addition, females reported better imagery than males. A planned comparison using the common mean square error term indicated that subjects in the Exercise-Flooding group reported significantly better imagery than did subjects in the Flooding group ($p < .05$).

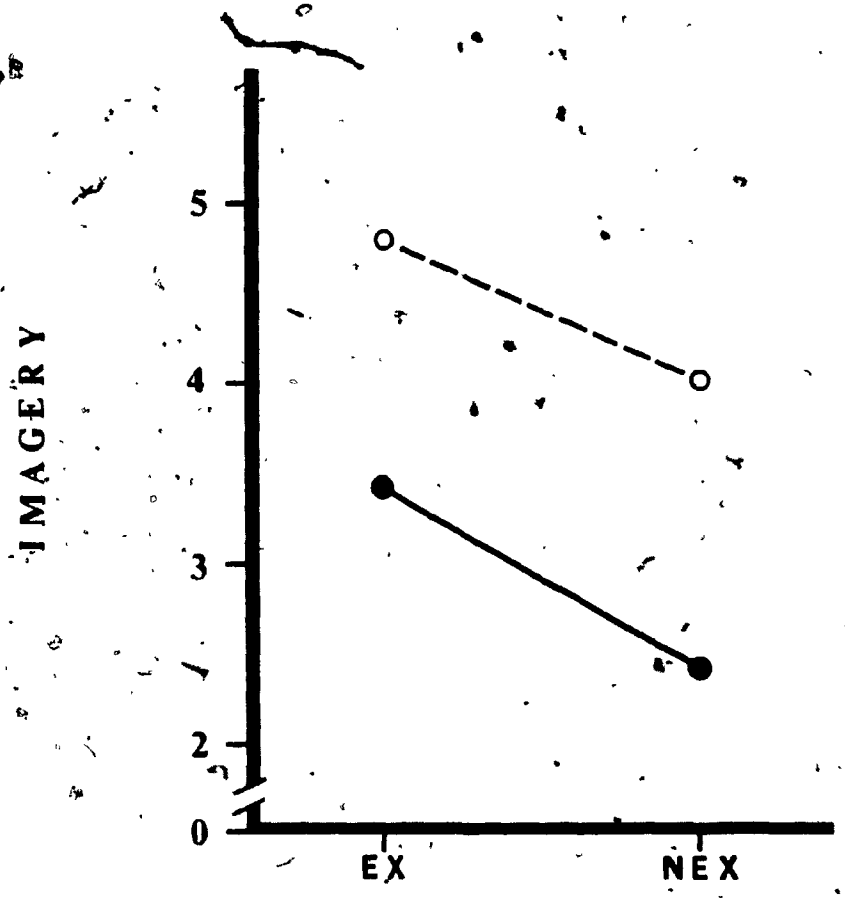


Figure 16. Mean Imagery ratings during exposure.
EX = exercise; NEX = no-exercise
FL = flooding; NFL = no-flooding

Correlational and Multiple Regression Analyses

The primary purpose for conducting the correlational and regression analyses was to determine which variables or sets of variables best predicted outcome improvement. Before addressing this isuue, two sets of simple correlational analyses were conducted in order to examine the construct validity (Cronbach & Meehl, 1955) of the measures of outcome improvement and the process indices. Three sets of analyses were then conducted in order to predict outcome improvement. Simple correlations were first performed between subject characteristics assessed prior to the experimental manipulation and outcome measures. Next, multiple regression analyses were used to test the relationships between process variables and outcome measures. Finally, simple correlational analyses were performed between the process attribution measures and outcome measures.

Nine outcome measures were used for these analyses. Eight of these were based on pre-posttest change scores of variables assessed during the actual three minute speech period. These included the Anxiety Thermometer (AT), TBCL, Overall-Estimate of Anxiety (OE-ANX), Overall-Estimate of Skill (OE-SKILL), Silence (SIL), HR, SCL, and SCR. For each of these measures, except the skill rating, lower scores indicated greater improvement. Higher scores indicated greater improvement on the skill rating. The ninth outcome measure was the treatment evaluation rating concerned with the effectiveness of the treatment in reducing target speech

anxiety (TRT EVAL). Since this measure was obtained only at posttesting, raw scores were used, and higher scores indicated greater improvement. These directions of improvement need to be kept in mind when examining all of the relationships involving outcome since the signs may be confusing.

The sixteen process measures used for these analyses included the peak response, within-session habituation, and between-session habituation measures for anxiety, arousal, HR, SCL, and SCR, plus the Imagery variable.

Correlations Among Outcome Measures

Table 3 presents the intercorrelations of the the nine outcome measures. There were significant positive relationships between the Anxiety Thermometer and Overall-Estimate of Anxiety, between the Overall-Estimate of Anxiety and the TBCL, and between SCL and SCR. In addition, correlations in the expected direction were obtained between the treatment evaluation measure and the Anxiety Thermometer, the Overall-Estimate of Anxiety, Silence, and SCR. Finally, increases in the Overall-Estimate of Skill were associated with reductions in both the Overall-Estimate of Anxiety and Silence. Thus, there appeared to be a reasonable degree of construct validity to the measures used to reflect outcome improvement. The physiological measures are, perhaps, an exception to this statement. Nonetheless, they are still of interest to be examined in terms of outcome effects.

Table 3

Pearson Product-moment Correlation Coefficients among Outcome Measures

	Measure	TBCL	OE-ANX	OE-SKILL	SIL	HR	SCL	SCR	TRT EVAL
1.	AT	.10	.33**	-.22	.20	.02	.10	.25	-.36**
2.	TBCL		.38**	-.26	.09	.10	.08	.11	-.10
3.	OE-ANX			-.41**	.25	.17	-.15	.04	-.27*
4.	OE-SKILL				-.46**	.12	.07	-.11	.10
5.	SIL					.00	.08	.18	-.30*
6.	HR						-.10	-.16	-.06
7.	SCL							.56**	-.00
8.	SCR								-.35**
9.	TRT EVAL								

Note. $N = 52$

* $p \leq .05$

** $p \leq .025$

Correlations Among Process Measures

Table 4 presents the intercorrelations among self-reported anxiety, self-reported arousal, HR, SCL, and SCR for each of the three process composite measures. For the peak response composite, significant positive relationships were found between self-reported anxiety and self-reported arousal, between self-reported arousal and both HR and SCR, and among all three psychophysiological indices . For the within-session habituation measure, positive relationships were found between self-reported anxiety and self-reported arousal, between self-reported arousal and SCL, and between SCL and SCR. For the between-session habituation measure, positive relationships emerged between self-reported anxiety and self-reported arousal, and also between SCL and SCR. Thus, there appeared to be a reasonable degree of construct validity to what was assessed as peak response. Although the intercorrelations for within- and between-session habituation were somewhat less clear, it is interesting that subjectively perceived arousal and anxiety were positively related for both habituation indices.

Correlations Between Subject Variables and Outcome Improvement

These analyses were conducted to determine if certain presenting characteristics might be associated with better response to treatment. Table 5 displays the correlations between the 14 subject characteristics assessed prior to the treatment sessions and the nine outcome criteria. Several predictors in the upper section of the table assess general

Table 4

Pearson Product-moment Correlation Coefficients among Process Measures

Peak Response

Measure	Arousal	HR	SCL	SCR
1. Anxiety	.60 **	.11	.01	-.04
2. Arousal		.48 **	-.01	.29 *
3. HR			.29 *	.51 **
4. SCL				.77 **
5. SCR				

Within-session Habituation

Measure	Arousal	HR	SCL	SCR
1. Anxiety	.52 **	.06	.12	-.05
2. Arousal		.14	.28 *	.08
3. HR			.13	.13
4. SCL				.65**
5. SCR				

Between-session Habituation

Measure	Arousal	HR	SCL	SCR
1. Anxiety	.46 **	.13	.05	-.02
2. Arousal		.02	-.01	-.07
3. HR			.19	.25
4. SCL				.56**
5. SCR				

Note. N = 52 for Anxiety, Arousal, and HR; N = 49 for SCL and SCR.

* $p \leqslant .05$; ** $p \leqslant .025$

Table 5

Pearson Product-moment Correlation Coefficients between Subject Variables and Outcome Measures

	Outcome Criteria								
Predictors	AT	TBCL	OE-ANX	OE-SKILL	SIL	HR	SCL	SCR	TRT EVAL
Age	.08	.07	.16	-.08	-.04	-.07	-.02	-.10	.02
	.15	-.06	.14	-.11	-.09	-.08	-.03	-.18	.19
Sex	-.14	.11	.09	-.03	-.07	-.10	-.30*	-.07	.06
	-.13	.04	.10	-.01	-.03	-.11	-.60**	-.36	.14
Fitness	.01	.21	-.14	-.10	.09	.15	.33**	.16	-.10
	.01	.15	-.19	-.08	.19	.45**	.22	.06	-.20
CSAQ-C	.10	.12	-.23	.01	.27*	-.04	.19	.07	-.07
	.05	.13	-.34	.02	.19	-.40*	.16	-.05	-.13
CSAQ-S	-.00	.06	-.11	-.07	-.13	.09	-.07	-.13	.02
	-.16	-.07	-.19	-.11	-.03	-.15	-.10	.01	.01
FSS-II	.13	.03	-.07	-.00	-.06	-.24	.17	.08	.02
	.21	.06	.02	-.06	-.04	-.37	.22	.31	-.19
FSS-II (Social Fear)	.04	.06	-.10	-.23	.07	-.13	-.11	-.06	-.14
	.09	-.10	-.11	-.17	.13	-.24	.09	.16	-.30
PRCS	.05	-.10	-.17	-.06	.17	-.02	-.10	.05	-.11
	-.09	-.30	-.24	.13	-.04	-.05	-.34	-.09	.14
S-R Inventory	.02	-.06	-.07	-.19	.18	-.02	-.03	-.04	-.13
	-.12	-.19	-.24	-.01	-.11	-.31	-.10	.00	-.07
Coping Factor 1	.18	.11	.28*	-.09	-.05	.03	-.14	-.09	.08
	.42*	.11	.34	-.17	-.02	-.20	-.11	.04	.21
Coping Factor 2	.08	-.02	-.27*	.03	-.04	-.15	.14	.24	.11
	-.16	-.06	-.32	.18	-.17	-.28	.16	.35	-.24
Coping Factor 3	.01	.02	.19	.06	-.09	.07	.04	.10	-.13
	.01	.20	.17	.06	-.03	.03	.15	.13	.11
Coping Factor 4	-.05	.03	-.23	.20	-.20	-.02	-.07	-.14	.31
	.05	.03	-.12	.27	-.27	-.21	-.14	-.00	.06
Coping Factor 5	.08	-.13	-.10	.07	-.05	-.27*	.25	.30*	.00
	-.14	-.41*	-.08	.33	-.21	-.22	.16	.18	.02

Note. Upper values indicate correlations for the whole sample ($N = 52$)

Lower values indicate correlations for the combined flooding groups ($N=26$)

* $p \leq .05$

** $p \leq .025$

levels of anxiety (CSAQ-C and CSAQ-S), fear (FSS-TOT), social anxiety (FSS-SOC), and anticipatory speech anxiety (PRCS and S-R Inventory). The predictors in the lower section are the five coping factors which assessed coping before and during the pretest situation. Correlations for the sample as a whole appear immediately above those based on the two flooding groups. Negative signs signify positive relationships between the level of the predictor in question and outcome improvement (except in the case of the treatment evaluation and skill measures). Sex was coded with a "0" representing females and a "1" representing males.

The poor predictive power of these preliminary variables is immediately apparent from inspection of the table. Focusing on the flooding groups, the only relationship of potential relevence is that higher levels of general cognitive anxiety (CSAQ-C) are significantly associated with greater pre-posttest reduction in HR during the speech. The other relationships which attain significance indicate that males show greater pre-posttest reduction in SCL, and that subjects with lower fitness levels show greater pre-posttest reductions in HR.

For the flooding groups, two interesting relationships emerge from the analyses involving the coping factors. The first is that subjects who show a less rational (i.e., more emotional) style of coping (Rational Cognition Factor) report greater pre-posttest reduction in subjectively experienced anxiety. The second relationship is that

subjects who cope with the situation by taking behavioral action show greater pre-posttest reductions in specific behavioral manifestations of anxiety.

Multiple Regression Analyses Predicting Outcome Improvement from Process Responses

To examine how the process composite measures related to outcome measures, two stepwise multiple regression analyses (one for the whole sample and one for the combined flooding groups) were performed for each outcome measure. No preestablished order for inclusion of variables was specified. The only criterion established in advance for entry of a variable was that the F value computed in testing the significance of each regression coefficient had to be at least 2.8 (approximately equivalent to an alpha level of $\leq .10$).

Table 6 presents the Beta weights (standardized regression coefficients) for the predictor variables that were included in the final regression equations for each outcome measure. Inspection of the table shows that, in general, a more pronounced response during exposure and greater habituation of responding either within or across sessions are predictive of outcome improvement. For example, higher peak anxiety and a higher level of SCL combined with greater between-session habituation of heart rate to predict ($R = .61$) pre-posttest reduction in self-reported anxiety (the AT measure) during the test speech. All the equations except for those calculated for the SC measures were significant at $p < .05$, signifying that the linear

Table 6

Beta weights of Process Predictors of Outcome from Multiple Regression Analyses

Predictors	Outcome Criteria: AT	TBCL	OE-ANX	OE-SKILL	SIL	HR	SCL	SCR	TRT EVAL
Imagery				-.26 -.44					
Peak Response									
Anxiety	-.30 --				-- -.37	-.22[a] --			
Arousal		-.21[b] -.36							
HR		-- .68						-- -.37[a]	-- .29[a]
SCL	-.35 -.50				-.37 -.39	.26 --			
SCR		-.27 -.48							
Within-session Habituation									
Anxiety		.22[a] --	.35 .41						
Arousal									
HR									
SCL				.35 --					.41 .47
SCR		-- .35							
Between-session Habituation									
Anxiety						.34 --	.25[a] .55	.26[a] --	
Arousal				-.22[a] --		-.51 -.43			
HR	.34 .32[a]		.36 .36		.30 --				
SCL					-- .47				
SCR							-- .32[a]		
Multiple R	.61 .64	.44 .77	.50 .58	.48 .44	.49 .65	.52 .43	.25 .53	.26 .37	.41 .59

Note. Upper values indicate Beta weights for the whole sample (N=52 (49 for SC))
Lower values indicate Beta weights for Flooding groups (N=26 (24 for SC))

[a] $p \leq .10$; [b] $p \leq .15$; if unmarked, $p \leq .05$

combination of variables accounted for a significant part of the explained variance of each outcome measure. As can be seen from the table, prediction of improvement in the subjective and behavioral dimensions was generally better than prediction for the psychophysiological indices.

Correlations between Process Attributions and Outcome Criteria

Correlational analyses were performed between attributions of both anxiety and arousal and outcome measures for the two flooding groups combined and also for the Exercise-Flooding group alone. For all outcome measures except the skill and treatment evaluation ratings, positive relationships between attribution and outcome measures indicate that attribution to the bike is associated with improved outcome.

For the combined flooding groups, greater attribution of arousal to the bike during both treatmemt sessions was significantly associated with better evaluation of the treatment for reducing target speech anxiety (e.g., r = -.54 for the second treatment session) This relationship was also found for the Exercise-Flooding group, but it failed to reach statistical significance due to the small sample size (r = -.50 for the first treatment session and -.43 for the second treatment session).

Greater attribution of arousal to the bike was significantly associated with greater pre-posttest reduction in SCL during the first treatment sesssion for the

combined flooding groups and during the second session for the Exercise-Flooding group (r = .45, .65, respectively). In addition, greater attribution of anxiety to the bike during the second treatment session was associated with greater pre-post reduction in SCL for both the combined flooding groups and the Exercise-Flooding group (r = .49, .58, respectively). These were the only significant relationships involving arousal and anxiety attribution ratings and outcome measures.

Discussion

Before considering the outcome results, it is important to examine three issues concerning the credibility of the data.

First, since the test speech used was a laboratory analogue rather than a real-life speech situation, one might justifiably question whether subjects would be sufficiently anxious during the pretest speech to warrant examining anxiety reduction at all. The repeated measures ANOVA (collapsed across groups) on the pretest Anxiety Thermometer ratings confirmed that subjects experienced much greater anxiety during the speech period than they did at baseline. Although this anxiety varied from subject to subject , there were no pretest group differences in anxiety ratings.

Second, it was essential to examine subjects' perceptions of the logic of their treatment for reducing speech anxiety. As this was an issue of concern when designing the experiment, it was especially pleasing to verify that subjects in the four treatment conditions perceived their treatment as equally logical. There was also uniformity in the ratings of the experimenter's consideration for subjects' safety and well-being. Thus, there appeared to be some control for both subject and experimenter bias.

Third, although "outcome improvement" was operationally defined for this experiment as pre- to posttest reductions

in subjective, behavioral, and physiological measures of anxiety, there is actually no consensus of an operational definition of improvement in speech anxiety in the therapy literature. Thus, the significant intercorrelations found among many of the measures representing outcome improvement verified a certain degree of contruct validity (Cronbach & Meehl, 1955) for these measures. Although not an essential requirement and seldom obtained in outcome research, this concordance in responding (also obtained by Paul; 1966) added some credibility to the outcome results.

The outcome results of this study support the experimental hypothesis that subjects administered flooding, either alone or in combination with exercise, show greater improvement in speech anxiety from pre- to posttesting than subjects receiving a neutral control for flooding. The data clearly demonstrate the effectiveness of the flooding manipulation for reducing subjective, behavioral, and physiological manifestations of speech anxiety.

Examining the subjective dimension, subjects administered flooding report significantly greater pre-posttest reduction in maximum anxiety experienced during the three-minute test speech than do no-flooding subjects. They also report significantly less (adjusted) posttest anxiety five minutes after completing the speech. In addition, they evaluate their treatment as being significantly more effective in reducing their target speech anxiety than do no-flooding subjects.

Behaviorally, subjects administered flooding, as compared to no-flooding subjects, show significantly greater reductions in both overall and specific behavioral manifestations of speech anxiety as assessed by outside raters. The lack of any group differences on the skill measure is not surprising since the treatment is designed to reduce anxiety rather than to increase skill.

Physiologically, posttest heart rate is significantly lower for flooding than for no-flooding subjects during the speech and also during the first and fifth minutes of the recovery period following the speech.

Despite significantly greater reductions in self-reported anxiety and heart rate both during and after the speech, there are no differences between flooding and no-flooding subjects in terms of anticipatory measures taken before and during the preparation period. It appears, then, that subjects must perform in the actual speech situation before they experience and show physiological manifestations of reduced anxiety. It is possible that the increased confidence gained as a result of this lowered anxiety during the posttest speech could result in lower anxiety during the preparatory period of a follow-up session (which, unfortunately, was beyond the scope of the present study).

Given the effectiveness of the flooding manipulation for reducing speech anxiety for both the Exercise-Flooding and Flooding groups, the central issue is whether the Exercise-Flooding group shows greater improvement than the Flooding group, as hypothesized.

The three patterns which emerged were that the Exercise-Flooding group, as compared to the Flooding group, demonstrates (1) greater improvement on the Anxiety Thermometer, Treatment Evaluation, and SCR frequency measures, (2) equivalent improvement on the Overall-Estimate of Anxiety and heart rate measures, and (3) less improvement on the TBCL.

The Exercise-Flooding group, as compared to the Flooding group, experience less subjective anxiety during the posttest speech and indicate that their treatment is more effective in reducing their speech anxiety. They also report greater generalization of anxiety reduction to other areas of their lives than do subjects in the Flooding group.

At the other extreme, the Flooding group, as compared to the Exercise-Flooding group, shows greater improvement in the specific behaviors of the TBCL which are believed to reflect anxiety (e.g., extraneous arm and hand movements).

Although the Overall-Estimate of Anxiety measure rates behavior, it involves a high degree of subjectivity on the part of the rater. This measure can thus be thought of as intermediate between the subjective Anxiety Thermometer ratings and the objective TBCL ratings. It is therefore interesting that the Exercise-Flooding group and the Flooding group show equivalent improvement on this measure.

In summary, during the posttest speech the Exercise-Flooding group reports less anxiety, but emits more specific behavioral manifestations of anxiety than does the Flooding

group. Both groups, however, appear to be equally anxious to independent raters when overall anxiety is considered.

The intercorrelations among the outcome measures substantiate these observations. Despite the concordance among many of the outcome measures, there is no relationship between the TBCL and either the Anxiety Thermometer or the Treatment Evaluation measure. The Overall Estimate of Anxiety rating, however, is significantly related to the TBCL, on the one hand, and to both the Anxiety Thermometer and the Treatment Evaluation measure, on the other hand.

Interesting implications for therapy emerge from these patterns. The Exercise-Flooding treatment might be more beneficial for subjects whose major concern is the cognitive aspect of the their speech anxiety. On the other hand, subjects concerned with how they appear before an audience might benefit more from flooding alone. In terms of generalization, subjects whose speech anxiety is part of a more widespread anxiety in many aspects of their lives might benefit more from the combined excercise-flooding treatment, whereas subjects with circumscribed speech anxiety might do better with flooding alone.

In addition to investigating outcome, this study attempted to identify theoretical process mechanisms which might account for outcome improvement.

The first issue of interest arose from the discrepant findings in the therapy literature suggesting that physiological arousal and/or anxiety during flooding may be either necessary, irrelevant, or detrimental for successful

outcome improvement. This issue was approached by conducting multiple regression analyses for the combined flooding groups using both self-report and physiological measures obtained during exposure to predict improvement on each outcome measure. The results suggested that greater responding combined with greater habituation of this responding either within or across sessions predicted outcome improvement. A possible implication of this finding for future studies is that investigators might attempt to determine the optimal way of achieving not only high levels of anxiety/arousal but also the habituation or extinction of this responding in order to maximize treatment effectiveness.

