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THE CONTRIBUTION OF AN EDUCATIONAL PHASE
TO THE STRESS INOCULATION OF ANXIETY

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The Contribution of an Educational Phase to
the Stress Inoculation of Anxiety

Recently the development of a hybrid has occurred in behavior modification such that cognitive factors are receiving more attention (Mahoney, 1977; Meichenbaum, 1977). One of the treatment packages developed by researchers in this area is stress inoculation. As the name implies, stress inoculation is a procedure to inoculate persons against stress by teaching skills to manage future stressful situations. The overall technique has been tested and shown to be effective in reducing test anxiety (Goldfried, Linehan and Smith, 1968; Hussian and Lawrence, 1978) speech anxiety (Fremouw and Zitter, 1978; Jaremko and Walker, Note 1), anger (Novaco, 1976) and laboratory pain (Horan, Hackett, Buchanon, Stone and Demchik-Stone, 1977). Further, it has been applied to diverse populations including college students (Meichenbaum, 1977), neurotics (Meichenbaum, Gilmore and Fedoravicius, 1971), law enforcement officers (Meichenbaum and Novaco, 1978) and burn patients (Jaremko, Taylor and Wernick, Note 2).

The treatment package of stress inoculation consists of a number of possible active ingredients (Jaremko, in press). Research in this area has been

marked by procedural variation. That is, different studies have employed different procedures. In an attempt to component analyze the active parts of this package, Jaremko (in press) conceptualized the procedures to be organized in three phases: education, skills, and application. Each of these phases is composed of a number of possibly active procedures. In the education phase, the client learns a model of the stress reaction that is intuitively plausible. The skills phase consists of a number of techniques to break the cycle of stress. These include: relaxation (Novaco, 1976; Hussian and Lawrence, 1978), cognitive restructuring (Fremouw and Zitter, 1978), cognitive coping strategies (Goldfried, et al., 1978; D'Zurilla, Wilson and Nelson, 1973) and stress reappraisal (Meichenbaum and Cameron, Note 3; Novaco, 1976; Turk, Note 4). Finally in the application phase, the techniques are practiced in vivo or imaginally while the client is exposed to the stressor.

In order for the therapeutic community to maximize the efficacious use of stress inoculation, we must determine how much each component contributes to the overall effect. Some researchers are devoted to this task. For example Horan et al., (1977) concluded that the cognitive restructuring component was the major

ingredient. These researchers used the cold pressor as an analogue of stress. While there are some methodological problems with this study, it was concluded that the educational phase was a necessary but not sufficient ingredient in stress inoculation. Other researchers have also concentrated on the cognitive restructuring part of stress inoculation. Fremouw and Zitter (1978) found that this procedure was better than skills training in reducing speech anxiety. Goldfried, Linehan and Smith (1978) demonstrated that cognitive restructuring was better than exposure only in treating test anxiety. In addition, Glogower, Fremouw and McCroskey (1978) component analyzed cognitive restructuring and found it to be composed of three separate ingredients: exposure, negative self statement identification, and negative self statement replacement.

Since the cognitive restructuring component has been considered by some to be the most important component of the stress inoculation package, most research has been directed to it. Contrary to the Horan et al. (1977) study, however, the educational phase may be of significance. Jaremko (in press) argued that Horan et al. (1977) failed to provide an adequate test of the contribution of the educational rationale to the efficacy of stress inoculation. Other data suggest that this part

may be important. The present study proposes a review of these data bearing on the educational model's contribution and a test of stress inoculation with an education component and without an education component.

Several investigators have shown the impact of the educational rationale in treatment. Oliveau, Agras, Leitenberg, Moore and Wright (1969) investigated the separate and combined influences of therapeutic instructions and positive reinforcement. Snake phobic subjects were assigned to groups receiving instructions only, instructions with reinforcement, and no instructions, no reinforcement. They found instructions alone had a significant effect on approach behavior; indicating that theoretical instructions enhances therapeutic effects. Hicks and Shenberg (1976) studied the effect of receiving a rationale and incentive separately and in combination. Approach behavior was significantly increased with both rationale and incentive alone but the best results were obtained by combining the two. Once again, therapeutic rationale or education made a difference.