The second issue in the attempt to identify process mechanisms operating to improve outcome is of theoretical interest. It involved differentiating between three theories (direct exposure, exhaustion, and fatigue) put forward to account for the role played by the exercise component of the exercise-flooding manipulation. None of these theories proposes that acute exercise would have a direct impact on the permanent extinction of phobic anxiety. Rather, they all regard the exercise as an adjunct which might either directly or indirectly increase the impact of the flooding manipulation.

Unfortunately, there is no unanimous support for any one of the theories to the mutual exclusion of the other two. Instead, there is some support for each of them. The

direct exposure hypothesis involves two possible mechanisms whereby exercise might increase exposure to fear stimuli. The first mechanism is that the exercise could add arousal which might contribute to a more intense anxiety-evoking experience. Although the Exercise-Flooding group clearly shows much greater physiological arousal, there are no significant differences in their perceptions of these physiological arousal cues. The Exercise-Flooding group reports only slightly greater arousal than does the Flooding group. Similarly, the additional arousal does not result in additional anxiety, as the Exercise-Flooding and Flooding groups report equivalent anxiety.

The alternative mechanism whereby exercise might enhance imagery and thus lead to greater exposure to fear cues and subsequent extinction of anxiety appears to be more plausible. The Exercise-Flooding group reports significantly better imagery than does the Flooding group. It seems that the exercise somehow helped subjects immerse themselves in the imaginal flooding scenes. Since imaginal rather than in vivo flooding was used in this experiment, this mechanism may have had considerable impact on the improvement of the Exercise-Flooding group.

Thus, there is some support for the direct exposure hypothesis through the mechanism of increased imagery rather than increased anxiety. Having found one possible submechanism for the role of exercise in the exercise-flooding treatment, the next fascinating step is to find the submechanism by which the exercise enhances imagery. It

could be that the increased activity provides the person with additional proprioceptive cues which aid imagery.

It was originally proposed that limited support for the exposure hypothesis would be provided by the Exercise group improving more than the Placebo-Control group. The fact that this occurs only for the TBCL and Silence measures is rather surprising since exercise appears to have the greatest impact on improvement of subjectively experienced anxiety when it was combined with flooding. However, the Exercise group shows no change in subjectively experienced anxiety from pre- to posttesting. This seems to suggest that it is not exercise per se but rather the unique combination of the exercise and flooding which is responsible for the reduction in subjectively experienced anxiety reported by the Exercise-Flooding group.

The exhaustion hypothesis postulated that a summation of fatigue from the exercise and flooding sources would more rapidly bring the individual to that point of exhaustion where fear stimuli cease to elicit anxiety. Although no significant differences are found between the Exercise-Flooding and Flooding groups on the fatigue measure, the Exercise-Flooding group shows a significantly greater within-session decrease of energy than does the Flooding group. The fact that the Exercise-Flooding group also shows a significantly greater within session decrease in energy than the Exercise group seems to suggest that the exercise and flooding combined in some way to increase their fatigue

over the course of the session.

There is also some support for the attribution hypothesis which suggested that attribution of exercise-induced arousal to the bike rather than to the flooding tapes would cause a decrease in alarm and thus indirectly facilitate exposure and extinction of conditioned fear. At first glance, this does not appear to have occurred since there was no difference between the Exercise-Flooding and Flooding groups in peak anxiety experienced during exposure. However, closer inspection reveals that the attribution of arousal for the Exercise-Flooding group shifts from the first to the second treatment session. During the first treatment session, there is very little difference between the Exercise-Flooding and Flooding groups in the attribution of their arousal, with both groups attributing much of it to the taped imagery scenes. During the second treatment session, however, the Exercise-Flooding group attributes their arousal much more to the bike than they had during the first session so that there is a significant difference between the two groups in their attribution of this arousal at that point. Parallel to this between-session shift in attribution to the bike, the Exercise-Flooding group is the only group showing any decrease in anxiety between the first and the second treatment sessions. Thus the increased attribution of arousal to the bike may have resulted in the decreased anxiety reported during the second treatment session. The fact that the Exercise-Flooding group also shows the greatest improvement between the pretest and

postest in subjectively experienced anxiety ties in with both these observations.

In conclusion, the Exercise-Flooding treatment seems to reduce the cognitive or subjective dimension of speech anxiety which is accompanied by a reduced frequency of skin conductance responses. It also results in greater feelings by subjects that the treatment has helped both their speech and more generalized anxiety. Thus, the treatment seems sufficiently beneficial to warrant further investigation taking more subjective measures specifically tied to the test situation. There is also some support for each of the three theories suggested to account for the benefit of the exercise in the exercise-flooding treatment combination. The most clear-cut finding was with respect to imagery. This implies that the direct exposure effects may be the mechanism by which exercise contributes to flooding.

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List of Appendices

Appendix A: Fear Survey Schedule II

S-R Inventory of Anxiousness

PRCS

Cognitive Somatic Anxiety Questionnaire

Coping Style Questionnaire

S #_____ Group: 1 2 3 4

FEAR SURVEY SCHEDULE - II

The items in this questionnaire refer to objects and situations that may cause fear or other unpleasant feelings. Circle the number following each item that describes how much you are disturbed by it.

	None	Very Little	A Little	Some	Much	Very Much	Terror
1. Sharp objects	1	2	3	4	5	6	7
2. Being a passenger in a car	1	2	3	4	5	6	7
3. Dead bodies	1	2	3	4	5	6	7
4. Suffocating	1	2	3	4	5	6	7
5. Failing a test	1	2	3	4	5	6	7
6. Looking foolish	1	2	3	4	5	6	7
7. Being a passenger in an airplane	1	2	3	4	5	6	7
8. Worms	1	2	3	4	5	6	7
9. Arguing with parents	1	2	3	4	5	6	7
10. Rats and mice	1	2	3	4	5	6	7
11. Life after death	1	2	3	4	5	6	7
12. Hypodermic needles	1	2	3	4	5	6	7
13. Being criticized	1	2	3	4	5	6	7
14. Meeting someone for the first time	1	2	3	4	5	6	7
15. Roller coasters	1	2	3	4	5	6	7
16. Being alone	1	2	3	4	5	6	7
17. Making mistakes	1	2	3	4	5	6	7
18. Being misunderstood	1	2	3	4	5	6	7
19. Death	1	2	3	4	5	6	7
20. Being in a fight	1	2	3	4	5	6	7
21. Crowded places	1	2	3	4	5	6	7
22. Blood	1	2	3	4	5	6	7
23. Heights	1	2	3	4	5	6	7
24. Being a leader	1	2	3	4	5	6	7
25. Swimming alone	1	2	3	4	5	6	7
26. Illness	1	2	3	4	5	6	7
27. Being with drunks	1	2	3	4	5	6	7
28. Illness or injury to loved ones	1	2	3	4	5	6	7
29. Being self-conscious	1	2	3	4	5	6	7
30. Driving a car	1	2	3	4	5	6	7
31. Meeting authority	1	2	3	4	5	6	7
32. Mental illness	1	2	3	4	5	6	7
33. Closed places	1	2	3	4	5	6	7
34. Boating	1	2	3	4	5	6	7
35. Spiders	1	2	3	4	5	6	7
36. Thunderstorms	1	2	3	4	5	6	7
37. Not being a success	1	2	3	4	5	6	7
38. God	1	2	3	4	5	6	7
39. Snakes	1	2	3	4	5	6	7
40. Cemetaries	1	2	3	4	5	6	7
41. Speaking before a group	1	2	3	4	5	6	7
42. Seeing a fight	1	2	3	4	5	6	7
43. Death of a loved one	1	2	3	4	5	6	7
44. Dark places	1	2	3	4	5	6	7
45. Strange dogs	1	2	3	4	5	6	7
46. Deep water	1	2	3	4	5	6	7
47. Being with a member of the opposite sex	1	2	3	4	5	6	7
48. Stinging insects	1	2	3	4	5	6	7
49. Untimely or early death	1	2	3	4	5	6	7
50. Losing a job	1	2	3	4	5	6	7
51. Auto accidents	1	2	3	4	5	6	7

S #_____ Group: 1 2 3 4 Session: 1 4

S-R INVENTORY OF ANXIOUSNESS

"you are getting up to give a speech before a large group"

Mark one of the five alternative degrees of reaction or attitude for each of the following items. If your heart beats much faster in this situation you would circle alternative 5; if your heart beats somewhat faster, you would circle either alternative 2, 3, or 4, depending on how much faster; if in this situation your heart does not beat faster at all, you would circle alternative 1.

1.	Heart beats faster		1	2	3	4	5
		Not at all					Much faster
2.	Get an "uneasy feeling"		1	2	3	4	5
		None					Very strong
3.	Emotions disrupt action		1	2	3	4	5
		Not at all					Very disruptive
4.	Feel exhilarated and thrilled		1	2	3	4	5
		Very much					Not at all
5.	Want to avoid situation		1	2	3	4	5
		Not at all					Very much
6.	Perspire		1	2	3	4	5
		Not at all					Very much
7.	Need to urinate frequently		1	2	3	4	5
		Not at all					Very frequently
8.	Enjoy the challenge		1	2	3	4	5
		Enjoy much					Not at all
9.	Mouth gets dry		1	2	3	4	5
		Not at all					Very dry

10.	Become immobilized	Not at all	1	2	3	4	5 Completely
11.	Get full feeling in stomach	None	1	2	3	4	5 Very full
12.	Seek experiences like this	Very much	1	2	3	4	5 Not at all
13.	Have loose bowels	None	1	2	3	4	5 Very much
14.	Experience nausea	Not at all	1	2	3	4	5 Much nausea

S #_____ Group: 1 2 3 4 Session: 1 4

PRCS

This instrument is composed of 30 items regarding your feelings of confidence as a speaker. After each question there is a "true" and a "false."

Try to decide whether "true" or "false" most represents your feelings associated with giving speeches, then put a circle around the "true" or "false." Remember that this information is completely confidential. Work quickly and don't spend much time on any one question. We want your first impression on this questionnaire. Now, go ahead, work quickly, and remember to answer every question.

1. I look forward to an opportunity to speak in public.---------- T F
2. My hands tremble when I try to handle objects on the platform.----- T F
3. I am in constant fear of forgetting my speech.---------- T F
4. Audiences seem friendly when I address them.---------- T F
5. While preparing a speech I am in a constant state of anxiety.------ T F
6. At the conclusion of a speech I feel that I have had a pleasant experience.---------- T F
7. I dislike to use my body and voice expressively.---------- T F
8. My thoughts become confused and jumbled when I speak before an audience.---------- T F
9. I have no fear of facing an audience.---------- T F
10. Although I am nervous just before getting up I soon forget my fears and enjoy the experience.---------- T F
11. I face the prospect of making a speech with complete confidence.--- T F
12. I feel that I am in complete possession of myself while speaking.-- T F
13. I prefer to have notes on the platform in case I forget my speech.- T F
14. I like to observe the reactions of my audience to my speech.------- T F
15. Although I talk fluently with friends I am at a loss for words on the platform.---------- T F
16. I feel relaxed and comfortable while speaking.---------- T F
17. Although I do not enjoy speaking in public I do not particularly dread it.---------- T F
18. I always avoid speaking in public if possible.---------- T F
19. The faces of my audience are blurred when I look at them.---------- T F
20. I feel disgusted with myself after trying to address a group of people.---------- T F
21. I enjoy preparing a talk.---------- T F
22. My mind is clear when I face an audience.---------- T F
23. I am fairly fluent.---------- T F
24. I perspire and tremble just before getting up to speak.---------- T F
25. My posture feels strained and unnatural.---------- T F
26. I am fearful and tense all the while I am speaking before a group of people.---------- T F
27. I find the prospect of speaking mildly pleasant.---------- T F
28. It is difficult for me to calmly search my mind for the right words to express my thoughts.---------- T F
29. I am terrified at the thought of speaking before a group of people.---------- T F
30. I have a feeling of alertness in facing an audience.---------- T F

S #_____ Group: 1 2 3 4

Cognitive-Somatic Anxiety Questionnaire

Please rate the degree to which you generally or typically experience this symptom when you are feeling anxious by circling a number from 1 through 5 with 1 representing "not at all" and 5 representing "very much so". Please answer every question.

1. I find it difficult to concentrate because of uncontrollable thoughts.....	1	2	3	4	5
2. My heart beats faster.....	1	2	3	4	5
3. I feel jittery in my body.....	1	2	3	4	5
4. I worry too much over something that doesn't really matter.....	1	2	3	4	5
5. I imagine terrifying scenes.....	1	2	3	4	5
6. I get diarrhea.....	1	2	3	4	5
7. I can't keep anxiety provoking pictures out of my mind.....	1	2	3	4	5
8. Some unimportant thought runs through my mind and bothers me.....	1	2	3	4	5
9. I feel tense in my stomach.....	1	2	3	4	5
10. I feel like I am losing out on things because I can't make up my mind soon enough.....	1	2	3	4	5
11. I nervously pace.....	1	2	3	4	5
12. I become immobilized.....	1	2	3	4	5
13. I can't keep anxiety provoking thoughts out of my mind.....	1	2	3	4	5
14. I perspire.....	1	2	3	4	5

S #_____ Group: 1 2 3 4

Session: 1 4

Coping Style Questionnaire

An hour and a half ago you were informed for the first time that participation in this experiment required you to deliver a three-minute speech today. We are interested in assessing how you tried to cope with this stressful event. Please circle "yes" or "no" following each item below depending on whether or not it applied to you during the one hour preceding the speech and/or during the speech situation itself.

1. I tried to see the positive side ..... yes no
2. I tried to step back from the situation and be more objective ..... yes no
3. I prayed or hoped for guidance or strength ..... yes no
4. I took things one step at a time ..... yes no
5. I considered several alternatives for handling the problem ..... yes no
6. I drew on my past experiences; I was in a similar situation before ..... yes no
7. I tried to find out more about the situation ..... yes no
8. I asked the experimenter for specific advice about how to handle the situation ..... yes no
9. I took some positive action (e.g., concentrated on making good notes and reviewing them as well as possible) ..... yes no
10. I talked with or confided in the experimenter in order to make myself feel better. ..... yes no
11. I tried to reduce the tension by practicing muscular relaxation or meditation ..... yes no
12. I tried to reduce the tension and relax by imagining pleasant events either in the past or future ..... yes no
13. I prepared for the worst ..... yes no
14. I found myself feeling angry and/or hostile about the situation even though I knew it was because I was really afraid ..... yes no
15. I kept my feelings to myself ..... yes no
16. I tried to get busy and concentrate on other things ..... yes no
17. I didn't worry about it; figured everything would probably work out fine ..... yes no

Appendix B: Phone Contact Statement

Explanation

Informed Consent Sheet

Research Participant Form

Structured Interview

Phone Contact Statement

I'm working with Dr. Danny Kaloupek in the Psychology Department. We're now in the process of conducting an experiment right here at Concordia in order to evaluate several treatment techniques which may reduce speech anxiety without requiring a large amount of time. Some of the procedures being used have been previously tested and found to be very effective. Other procedures which we have recently developed are being tested in this study in order to determine which parts of the treatment process are responsible for success.

I can't give you details over the phone--but what I can say at this point is that each treatment will involve listening to and imagining some tape-recorded scenes while either exercising or sitting still. If you come into the lab for an initial 90-minute session, I will explain the experiment to you more fully. If things go well for you during this session and you decide that you're interested, your participation will be spread over three additional 90-minute sessions approximately one week apart. Of course, you don't have to stay for the whole initial 90-minute session. You can leave at any time. Are you interested in setting up an appointment?

If subject expresses interest, say: Do you have a pencil and paper? I'd like to arrange a time when you'll have a free hour and a half, so that if you do decide to participate, we can complete the initial assessment. That way, the next time you come, we can begin the treatment procedures right away.

> Schedule the subject: Give the room number--phone number where the experimenter can be reached--Repeat your name and the date and time of the appointment (make sure the person writes down the information).

I may be calling you back to remind you about the session. Will that be all right?

Explanation

Subjects were explained the purpose and nature of the study as follows:

> Speech anxiety is a very common problem among college students. It can range from mild anxiety which is more of an annoyance than anything else to an extremely painful and even threatening experience. The increasing trend to require oral presentations in many courses is bringing the problem to a head for many students who could previously avoid the situation entirely. In addition, it is almost an essential requirement for success in many fields outside the university that you be able to stand up and speak with assurance before groups of people. The purpose of this experiment is to evaluate several treatment techniques which may reduce speech anxiety without requiring a large investment of one's time. This is an experimental study. Some of the procedures being used have been previously tested and found to be very effective. Other procedures which we have recently developed are being tested in the study in order to determine which parts of the treatment process are most effective.

Subjects were then given the following information concerning their requirements for participation in the study.

> Participation in this experiment requires that you attend four 90-minute sessions. During all sessions you will be seen on an individual basis. If you decide to continue, today will be the first session. You will deliver a three-minute speech in order for us to complete the assessment of your speech anxiety. The next two sessions will involve your treatment. Assignment to treatments will be done randomly. Each treatment will involve listening to and imagining some tape-recorded scenes while either sitting still or exercising. I don't know now to which treatment you'll be assigned but it will be fully explained to you at the next session. During the fourth and final session we will assess your improvement by having you give another three-minute speech and complete some forms. Thus, your total participation time will be spread over four weeks. If at the end of these four sessions you want to improve more, another treatment which has been used for speech anxiety will be offered to you. In exchange for your participation, all treatment is being offered free of charge.

Informed Consent Sheet

As a participant in this experiment investigating methods of reducing speech anxiety, you will be assigned to one of four treatment groups. Depending on this assignment, you may be asked to perform exercise on a bicycle ergometer and/or listen to tapes describing public speaking situations. In addition, you will be asked to complete several forms and deliver two three-minute videotaped speeches. Participation involves 4 laboratory sessions distributed over 4 weeks, each session lasting 90 minutes.

Explanation of exercise on bicycle ergometer

The work loads will begin at a level you can easily accomplish and will be advanced in stages depending on your work capacity. We may stop the exercise at any time because of signs of fatigue, or you may stop when you wish to because of personal feelings of fatigue or discomfort. We do not wish you to exercise at a level which is abnormally uncomfortable for you. Your heart rate will be continuously monitored throughout the cycling via discs attached to your back.

Explanation of audiotapes

These tapes (heard over headphones) will present imaginal scenes, some of which have been designed to elicit both subjective and physiological arousal. Although imagining the recorded scenes is important for the experiment, we will certainly understand if you request to terminate the session at any time.

Benefits

The expected benefits of this project are potential reduction of your speech anxiety so that you will be more confident and less nervous when you are required to speak before a group.

Risks and discomforts

There exists the possibility of certain changes occurring during the tasks. They include abnormal blood pressures, fainting, disorders of heart beat, and extremely rare instances of heart attack. Every effort will be made to minimize these by the preliminary screening and by observations during the testing. The experimenter has been trained in Cardio-Pulmonary Resuscitation in order to better deal with unusual situations should they arise.

Privacy

All information disclosed and data gathered during the course of this experiment will be held in strict confidence. Similarly, your comments, suggestions and complaints, which we encourage you to provide, will remain confidential. In order to insure such confidentiality, all experimental information is numerically coded.

Inquiries

If you have any doubts or questions about the procedures used in the exercise or the taped scene presentations or the two short speeches, please ask us for further explanation. Also, you are free to ask questions at any time regarding the experiment, although need for experimental control may lead us to request delayed disclosure until after the study is complete.

Persons requesting your consent

Your consent is being requested by Dr. Danny Kaloupek, assistant professor of Psychology at Concordia University and by Sandra Schwartz, masters student in experimental psychology at Concordia University.

Freedom of consent

Your participation in the exercise, taped scene visualizations, and the two speeches is completely voluntary. You are free to deny consent if you desire. You are also free to withdraw from the experiment at any time without penalty.

I have read this form and I understand the procedures and the possible risks and discomforts involved. I consent to participate in this experiment. I know of no medical reason preventing me from participating in this research.

_____

Date

_____

Signature of Participant

_____

Witness

S #_____ Group: 1 2 3 4

Research Participant Form

Thank you for participating in this research project. All information provided on this questionnaire will be held in strict confidence and used only for research purposes. Please do not put your name on this questionnaire.

age:_____ sex_____ year of university_____

mother tongue:_____ If not English, are you completely fluent in English?_____

Please answer the following questions carefully

Do you smoke? yes____ no____ If yes, approximately how many cigarettes per day?____ No. of years_____

Have you had any medical or surgical problems during the last year? yes____ no____ Please specify_____

Do you suffer from any chronic illness? yes____ no____ Please specify _____

Have you ever had heart trouble of any kind? yes____ no____ Please specify_____

Do you now, or have you ever had high blood pressure?_____

Do you have diabetes? yes____ no____

Do you suffer from epilepsy? yes____ no____

Have you ever had a fainting spell? yes____ no___ If yes, please explain_____

Do you have asthma? yes____ no____

Are you presently, or have you ever been treated for psychological or psychiatric reasons? yes____ no____ If yes, please explain _____

Have you ever taken tranquilizers or other psycho-active drugs? yes____ no____ If yes, what drug_____, when_____, and for how long_____?

Please list any medication that you are presently taking and the reason for taking it_____

Please give the date (or approximate date) of you last medical check-up____ _____

Structured Interview

In this interview the following issues concerning the subject's speech anxiety were discussed.

1. length of time S experienced speech anxiety
2. degree of interference with functioning
3. whether other social or evaluative situations provoke anxiety
4. whether the speech anxiety is anticipatory and/or situational
5. whether S deliberately avoids situations requiring speeches or oral presentations, e.g. if avoids taking an interesting course because of speech requirements.
6. whether S is currently experiencing any other kinds of problems, e.g., sleep disturbance, appetite, depression (and how often)
7. whether S is currently under any particular life stresses. Explain
8. number and type of speeches or presentations subject is required to give during the current term
9. extent of participation in aerobic sports as quantified by Cooper's (1977) point system.

Pertinent information was recorded on Data Sheet I

Appendix C: Anxiety Thermometer

Subjective Rating Sheets

Imagery Rating Sheet

Treatment Evaluation Sheet

Circle the number which best describes the maximum level of anxiety or tension experienced during the last minute of the preceding rest period.

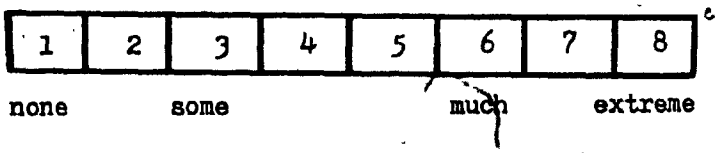
ANXIETY-TENSION

1	2	3	4	5	6	7	8

none some much extreme

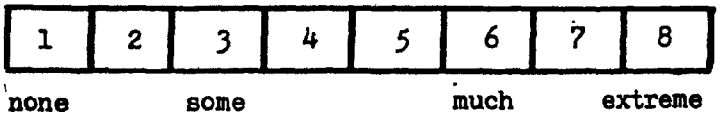
Circle the number which best describes your present level of anxiety or tension at this moment.

ANXIETY-TENSION



Circle the number which best describes the maximum level of anxiety or tension experienced during the preceding three-minute speech.

ANXIETY-TENSION



Below are 5 subjective rating scales or thermometers. The headings above the scales each describe a particular kind of feeling. Circle the number which best describes the maximum amount of each of these feelings that you experienced during the preceding minute.

ANXIETY-TENSION

1	2	3	4	5	6	7	8

none some much extreme

ENERGY-LIVELINESS

1	2	3	4	5	6	7	8

none some much extreme

RELAXATION-CALMNESS

1	2	3	4	5	6	7	8

none some much extreme

FATIGUE-TIREDNESS

1	2	3	4	5	6	7	8

none some much extreme

PHYSIOLOGICAL AROUSAL

1	2	3	4	5	6	7	8

none some much extreme

On the left are 5 subjective rating scales or thermometers. The headings above the scales each describe a particular kind of feeling. Circle the number which best describes the maximum amount of each of these feelings that you experienced during the preceding 15-minute tape-bike period. To the right of each of these scales is an accompanying Tape vs Bike scale. As soon as you have completed each subjective scale, circle the number on the Tape vs Bike scale which describes to what extent you think this feeling was caused by the tape and bike.

ANXIETY-TENSION

1	2	3	4	5	6	7	8

none some much extreme

TAPE none some much all

1	2	3	4	5	6	7	8

BIKE all much some none

ENERGY-LIVELINESS

1	2	3	4	5	6	7	8

none some much extreme

TAPE none some much all

1	2	3	4	5	6	7	8

BIKE all much some none

RELAXATION-CALMNESS

1	2	3	4	5	6	7	8

none some much extreme

TAPE none some much all

1	2	3	4	5	6	7	8

BIKE all much some none

FATIGUE-TIREDNESS

1	2	3	4	5	6	7	8

none some much extreme

TAPE none some much all

1	2	3	4	5	6	7	8

BIKE all much some none

PHYSIOLOGICAL AROUSAL

1	2	3	4	5	6	7	8

none some much extreme

TAPE none some much all

1	2	3	4	5	6	7	8

BIKE all much some none

S #____ Group: 1 2 3 4 Session: 2 3 Trial: 1b 2b 3b Order: A B

Imagery Rating Sheet

Circle the number which best describes your experience of the imagery scenes during the preceding 15-minute tape-bike period.

1. Please indicate the average clarity or vividness of the imagery scenes as they appeared to you.

1	2	3	4	5	6	7	8
no clarity at all		some clarity			much clarity		extreme clarity

2. What degree of difficulty did you have maintaining the image at the level of clarity you checked off above?

1	2	3	4	5	6	7	8
no difficulty at all		some difficulty			much difficulty		extreme difficulty

3. What part of the time that you were listening to the tape were you able to keep the image clear?

1	2	3	4	5	6	7	8
none of the time		some of the time			much of the time		all of the time

S #_____ Group: 1 2 3 4

Treatment Evaluation Sheet

Please answer each question by circling the appropriate number.

1. To what degree do you feel these treatment sessions have been helpful in reducing your speech anxiety?

1	2	3	4	5	6	7	8	9
not at all helpful				fairly helpful				very helpful

2. To what degree do you feel these treatment sessions have been helpful in reducing anxiety in other areas besides the speech situation?

1	2	3	4	5	6	7	8	9
not at all helpful				fairly helpful				very helpful

Please list other areas:_____

3. How logical did this type of treatment seem to you for helping people to reduce their speech anxiety?

1	2	3	4	5	6	7	8	9
not at all logical				fairly logical				very logical

4. How confident would you be in recommending this treatment to a friend who had a problem similar to yours?

1	2	3	4	5	6	7	8	9
not at all confident				fairly confident				very confident

5. How well did the form you signed at the beginning of the study supply information which allowed you to understand what the study involved?

1	2	3	4	5	6	7	8	9
completely inadequate information				fairly adequate information				completely adequate

6. How fully do you feel your safety and well-being were considered with respect to the tasks included in the experiment?

1	2	3	4	5	6	7	8	9
not considered at all				fairly considered				fully considered

Appendix D: Timed Behavioral Checklist

Overall-Estimates of Anxiety and Skill

Speech Code_____ Rater_____ Date_____

Timed Behavioral Checklist

Behavior Observed	Time Period						
	1	2	3	4	5	6	Σ
1. Sways or Shifts		/					
2. Extraneous Arm & Hand Movement (swings, scratches, toys, swings card, hand tremors)							
3. Arms Rigid							
4. Hands Restrained (in pockets, behind back, clasped)							
5. Voice Quivers							
6. Speech Blocks or Stammers							
7. Clears Throat							
8. Swallows							
9. Moistens Lips, Teeth, Tongue out							
10. Face-Grimaces, Grits Teeth, Tics							
11. Breathes Heavily, Sighs							
12. No Eye Contact							
						ΣΣ	

Overall Rating of Speech Anxiety

Rate the subject's general level of anxiety (e.g., distress, discomfort, fear, avoidance) taking into account the INTENSITY, DURATION, and DEGREE OF INCAPACITATION of the subject's BEHAVIOR.

1	2	3	4	5	6	7	8
no anxiety		some anxiety			much anxiety		extreme anxiety

Overall Rating of Speech Skill

Rate how well the subject demonstrates those aspects of COMPOSITION (e.g., content, intelligibility) and DELIVERY (e.g., body action, personality, language, voice) which MAXIMIZE COMMUNICATION OF THE INTENDED MESSAGE.

1	2	3	4	5	6	7	8
no skill		some skill			much skill		extreme skill

Appendix E: Procedural Instructions Transcript for Speech Rationale-Instructions Transcripts

Procedural Instructions Transcript for Speech

(affix & hook up electrodes; attach headphones)

The instructions for this part of the session are taped. If the volume is either too high or too low, please let me know now. I will be in the lab at all times. If you wish to communicate with me, simply speak up and I will hear you. Please try to follow the instructions you will be given as closely as possible.

There will now be a ten-minute rest period. Keep your eyes open, but try to relax. Please try to move as little as possible so that your resting-state physiological responses can be recorded.

(stop tape; wait 10 min; start tape)

I will now be handing you a clipboard with attached pen. Please keep it on your lap. The clipboard holds five sheets of paper stapled together. Check that the top sheet has a number "1" in the upper right corner. This sheet consists of an "Anxiety-Tension" rating scale or thermometer. The scale is numbered from "1" to "8" with corresponding labels such that "1" equals "none" and "8" equals an "extreme" amount of anxiety. With your free hand, circle the number which best describes the maximum level of anxiety or tension that you experienced during the last minute of the preceding rest period...30 sec pass...Please flip this sheet that you have just completed over so that it is now at the back of the pile. Leave the clipboard on your lap.

You will now be given instructions concerning today's speech. We realize that this may be a stressful experience for you, but one of the best ways of assessing your present degree of speech anxiety, and the extent of your improvement with treatment, is to see how you actually perform in a speech situation. You will be given general instructions now and more detailed instructions as we proceed.

I will soon pass you a card on which the topic of your speech is printed. You will be given a five-minute period in which to prepare a three-minute speech. The first three minutes of this five-min preparation period will be spent making notes on the card, while the remaining two minutes will be used to study your notes and rehearse in your mind. You will then stand up and give your speech before a microphone and videocamera. Your speech will be recorded on videotape and audiotape for later scoring by a team of trained raters. After the speech you will sit down and relax for a few minutes.

Before we proceed, please complete the Personal Report of Confidence as a Speaker questionnaire which should now be the top sheet on the clipboard. Make sure that the heading PRCS appears on this sheet. Read the directions at the top of the PRCS and then answer all the questions. Do not leave out any question. If you can't decide, just answer the first

thing that comes to your mind...3 min. pass...Please flip this PRCS sheet that you have just completed over so that it is now at the back of the pile.

I will now place the note card on your clipboard...30 sec pass...Use this card and the pen attached to the clipboard to make notes on the topic you have been given. Remember that you are preparing for a three-minute speech. You may use these notes for later reference during the speech if you wish. You have three minutes in which to make these notes. Start now...3 min pass...Stop writing. Leave the note card on your lap where you can see it without moving. Rest your arms on the arms of the chair. During the next two minutes study the notes you have made and practice your speech in your mind. It is very important that you sit quietly and not move while rehearsing, as your physiological responses will be monitored during this time. For this reason, it is also important that you don't rehearse out loud. Start rehearsing in your mind now...1 min passes...There is now one minute remaining until speech delivery. Continue rehearsing...1 min passes...Stop rehearsing. Now, fill out the sheet with a "2" in the upper right corner. Circle the number which best describes your present level of anxiety or tension at this moment...30 sec pass...Once again, flip this sheet that you have just completed over to the back of the pile.

After I remove your headphones, you will stand up before the microphone and deliver your speech for the whole three minutes. I'll let you know when to start and stop.

(stop tape; take headphones off S; take clipboard from S and place in chair; make sure S has note card; help S out of chair and show where to stand on the taped line; start videocamera and tell S when to start and stop; at end of speech, seat S, check that electrodes are still properly attached, replace headphones, hand clipboard back to S.)

(start tape)

Now, please complete the top sheet which should have a number "3" in the upper right corner. Circle the number which best describes the maximum level of anxiety or tension that you experienced during the preceding three-minute speech...30 sec. pass...Flip the completed sheet over to the back of the pile.

There will now be a five-minute rest period. Keep your eyes open, but try to relax...5 min pass...The rest period is now over. Please fill out the last sheet, with the number "4" in the upper right corner. Circle the number which best describes your present level of anxiety or tension at this moment. The speech test section is now over.

(Stop tape; stop polygraph; remove electrodes and headphones from S)

Rationale-Instructions--Group 1 (Exercise-Flooding)

The anxiety that you experience in the speech situation is something that you have learned in the course of your past experiences. This anxiety is unadaptive in the sense that the speech situation is not dangerous or threatening in reality. However, because of your past experiences, the fact is that you DO perceive the situation as threatening. Thus, you naturally react with fear and anxiety, as anyone normally does to a perceived threat. As you have probably found out, trying to intellectualize the problem away and convince your emotions that the situation is not really threatening simply doesn't work. So, let's start off by accepting that, for whatever reason, your speech anxiety exists in the here and now. We're not going to try to figure out the cause of this anxiety. Instead we'll try to focus on directly reducing it.

Before we begin the actual treatment, I'd like to take a few minutes to tell you about the rationale behind the procedures that we will be using. I'll then describe these procedures in more detail so that you'll have a better idea of what you will be doing during the session.

The specific technique we will be using to reduce your speech anxiety employs two main procedures. One of the procedures involves listening to and imagining feared public speaking situations. The other procedure is exercise on the bicycle ergometer. When used in combination, these two procedures can be very effective.

Let me first describe how imagining anxiety-provoking public speech situations works to reduce anxiety. Let us suppose that in the course of learning to ride a horse you fell off. We'll assume that you were not injured but got slightly bruised and extremely frightened. You'd naturally be afraid to get back on the horse. But that's exactly what a good instructor would have you do. If you did NOT get back on the horse, your fear would increase and generalize to many aspects connected with the horse-riding situation. But, by forcing yourself to get back on the horse and be exposed to what you are afraid of, you can overcome your fear.

The procedure we will be using follows the same basic principle. You will be asked to imagine public speaking scenes which have been explicitly designed to evoke anxiety. By repeatedly exposing yourself to these scenes, your anxiety will be reduced or extinguished. You will, in effect, be unlearning previously learned fears through exposure in imagery.

The other procedure we will be using is physical exercise. Many people make use of this procedure (e.g., going for a run) after a stressful event has occured in order to relieve their tension and anxiety. Even people who don't habitually exercise use this principle when they take a walk to clear the "cobwebs" or anxious feelings resulting from stressful situations. However, exercise can also be

used during a stressful event in order to make it easier and less anxiety-provoking for us to expose ourselves to what we fear.

We are going to take advantage of the capacity of exercise to relieve anxiety by having you simultaneously exercise and be exposed to stressful speech tapes. Thus, by using a combination of two anxiety-reducing procedures, namely, exposing you to public speaking imagery and having you exercise during this exposure, we hope to reduce you anxiety very quickly.

You will now be given instructions for today's session. The treatment you will be receiving is divided into three 20-minute sections. Each section consists of five minutes of resting in the chair followed by 15 minutes of imagining the tape-recorded speech scenes while cycling the bicycle ergometer. I will be helping you on and off the bike so that we don't disturb the electrodes.

The bike exercise which you will perform while imagining the scenes will consist of pedaling against a resistance or load which maintains your heart rate at a safe comfortable level. We'll now take a few minutes to determine what that load will be. In a short while you'll begin pedaling in time to the beat of a metronome. I'll gradually increase the load on the bike as you pedal. When your heart rate reaches the target level, you'll continue pedaling for two minutes to ensure that your heart rate stabilizes at this level. During these two minutes I may be making further adjustments. The load on the bike required to maintain the target heart rate at the end of the two minute trial period will be used as the load against which you will pedal during the three fifteen minute exercise-speech imagery periods of the session. Start pedaling (a metronome beats softly for four minutes on the tape)

(show S how to pedal; when S has the rhythm and E is satisfied with the load, show S how to keep the desired rate of pedaling by keeping the large line on the gauge at the front of the bike at the predetermined workload)

When you listen to the tapes describing the public speaking scenes, it is extremely important for you to take an involved rather than a passive role. If you just listen to the tapes in a passive manner, you will not benefit from them We are not asking you to believe that any of the scenes ever happened or ever could happen to you in exactly the way they are described. What we ARE asking is that you try to imagine the scenes as clearly and vividly as possible AS IF they are happening to you at the time you hear them. Try to experience all aspects of the scenes as they are described. Lose yourself in the scene as if you are an actor and try to experience all the emotions described. Don't fight any emotion or sensation. Just let it happen and experience it. Especially, experience the anxiety you would feel if you were actually in the situation. The more you are able to

feel the way you would in the actual situation, the better the treatment will work. However, don't worry if you are not able to imagine a particular item. There will be some items that will be more difficult for you to imagine than others. Simply go along with the tape to the next item and concentrate on imagining it as vividly as possible. The instructions on the tapes will guide you at all times. Try to listen to them as carefully as possible. Do you have any questions about the procedure?

Rationale-Instructions--Group 2 (No Exercise-Flooding)

The anxiety that you experience in the speech situation is something that you have learned in the course of your past experiences. This anxiety is unadaptive in the sense that the speech situation is not dangerous or threatening in reality. However, because of your past experiences, the fact is that you DO perceive the situation as threatening. Thus, you naturally react with fear and anxiety, as anyone normally does to a perceived threat. As you have probably found out, trying to intellectualize the problem away and convince your emotions that the situation is not really threatening simply doesn't work. So, let's start off by accepting that, for whatever reason, your speech anxiety exists in the here and now. We're not going to try to figure out the cause of this anxiety. Instead, we'll try to focus on directly reducing it.

Before we begin the actual treatment, I'd like to take a few minutes to tell you about the rationale behind the procedures that we will be using. I'll then describe these procedures in more detail so that you'll have a better idea of what you will be doing during the session.

The specific technique we will be using to reduce your speech anxiety involves listening to and imagining feared public speaking situations.

Let me describe how imagining anxiety-provoking public speech situations works to reduce anxiety. Let us suppose that in the course of learning to ride a horse you fell off. We'll assume that you were not injured but got slightly bruised and extremely frightened. You'd naturally be afraid to get back on the horse. But that's exactly what a good instructor would have you do. If you did NOT get back on the horse, your fear would increase and generalize to many aspects connected with the horse-riding situation. But, by forcing yourself to get back on the horse and be exposed to what you are afraid of, you can overcome your fear.

The procedure we will be using follows the same basic principle. You will be asked to imagine public speaking scenes which have been explicitly designed to evoke anxiety. By repeatedly exposing yourself to these scenes, your anxiety will be reduced or extinguished. You will, in effect, be unlearning previously learned fears through exposure in imagery. Thus, by using an anxiety-reducing procedure, namely, exposing you to public speaking imagery, we hope to reduce your anxiety very quickly.

You will now be given instructions for today's session. The treatment you will be receiving is divided into three 20-minute sections. Each section consists of five minutes of resting in the chair followed by 15 minutes of imagining the tape-recorded speech scenes while sitting on the bicycle ergometer. I will be helping you on and off the bike so that we don't disturb the electrodes.

Although you will be sitting on the bike during the taped imagery, you will not be pedaling it. The load or resistance on the bike has been set very high in order that you do not inadvertently begin pedaling during the imagery periods. Try it and you'll see how difficult it is to pedal...There are two reasons for having you sit on the bike during the imagery instead of in the chair. First, we have found in the past that we get a much clearer heart rate signal when a person is seated upright on the bike than when seated with their back pressed against the chair. There seems to be less interference with the recording. Secondly, sitting alternately on the bike and in the chair is much less tiring than staying in the same position for the entire session.

When you listen to the tapes describing the public speaking scenes, it is extremely important for you to take an involved rather than a passive role. If you just listen to the tapes in a passive manner, you will not benefit from them. We are not asking you to believe that any of the scenes ever happened or ever could happen to you in exactly the way they are described. What we ARE asking is that you try to imagine the scenes as clearly and vividly as possible AS IF they are happening to you at the time you hear them. Try to experience all aspects of the scenes as they are described. Lose yourself in the scene as if you are an actor and try to experience all the emotions described. Don't fight any emotion or sensation. Just let it happen and experience it. Especially, experience the anxiety you would feel if you were actually in the situation. The more you are able to feel the way you would in the actual situation, the better the treatment will work. However, don't worry if you are not able to imagine a particular item. There will be some items that will be more difficult for you to imagine than others. Simply go along with the tape to the next item and concentrate on imagining it as vividly as possible. The instructions on the tapes will guide you at all times. Try to listen to them as carefully as possible. Do you have any questions about the procedure?

Rationale-Instructions--Group 3 (Exercise-No Flooding)

The anxiety that you experience in the speech situation is something that you have learned in the course of your past experiences. This anxiety is unadaptive in the sense that the speech situation is not dangerous or threatening in reality. However, because of your past experiences, the fact is that you DO perceive the situation as threatening. Thus, you naturally react with fear and anxiety, as anyone normally does to a perceived threat. As you have probably found out, trying to intellectualize the problem away and convince your emotions that the situation is not really threatening simply doesn't work. So, let's start off by accepting that, for whatever reason, your speech anxiety exists in the here and now. We're not going to try to figure out the cause of this anxiety. Instead, we'll try to focus on directly reducing it.

Before we begin the actual treatment, I'd like to take a few minutes to tell you about the rationale behind the procedures that we will be using. I'll then describe these procedures in more detail so that you'll have a better idea of what you will be doing during the session.

The specific technique we will be using to reduce your speech anxiety employs two main procedures. One of these procedures is exercise on the bicycle ergometer. The other procedure is listening to and imagining scenes involving mild physical exercise. When used in combination, these two procedures can be very effective.

Let me explain how this works. Not only is it important that you become a better speaker, but also that you keep your arousal level down while speaking. A large part of the anxiety you experience while delivering a speech is physiological arousal, which includes, e.g., a racing heart and rapid breathing. Your awareness of this physiological arousal during a speech could lead to increased feelings of anxiety, which, in turn, cause further increases in physiological arousal. In this way, a spiral of escalating anxiety can rapidly build up. We will essentially be trying to break this spiral before it builds up by learning to associate feelings of physiological arousal with feelings of calmness rather than anxiety.

One of the procedures we will be using is physical exercise. The reason we chose exercise is that during exercise you produce physiological arousal similar to the arousal you experience when giving a speech. However, it's different because exercise tends to REDUCE anxiety. Many people make use of this procedure (e.g., going for a run) when feeling stressed in order to relieve tension and clear the "cobwebs" or anxious feelings. Thus, although physiological arousal will be high while exercising, your mind will be calm.

The second procedure we will be using to ensure low anxiety is listening to tapes describing scenes involving

mild physical exercise. You will be asked to imagine scenes which have been explicitly designed to induce a calm mental awareness. Thus, despite the fact that physiological arousal is high from exercising, the tapes will have a further calming effect.

By using a combination of two anxiety-reducing procedures, namely exercise and being exposed to relaxing tapes, you will gradually get used to being both physiologically aroused and mentally calm at the same time. Therefore, when you experience physiological arousal during your next speech, you will not be bothered by it, and it will not contribute to the spiral of escalating anxiety as it did before. This should help you feel much calmer while speaking. By having you simultaneously exercise and listen to the tapes we hope to reduce your anxiety very quickly.