To study differing amounts of information as related to initial effort in study skills treatment Scidman (1973) gave subjects a model and treatment strategy with much explanation (maximum structure) or

with little explanation (minimum structure).

Subjects given the maximum structure gave more statements of intention and showed greater initial effort in treatment than those given minimum structure. Giving subjects a theoretical framework thus enhances the subject's effort. In treating snake anxiety with operant conditions Parrino (1971) gave his subjects different kinds of pretherapy information: Learning theory (advance-organizer group), expected behaviors (expectation group), Learning theory and expected behaviors (advance organizer-expectation group), no information (NI) and information not relevant to operant therapy (NOA). Pretherapy information differentially facilitated approach behaviors in therapy as compared to controls. Another group of investigators (Leitenberg, Agras, Barlow and Oliveau, 1969) studied the contribution of selective positive reinforcement and therapeutic instructions to systematic desensitization therapy. In one of their groups subjects were exposed to instructions on how the therapy was to work and given reinforcement after each step in the presentation of the hierarchy. The second group just received the presentation of the hierarchy and relaxation training. Greater therapeutic outcome was achieved through the combination of reinforcement and pretherapy information.

Nash, Hoen-Saric, Battle, Stone, Imber and Frank (1965) gave some of their subjects a Role Induction Interview (RII) which consisted of a general exposition of psychotherapy, a description and explanation of expected patient and therapist behaviors, preparation for typical phenomenon in therapy and a realistic expectation for improvement. Other subjects received the same psychotherapy without the Role Induction Interview. The role inducted subjects achieved better outcome from therapy compared to the subjects not given the role induction interview.

All of the above findings point to the conclusion that an educational phase of therapy is an important component of the therapeutic process. Though research has been conducted on the effect of prior information on outcome of systematic desensitization, operant conditioning and general psychotherapy, little has been directed to analyzing the education aspect of the stress inoculation treatment package. The present study proposes to investigate the relative contribution of an educational model to stress inoculation in the treatment of speech anxiety.

The educational component to be evaluated will be based on a modified Schachterian model of emotional arousal (Jaremko, in press). In this model emotional

arousal is seen as involving a cycle of three things: (1) heightened arousal (e.g. increased heart rate, sweaty palms, rapid breathing, bodily tension), (2) automatic appraisal of a situation as anxious, and (3) negative self statements that cause more physical arousal thus setting the cycle off again. This model is being used since it conceptualizes anxiety in a plausible way, and lends itself to the smooth use of specific coping techniques (Jaremko, in press). Meichenbaum (1975) states that the educational model is used by the client to understand the nature of his response to stressors and to facilitate the client's participation. Therefore its plausibility to the client is more important than its scientific validity.

The present study is only the first step in understanding the contribution the educational component can make to the stress inoculation treatment. Other relationships such as why and how the educational phase works or the effectiveness of different models can be examined. Jaremko (in press) suggests that we should also empirically validate the "plausibility" of treatment rationales. Future research will address these issues. The present study is a test of stress inoculation with education versus stress inoculation without education. If it is found that education contributes nothing, further work is unnecessary.

The knowledge to be gleaned from this study has significance for other treatments as well. Since theoretical frameworks and their value can be assessed for these other treatments, it is possible that the findings for stress inoculation in the educational model may apply to other treatments. It is hoped that future research will be generated because of the present work on the topic.

In order to test this contribution of education to stress inoculation, an outcome study using speech anxiety was performed. Jaremko and Walker (Note 1) used a similar research design and treatment procedure to evaluate the contribution of different self-statements in the cognitive restructuring component of stress inoculation. The procedure is to present stress inoculation in a speech anxiety workshop format. Speech anxious students are evaluated for treatment effects by in-class (introductory speech) measurement of anxiety.

This approach has a number of advantages. First the nature of the problem of speech anxiety for students currently enrolled in a speech class is more clinical than many fear analogues. Students who really need clinical help in the management of anxiety get it. Secondly, the measurement of fear in the actual fear

situation (speech class) increases the external validity of the test. Finally, the workshop format allows for a time efficient treatment application. Since subjects are all in groups and the stress inoculation package can be completed in two sessions, the therapist's time expenditure is minimal.