You will now be given instructions for today's session. The treatment you will be receiving is divided into three 20-minute sections. Each section consists of five minutes of resting in the chair followed by 15 minutes of imagining the tape-recorded exercise scenes while cycling the bicycle ergometer. I will be helping you on and off the bike so that we don't disturb the electrodes.

The bike exercise which you will perform while imagining the taped scenes will consist of pedaling against a resistance or load which maintains your heart rate at a safe comfortable level. We'll now take a few minutes to determine what that load will be. In a short while you'll begin pedaling in time to the beat of a metronome. I'll gradually increase the load on the bike as you pedal. When your heart rate reaches the target level, You'll continue pedaling for two minutes to ensure that you heart rate stabilizes at this level. During these two minutes I may be making further adjustments. The load on the bike required to maintain the target heart rate at the end of this two minute trial period will be used as the load against which you will pedal during the three 15-minute exercise-imagery periods during the session. Start pedaling. (a metronome beats softly for four minutes on the tape)

(Show S how to pedal; when S has the rhythm and E is satisfied with the load, show S how to keep the desired rate of pedaling by keeping the large line on the gauge in front of the bike at the predetermined workload)

When you listen to the taped scenes describing mild exercise, it is extremely important for you to take an involved rather than a passive role. If you just listen to the tapes in a passive manner, you will not benefit from them. We are not asking you to believe that any of the scenes ever happened or ever could happen to you in exactly the way they are described. What we ARE asking is that you try to imagine the scenes as clearly and vividly as possible AS IF they are happening to you at the time you hear them. Try to experience all aspects of the scenes as they are

described. Lose yourself in the scene as if you are an actor and try to experience all the sensations described. Don't fight any sensation. Just let it happen and experience it. The more you are able to feel the way you would in the actual situation, the better the treatment will work. However, don't worry if you are not able to imagine a particular item. There will be some items that will be more difficult for you to imagine than others. Simply go along with the tape to the next item and concentrate on imagining it as vividly as possible. The instructions on the tapes will guide you at all times. Try to listen to them as carefully as possible. Do you have any questions about the procedure?

Rationale-Instructions--Group 4 (No Exercise-No Flooding)

The anxiety that you experience in the speech situation is something that you have learned in the course of your past experiences. This anxiety is unadaptive in the sense that the speech situation is not dangerous or threatening in reality. However, because of your past experiences, the fact is that you DO perceive the situation as threatening. Thus, you naturally react with fear and anxiety, as anyone normally does to a perceived threat. As you have probably found out, trying to intellectualize the problem away and convince your emotions that the situation is not really threatening simply doesn't work. So, let's start off by accepting that, for whatever reason, your speech anxiety exists in the here and now. We're not going to try to figure out the cause of this anxiety. Instead, we'll try to focus on directly reducing it.

Before we begin the actual treatment, I'd like to take a few minutes to tell you about the rationale behind the procedures that we will be using. I'll then describe these procedures in more detail so that you'll have a better idea of what you will be doing during the session.

The specific technique we will be using to reduce your speech anxiety involves listening to and imagining scenes involving mild physical exercise.

Let me describe how this works. Because you delivered your pretreatment test speech in this room, the room itself has now become associated with the anxiety-provoking situation. Thus, merely being in the room is sufficient to evoke a certain amount of anxiety. This is a common experience with speech-anxious individuals who are often required to give several oral presentations in a particular classroom or auditorium.

We'd like to completely reverse this situation by first working to get you totally relaxed in this room. In other words, we'll start off small. You'll gradually achieve command of the situation so that you can relax and control your anxiety here. This control of your anxiety will then generalize or extend to any speaking situation in this room. You'll first achieve a much more relaxed approach to giving a speech here. Once you are able to comfortably speak in this room, this relaxed approach to the speech situation will also generalize or extend to other speech situations beyond this room. Thus, speaking almost anywhere will be much easier for you. As you can see, the main idea is to build on your success.

During the procedure you will be asked to listen to and imagine taped scenes describing mild physical exercise. The descriptions of the light physical exercise in these scenes have been explicitly designed to induce calm mental awareness. This type of exercise uses the leg muscles to achieve a discharge of energy without appreciably increasing physiological arousal or fatigue. This can be very relaxing

and is often used to relieve tension. By repeatedly exposing yourself to these relaxing scenes, you will gradually become better able to control yourself while giving speeches. We thus hope to very quickly reduce the anxiety which you originally experienced in this room. You should then find yourself much more relaxed when you deliver future speeches.

You will now be given instructions for today's session. The treatment you will be receiving is divided into three 20-minute sections. Each section consists of five minutes of resting in the chair followed by 15 minutes of imagining the tape-recorded exercise scenes while sitting on the bicycle ergometer. I will be helping you on and off the bike so that we don't disturb the electrodes.

Although you will be sitting on the bike during the taped imagery, you will not be pedaling it. The load or resistance on the bike has been set very high in order that you do not inadvertently begin pedaling during the imagery period. There are two reasons for having you sit on the bike during the imagery. First, we have found in the past that we get a much clearer signal when a person is seated upright on the bike than when seated with their back pressed against the chair. There seems to be less interference with the electrodes. Secondly, sitting alternately on the bike and in the chair is much less tiring than staying in the same position for the entire session.

When you listen to the taped scenes describing mild exercise, it is extremely important for you to take an involved rather than a passive role. If you just listen to the tapes in a passive manner, you will not benefit from them. We are not asking you to believe that any of the scenes ever happened or ever could happen to you in exactly the way they are described. What we ARE asking is that you try to imagine the scenes as clearly and vividly as possible AS IF they are happening to you at the time you hear them. Try to experience all aspects of the scenes as they are described. Lose yourself in the scene as if you are an actor and try to experience all the sensations described. Don't fight any sensation. Just let it happen and experience it. The more you are able to feel the way you would in the actual situation, the better the treatment will work. However, don't worry if you are not able to imagine a particular item. There will be some items that will be more difficult for you to imagine than others. Simply go along with the tape to the next item and concentrate on imagining it as vividly as possible. The instructions on the tapes will guide you at all times. Try to listen to them as carefully as possible. Do you have any questions about the procedure?

Appendix F: Transcripts of Flooding Tapes

Flooding-Situation 1

Let's start off by setting the scene where you will soon give your speech. I want you to try to imagine or picture the class where you think you would have the most trouble giving a presentation, the class where you feel least sure of your knowledge of the subject matter, the class where you feel most insecure. Try and experience the feelings of being in this classroom, the extreme intelligence of some of the students, their general perceptiveness and broad knowledge of the subject matter. Choosing your own setting will make it easier for you to visualize the scene in a way that will be most meaningful to you.

Now, imagine that you're on your way to school. Today is the day that you have to give a speech and because of this speech you have been worried and on edge for the past week. The only saving grace to your dilemma is that you have made careful logical notes on a set of cards which you've arranged in order. Also, you've made these notes in outline form so that they'll be easy to see at a glance in case you forget what you want to say at any time. On your way to school a gnawing feeling of dread slowly creeps into your mind in addition to the anxiety you're already experiencing about the speech. What's bothering you? What are you thinking about? You can't identify it. You feel a tightness in your stomach like a dull knife and you have a slight headache. This dread seems to be enveloping you. It suddenly hits you. You can't seem to remember the main points of your talk. But you know it will all come back to you when you look at your notes. You take out your notes. This will be a good time to go over them and rehearse your speech in your mind. However, you find that there are quite a few points that you can't remember even if you look at your notes. You start to realize that the notes are not detailed enough. If you knew your topic well they would be, but you know now that you simply do not have a good grasp of your topic. There are too many gaps in your thinking just as there are too many gaps in this supposedly well made set of notes. Oh no. You suddenly come across two points that obviously contradict each other. How on earth did you ever not realize this when you were planning the speech? Is this ever going to mess things up. You think to yourself, "if I say it this way, then I can't say that." Which side of the issue will I present? You experience uneasiness and confusion. All along your way to school you can feel the anxiety building up inside you.

You rush into the building. The weather has been lousy and you're a few minutes late. You thought you'd have a few minutes to go to the washroom and relax a little before venturing into the class. You wanted to compose yourself so you'd appear cool and nonchalant about the speech. No one has to know how scared you really are. But instead here you are rushing up the escalator or stairs with your heart pounding away and totally out of breath. There goes your

whole cool image right down the drain.

You enter the classroom already feeling anxious from the rush to get there and from your realization of how poorly prepared you are. You look around. Take a good look at that room. Work on taking in every detail. Notice the students and their expressions. Try to focus clearly on the front of the classroom. Imagine how horrible it will feel standing up there in front of the class during your speech. You collapse in a seat. The instructor is a few minutes late. This gives you time to think about the situation. Two speakers have been scheduled. You each have to talk for 30 minutes. The format is informal in that people are allowed to question you and bring up issues during the speech. This absolutely terrifies you because you now know how hard it's going to be to keep yourself organized and on the right track. Any interruption is going to confuse you so badly--as if you're not already confused enough.

Now experience the anxiety, the dread you feel about having to give this awful speech. Let all your anxiety come up and feel it as strongly as you possibly can. The more you experience your anxiety, the more your anxiety will eventually be reduced. Let that anxiety come out, don't attempt to block it.

The instructor walks in, looks around, and calls someone's name. They answer present. Now your name is called. You answer present. What's going through your mind? That's right. You're second. Wouldn't you know it? Your luck. You were almost praying that you'd be the first speaker scheduled so that you could get it all over with. All you want to do right now is get the darn thing over with so you can get rid of this dark cloud of a speech that's been hanging over you for so long. You want to ask the instructor if it's possible for you to present first, but you're too anxious to speak. It looks like you're going to have to sweat out waiting for a whole half hour. The fact that you couldn't bring yourself to speak makes you even more upset.

You want to die. You want the floor to open up and swallow you. But there is no escape. You can't leave. There is too much at stake. Passing the course depends on giving this presentation..aside from the fact that by leaving you would make an utter fool of yourself. Experience the feeling of being trapped in this feared situation..You have to go through with it. You're in this room with all these people and you're shaking like a leaf. Your heart is racing so fast and thumping so hard that you feel it's going to jump out of your body. You're scared stiff. Focus on these sensations...Feel your heart beating, racing. Feel that general shakiness. Feel yourself starting to sweat. Feel your muscles tensing up and a lump developing in your throat. Keep focusing on these sensations, experiencing them as intensely as possible...You keep thinking to yourself. There's just no way I can do it, I just can't, I just can't go through with it. But you have to.

The first speaker starts speaking in a clear confident voice. You are far too nervous to concentrate on what's being said but you get the impression that this person really knows what they're talking about and is being well received by the audience. This is going to be a hard act to follow. As you sit in the audience waiting, waiting with dreaded anticipation for your turn, you try to remember some of your ideas. But you can't seem to think clearly. Throughout this 30 minute speech you keep thinking ahead about your own speech, about standing at the blackboard completely disorganized with all eyes on you, watching you. You experience a sinking feeling in your stomach as the full horrible impact of the situation hits you: Your notes will just never get you through this in one piece.

The fist speech is over. The instructor is introducing you and asking you to come over to the blackboard area. You feel yourself walking mechanically and stiffly to the front of the class. Your whole body feels strained and rigid. Try and experience this rigidity, this tension as you make your way to where you'll be fully exposed and unprotected. You feel like you can barely make it. The distance seems to grow as you walk. Do you ever feel embarrassed. You must really look foolish. And you wanted to look so assured. Feel this embarrassment, concentrate on it. Here you are, walking like a tin soldier up to the blackboard. Everybody knows how scared you are. They can all see how pale and strained your face is and how stiff your body is. Experience your fear, your shakiness, your growing panic. Force yourself to stick with the image. Feel the embarrassment that they all know you're scared. You feel that they're all seeing you for what you really are--a total nervous wreck.

You look out at the audience. All eyes are looking up at you with interest and expectation. They expect you to perform well like the first speaker. They expect to learn something from you. This seems to have the effect of putting more pressure on you. You're afraid how you'll react up here at the blackboard all exposed. You worry that the audience will see how anxious and disorganized you are. You worry that the lump in your throat will prevent you from being able to speak up. You worry tht your shaking hands will prevent you from writing any legible notes on the blackboard. Concentrate on experiencing this anxiety just before you begin to speak. Experience it as intensely as possible. Think of how horrible it will be if you perform poorly.

You experience a feeling of total blankness as you desperately try to begin your speech. It feels as if your mind has completely stopped working. Slowly, some hazy thoughts come back to you. Your voice quivers as you start to speak. You try to organize yourself, but your thoughts are confused and jumbled. You look down at your notes but they are too sketchy to fill in the gaps in your thinking. You realize that you cannot possibly be coming across clearly. The instructor interjects and asks you to clarify your last point...Your last point? You again experience a

complete block. The silent seconds seem like an eternity. You can't even remember what your last point was. And even if you could, your thoughts are too disorganized to explain anything properly now. You stand there completely unable to answer, feeling waves of panic rush over you.

You look up. The audience is silently looking at you, waiting. You can't read anything from that blank wall of faces. Look at them. What are they thinking? Those empty blank stares. What's going through their minds?

You try to explain that you were relying totally on your notes which unfortunately are a bit too sketchy to help you in illustrating the point. You apologize for being unable to answer. You look at the faces, the eyes. Nobody seems particularly impressed by your apology. This obvious lack of support from the audience makes you feel increasingly uncomfortable. And this is only the beginning of your speech. You'll have to sweat out many more explanations before you're done. You don't know how you'll be able to stand it. You keep saying to yourself, I just can't go on, I just can't. But you force yourself to keep going.

Now you go back to your notes to try to illustrate the next point in a clearer fashion. But the point doesn't really seem to fit anymore. You try to communicate what you mean by adding another example, but you can't seem to do it effectively. You look at the faces of the audience. You're not coming across at all. They know that you're totally disorganized and incapable of explaining anything properly.

Concentrate on keeping yourself in the situation. Stay with the image. Force yourself to look at that audience. They're all looking at you in total silence. You feel like they're almost glaring at you now. It seems that they don't like you. You sense rejection and disapproval in those eyes. Experience this rejection. Let yourself feel totally rejected, totally alone amidst this sea of glaring faces. So far nobody says anything--But you can see several individuals giving each other those knowing looks. You know deep down what those looks are saying. They're saying, Oh boy, I need this? Why should I have to tolerate this nonsense, this person who can't even organize and present their own topic in a reasonable way. You feel like you've wasted their time and that they're angry at you. Don't avoid their expressions of disapproval. Absorb it all and feel threatened, alone, and humiliated.

You clear your throat. What's the matter? You seem to be loosing your voice. It's barely audible. Everyone is straining forward in their seats to hear you. Your heart is racing and thumping in your chest. You moisten your lips and try to get back on track again and again but you're not succeeding. You're not thinking clearly. The audience senses your uncertainty and hesitation. The class brains keep interrupting you over and over again with their own examples and ideas which keep taking you further off track and totally frustrate you.

You panic as you look at the clock. There are only three minutes left and you've only covered half your material. You wish you could shut these people up so you could at least tie the whole mess together and make some sense of it. You hear chairs being moved around, people generally becoming restless, even whispering among themselves. You feel that they're angry at you for not being able to take the situation in hand. But, lacking control over both the audience and yourself, you just stand there unable to stop the interruptions.

Finally, it's all over. As everyone is getting organized to leave, one of the most intelligent members of the class comes over to you and comments with genuine appreciation: "I found your third point extremely interesting. Although you were having a bit of trouble expressing yourself, the essence of what you were saying really made sense. I wonder if you'd be able to give me some of your references concerning that particular point as I'd like to follow it up for my talk." This comment, expressed so sincerely, makes you feel somewhat better.

As you leave the classroom, you experience more relief. You're starting to have a good feeling about yourself. You've survived. Even though everything in you wanted to avoid giving this speech and you actually felt like running out of the place at times, you didn't. Instead you tried your best and stuck it out. You really feel good that you didn't avoid the situation and hung in ther when the going was so rough. You just know that it will be easier next time.

Flooding--Situation 2

Let's start off by setting the scene where you will soon give your speech. I want you to try to imagine or picture the class where you think you would have the most trouble giving a presentation, the class where you feel most uncomfortable. Try and experience the feelings of being in this classroom, the negative attitude of several individuals, the deliberately challenging way they have of questioning the instructor and being generally disagreeable. Choosing you own setting will make it easier for you to visualize the scene in a way that will be most meaningful to you.

Now imagine that it's morning and you've just woken up. Something's wrong. You don't feel at all refreshed. An uneasy feeling pervades you. What's the matter?...Of course. The day you've dreaded has finally arrived. SPEECH DAY. You've been worrying and worrying about this speech all week. Feel the heaviness of your whole body. Your arms and legs feel like lead. You don't want to get out of bed this morning. You don't want to give the speech that you're expected to give today. You wish you could push a magic button that would somehow make this wretched day disappear so that right now would actually be tomorrow morning and the speech would be behind you. But you can't. You think about phoning in sick. But this speech is important to you. You simply cannot pass the course without giving this presentation. Force yourself to get out of bed. You can't avoid the situation. You must give the speech today. You look at the clock. It's late. How are you ever going to get there on time? The rush is on. No time for breakfast...as if you can eat anyway with that knot and nervous feeling in your stomach. The review you had planned is simply out of the question. You rush to get washed and dressed and out of the house. This combination of having to hurry and the speech looming on the horizon has managed to produce a tightness in your neck and head in addition to the knot that's there in your stomach. You feel tense and strained all over. Try and experience this rushing around, this mental and physical strain, this tension. You rush out of the house and head for school. All along the way you can feel the anxiety building up inside you.

You rush into the building five minutes late. You've sure done it all right. You were counting on a few minutes to relax and unwind so you'd walk into the class looking really cool. It's especially important to you that no one know how scared you are. Look at yourself now. Racing breathlessly up the escalator or stairs with your heart pounding away. You've blown the whole cool image you wanted to project. How can you possibly walk in looking cool when you can't even catch your breath from rushing?

You enter the classroom already feeling anxious from the rush to get there. You look around. Take a good look at that room. Notice the seats occupied by your classmates. Try to focus clearly on the front of the classroom. Imagine how

horrible it will feel standing up there in front of the class, especially during the question period. You collapse in a seat. The instructor is late. This gives you a few moments to think about the situation. Two speakers have been scheduled. You each have to talk for 20 minutes and then answer questions for the next 10 minutes. What you really dread is this question period. The very thought of it terrifies you. You've prepared and planned your speech as much as possible. You know it cold. But you can't plan for the questions. You're basically at the mercy of the audience, at the mercy of the surprise questions they could throw at you.

Now experience the anxiety, the dread you feel about the question period. Let all your anxiety come up and feel it as strongly as you possibly can. The more you experience your anxiety, the more your anxiety will eventually be reduced. Let that anxiety come out, don't attempt to block it.

The instructor walks in, looks around, and calls the first speaker's name...NO ANSWER..Now your name. You answer "present". What's going through your mind? That's right. YOU'RE THE ONLY ONE. Your luck, the other speaker hasn't shown up. The instructor makes an announcement "It looks like we're only going to have one speaker today. In a way this is kind of good. Let's make the most of it. This way there will be much more time for the question period following your talk." DO YOU KNOW WHAT THIS MEANS? A 40 minute rather than a 10 minute question period. You want to plead that there's no way you can pull off having questions fired at you for 40 minutes. But you're so anxious now that you can't even bring yourself to speak up.

You never should have gotten out of bed. Oh for that magic button to make this mess disappear. But there is no escape. You can't leave. There is too much at stake. This presentation is a course requirement. Besides, if you left now you'd lose the complete respect of your classmates. Experience the feeling of being trapped in this feared situation. You have to go through with it. Everyone is watching you literally shaking in your boots. Your heart is racing so fast and thumping so hard that you feel it's going to jump out of your skin. You're scared stiff. Focus on these sensations...Feel your heart beating, racing. Feel that general shakiness. Feel yourself starting to sweat. Feel your muscles tensing up and a lump developing in your throat. Keep focusing on these sensations, experiencing them as intensely as possible...You keep thinking to yourself. There's just no way I can do it, I just can't, I just can't go through with it. But you have to.

You experience a mechanical feeling as you walk up to the front of the class. You force yourself to look at the audience. All eyes are looking up at you. You give your speech in robot fashion, hiding as much of yourself as possible behind the desk or podium. You've memorized your speech; you know it cold. But what keeps going through your mind throughout this whole 20 minute speech period? You just

keep thinking ahead about the question period, about this overhanging black cloud of a 40 minute question period. That sure is a long time. You worry about the questions that will soon be thrown at you, whether you'll be able to answer them or not. Feel this worry, this dread about the question period. With a sinking feeling in your stomach, you just know that the question period will finish you off.

The actual speech is over. The question period begins. The instructor asks you to move over to the blackboard area so that everybody can see you. You wish you could stay where you were, half hidden by the furniture. Now you will be fully exposed and unprotected. You try to move but your knees are shaking. You stumble and trip over your own feet. You almost fall and then you recover your balance. Do you ever feel embarrassed. You really feel like a fool. And you wanted to look so cool. Feel this embarrassment, concentrate on it. Here you are stumbling up to the blackboard. Everybody knows you're scared. Everybody saw you stumble. They all see that you hands are shaking. Experience your fear, your shakiness, your growing panic. Force yourself to stick with the image. Feel the embarrassment that everybody knows how scared you are. You feel that they're all seeing you for what you really are--a pack of raw nerves.

With great apprehension you look out at the audience. All eyes are looking up at you, most with interest and expectation--but some have a look of challenge in them. On the basis of your speech which you feel wasn't bad, they expect you to be able to handle any question. This seems to have the effect of putting even more pressure on you You're afraid how you'll react when attacked or criticized. You worry that the audience will see how anxious you are, how little you know. You worry that they will ask questions that you can't answer, that you never even thought of. Concentrate on experiencing this anxiety just before the questions start. Experience it as intensely as you can. Think of all the frightening consequences of performing poorly.

The questions start. Wouldn't you know it? The first question is from the class smart alec. Just what you need now. The smart alec informs everyone that others have taken an entirely opposite approach to the issue you're presenting and rattles off names of writers like a dictionary. This person is out to impress everyone--at your expense. The smart alec asks you to explain your interpretation of the topic in view of these opposite approaches. You stand there dumbfounded. You can't think of a single thing to say. You've approached this rather complex topic from only one point of view without considering the others. You haven't even heard of these other writers. You stand there feeling your embarrassment rise, as your anxiety grows.

You look up. The audience is silently looking at you, waiting. You can't read anything from that blank wall of faces. Look at them. What are they thinking? Those empty blank stares. What's going through their minds?

You try to explain that your talk was only concerned with one aspect of this larger issue. You haven't considered other viewpoints and you're sorry you can't adequately answer. You look at the faces, the eyes. Nobody seems particularly impressed by your admission. This seeming lack of support from the audience makes you feel increasingly uneasy. And this is only the first question. You'll have to answer many more questions before you're done. You don't know how you'll be able to stand it. You keep saying to yourself, I just can't go on, I just can't.

Now the next person is in the process of telling you that you have overlooked some important aspects in your talk and in fact have dealt with many irrelevant aspects. As this goes on and on, and you're unable to answer many of the questions, you look at the faces of the audience. You're not coming across effectively. They probably think that you don't know what you're talking about.

Concentrate of keeping yourself in the situation. Stay with the image. Force yourself to look at that audience. They're all looking at you in total silence. You feel like they're almost glaring at you now. It seems that they don't like you. You sense rejection and disapproval in those eyes. Experience this rejection. Let yourself feel totally rejected, totally alone amidst this sea of glaring faces. So far nobody says anything. But you can see several individuals giving each other those knowing looks. You know deep down what those looks are saying. They're saying, Oh boy, I need this? I came in especially for this junk, this person who can't even answer questions about the topic they chose themselves. You feel like you've wasted their time and that they're angry at you. Don't avoid their expressions of disapproval. Absorb it all and feel threatened, humiliated, and alone.

You try to speak. What's wrong? Your speech falters, your voice shakes, and your heart is racing and thumping in your chest. The questions keep coming at you relentlessly. Now you're almost is a daze as the words filter into your mind. Then the next individual declares "You have told us nothing new in your talk today. I thought the whole idea of having these presentaions was to open up new avenues of throught, of awareness, and I don't feel you have succeeded in doing this."

You can't even answer this one. You never expected anything like this. Your voice has left you totally stranded. You hear rustling of papers, people generally becoming restless. Some of them even seem to be snickering among themselves. You feel that they're all against you, angry at you for wasting their time. You feel like you've lost control of both the audience and yourself. You're standing there in full view feeling completely exposed with no means of escape.

Mercifully it ends. As everyone is gathering up their books, one of your classmates that you've always respected comes over to you and says with genuine warmth "You know, you really simplified and clarified what to me has always

been a very complicated area. By the way, I admire how you handled yourself during that rather unfair question period. It really took a lot of dignity to not answer some of those sarcastic questions with similar sarcasm." This comment seems to lift a great weight from your shoulders. You leave the classroom and begin to experience relief. You're feeling kind of good about yourself. You've survived. Even though earlier you felt like staying home or quitting in the middle, you didn't. Instead you went through with it and gave it your best shot. You really feel good that you didn't avoid the situation and that you accomplished something that was so difficult for you. You just know it will be easier next time.

Appendix G: Transcripts of Neutral Tapes

Neutral Scenes-Situation 1

Imagine that it's morning and you've just woken up. Yesterday was the last day of the winter school term. Nature helped celebrate by unleashing a blizzard which blanketed the city. Last night, while you were watching the snow fall from the comfort of your home, you heard the forecaster predicting that today would be beautiful--sunny and warm. It had occurred to you then that it might be a good idea to go for a walk in the morning. You get out of bed, draw the curtains, and look out the window. The snow storm is over, and the sun is shining brightly on the clean white snow. Tufts of cotton candy-like snow, glittering with fiery pink and blue crystals, cling to the branches of the trees. You can see a few puffy white clouds drifting aimlessly along in the clear blue sky.

You've been studying hard for the past few weeks. Now, after a 12-hour sleep, the thought of going for a walk with no particular destination in mind seems very appealing to freshen your body and spirit. After getting dressed and eating a hearty breakfast, you venture out into the cool crisp air. The sidewalks are full of snow, so you walk in the middle of the road which has just been cleared by the plow up ahead. The sun is so dazzling on the white snow that you almost have to squint. It warms the icicles which decorate the roof edges, causing them to drip like rows of leaky faucets. You soon pass under the snow laden branches of a large tree. The air is much cooler here in the shade of the tree but feels warmer again when you get back into the open. Just then, the snow of the tree is shaken up a bit by a gentle breeze, which sprays a fine swirling mist about, momentarily tingling your cheeks and nose. You brush the light dusting of snow off your face and clothes and continue on.

You soon pass a funny-looking snowman. Two children wearing bright red snowsuits are now in the process of admiring this newly-finished creation. The snowman certainly isn't unusual in terms of his main parts. He consists of the same two large spheres of snow, the smaller one being the head, as do countless other snowmen. However, in addition to the typical carrot nose, this snowman boasts two tangerine eyes held in place by wooden cooking skewers and a banana mouth similarly speared. He's also been dressed for the weather in an incongruous mixture of a navy blue woolen scarf and a baseball cap. Thoughtful kids didn't want him to be cold. You can't help but admire their magnificent serene collie tied to a nearby tree. It's obvious that someone spends alot of time brushing that silky golden brown fur. You stop and tell the children that you like both their snowman and their dog. Their eyes shine with pride and delight. They quickly inform you that the dog's name is Princess and that she is their sister and that she does tricks and that she is very friendly and very very smart.

"Isn't she friendly?" they ask the postman trudging his way through the snow on the walkway. "You betcha" he agrees. "This is the only dog on the street that licks me instead of barking me down."

After saying goodby to the children, you pass on as the snowman starts melting. You gradually start to pick up your pace a bit. As you walk along the silent street, you listen to the squishy crunch of fresh snow under your boots. After several minutes, you become aware of your body's movements. You begin to realize that walking is such a completely natural exercise that it imposes no physical or mental strain and requires no conscious effort. Not that you haven't done plenty of walking before. But it's usually been the necessary sort of walking that takes you from point A to point B, rather than the freewheeling kind of walking you're doing today-sort of a combination of exercise and sightseeing. Feel your leg muscles tense and relax as you walk along at a brisk rhythmic pace. All your muscles feel like they're moving in one beautifully synchronized rhythm.

You turn the corner onto a street with a bit more activity on it. The snow here is no longer pure white as it was on the street from which you just emerged. You see the odd person walking their dog or doing errands. You soon come upon the corner grocery store--one member of a hardy species which refuses to be blotted out by the larger and considerably less expensive supermarkets. The "Free Delivery" and "Cold Beer" signs hanging in the window are probably two very good reasons for any corner grocery store's amazing ability to survive. As you open the door, a little bell announces your arrival. Amidst the clutter, you manage to find the small item that you need. After you pay for your purchase, you say goodbye to the owner and go back out into the sunshine.

You continue walking until you arrive at an intersection. While you're waiting for the light to turn green, a large expensive burgundy motorcycle pulls up beside you. You unexpectedly catch a glimpse of yourself in one of the two mirrors extending from either side of this shiny purring machine. You're pleased to observe that your face looks healthy and aglow with color and that your eyes are bright and alert. The driver of the cycle looks like he's just stepped out from the fashion page of the city newspaper. He's wearing a beige jumpsuit, accented with burgundy trim and coated with a plastic finish to keep out snow and rain. As soon as the light changes to green, he pulls his goggles down over his eyes, turns the corner, and roars off down the street. You cross the intersection and continue walking.

As you walk along at a nice rhythmic pace, you think about how really great it is to be walking around outdoors after so many days of staying inside studying. You don't know why, but for some reason, cool air feels so much fresher and cleaner when the sun is shining. Imagine that you're breathing in this fresh invigorating air. Think of it expanding your lungs and giving life to your whole body.

You soon come upon a young schoolteacher, diligently trying to gather her little troop together so that they can proceed with some semblance of decorum. The children, however, have other plans in mind. Their voices fill the air. One of them calls out, "Everybody look at me. I'm a dragon. Look at all the smoke coming out of my mouth." After sucking in as much air as possible, he blows it all out for everyone to admire. The teacher tells him to stop acting silly, and that it's just his warm breath hitting the cold air. Big mistake. She suddenly has eight more little dragons to contend with, all huffing and puffing into the air. They start chanting over and over in unison, "Look at Miss Smith. She's a dragon. She's a great big dragon." All the children are howling with laughter. Luckily for her, Miss Smith soon joins in. Several minutes later, everyone's happy, the children have gotten tired of being dragons, and they proceed calmly down the street.

You soon smell the delicious aroma of freshly brewed coffee and realize that you're getting a bit hungry. Now might be a good time to rest a while and have a little snack. You enter the little coffe house and sit down beside the window. You order a cafe au lait and a pastry. The first thing you notice is how quiet it is in here today. The snowstorm has really kept people off the streets. As you sit there, you notice an elderly gentleman wearing extremely odd-looking boots. He observes you observing his boots and immediately comes over and introduces himself with a hearty handshake. Without waiting to be asked, he sits down beside you and explains that his boots have been custom-made expressly so that his 80-year old feet can do four miles of city-walking a day without getting tired.

You leave the coffee house together. You have just met a genuine avid walker. He is overjoyed to learn that you have decided to do some city walking today. He informs you that he very rarely travels by car or bus. Even in the worst weather, he walks almost everywhere, encorporating errands into his daily four-mile ritual. He claims, as do others, that the best way to really get to feel the pulse of a city is to walk it. You are exposed to several more minutes of philosophizing about the boundless benefits of walking. "After all", he concludes, "as Emerson so beautifully put it, "'Tis the best of humanity that comes out to walk."" After bidding you good day, he goes off in another direction.

You turn onto a residential street. The snow removal crew have arrived and are busily working. It occurs to you that people in the high rises must view this whole procession as a great big set of tonka toys. First, the big yellow snowplow passes, throwing the snow into great piles on the side of the street and blocking the driveways that have just been shoveled. A few seconds later, an adorable little tractor gismo with attached blade scoots along the sidewalk and does the same thing there. The snowblower's job is to get rid of this long ridge of snow now separating the cleared sidewalk and street. A man is walking backwards a

few yards in front of the snowblower as is required by law. You recognize him as the man who sweeps out the district's chimneys in the early fall. The people on this street are in for a nice surprize. Instead of having the snow blown back onto their lawns, contaminating white with grey, the snowblower dumps the whole works into a gigantic truck which slowly travels along beside it. Just as the truck looks like it can hold no more snow, it moves on and another one takes its place. This is quite an organized operation.

The snow is of the moist sticky variety that makes excellent snowmen and snowballs. You bend down and scoop up a large handful of this wonderful wet modeling clay and shape it into a ball. It's been a long time since you threw a snowball. You send it off toward the sky and watch it crash-land in the shrubbery a couple of buildings away. By the time you reach the landing sight, it no longer exists. But the bushes, covered with icicles and snow, appear to be gleaming with hundreds of tiny rainbows. Feel the sun warming your face. For a moment you just stand there with your face turned up to the sun and your eyes closed soaking in this warmth so welcome during the winter season. The snow has adorned the street with a carpet of sparkling white and has softened the silhouettes of the tree branches previously so bare and sharply outlined.

As you walk along, a faint rustling sound causes you to glance up. Sure enough, a squirrel is travelling along the wire above you at a considerably faster pace than you're doing. It soon stops this agile tightrope act and effortlessly leaps into a nearby tree. After losing sight of it for a few seconds, you see it scampering to the ends of the tree's snow-laced branches. Its destination is an airconditioner protruding from a second-story window. The bushy-tailed squirrel starts playing a game of repeatedly jumping from the tree to the top of this airconditioner, and from there apparently into part of the window itself. As you approach the building, you take a closer look at this window. It appears that whoever installed the airconditioner left a recessed area, sealed from the inside, between the airconditioner and the outer edge of the window. The squirrel seems to have made a little lodging for itself in this area. After a minute or so, you hear someone banging on the window from inside the house, sending the squirrel right back into the tree, down to the ground, and off towards the back of the building.

As you head back home, you begin thinking...You've been hearing so much lately about how different sorts of meditation and sports help relieve people's tension and generally make them feel better. The kind of walking you've been doing today seems to have had a similar effect. You feel quite relaxed and yet alert-not tired at all. Somehow, the rhythmic exercise, the invigorating fresh air, and the freedom to walk wherever you felt like have combined to help refreshen both your body and spirit. You're also feeling kind of good about yourself. Even though it was tempting to just lounge around the house doing nothing except watching

television all day, you didn't. Instead, you got out of the house and went walking in the fresh wholesome outdoors. You would soon like to do this again.

Neutral Scenes-Situation 2

Imagine that it's morning and you've just woken up. It's the beginning of August and you have a whole day to do whatever you please. Last night, on your way home, the sunset had been a magnificent display of pinks and reds, promising beautiful weather today. It had occurred to you then, after watching several suntanned cyclists pass by, that it might be fun to go for a bicycle ride in the morning. You get out of bed and open the curtains. The sun streams into the room, flooding it with light. The air, however, is heavy and hot without even a hint of a breeze coming in through the open windows. You decide that today would be an ideal time to get out of the city and take a leisurely bike ride in the countryside.

You know some people with a station wagon who are going up north for the day. They've previously offered you lifts many times and you now decide to take them up on it. You arrange to meet them on the outskirts of the city. You'll ride with them to a point about 10 miles before their cottage, tour around on your bike, and then arrive at their cottage for a lift home. You get dressed, have something to eat, and go down to the garage to check out your bike. Everything seems to be in order. You gather together a few supplies such as a plastic bottle of water that attaches to your bike, a stick of 6-12 to ward off bugs, and a couple of sandwiches. After going through a bit of city traffic, you coast on, weaving your way through a series of narrow residential streets until you arrive at the arranged meeting place. Your lift arrives and you load your bike into the wagon. Before you know it, you're up north and riding your bike through the rolling countryside.

You decide to stick to the highway until you reach a tourist center. Since you want to explore the more picturesque back roads, you think it would be a good idea to have a map of the area so that you can know where you are in relation to the main road and your friends' cottage. After cycling along the side of the highway for 10 minutes, you come to a small wooden tourist center and obtain an excellent map showing both main and subsidiary roads of the local region. You tuck it away in your pocket, get on your bike, and turn off onto a rustic smaller road which seems to go in the same general direction as the main highway. You slow down as you pass two open-air stands facing each other on opposite sides of the road. The one on your left sells the typical roadside fare such as hotdogs, french fries, and soft drinks. The right hand stand, on the other hand, offers a colorful assortment of healthy fresh fruits and vegetables. Both stands are equally busy with several customers waiting to be served.

As you're leisurely cycling along enjoying the scenery, you suddenly see a solid mass of bicycles pedaling full speed head-on. You listen to your common sense which tells you to get yourself and your bike over to the other side

of the road. One of the troop bursts into some local song and the rest join in, all singing at the top of their lungs. As they come closer, you notice that this appears to be an extremely physically fit group of young men and women with lean suntanned bodies and powerful-looking leg muscles. They're also very polite. As they pass you by, they slow down and say hello, nodding their approval at your diligent effort at solitary cycling. They then take off like a shot, becoming specks in the distance.

Influenced by these superb cyclists, you gradually start to pick up a little speed. As you cycle along a very flat and quiet section of road, you feel a wonderful sense of freedom--freedom not only from the city but also from your cares and worries. It's almost as if the gentle wind created by your own movement is blowing them away. You're also becoming aware of your body's position and movements. You feel the gentle pressure of your hands against the handlebars and your feet against the pedals. You begin to really appreciate this experience of pedaling yourself on an amazingly efficient and simple machine. The rhythmic movement of your whole body as you travel under your own power is extremely satisfying. Feel your leg muscles tense and relax as you pedal along at a brisk pace. Listen to the even click of the pedals accompanying your steady rhythmic leg movements.

As you approach a more populated area, you hear the tinkle of the bell on the ice cream man's wagon. It's a bright melodious sound soaring over the background hum of a lawnmower. A woman and two children are in the process of deciding what to select from the assortment of ice creme cones, bars, and sundaes. As you cycle on, the ice cream bell fades off in the distance behind you. You soon arrive at a tiny village consisting of a main street with several smaller side streets. As you turn off on one of these sidestreets, you smell the aroma of freshly baked bread. You follow your nose to a small bakery and go inside. In the back are a few tables where a small family is being served coffee and hot chocolate accompanied by an assortment of rolls and pastry. You buy a croissant and go off on your way.

Down the road you stop at a small grocery store to get a drink. Leaning against the balcony, several shabbily dressed teenagers are happily drinking Cokes and munching potato chips. They admire your bike. You admire their dog. Your leave your bike propped against the balcony and go inside. A few people are buying provisions, reading the notices on the bulletin board, and having animated conversations with the short weather-beaten old woman behind the counter. After buying an ice-cold Coke, you go back out and sit on one of the old rickety chairs lined up against the building. As you sit there lazily sipping your Coke, you hear gravel being crunched under tires as an old car pants to a halt in front of the store. A deeply tanned middle-aged man hops out, slamming the door behind him. He bounds into the grocery store, emerges a minute later with a pack of

cigarettes, and introduces himself to you with a warm smile and a hearty handshake. He informs you that he is the main caretaker of a lake in the vicinity. During the winter he looks after the empty summer cottages to ensure that pipes don't freeze, roofs don't collapse under the weight of the snow, and skunks don't hibernate under sofas. From the end of June until Labour Day, he generally builds whatever the summer people want built and fixes whatever gets broken. After saying goodbye to you, he gets back into his car and roars off, leaving a cloud of dust hanging in the air.

You stand up and stretch. After returning the empty Coke bottle, you get your bike and venture on. You're now pedaling along at a nice slow pace. Imagine yourself breathing in the fresh fragrant country air. Let it give life to your whole body. You're becoming aware of a very light sweat on your arms and legs. The breeze blowing against this sweat makes you feel wonderfully cool and refreshed.

After a while, you arrive at a fork in the road and can't decide which way to go. The two branches seem to meander over the countryside and disappear in opposite directions. Although you intended to keep away from main roads, you don't want to stray too far from civilization. Your map is of no help since neither road is marked on it. As you stand there just about to flip a coin, you see a motorcycle approaching you in the distance. Before he has a chance to verve off on one of the branches, you flag down the driver, causing him to skid to an obligatory halt. He informs you that the right road, after initially twisting and turning a bit, stays pretty close to the main road, while the left one eventually becomes a dead-end dirt road ending deep in the brush. After thanking him for his help, you take the right road while he roars off down the left.

As you pedal on, you hear the sound of motor boats, suggesting that you are near a lake. You get off your bike and stand gazing down on a pretty picture-postcard lake set against the majestic backdrop of a Laurentian forest. Most of the houses on this lake look immaculately kept. Flowers bloom everywhere both on the ground and in the many baskets suspended from the porch tops. Some of the properties have stone walls along the shoreline to prevent erosion of the land. As you scan this shoreline, your attention is riveted to an interesting point of land which juts out into the water. Set back amidst the towering birch and pine trees on this point of land stands a pretty white and blue house. Except for a small beach, the 300 or so yards of shoreline bordering this property have been left with the natural green brush that nature has supplied. You watch as a woman pushes off from the shore of this point in a beautiful old Indian canoe. She skillfully maneuvers it over to the next property and chats for a couple of minutes with a man in the process of fixing his shiny red and white seaplane. Looking out toward the middle of the lake, you can see three sailboats skimming the water like giant sea-birds while two noisy motorboats speed up and down the lake towing

waterskiers.

You get back on your bike and start touring around this little jewel of a lake. You soon spy a wooded path leading to a clearing a little ways in from the road. This looks like a good place to relax and eat your sandwiches. The path, which is almost completely tunneled with the branches of the surrounding trees, follows a sparkling little stream. As you bend down to dip your fingers into this stream, a little rabbit progresses in great big bounces past you and disappears into the woods. Leaves and twigs crackle underfoot as you wheel your bike along the path into the lush green grass of the clearing. You make yourself comfortable under the high spreading boughs of a gigantic birch tree. The sun breaks through the spaces between the leaves, shining down on the ground in lacy patterns. Just enough sun reaches you to make you feel comfortably warm. As you relax and eat your sandwiches, you marvel at how the fresh country air causes even mundane sandwiches to become a virtual feast. After relaxing a bit longer, you brush yourself off and resume your journey.

After traveling for about a mile, you slow down to a stop as you notice a small group of people walking beside the road. The group consists of an old man and woman accompanied by two small children. You can't help but notice the odd-looking contraption made out of mosquito netting which completely encases the old woman's face, head, and neck. The other members of this party wear closely-woven straw hats pulled well down over their faces. They carry an assortment of pots and other containers. The old man notices your puzzled expression and informs you that they're going blueberry picking. He asks if you'd like to see the berry patches and perhaps spend a few minutes picking before heading on your way. The idea really appeals to you.