The hypotheses of the present study are that a treatment group receiving the package of stress inoculation including education show greater fear reduction on self report and behavioral measures of speech anxiety than a treatment group receiving stress inoculation without education. The treatment group receiving stress inoculation without education show greater fear reduction than a group receiving education without the stress inoculation skills. All three groups show greater fear reduction than no treatment control group.

METHOD

Subjects

All subjects were selected from introductory speech classes at the University of Richmond. A public speaking fear survey (Appendix A) was given to all students at the beginning of the semester. Construct validity of this survey has been established by discriminating anxious from non-anxious people (Jaremko and Wenrich, 1973; Jaremko and Walker, Note 1). Students scoring above the median were invited to participate in a workshop on dealing with the stress of public speaking. Subjects who accepted the invitation were assigned to one of four groups: stress inoculation with education (Combination), stress inoculation without education (Skills only), education without stress inoculation (Education only), or a no treatment control (NTC). The assignments were made according to the subjects' schedules.

Instruments

The Affect Adjective Checklist (AACL) (Appendix B) (Zuckerman and Lubin, 1965) was used as a measure of anxiety. Only the anxiety scale of this checklist was used since it is the only scale that has been shown to discriminate speech anxiety (Zuckerman and Lubin, 1965). This measure is a list of adjectives which describe

affect. A measure of self efficacy (SE) in public speaking was also used (Appendix C). This measure was designed for a previous study in public speaking anxiety (Jaremko and Walker, Note 2). It was derived from other self efficacy measures (Bandura, 1977). This instrument contains ten specific behaviors involved in preparing and giving a speech (e.g. choosing a topic, practicing with a friend, delivering a speech for a grade, receiving feedback about a speech). Subjects are to rate the extent they feel able to perform the behaviors on a ten point scale ranging from "great uncertainty" to "complete certainty". This measure's validity was suggested by its correlation with others measures in the previous study (Jaremko and Walker, Note 1). A third assessment scale is the Behavioral Assessment of Speech Anxiety (BASA) (Appendix D) (Mulac and Sherman, 1974). This scale was filled out by two independent raters blind to the experimental groups. The raters filled out the forms while the subject gave one of his/her speeches in the class. It totals into a final score on the basis of 17 specific aspects of speech anxiety which are grouped into six major categories: voice, verbal fluency, mouth and throat, facial expression, arm and hand movement, and gross body movement. Mulac and Sherman (1974) have shown this instrument to have

adequate reliability and validity. Interrater reliability was computed by correlating the scores of the pair who rated each subject.

Procedure

The professors of the speech classes were contacted before the beginning of the term. The rationale and plan of the study was described to them and their cooperation solicited. The researcher went to the first meeting of the classes to explain the study. An informed consent agreement (Appendix E) and the SFSS (Jaremko and Wenrich, 1973) were given to the students at that meeting.

After subjects have been recruited and assigned to one of the groups, the author and the two raters observed them during their first in-class speech of the semester and their third in-class speech of the semester. The subjects were rated on the behavioral measure (BASA) for these two speeches as a pretest and a posttest. Stress inoculation was given between these two speeches. Prior to each speech the person filled out an AACL and a Self Efficacy measure. A final questionnaire which assesses the subjects perception of the effect of the speech workshop (Appendix F) was completed after the final speech.

Treatments

After the first and before the second speech the subjects who volunteered for the speech workshops were met for two one-hour sessions. The stress inoculation procedure was given during these sessions. Each stress inoculation group was divided in half. Half of the subjects from each experimental group was exposed to one therapist and the other half was exposed to the other.

Stress Inoculation With Education. (Combination)

This was identical to Jaremko and Walker's (Note 1) treatment procedure. The treatment has three phases: education, skills and application. In the education phase a modified Schachterian model of stress was given. Under this model stress is seen as a cycle of physical arousal, automatic appraisal of anxiety, and negative self-statements. The plan is to break the cycle using three sets of skills: (1) physical relaxation, (2) coping statements that reappraise the stress in a series of four stages: preparation, confrontation, coping and self reinforcement, and (3) identification of negative self-statements and replacement of these with positive self-statements. The education was given in a lecture/discussion format.