You leave your bike in the bushes beside the road and follow a path leading to unbelievable blueberry fields. Large ripe blueberries weigh down the bushes and sparkle like saphires as the sunlight hits their dewey surface. One of the children gives you a styrofoam cup and you pick a few berries. They taste sweet and delicious. You ask the old man if this magnificent mountain is private propery, only to discover that he owns it and that everyone is welcome to pick there. You also learn that each August, many of the women in the area routinely make enough blueberry jam to last all year long. In addition, they freeze the berries whole for baking cakes, pies, and muffins over the winter months. After picking and eating a few more berries, you say goodbye to the little group and follow the path back to your bike.

You take out your map. You're now only a half a mile away from the cottage where your lift awaits you and you have plenty of time to spare. As you leisurely pedal along you begin thinking. You've been reading so much lately about how aerobic sports such as running, swimming, and cycling help remove worry and tension and make people feel better. The cycling you've been doing today seems to have had just

that effect. You feel quite calm and yet alert. Because you've combined your cycling with frequent stops along the way, both your body and mind feel refreshed rather than tired. You're also feeling quite good about yourself. Even though the steamy heat in the city made you feel like doing absolutely nothing all day, you got yourself out into the fresh invigorating country air. You'd like to do this again some time in the near future.

Appendix H: MANOVA and ANOVA Summary Tables for Pretest Measures.

Measure	Effect	df	SS	F	p
Baseline AT	Flooding	1	.41	.23	N.S.
	Exercise	1	.96	.53	N.S.
	Sex	1	.66	.36	N.S.
	F x E	1	.80	.44	N.S.
	F x S	1	1.33	.73	N.S.
	E x S	1	4.04	2.21	N.S.
	F x E x S	1	.80	.44	N.S.
	Error	44	80.38		
Preparation AT	Flooding	1	.30	.16	N.S.
	Exercise	1	.04	.02	N.S.
	Sex	1	.80	.43	N.S.
	F x E	1	3.07	1.63	N.S.
	F x S	1	.00	.00	N.S.
	E x S	1	.66	.35	N.S.
	F x E x S	1	1.54	.82	N.S.
	Error	44	83.14		
Speech AT	Flooding	1	.18	.07	N.S.
	Exercise	1	.80	.29	N.S.
	Sex	1	1.33	.49	N.S.
	F x E	1	7.04	2.56	N.S.
	F x S	1	2.64	.96	N.S.
	E x S	1	7.26	2.64	N.S.
	F x E x S	1	4.57	1.66	N.S.
	Error	44	121.09		
Recovery AT	Flooding	1	.49	.34	N.S.
	Exercise	1	.20	.14	N.S.
	Sex	1	5.04	3.43	N.S.
	F x E	1	.92	.63	N.S.
	F x S	1	3.96	2.69	N.S.
	E x S	1	5.04	3.43	N.S.
	F x E x S	1	3.00	2.04	N.S.
	Error	44	64.78		
One-way Repeated Measures ANOVA on Baseline, Preparation, Speech, and Recovery AT					
	Period	3	426.92	136.44	.00
	Error	153	159.57		

MANOVA on Pretest S-R Inventory and PRCS

Measures	Effect	df	TSQ	F	p
S-R, PRCS	Flooding	2	2.78	1.36	N.S.
	Exercise	2	.10	.05	N.S.
	Sex	2	1.78	.87	N.S.
	F x E	2	.96	.47	N.S.
	F x S	2	7.01	3.43	.04
	E x S	2	2.26	1.11	N.S.
	F x E x S	2	.57	.28	N.S.
	Error	43			

Follow-up ANOVA on Pretest S-R Inventory

Measure	Effect	df	SS	F	p
S-R	Flooding	1	38.50	.89	N.S.
	Exercise	1	.22	.01	N.S.
	Sex	1	75.47	1.74	N.S.
	F x E	1	16.52	.38	N.S.
	F x S	1	268.66	6.19	.01
	E x S	1	37.45	.86	N.S.
	F x E x S	1	21.76	.50	N.S.
	Error	44	1910.19		

Follow-up ANOVA on Pretest PRCS

Measure	Effect	df	SS	F	p
PRCS	Flooding	1	5.64	.25	N.S.
	Exercise	1	1.93	.09	N.S.
	Sex	1	9.36	.41	N.S.
	F x E	1	1.09	.05	N.S.
	F x S	1	15.33	.68	N.S.
	E x S	1	2.85	.13	N.S.
	F x E x S	1	1.09	.05	N.S.
	Error	44	995.50		

Measure	Effect	df	SS	F	p
Coping Factor 1	Flooding	1	.03	.55	N.S.
	Exercise	1	.05	.77	N.S.
	Sex	1	.09	1.13	N.S.
	F x E	1	.00	.00	N.S.
	F x S	1	.19	2.84	N.S.
	E x S	1	.00	.00	N.S.
	F x E x S	1	.00	.03	N.S.
	Error	44			
Coping Factor 2	Flooding	1	.02	.29	N.S.
	Exercise	1	.00	.07	N.S.
	Sex	1	.09	.96	N.S.
	F x E	1	.08	.79	N.S.
	F x S	1	.02	.29	N.S.
	E x S	1	.00	.07	N.S.
	F x E x S	1	.01	.13	N.S.
	Error	44			
Coping Factor 3	Flooding	1	.01	.11	N.S.
	Exercise	1	.00	.02	N.S.
	Sex	1	.04	.31	N.S.
	F x E	1	.00	.06	N.S.
	F x S	1	.14	1.03	N.S.
	E x S	1	.30	2.18	N.S.
	F x E x S	1	.00	.00	N.S.
	Error	44			
Coping Factor 4	Flooding	1	.04	.43	N.S.
	Exercise	1	.02	.19	N.S.
	Sex	1	.18	1.71	N.S.
	F x E	1	.00	.00	N.S.
	F x S	1	.04	.43	N.S.
	E x S	1	.00	.03	N.S.
	F x E x S	1	.17	1.59	N.S.
	Error	44			
Coping Factor 5	Flooding	1	.30	1.25	N.S.
	Exercise	1	.00	.00	N.S.
	Sex	1	.06	.27	N.S.
	F x E	1	.41	1.66	N.S.
	F x S	1	.00	.01	N.S.
	E x S	1	.00	.00	N.S.
	F x E x S	1	1.33	5.39	.02
	Error	44			

Measure	Effect	df	SS	F	p
TBCL	Flooding	1	32.64	.14	N.S.
	Exercise	1	38.24	.16	N.S.
	Sex	1	132.03	.55	N.S.
	F x E	1	40.93	.17	N.S.
	F x S	1	43.71	.18	N.S.
	E x S	1	.24	.00	N.S.
	F x E x S	1	1.70	.01	N.S.
	Error	44	10634.45		
OE-ANX	Flooding	1	2.11	.22	N.S.
	Exercise	1	.14	.02	N.S.
	Sex	1	17.58	1.79	N.S.
	F x E	1	.08	.01	N.S.
	F x S	1	.73	.07	N.S.
	E x S	1	.14	.02	N.S.
	F x E x S	1	2.24	.23	N.S.
	Error	44	433.28		
OE-SKILL	Flooding	1	13.23	1.48	N.S.
	Exercise	1	.08	.01	N.S.
	Sex	1	4.76	.53	N.S.
	F x E	1	3.70	.42	N.S.
	F x S	1	1.54	.17	N.S.
	E x S	1	25.93	2.91	N.S.
	F x E x S	1	3.70	.42	N.S.
	Error	44	392.66		
SILENCE	Flooding	1	903.85	.58	N.S.
	Exercise	1	696.10	.45	N.S.
	Sex	1	48.36	.03	N.S.
	F x E	1	4036.15	2.60	N.S.
	F x S	1	3425.01	2.21	N.S.
	E x S	1	3998.17	2.58	N.S.
	F x E x S	1	181.15	.12	N.S.
	Error	44	68228.21		

Measure	Effect	df	SS	F	p
Preparation	Flooding	1	2.37	.04	N.S.
HR	Exercise	1	16.87	.31	N.S.
Difference	Sex	1	194.64	3.54	N.S.
Scores	F x E	1	60.66	1.10	N.S.
	F x S	1	199.45	3.63	N.S.
	E x S	1	23.80	.43	N.S.
	F x E x S	1	70.35	1.28	N.S.
	Error	44			
Speech	Flooding	1	89.04	.90	N.S.
HR	Exercise	1	71.44	.72	N.S.
Difference	Sex	1	16.70	.17	N.S.
Scores	F x E	1	1.28	.01	N.S.
	F x S	1	89.04	.90	N.S.
	E x S	1	111.28	1.13	N.S.
	F x E x S	1	149.28	1.51	N.S.
	Error	44			
Recovery-Min 1	Flooding	1	10.57	.62	N.S.
HR	Exercise	1	.00	.00	N.S.
Difference	Sex	1	34.87	2.03	N.S.
Scores	F x E	1	20.57	1.20	N.S.
	F x S	1	40.11	2.34	N.S.
	E x S	1	1.23	.07	N.S.
	F x E x S	1	4.57	.27	N.S.
	Error	44			
Recovery-Min 5	Flooding	1	6.11	.52	N.S.
HR	Exercise	1	1.43	.12	N.S.
Difference	Sex	1	23.38	1.97	N.S.
Scores	F x E	1	15.84	1.33	N.S.
	F x S	1	50.46	4.25	.04
	E x S	1	5.74	.48	N.S.
	F x E x S	1	4.76	.40	N.S
	Error	44			

MANOVA on Pretest Preparation SCL and SCR Difference Scores

Measures	Effect	df	TSQ	F	p
SCL, SCR	Flooding	2	.10	.05	N.S.
	Exercise	2	.50	.25	N.S.
	Sex	2	5.24	2.56	N.S.
	F x E	2	.53	.26	N.S.
	F x S	2	6.45	3.16	.05
	E x S	2	.84	.41	N.S.
	F x E x S	2	1.37	.67	N.S.
	Error	43			

Follow-up ANOVA on Pretest Preparation SCL Difference Scores

Measure	Effect	df	SS	F	p
SCL	Flooding	1	.27	.08	N.S.
	Exercise	1	1.55	.47	N.S.
	Sex	1	.35	.11	N.S.
	F x E	1	.05	.02	N.S.
	F x S	1	9.07	2.78	N.S.
	E x S	1	2.65	.81	N.S.
	F x E x S	1	.06	.02	N.S.
	Error	44	143.70		

Follow-up ANOVA on Pretest Preparation SCR Difference Scores

Measure	Effect	df	SS	F	p
SCR	Flooding	1	.00	.00	N.S.
	Exercise	1	.22	.04	N.S.
	Sex	1	25.50	4.50	.03
	F x E	1	2.64	.47	N.S.
	F x S	1	35.38	6.24	.01
	E x S	1	.52	.09	N.S.
	F x E x S	1	4.95	.87	N.S.
	Error	44	249.47		

MANOVA on Pretest Speech SCL and SCR Difference Scores

Measures	Effect	df	TSQ	F	p
SCL, SCR	Flooding	2	.42	.21	N.S.
	Exercise	2	1.12	.55	N.S.
	Sex	2	1.96	.96	N.S.
	F x E	2	.12	.06	N.S.
	F x S	2	.84	.41	N.S.
	E x S	2	.05	.03	N.S.
	F x E x S	2	.92	.45	N.S.
	Error	43			

MANOVA on Pretest Recovery-Min 1 SCL and SCR Difference Scores

Measures	Effect	df	TSQ	F	p
SCL, SCR	Flooding	2	.59	.29	N.S.
	Exercise	2	7.50	3.67	.03
	Sex	2	2.83	1.39	N.S.
	F x E	2	5.04	2.47	N.S.
	F x S	2	.53	.26	N.S.
	E x S	2	.30	.15	N.S.
	F x E x S	2	2.53	1.24	N.S.
	Error	43			

Follow-up ANOVA on Pretest Recovery-Min 1 SCL Difference Scores

Measure	Effect	df	SS	F	p
SCL	Flooding	1	.31	.09	N.S.
	Exercise	1	2.50	.73	N.S.
	Sex	1	5.04	1.46	N.S.
	F x E	1	.23	.07	N.S.
	F x S	1	1.84	.53	N.S.
	E x S	1	.98	.29	N.S.
	F x E x S	1	.09	.03	N.S.
	Error	44	151.89		

Follow-up ANOVA on Pretest Recovery-Min 1 SCR Difference Scores

Measure	Effect	df	SS	F	p
SCR	Flooding	1	.44	.24	N.S.
	Exercise	1	6.70	3.73	.05
	Sex	1	.44	.24	N.S.
	F x E	1	6.26	3.49	N.S.
	F x S	1	.13	.07	N.S.
	E x S	1	.24	.13	N.S.
	F x E x S	1	3.96	2.20	N.S.
	Error	44	79.07		

MANOVA on Pretest Recovery-Min 5 SCL and SCR Difference Scores

Measure	Effect	df	TSQ	F	p
SCL, SCR	Flooding	2	1.13	.56	N.S.
	Exercise	2	3.57	1.75	N.S.
	Sex	2	2.82	1.38	N.S.
	F x E	2	3.83	1.87	N.S.
	F x S	2	1.70	.83	N.S.
	E x S	2	1.46	.72	N.S.
	F x E x S	2	.20	.10	N.S.
	Error	43			

Appendix I: Summary Tables for Outcome Measures (MANOVAS, ANOVAS, MANCOVAS, ANCOVAS)

Measure	Effect	df	SS	F	p
Baseline	Flooding	1	1.28	.39	N.S.
AT	Exercise	1	.33	.10	N.S.
Change	Sex	1	1.19	.36	N.S.
Scores	F x E	1	2.05	.63	N.S.
	F x S	1	.13	.04	N.S.
	E x S	1	.10	.03	N.S.
	F x E x S	1	.44	.13	N.S.
	Error	44	144.59		
Preparation	Flooding	1	4.11	2.93	N.S.
AT	Exercise	1	.08	.06	N.S.
Posttest	Sex	1	.22	.16	N.S.
Scores	F x E	1	.07	.06	N.S.
(Adjusted)	F x S	1	1.18	.84	N.S.
	E x S	1	.00	.00	N.S.
	F x E x S	1	.05	.04	N.S.
	(Pretest)	1	14.93	10.62	.00
	Error	43	60.44		
Speech	Flooding	1	23.17	7.85	.007
AT	Exercise	1	3.62	1.23	N.S.
Change	Sex	1	3.30	1.12	N.S.
Scores	F x E	1	.92	.31	N.S.
	F x S	1	.10	.03	N.S.
	E x S	1	4.85	1.65	N.S.
	F x E x S	1	.00	.00	N.S.
	Error		129.88		
Speech	Flooding	1	14.28	12.37	.001
AT	Exercise	1	9.14	7.92	.009
Change Scores	F x E	1	.57	.49	N.S.
Females	Error	24	27.71		
Speech	Flooding	1	9.37	1.84	N.S.
AT	Exercise	1	.04	.01	N.S.
Change Scores	F x E	1	.37	.07	N.S.
Males	Error	20	102.16		
Recovery	Flooding	1	5.00	4.85	.03
AT	Exercise	1	.66	.60	N.S.
Posttest	Sex	1	.00	.00	N.S.
Scores	F x E	1	2.32	2.13	N.S.
(Adjusted)	F x S	1	1.13	1.04	N.S.
	E x S	1	.01	.01	N.S.
	F x E x S	1	8.62	7.90	.007
	(Pretest)	1	.56	.52	N.S.
	Error	43	46.95		

MANCOVA on Posttest S-R Inventory and PRCS

Measures	Effect	df	TSQ	F	p
S-R, PRCS	Flooding	2	1.70	.83	N.S.
	Exercise	2	1.30	.64	N.S.
	Sex	2	1.03	.51	N.S.
	F x E	2	1.53	.75	N.S.
	F x S	2	4.22	2.06	N.S.
	E x S	2	1.55	.76	N.S.
	F x E x S	2	.58	.28	N.S.
	(Pretest)	4, 82	.42 (LRATIO)	10.85	.00
	Error	41			

Measure	Effect	df	SS	F	p
Logic of Treatment	Flooding	1	.18	.03	N.S.
	Exercise	1	.04	.01	N.S.
	Sex	1	2.78	.52	N.S.
	F x E	1	3.23	.61	N.S.
	F x S	1	3.87	.73	N.S.
	E x S	1	.66	.12	N.S.
	F x E x S	1	3.23	.61	N.S.
	Error	44	234.52		
Experimenter's Consideration	Flooding	1	.08	.07	N.S.
	Exercise	1	1.43	1.05	N.S.
	Sex	1	1.43	1.05	N.S.
	F x E	1	2.24	1.64	N.S.
	F x S	1	2.24	1.64	N.S.
	E x S	1	.35	.26	N.S.
	F x E x S	1	.08	.07	N.S.
	Error	44	60.33		

MANOVA on Treatment Evaluation Measures Taken at Posttesting

Measures	Effect	df	TSQ	F	p
Target	Flooding	3	14.43	4.59	.007
Speech Anx.,	Exercise	3	8.66	2.76	.05
	Sex	3	1.96	.62	N.S.
General Anx.,	F x E	3	1.86	.59	N.S.
	F x S	3	.91	.29	N.S.
Confidence	E x S	3	10.16	3.24	.03
	F x E x S	3	3.28	1.04	N.S.
	Error	42			

Follow-up ANOVAS

Measure	Effect	df	SS	F	p
Target	Flooding	1	20.00	7.22	.01
Speech	Exercise	1	14.02	5.06	.02
Anxiety	Sex	1	.62	.23	N.S.
Reduction	F x E	1	1.19	.43	N.S.
	F x S	1	.38	.14	N.S.
	E x S	1	3.79	1.37	N.S.
	F x E x S	1	.03	.01	N.S.
	Error	44	121.92		
General	Flooding	1	2.24	.44	N.S.
Anxiety	Exercise	1	17.23	3.36	.07
Reduction	Sex	1	5.95	1.16	N.S.
	F x E	1	4.76	.93	N.S.
	F x S	1	4.39	.86	N.S.
	E x S	1	12.61	2.46	N.S.
	F x E x S	1	10.30	2.01	N.S.
	Error	44	225.80		
Confidence	Flooding	1	10.44	2.00	N.S.
in	Exercise	1	.07	.01	N.S.
Recommending	Sex	1	.20	.04	N.S.
	F x E	1	8.59	1.64	N.S.
	F x S	1	.44	.08	N.S.
	E x S	1	3.15	.60	N.S.
	F x E x S	1	.13	.03	N.S.
	Error	44	230.07		

Measure	Effect	df	SS	F	p
Coping Factor 1 Posttest Scores (Adjusted)	Flooding	1	.02	.64	N.S.
	Exercise	1	.01	.37	N.S.
	Sex	1	.00	.23	N.S.
	F x E	1	.00	.06	N.S.
	F x S	1	.00	.03	N.S.
	E x S	1	.16	4.85	.03
	F x E x S	1	.07	2.25	N.S.
	(Pretest)	1	.37	11.28	.001
	Error	43	1.41		
Coping Factor 2 Change Scores	Flooding	1	.05	.67	N.S.
	Exercise	1	.00	.00	N.S.
	Sex	1	.01	.17	N.S.
	F x E	1	.07	.94	N.S.
	F x S	1	.00	.01	N.S.
	E x S	1	.17	2.19	N.S.
	F x E x S	1	.27	3.57	N.S.
	Error	44	3.43		
Coping Factor 3 Posttest Scores (Adjusted)	Flooding	1	.04	.56	N.S.
	Exercise	1	.09	1.21	N.S.
	Sex	1	.22	2.87	N.S.
	F x E	1	.00	.00	N.S.
	F x S	1	.16	2.07	N.S.
	E x S	1	.09	1.17	N.S.
	F x E x S	1	.00	.03	N.S.
	(Pretest)	1	1.13	14.61	.000
	Error	43	3.34		
Coping Factor 4 Posttest Scores (Adjusted)	Flooding	1	.00	.01	N.S.
	Exercise	1	.07	.93	N.S.
	Sex	1	.08	1.08	N.S.
	F x E	1	.00	.03	N.S.
	F x S	1	.13	1.73	N.S.
	E x S	1	.02	.36	N.S.
	F x E x S	1	.01	.20	N.S.
	(Pretest)	1	.19	2.45	N.S.
	Error	43	3.40		
Coping Factor 5 Change Scores	Flooding	1	1.28	4.92	.03
	Exercise	1	.07	.30	N.S.
	Sex	1	.00	.02	N.S.
	F x E	1	.13	.51	N.S.
	F x S	1	.13	.51	N.S.
	E x S	1	.00	.00	N.S.
	F x E x S	1	1.28	4.92	.03
	Error	44	11.50		

Measure	Effect	df	SS	F	p
TBCL	Flooding	1	649.83	8.20	.006
Posttest	Exercise	1	34.06	.43	N.S.
Scores	Sex	1	168.46	2.13	N.S.
(Adjusted)	F x E	1	1023.27	12.91	.000
	F x S	1	14.50	.18	N.S.
	E x S	1	25.70	.32	N.S.
	F x E x S	1	3.07	.04	N.S.
	(Pretest)	1	4560.86	57.54	.000
	Error	43	3408.32		
OE-ANX	Flooding	1	41.76	5.02	.03
Change	Exercise	1	.01	.00	N.S.
Scores	Sex	1	3.07	.37	N.S.
	F x E	1	1.99	.24	N.S.
	F x S	1	.22	.03	N.S.
	E x S	1	.01	.00	N.S.
	F x E x S	1	4.76	.57	N.S.
	Error	44	366.38		
OE-SKILL	Flooding	1	.72	.21	N.S.
Posttest	Exercise	1	12.12	3.50	N.S.
Scores	Sex	1	1.44	.42	N.S.
(Adjusted)	F x E	1	3.23	.93	N.S.
	F x S	1	.51	.15	N.S.
	E x S	1	.74	.21	N.S.
	F x E x S	1	3.23	.93	N.S.
	(Pretest)	1	172.09	49.62	.000
	Error	43	149.14		
SILENCE	Flooding	1	40.08	.09	N.S.
Posttest	Exercise	1	216.83	.50	N.S.
Scores	Sex	1	123.62	.29	N.S.
(Adjusted)	F x E	1	1860.08	4.31	.04
	F x S	1	604.03	1.40	N.S.
	E x S	1	639.41	1.48	N.S.
	F x E x S	1	25.93	.06	N.S.
	(Pretest)	1	10716.90	24.81	.000
	Error	43	18572.07		

Measure	Effect	df	SS	F	p
Preparation	Flooding	1	83.65	3.22	N.S.
HR	Exercise	1	35.38	1.36	N.S.
Posttest	Sex	1	.02	.00	N.S.
Difference	F x E	1	6.37	.25	N.S.
Scores	F x S	1	3.32	.13	N.S.
(Adjusted)	E x S	1	28.07	1.08	N.S.
	F x E x S	1	37.76	1.46	N.S.
	(Pretest)	1	1090.49	42.04	.000
	Error	43	1115.36		
Speech	Flooding	1	438.09	4.76	.03
HR	Exercise	1	16.81	.18	N.S.
Posttest	Sex	1	65.48	.71	N.S.
Difference	F x E	1	145.06	1.58	N.S.
Scores	F x S	1	4.84	.05	N.S.
(Adjusted)	E x S	1	88.94	.97	N.S.
	F x E x S	1	57.91	.63	N.S.
	(Pretest)	1	2868.14	31.18	.000
	Error	43	3954.90		
Recovery-Min 4	Flooding	1	164.44	11.81	.001
HR	Exercise	1	3.66	.26	N.S.
Posttest	Sex	1	.05	.00	N.S.
Difference	F x E	1	15.66	1.12	N.S.
Scores	F x S	1	.27	.02	N.S.
(Adjusted)	E x S	1	14.97	1.08	N.S.
	F x E x S	1	.02	.00	N.S.
	(Pretest)	1	111.65	8.02	.007
	Error	43	598.74		
Recovery-Min 5	Flooding	1	103.48	7.58	.008
HR	Exercise	1	1.65	.12	N.S.
Posttest	Sex	1	31.00	2.27	N.S.
Difference	F x E	1	16.27	1.19	N.S.
Scores	F x S	1	.22	.02	N.S.
(Adjusted)	E x S	1	.00	.00	N.S.
	F x E x S	1	.38	.03	N.S.
	(Pretest)	1	28.74	2.11	N.S.
	Error	43	586.90		

MANCOVA on Preparation SCL and SCR Posttest Difference Scores

Measures	Effect	df	TSQ	F	p
SCL, SCR	Flooding	2	1.98	.97	N.S.
	Exercise	2	.66	.32	N.S.
	Sex	2	3.25	1.59	N.S.
	F x E	2	1.79	.88	N.S.
	F x S	2	9.16	4.47	.01
	E x S	2	.82	.40	N.S.
	F x E x S	2	1.70	.83	N.S.
	(Pretest)	4, 82	.51 (LRATIO)	8.00	.000
	Error	41			

Follow-up ANCOVAS

Measure	Effect	df	SS	F	p
SCL	Flooding	1	2.69	1.78	N.S.
	Exercise	1	.86	.57	N.S.
	Sex	1	5.62	3.71	N.S.
	F x E	1	2.70	1.78	N.S.
	F x S	1	14.99	9.88	.003
	E x S	1	.13	.09	N.S.
	F x E x S	1	.56	.37	N.S.
	(Pretest)	1	54.08	35.64	.000
	Error	43	65.24		
SCR	Flooding	1	.88	.10	N.S.
	Exercise	1	.06	.01	N.S.
	Sex	1	9.14	1.00	N.S.
	F x E	1	6.95	.76	N.S.
	F x S	1	19.76	2.15	N.S.
	E x S	1	1.30	.14	N.S.
	F x E x S	1	2.35	.26	N.S.
	(Pretest)	1	58.82	6.41	.01
	Error	43	394.48		

MANCOVA on Speech SCL and SCR Posttest Difference Scores

Measures	Effect	df	TSQ	F	p
SCL , SCR	Flooding	2	2.44	1.19	N.S.
	Exercise	2	1.95	.95	N.S.
	Sex	2	7.56	3.69	.03
	F x E	2	3.47	1.70	N.S.
	F x S	2	6.37	3.11	.05
	E x S	2	8.23	4.02	.02
	F x E x S	2	6.51	3.18	.05
	(Pretest)	4, 82	.61 (LRATIO)	5.55	.000
	Error	41			

Follow-up ANCOVAS

Measure	Effect	df	SS	F	p
SCL	Flooding	1	.71	.25	N.S.
	Exercise	1	.72	.26	N.S.
	Sex	1	18.83	6.72	.01
	F x E	1	4.26	1.52	N.S.
	F x S	1	8.61	3.07	N.S.
	E x S	1	.13	.05	N.S.
	F x E x S	1	.55	.20	N.S.
	(Pretest)	1	61.70	22.01	.000
	Error	43	120.56		
SCR	Flooding	1	8.72	.85	N.S.
	Exercise	1	6.11	.60	N.S.
	Sex	1	20.74	2.02	N.S.
	F x E	1	36.88	3.59	N.S.
	F x S	1	56.80	5.53	.02
	E x S	1	50.34	4.90	.03
	F x E x S	1	33.34	3.24	N.S.
	(Pretest)	1	5.23	.51	N.S.
	Error	43	441.95		

MANCOVA on Recovery-Min 1 SCL and SCR Posttest Difference Scores

Measures	Effect	df	TSQ	F	p
SCL, SCR	Flooding	2	.69	.34	N.S.
	Exercise	2	.13	.06	N.S.
	Sex	2	8.48	4.14	.02
	F x E	2	1.49	.73	N.S.
	F x S	2	12.05	5.88	.005
	E x S	2	1.45	.71	N.S.
	F x E x S	2	1.36	.66	N.S.
	(Pretest)	4,82	.61 (LRATIO)	5.72	.000
	Error	41			

Follow-up ANCOVAS

Measure	Effect	df	SS	F	p
SCL	Flooding	1	.70	.45	N.S.
	Exercise	1	.71	.46	N.S.
	Sex	1	14.25	9.08	.004
	F x E	1	1.29	.83	N.S.
	F x S	1	9.87	6.30	.01
	E x S	1	.22	.14	N.S.
	F x E x S	1	3.02	1.93	N.S.
	(Pretest)	1	39.35	25.08	.000
	Error	43	67.47		
SCR	Flooding	1	.00	.00	N.S.
	Exercise	1	.21	.07	N.S.
	Sex	1	.08	.03	N.S.
	F x E	1	3.45	1.14	N.S.
	F x S	1	29.30	9.67	.003
	E x E	1	2.34	.77	N.S.
	F x E x S	1	.16	.05	N.S.
	(Pretest)	1	.39	.13	N.S.
	Error	43	130.31		

MANCOVA on Recovery-Min 5 SCL and SCR Posttest Difference Scores

Measures	Effect	df	TSQ	F	p
SCL, SCR	Flooding	2	.03	.02	N.S.
	Exercise	2	.40	.20	N.S.
	Sex	2	10.45	5.10	.01
	F x E	2	1.06	.52	N.S.
	F x S	2	4.19	2.05	N.S.
	E x S	2	.38	.19	N.S.
	F x E x S	2	6.53	3.19	.05
	(Pretest)	4, 82	.60 (LRATIO)	5.88	.000
	Error	41			

Follow-up ANCOVAS

Measure	Effect	df	SS	F	p
SCL	Flooding	1	.18	.10	N.S.
	Exercise	1	.14	.08	N.S.
	Sex	1	6.42	3.48	N.S.
	F x E	1	.13	.07	N.S.
	F x S	1	7.41	4.02	.051
	E x S	1	.05	.03	N.S.
	F x E x S	1	4.03	2.19	N.S.
	(Pretest)	1	18.17	9.85	.003
	Error	43	79.35		
SCR	Flooding	1	.07	.01	N.S.
	Exercise	1	.31	.05	N.S.
	Sex	1	1.31	.22	N.S.
	F x E	1	2.37	.40	N.S.
	F x S	1	19.67	3.31	N.S.
	E x S	1	1.51	.25	N.S.
	F x E x S	1	.95	.16	N.S.
	(Pretest)	1	.28	.05	N.S.
	Error	43	255.85		

Appendix J: Summary Tables for Five-Way ANOVAS on Process Feeling Scale and Physiological Measures

Measure	Effect	df	SS	F	p
Anxiety	Flooding	1	231.57	26.51	.000
Imagery	Exercise	1	1.80	.21	N.S.
Periods	Sex	1	5.23	.60	N.S.
	F x E	1	.02	.00	N.S.
	F x S	1	38.03	4.35	.04
	E x S	1	1.80	.21	N.S.
	F x E x S	1	.79	.09	N.S.
	Error	44	384.42		
	Day	1	11.13	3.04	N.S.
	D x F	1	24.79	6.76	.01
	D x E	1	4.76	1.30	N.S.
	D x S	1	.67	.18	N.S.
	D x F x E	1	.37	.10	N.S.
	D x F x S	1	9.56	2.61	N.S.
	D x E x S	1	3.89	1.06	N.S.
	D x F x E x S	1	12.57	3.43	N.S.
	Error	44	161.28		
	Period	2	19.56	7.74	.000
	P x F	2	3.70	1.47	N.S.
	P x E	2	.40	.16	N.S.
	P x S	2	.28	.11	N.S.
	P x F x E	2	.57	.23	N.S.
	P x F x S	2	6.78	2.68	N.S.
	P x E x S	2	6.63	2.62	N.S.
	P x F x E x S	2	1.26	.50	N.S.
	Error	88	111.26		
	D x P	2	.35	.26	N.S.
	D x P x F	2	.03	.03	N.S.
	D x P x E	2	.52	.38	N.S.
	D x P x S	2	.12	.09	N.S.
	D x P x F x E	2	.64	.46	N.S.
	D x P x F x S	2	.57	.41	N.S.
	D x P x E x S	2	.32	.23	N.S.
	D x P x F x E x S	2	.59	.43	N.S.
	Error	88	61.07		

Measure	Effect	df	SS	F	p
Relaxation	Flooding	1	426.47	27.72	.000
Imagery	Exercise	1	4.39	.29	N.S.
Periods	Sex	1	.14	.01	N.S.
	F x E	1	19.38	1.26	N.S.
	F x S	1	5.31	.35	N.S.
	E x S	1	.01	.00	N.S.
	F x E x S	1	.53	.03	N.S.
	Error	44	676.98		
	Day	1	.17	.03	N.S.
	D x F	1	48.84	7.35	.009
	D x E	1	12.70	1.91	N.S.
	D x S	1	6.86	1.03	N.S.
	D x F x E	1	1.49	.23	N.S.
	D x F x S	1	.76	.11	N.S.
	D x E x S	1	2.47	.37	N.S.
	D x F x E x S	1	.95	.14	N.S.
	Error	44	292.34		
	Period	2	9.46	3.47	.03
	P x F	2	.11	.04	N.S.
	P x E	2	.26	.10	N.S.
	P x S	2	.31	.11	N.S.
	P x F x E	2	.97	.36	N.S.
	P x F x S	2	3.88	1.43	N.S.
	P x E x S	2	3.95	1.45	N.S.
	P x F x E x S	2	1.28	.47	N.S.
	Error	88	119.87		
	D x P	2	1.48	.71	N.S.
	D x P x F	2	1.01	.48	N.S.
	D x P x E	2	.93	.44	N.S.
	D x P x S	2	1.79	.85	N.S.
	D x P x F x E	2	.72	.34	N.S.
	D x P x F x S	2	2.08	.99	N.S.
	D x P x E x S	2	1.31	.62	N.S.
	D x P x F x E x S	2	.03	.02	N.S.
	Error	88	92.88		

Measure	Effect	df	SS	F	p
Arousal	Flooding	1	49.32	4.61	.03
Imagery	Exercise	1	123.47	11.53	.001
Periods	Sex	1	62.08	5.80	.02
	F x E	1	32.24	3.01	N.S.
	F x S	1	3.56	.33	N.S.
	E x S	1	2.47	.23	N.S.
	F x E x S	1	1.37	.13	N.S.
	Error	44	471.27		
	Day	1	.85	.16	N.S.
	D x F	1	1.02	.19	N.S.
	D x E	1	.03	.01	N.S.
	D x S	1	1.06	.19	N.S.
	D x F x E	1	3.36	.62	N.S.
	D x F x S	1	4.69	.86	N.S.
	D x E x S	1	.00	.00	N.S.
	D x F x E x S	1	6.59	1.21	N.S.
	Error	44	240.30		
	Period	2	4.38	2.00	N.S.
	P x F	2	.69	.32	N.S.
	P x E	2	1.02	.47	N.S.
	P x S	2	3.23	1.48	N.S.
	P x F x E	2	3.62	1.66	N.S.
	P x F x S	2	5.84	2.67	N.S.
	P x E x S	2	1.71	.78	N.S.
	P x F x E x S	2	1.96	.90	N.S.
	Error	88	96.31		
	D x P	2	1.93	1.10	N.S.
	D x P x F	2	4.77	2.70	N.S.
	D x P x E	2	3.40	1.93	N.S.
	D x P x S	2	.03	.02	N.S.
	D x P x F x E	2	.52	.30	N.S.
	D x P x F x S	2	2.42	1.37	N.S.
	D x P x E x S	2	1.81	1.03	N.S.
	D x P x F x E x S	2	2.83	1.61	N.S.
	Error	88	77.76		

Measure	Effect	df	SS	F	p
Fatigue	Flooding	1	1.25	.11	N.S.
Imagery	Exercise	1	5.15	.46	N.S.
Periods	Sex	1	262.31	23.58	.000
	F x E	1	21.11	1.90	N.S.
	F x S	1	12.45	1.12	N.S.
	E x S	1	.82	.07	N.S.
	F x E x S	1	22.08	1.99	N.S.
	Error	44	489.50		
	Day	1	11.37	1.38	N.S.
	D x F	1	26.02	3.16	N.S.
	D x E	1	19.69	2.39	N.S.
	D x S	1	14.90	1.81	N.S.
	D x F x E	1	3.11	.38	N.S.
	D x F x S	1	.20	.03	N.S.
	D x E x S	1	3.05	.37	N.S.
	D x F x E x S	1	9.78	1.19	N.S.
	Error	44	362.76		
	Period	2	14.94	5.38	.006
	P x F	2	5.27	1.90	N.S.
	P x E	2	8.16	2.94	N.S.
	P x S	2	.17	.06	N.S.
	P x F x E	2	.46	.17	N.S.
	P x F x S	2	.98	.36	N.S.
	P x E x S	2	1.10	.49	N.S.
	P x F x E x S	2	.71	.26	N.S.
	Error	88	122.14		
	D x P	2	3.57	1.75	N.S.
	D x P x F	2	.99	.48	N.S.
	D x P x E	2	1.76	.86	N.S.
	D x P x S	2	.03	.02	N.S.
	D x P x F x E	2	.82	.40	N.S.
	D x P x F x S	2	1.73	.85	N.S.
	D x P x E x S	2	1.02	.50	N.S.
	D x P x F x E x S	2	1.38	.68	N.S.
	Error	88	89.87		

Measure	Effect	df	SS	F	p
Energy	Flooding	1	9.29	.84	N.S.
Imagery	Exercise	1	65.86	5.95	.01
Periods	Sex	1	36.22	3.27	N.S.
	F x E	1	5.60	.51	N.S.
	F x S	1	.00	.00	N.S.
	E x S	1	.02	.00	N.S.
	F x E x S	1	8.87	.80	N.S.
	Error	44	487.28		
	Day	1	7.76	2.02	N.S.
	D x F	1	.06	.02	N.S.
	D x E	1	.52	.14	N.S.
	D x S	1	3.72	.97	N.S.
	D x F x E	1	.04	.01	N.S.
	D x F x S	1	1.23	.32	N.S.
	D x E x S	1	.38	.10	N.S.
	D x F x E x S	1	3.20	.83	N.S.
	Error	44	169.09		
	Period	2	.81	.38	N.S.
	P x F	2	4.57	2.12	N.S.
	P x E	2	3.67	1.70	N.S.
	P x S	2	1.45	.67	N.S.
	P x F x E	2	3.29	1.53	N.S.
	P x F x S	2	.91	.42	N.S.
	P x E x S	2	.08	.04	N.S.
	P x F x E x S	2	1.60	.74	N.S.
	Error	88	94.99		
	D x P	2	3.41	2.88	N.S.
	D x P x F	2	.58	.49	N.S.
	D x P x E	2	.23	.20	N.S.
	D x P x S	2	.18	.16	N.S.
	D x P x F x E	2	.83	.70	N.S.
	D x P x F x S	2	.22	.19	N.S.
	D x P x E x S	2	1.02	.87	N.S.
	D x P x F x E x S	2	1.16	.99	N.S.
	Error	88	52.13		

Measure	Effect	df	SS	F	p
HR	Flooding	1	154.96	.61	N.S.
Imagery	Exercise	1	40478.24	159.02	.000
Periods	Sex	1	550.15	2.16	N.S.
	F x E	1	80.17	.31	N.S.
	F x S	1	70.76	.28	N.S.
	E x S	1	100.74	.40	N.S.
	F x E x S	1	6.11	.02	N.S.
	Error	44	11199.80		
	Day	1	110.07	.76	N.S.
	D x F	1	114.51	.79	N.S.
	D x E	1	.71	.00	N.S.
	D x S	1	9.18	.06	N.S.
	D x F x E	1	50.93	.35	N.S.
	D x F x S	1	10.50	.07	N.S.
	D x E x S	1	194.62	1.35	N.S.
	D x F x E x S	1	112.28	.78	N.S.
	Error	44	6349.13		
	Period	2	26.06	1.42	N.S.
	P x F	2	12.66	.69	N.S.
	P x E	2	170.56	9.20	.000
	P x S	2	53.52	2.91	N.S.
	P x F x E	2	28.06	1.53	N.S.
	P x F x S	2	2.96	.16	N.S.
	P x E x S	2	17.10	.93	N.S.
	P x F x E x S	2	13.24	.72	N.S.
	Error	88	808.49		
	D x P	2	16.53	1.04	N.S.
	D x P x F	2	15.89	1.00	N.S.
	D x P x E	2	27.97	1.77	N.S.
	D x P x S	2	6.30	.40	N.S.
	D x P x F x E	2	4.19	.26	N.S.
	D x P x F x S	2	.56	.04	N.S.
	D x P x E x S	2	.40	.03	N.S.
	D x P x F x E x S	2	2.50	.16	N.S.
	Error	88	696.63		

Measure	Effect	df	SS	F	p
SCL	Flooding	1	6.59	.30	N.S.
Imagery	Exercise	1	165.86	7.65	.008
Periods	Sex	1	1.19	.06	N.S.
	F x E	1	1.12	.05	N.S.
	F x S	1	85.59	3.95	N.S.
	E x S	1	18.83	.87	N.S.
	F x E x S	1	53.13	2.45	N.S.
	Error	41	889.15		
	Day	1	5.39	.78	N.S.
	D x F	1	1.92	.28	N.S.
	D x E	1	5.33	.77	N.S.
	D x S	1	4.24	.61	N.S.
	D x F x E	1	2.40	.35	N.S.
	D x F x S	1	3.93	.57	N.S.
	D x E x S	1	13.61	1.97	N.S.
	D x F x E x S	1	8.85	1.28	N.S.
	Error	41	283.11		
	Period	2	3.35	4.01	.02
	P x F	2	.12	.15	N.S.
	P x E	2	2.14	2.57	N.S.
	P x S	2	.33	.40	N.S.
	P x F x E	2	1.62	1.95	N.S.
	P x F x S	2	.39	.47	N.S.
	P x E x S	2	1.45	1.74	N.S.
	P x F x E x S	2	1.08	1.31	N.S.
	Error	82	34.21		
	D x P	2	2.13	2.97	N.S.
	D x P x F	2	.52	.73	N.S.
	D x P x E	2	.06	.09	N.S.
	D x P x S	2	.14	.20	N.S.
	D x P x F x E	2	.44	.62	N.S.
	D x P x F x S	2	1.23	1.72	N.S.
	D x P x E x S	2	.36	.51	N.S.
	D x P x F x E x S	2	2.47	3.45	.03
	Error	82	29.41		

Measure	Effect	df	SS	F	p
SCR	Flooding	1	14.54	.62	N.S.
Imagery	Exercise	1	457.81	19.44	.000
Periods	Sex	1	20.34	.86	N.S.
	F x E	1	44.23	1.88	N.S.
	F x S	1	90.34	3.84	N.S.
	E x S	1	9.50	.40	N.S.
	F x E x S	1	44.23	1.88	N.S.
	Error	41	965.44		
	Day	1	5.06	.47	N.S.
	D x F	1	.36	.03	N.S.
	D x E	1	21.43	1.97	N.S.
	D x S	1	3.15	.29	N.S.
	D x F x E	1	10.25	.94	N.S.
	D x F x S	1	3.21	.30	N.S.
	D x E x S	1	10.25	.94	N.S.
	D x F x E x S	1	.70	.06	N.S.
	Error	41	446.33		
	Period	2	38.01	8.65	.000
	P x F	2	5.98	1.36	N.S.
	P x E	2	6.05	1.38	N.S.
	P x S	2	2.26	.52	N.S.
	P x F x E	2	3.54	.81	N.S.
	P x F x S	2	.08	.02	N.S.
	P x E x S	2	6.75	1.54	N.S.
	P x F x E x S	2	3.26	.74	N.S.
	Error	82	180.18		
	D x P	2	1.39	.51	N.S.
	D x P x F	2	1.87	.68	N.S.
	D x P x E	2	2.41	.88	N.S.
	D x P x S	2	3.81	1.39	N.S.
	D x P x F x E	2	2.63	.96	N.S.
	D x P x F x S	2	5.91	2.16	N.S.
	D x P x E x S	2	1.57	.57	N.S.
	D x P x F x E x S	2	11.76	4.28	.01
	Error	82	112.57		

Appendix K: ANOVA Summary Tables for Process Composite Measures.

Measure	Effect	df	SS	F	p
Anxiety Peak Response	Flooding	1	46.74	22.70	.000
	Exercise	1	.64	.31	N.S.
	Sex	1	.75	.36	N.S.
	F x E	1	.32	.16	N.S.
	F x S	1	7.79	3.79	N.S.
	E x S	1	.12	.06	N.S.
	F x E x S	1	.03	.02	N.S.
	Error	44	90.60		
Anxiety Within-Session Habituation	Flooding	1	3.70	2.46	N.S.
	Exercise	1	.03	.02	N.S.
	Sex	1	.22	.15	N.S.
	F x E	1	.56	.37	N.S.
	F x S	1	3.70	2.46	N.S.
	E x S	1	6.26	4.17	.04
	F x E x S	1	1.09	.73	N.S.
	Error	44	66.20		
Anxiety Between-Session Habituation	Flooding	1	16.52	6.76	.01
	Exercise	1	3.17	1.30	N.S.
	Sex	1	.44	.18	N.S.
	F x E	1	.24	.10	N.S.
	F x S	1	6.37	2.61	N.S.
	E x S	1	2.59	1.06	N.S.
	F x E x S	1	8.38	3.43	N.S.
	Error	44	107.52		
Relaxation Peak Response	Flooding	1	78.47	30.57	.000
	Exercise	1	.33	.13	N.S.
	Sex	1	.10	.04	N.S.
	F x E	1	3.87	1.51	N.S.
	F x S	1	.59	.23	N.S.
	E x S	1	.33	.13	N.S.
	F x E x S	1	.22	.09	N.S.
	Error	44	112.94		
Relaxation Within-Session Habituation	Flooding	1	.09	.04	N.S.
	Exercise	1	.05	.02	N.S.
	Sex	1	.14	.06	N.S.
	F x E	1	.94	.44	N.S.
	F x S	1	1.84	.85	N.S.
	E x S	1	.45	.21	N.S.
	F x E x S	1	.00	.00	N.S.
	Error	44	95.55		
Relaxation Between-Session Habituation	Flooding	1	32.56	7.35	.009
	Exercise	1	8.46	1.91	N.S.
	Sex	1	4.57	1.03	N.S.
	F x E	1	.99	.23	N.S.
	F x S	1	.50	.11	N.S.
	E x S	1	1.64	.37	N.S.
	F x E x S	1	.63	.14	N.S.
	Error	44	194.89		

Measure	Effect	df	SS	F	p
Arousal Peak Response	Flooding	1	6.92	3.66	N.S.
	Exercise	1	20.38	10.76	.002
	Sex	1	11.72	6.19	.01
	F x E	1	8.22	4.34	.04
	F x S	1	.69	.37	N.S.
	E x S	1	2.30	1.22	N.S.
	F x E x S	1	.18	.10	N.S.
	Error	44	83.32		
Arousal Within-Session Habituation	Flooding	1	.62	.45	N.S.
	Exercise	1	.62	.45	N.S.
	Sex	1	.28	.21	N.S.
	F x E	1	2.57	1.86	N.S.
	F x S	1	5.24	3.78	N.S.
	E x S	1	1.70	1.23	N.S.
	F x E x S	1	1.19	.86	N.S.
	Error	44	61.00		
Arousal Between-Session Habituation	Flooding	1	.68	.19	N.S.
	Exercise	1	.02	.01	N.S.
	Sex	1	.70	.19	N.S.
	F x E	1	2.24	.62	N.S.
	F x S	1	3.12	.86	N.S.
	E x S	1	.00	.00	N.S.
	F x E x S	1	4.39	1.21	N.S.
	Error	44	160.20		

Measure	Effect	df	SS	F	p
Fatigue Peak Response	Flooding	1	.02	.01	N.S.
	Exercise	1	1.36	.66	N.S.
	Sex	1	50.92	24.60	.000
	F x E	1	2.40	1.16	N.S.
	F x S	1	1.41	.68	N.S.
	E x S	1	.01	.01	N.S.
	F x E x S	1	1.67	.81	N.S.
	Error	44	91.08		
Fatigue Within-Session Habituation	Flooding	1	4.85	2.67	N.S.
	Exercise	1	8.09	4.46	.04
	Sex	1	.16	.09	N.S.
	F x E	1	.16	.09	N.S.
	F x S	1	.01	.01	N.S.
	E x S	1	1.09	.61	N.S.
	F x E x S	1	.01	.01	N.S.
	Error	44	79.90		
Fatigue Between-Session Habituation	Flooding	1	17.35	3.16	N.S.
	Exercise	1	13.12	2.39	N.S.
	Sex	1	9.91	1.81	N.S.
	F x E	1	2.07	.38	N.S.
	F x S	1	.13	.03	N.S.
	E x S	1	2.03	.37	N.S.
	F x E x S	1	6.52	1.19	N.S.
	Error	44	241.84		
Energy Peak Response	Flooding	1	1.38	.63	N.S.
	Exercise	1	15.16	6.85	.01
	Sex	1	8.22	3.71	N.S.
	F x E	1	.44	.20	N.S.
	F x S	1	.00	.00	N.S.
	E x S	1	.35	.16	N.S.
	F x E x S	1	1.59	.72	N.S.
	Error	44	97.44		
Energy Within-Session Habituation	Flooding	1	4.57	3.82	.057
	Exercise	1	2.24	1.87	N.S.
	Sex	1	.80	.67	N.S.
	F x E	1	2.93	2.44	N.S.
	F x S	1	.88	.74	N.S.
	E x S	1	.08	.07	N.S.
	F x E x S	1	1.23	1.03	N.S.
	Error	44	52.78		
Energy Between-Session Habituation	Flooding	1	.04	.02	N.S.
	Exercise	1	.35	.14	N.S.
	Sex	1	2.48	.97	N.S.
	F x E	1	.02	.01	N.S.
	F x S	1	.82	.32	N.S.
	E x S	1	.25	.10	N.S.
	F x E x S	1	2.13	.83	N.S.
	Error	44	112.72		

Measure	Effect	df	SS	F	p
HR Peak Response	Flooding	1	24.64	.54	N.S.
	Exercise	1	6939.30	152.36	.000
	Sex	1	121.44	2.67	N.S.
	F x E	1	35.89	.79	N.S.
	F x S	1	21.76	.48	N.S.
	E x S	1	13.07	.29	N.S.
	F x E x S	1	4.39	.10	N.S.
	Error	44	2003.94		
HR Within-Session Habituation	Flooding	1	7.79	.59	N.S.
	Exercise	1	168.42	12.64	.000
	Sex	1	50.92	3.82	N.S.
	F x E	1	18.40	1.38	N.S.
	F x S	1	.12	.01	N.S.
	E x S	1	11.21	.84	N.S.
	F x E x S	1	3.04	.23	N.S.
	Error	44	586.23		
HR Between-Session Habituation	Flooding	1	76.34	.79	N.S.
	Exercise	1	.47	.00	N.S.
	Sex	1	6.12	.06	N.S.
	F x E	1	33.95	.35	N.S.
	F x S	1	7.00	.07	N.S.
	E x S	1	129.75	1.35	N.S.
	F x E x S	1	74.85	.78	N.S.
	Error	44	4232.75		
SCL Peak Response	Flooding	1	1.52	.39	N.S.
	Exercise	1	26.30	6.67	.01
	Sex	1	.14	.04	N.S.
	F x E	1	.41	.10	N.S.
	F x S	1	17.36	4.41	.04
	E x S	1	2.70	.69	N.S.
	F x E x S	1	11.92	3.03	N.S.
	Error	41	161.56		
SCL Within-Session Habituation	Flooding	1	.08	.13	N.S.
	Exercise	1	.14	.23	N.S.
	Sex	1	.28	.44	N.S.
	F x E	1	1.38	2.15	N.S.
	F x S	1	.16	.26	N.S.
	E x S	1	1.21	1.89	N.S.
	F x E x S	1	.60	.94	N.S.
	Error	41	26.37		

Measure	Effect	df	SS	F	p
SCL	Flooding	1	1.28	.28	N.S.
Between-	Exercise	1	3.55	.77	N.S.
Session	Sex	1	2.83	.61	N.S.
Habituation	F x E	1	1.60	.35	N.S.
	F x S	1	2.62	.57	N.S.
	E x S	1	9.07	1.97	N.S.
	F x E x S	1	5.90	1.28	N.S.
	Error	41	188.74		
SCR	Flooding	1	.51	.11	N.S.
Peak Response	Exercise	1	79.11	17.65	.000
	Sex	1	3.62	.81	N.S.
	F x E	1	12.29	2.74	N.S.
	F x S	1	14.41	3.22	N.S.
	E x S	1	2.15	.48	N.S.
	F x E x S	1	4.81	1.08	N.S.
	Error	41	183.75		
SCR	Flooding	1	5.97	1.76	N.S.
Within-	Exercise	1	3.16	.93	N.S.
Session	Sex	1	1.28	.38	N.S.
Habituation	F x E	1	3.46	1.02	N.S.
	F x S	1	.03	.01	N.S.
	E x S	1	.30	.09	N.S.
	F x E x S	1	2.66	.78	N.S.
	Error	41	139.55		
SCR	Flooding	1	.24	.03	N.S.
Between-	Exercise	1	14.28	1.97	N.S.
Session	Sex	1	2.10	.29	N.S.
Habituation	F x E	1	6.83	.94	N.S.
	F x S	1	2.14	.30	N.S.
	E x S	1	6.83	.94	N.S.
	F x E x S	1	.47	.06	N.S.
	Error	41	297.55		

Appendix L: ANOVA Summary Tables for Attribution Ratings

Measure	Effect	df	SS	F	p
Anxiety Attribution (first session)	Flooding	1	39.44	8.63	.005
	Exercise	1	.29	.07	N.S.
	Sex	1	4.28	.94	N.S.
	F x E	1	.04	.01	N.S.
	F x S	1	1.48	.32	N.S.
	E x S	1	.00	.00	N.S.
	F x E x S	1	.93	.20	N.S.
	Error	44	201.17		
Anxiety Attribution (second session)	Flooding	1	87.08	27.81	.000
	Exercise	1	1.11	.36	N.S.
	Sex	1	9.01	2.88	N.S.
	F x E	1	.32	.10	N.S.
	F x S	1	.49	.16	N.S.
	E x S	1	.35	.11	N.S.
	F x E x S	1	1.04	.33	N.S.
	Error	44	137.77		
Relaxation Attribution (first session)	Flooding	1	40.41	14.52	.000
	Exercise	1	21.14	7.60	.008
	Sex	1	.24	.09	N.S.
	F x E	1	.00	.00	N.S.
	F x S	1	27.55	9.90	.003
	E x S	1	.08	.03	N.S.
	F x E x S	1	.39	.14	N.S.
	Error	44	122.45		
Relaxation Attribution (second session)	Flooding	1	61.36	26.11	.000
	Exercise	1	19.14	8.15	.006
	Sex	1	16.30	6.94	.01
	F x E	1	.01	.01	N.S.
	F x S	1	2.86	1.22	N.S.
	E x S	1	1.36	.58	N.S.
	F x E x S	1	3.26	1.39	N.S.
	Error	44	103.42		
Arousal Attribution (first session)	Flooding	1	56.28	14.17	.0005
	Exercise	1	9.78	2.46	N.S.
	Sex	1	.15	.04	N.S.
	F x E	1	1.81	.46	N.S.
	F x S	1	19.24	4.85	.03
	E x S	1	.01	.00	N.S.
	F x E x S	44	.39	.10	N.S.
	Error		174.73		

Measure	Effect	df	SS	F	p
Arousal Attribution (second session)	Flooding	1	47.59	17.45	.000
	Exercise	1	48.54	17.79	.000
	Sex	1	1.24	.46	N.S.
	F x E	1	.25	.10	N.S.
	F x S	1	.52	.19	N.S.
	E x S	1	.30	.11	N.S.
	F x E x S	1	18.35	6.73	.01
	Error	44	120.03		
Fatigue Attribution (first session)	Flooding	1	25.13	7.11	.01
	Exercise	1	11.56	3.27	N.S.
	Sex	1	18.00	5.10	.02
	F x E	1	.93	.26	N.S.
	F x S	1	2.27	.64	N.S.
	E x S	1	.03	.01	N.S.
	F x E x S	1	.33	.09	N.S.
	Error	44	155.45		
Fatigue Attribution (Second session)	Flooding	1	13.37	7.91	.007
	Exercise	1	11.27	6.67	.01
	Sex	1	6.19	3.66	N.S.
	F x E	1	.07	.04	N.S.
	F x S	1	.39	.24	N.S.
	E x S	1	.86	.51	N.S.
	F x E x S	1	.17	.11	N.S.
	Error	44			
Energy Attribution (first session)	Flooding	1	.17	.04	N.S.
	Exercise	1	41.87	8.46	.005
	Sex	1	11.25	2.28	N.S.
	F x E	1	.54	.11	N.S.
	F x E	1	7.90	1.60	N.S.
	E x S	1	.29	.06	N.S.
	F x E x S	1	1.38	.28	N.S.
	Error	44	217.65		
Energy Attribution (second session)	Flooding	1	1.29	.37	N.S.
	Exercise	1	25.74	7.42	.009
	Sex	1	10.34	2.98	N.S.
	F x E	1	12.93	3.37	N.S.
	F x S	1	.56	.16	N.S.
	E x S	1	3.95	1.14	N.S.
	F x E x S	1	.15	.04	N.S.
	Error	44	152.56		

Appendix M: Summary Table of Five-way MANOVA and Follow-up ANOVAS on Process Imagery Variables

Measures	Effect	df	TSQ	F	p
Clarity, Difficulty, Amount of Time	Flooding	3	24.06	7.66	.000
	Exercise	3	12.59	4.01	.01
	Sex	3	7.01	2.23	N.S.
	F x E	3	1.55	.49	N.S.
	F x S	3	1.95	.62	N.S.
	E x S	3	1.34	1.34	N.S.
	F x E x S	3	2.10	2.10	N.S.
	Error	42			
	Day	3	2.68	.85	N.S.
	D x F	3	17.80	5.66	.002
	D x E	3	1.87	.60	N.S.
	D x S	3	11.43	3.64	.02
	D x F x E	3	6.89	2.19	N.S.
	D x F x S	3	4.21	1.34	N.S.
	D x E x S	3	2.50	.80	N.S.
	D x F x E x S	3	7.82	2.49	N.S.
	Error	42			
	Period	6	13.68	2.01	N.S.
	P X F	6	10.54	1.56	N.S.
	P x E	6	6.45	.95	N.S.
	P x S	6	6.00	.89	N.S.
	P x F x E	6	7.43	1.10	N.S.
	P x F x S	6	5.88	.87	N.S.
	P x E x S	6	5.24	.77	N.S.
	P x F x E x S	6	10.16	1.50	N.S.
	Error	39			
	D x P	6	9.34	1.38	N.S.
	D x P x F	6	12.63	1.87	N.S.
	D x P x E	6	23.05	3.41	.008
	D x P x S	6	7.18	1.06	N.S.
	D x P x F x E	6	7.74	1.14	N.S.
	D x P x F x S	6	6.04	.89	N.S.
	D x P x E x S	6	9.86	1.46	N.S.
	D x P x F x E x S	6	4.72	.70	N.S.
	Error	39			

Measure	Effect	df	SS	F	p
Clarity	Flooding	1	141.35	21.74	.000
	Exercise	1	39.01	6.00	.01
	Sex	1	20.24	3.11	N.S.
	F x E	1	9.50	1.46	N.S.
	F x S	1	3.02	.46	N.S.
	E x S	1	17.21	2.65	N.S.
	F x E x S	1	17.07	2.63	N.S.
	Error	44	286.13		
	Day	1	3.14	2.11	N.S.
	D x F	1	16.92	11.37	.001
	D x E	1	.23	.16	N.S.
	D x S	1	3.14	2.11	N.S.
	D x F x E	1	6.82	4.58	.03
	D x F x S	1	1.92	1.30	N.S.
	D x E x S	1	.12	.09	N.S.
	D x F x E x S	1	5.77	3.88	N.S.
	Error	44	65.48		
	Period	2	1.04	.45	N.S.
	P x F	2	9.23	3.77	.02
	P x E	2	.74	.32	N.S.
	P x S	2	.59	.26	N.S.
	P x F x E	2	.07	.03	N.S.
	P x F x S	2	.06	.03	N.S.
	P x E x S	2	.12	.05	N.S.
	P x F x E x S	2	5.39	2.32	N.S.
	Error	88	102.20		
	D x P	2	2.82	2.41	N.S.
	D x P x F	2	7.28	6.22	.003
	D x P x E	2	4.05	3.47	.03
	D x P x S	2	2.63	2.25	N.S.
	D x P x F x E	2	2.13	1.82	N.S.
	D x P x F x S	2	1.70	1.46	N.S.
	D x P x E x S	2	.19	.17	N.S.
	D x P x F x E x S	2	1.29	1.11	N.S.
	Error	88	51.47		

Measure	Effect	df	SS	F	p
Difficulty	Flooding	1	28.30	5.74	.02
	Exercise	1	57.62	11.69	.00
	Sex	1	19.61	3.98	N.S.
	F x E	1	2.55	.52	N.S.
	F x S	1	.84	.17	N.S.
	E x S	1	.14	.03	N.S.
	F x E x S	1	28.86	5.05	.01
	Error	44	216.94		
	Day	1	1.64	.90	N.S.
	D x F	1	10.73	5.84	.01
	D x E	1	.42	.23	N.S.
	D x S	1	7.57	4.12	.04
	D x F x E	1	3.86	2.10	N.S.
	D x F x S	1	4.96	2.70	N.S.
	D x E x S	1	3.66	1.99	N.S.
	D x F x E x S	1	7.86	4.28	.04
	Error	44	80.91		
	Period	2	8.93	3.58	.03
	P x F	2	2.37	.95	N.S.
	P x E	2	5.59	2.24	N.S.
	P x S	2	3.63	1.45	N.S.
	P x F x E	2	.85	.34	N.S.
	P x F x S	2	3.22	1.29	N.S.
	P x E x S	2	6.16	2.47	N.S.
	P x F x E x S	2	12.70	5.08	.008
	Error	88	109.94		
	D x P	2	4.85	2.43	N.S.
	D x P x F	2	3.45	1.73	N.S.
	D x P x E	2	18.17	9.10	.000
	D x P x S	2	1.01	.51	N.S.
	D x P x F x E	2	.53	.27	N.S.
	D x P x F x S	2	3.75	1.88	N.S.
	D x P x E x S	2	5.02	2.51	N.S.
	D x P x F x E x S	2	1.99	1.00	N.S.
	Error	88	87.92		

Measure	Effect	df	SS	F	p
Amount of Time	Flooding	1	71.06	14.04	.000
	Exercise	1	43.73	8.64	.005
	Sex	1	34.97	6.91	.01
	F x E	1	1.69	.33	N.S.
	F x S	1	1.47	.29	N.S.
	E x S	1	2.50	.49	N.S.
	F x E x S	1	8.87	1.75	N.S.
	Error	44	222.66		
	Day	1	.97	.58	N.S.
	D x F	1	.80	.48	N.S.
	D x E	1	1.69	1.01	N.S.
	D x S	1	1.23	.73	N.S.
	D x F x E	1	7.57	4.49	.03
	D x F x S	1	4.65	2.76	N.S.
	D x E x S	1	.00	.00	N.S.
	D x F x E x S	1	7.57	4.49	.03
	Error	44	74.15		
	Period	2	5.18	2.05	N.S.
	P x F	2	4.24	1.68	N.S.
	P x E	2	.50	.20	N.S.
	P x S	2	2.18	.86	N.S.
	P x F x E	2	1.82	.72	N.S.
	P x F x S	2	.06	.02	N.S.
	P x E x S	2	.96	.38	N.S.
	P x F x E x S	2	5.41	2.14	N.S.
	Error	88	111.44		
	D x P	2	3.02	1.49	N.S.
	D x P x F	2	4.59	2.25	N.S.
	D x P x E	2	5.65	2.78	N.S.
	D x P x S	2	2.38	1.17	N.S.
	D x P x F x E	2	3.02	1.48	N.S.
	D x P x F x S	2	4.05	1.99	N.S.
	D x P x E x S	2	4.73	2.32	N.S.
	D x P x F x E x S	2	.86	.43	N.S.
	Error	88	89.64		

Appendix N: Varimax Rotated Factor Matrix after Rotation for Items of Coping Style Questionnaire

Varimax Rotated Factor Matrix after Rotation with Kaiser Normalization

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1.	.56*	-.05	-.08	.33	.38
2.	.00	-.70*	.11	.37	.14
3.	-.26	.68*	.05	.23	.07
4.	.56*	-.22	-.25	.38	.20
5.	.15	.33	.02	.59*	-.20
6.	-.14	.02	.08	.49*	.21
7.	.04	.01	.67*	.29	-.11
8.	-.14	.68*	.23	.01	.11
9.	.05	.08	-.00	-.05	.88*
10.	.05	.19	.81*	-.12	-.11
11.	-.17	-.35	.24	-.19	.00
12.	.56*	-.02	.23	-.28	-.07
13.	-.62*	.15	.15	-.05	.19
14.	-.64*	.17	.05	.17	-.35
15.	.14	.11	-.64*	-.06	-.27
16.	.06	-.06	.04	.64*	-.10
17.	.71*	.09	.05	.07	-.03

Note Item inclusion in a factor is indicated by a *