In the skills phase, two physical coping skills

were taught: (1) identification of where each person feels the arousal (e.g. tension in the neck, rapid breathing, etc.) and a specific technique to combat the arousal (such as counter-tension, self massage or deep breathing); (2) deep, slow breathing to be used in a practice speech in the rehearsal phase. Examples of coping statements that change the appraisal of stress (Meichenbaum and Cameron, Note 4) were given to the subjects. Finally subjects write down the respective self-statements they made during a speech (e.g. "The audience will be able to tell I'm nervous," "I'll forget the details of the speech," "They'll think I'm stupid."). Positive self-statements were then generated by the group to replace these negative ones (e.g. "At least I learned something by preparing this speech," "By doing this I feel better about myself."). The subjects were instructed to pick the two positive self-statements which they thought applied to them and use them as replacement statements.

In the second session the stress cycle model and the skills were reviewed. The subjects shared their negative self-statements and chose two positive self-statements. Following this exercise each person was called upon to give a short speech on a topic assigned to them at the beginning of the session. This is the application phase of treatment. Each subject stated

out loud where they felt their physical arousal resided, tried to reduce it, state what negative statements they were having, and then breathe deeply as they walk to the head of the table. After they had given their speech, they were instructed to reward themselves for having coped. When all the subjects had given their speeches the second session was terminated. Appendix G is the treatment manual for this group.

Stress Inoculation Without Education. (Skills only) This group had the same procedure as the stress inoculation with education group except they did not receive the stress cycle model. The review of the model was also omitted for this group in the second session. Subjects in this group were told to locate their individual physical arousal area and given the relaxation skills to counteract it. Like the Combination group they were told to identify their negative self-statements and replace them with two positive self-statements of their choice. Each subject was called on randomly to give a speech on the pre-arranged topic in similar fashion to the Combination group. Appendix II is the treatment manual for this group.

Education Without Stress Inoculation (Education only) This group received the modified Schachterian stress cycle model but had not received the stress

inoculation skills. Like the Combination group this group was instructed to conceptualize stress as a cycle of physical arousal, automatic appraisal of anxiety, and negative self-statements. Subjects were told that they can break the cycle by using three sets of skills: (1) physical relaxation, (2) coping statements that reappraise the stress in a series of stages, and (3) identification of negative self-statements and replacement of these with positive self-statements. The second session was a review of this model and a general filler discussion of the nature of stage fright.

Appendix I is the treatment manual for this group.

No Treatment Control. This group received the same assessment procedures as the two treatment groups but received no treatment. They were told that they can seek assistance for their speech anxiety at the University counseling center. No assistance was given until after the final assessment.

Therapists

A Doctoral level clinical psychologist with three years experience in behavior therapy and a female Master's level graduate student served as the therapists. The female graduate has had course work in cognitive therapies but is otherwise inexperienced. The female therapist received a detailed treatment manual training by the

clinical psychologist prior to the treatment sessions. Each therapist conducted groups in the two treatment conditions. In each treatment condition one experienced and one inexperienced therapist conducted a group individually. Two therapists were included to assess the effect of different therapists on outcome.

Design

The present investigation was a two X two X two design. There are two education levels (Education and No Education) making up the (A) factor, two skills levels (Skills and No Skills) making up the (B) factor, and a pre- and posttest making up the (C) factor. An orthogonal analysis was used since there are specific hypotheses. A post hoc therapist X trials X groups analysis was conducted to assess any differences between the therapists. The acceptable level of significance was $\alpha = .05$.

RESULTS

Table 1 presents the means and standard deviations of all four groups for each measurement time on all three measures. A three-way orthogonal analysis of variance (Ed/No Ed X Skills/No Skills X Trials) was performed on the three measures. The analysis revealed no differences between groups on the pretest for the AACL, SE or BASA data. Testing on the AACL data yielded a significant education X trials interaction ($F(1,52) = 4.50, p < .05$). This interaction suggests that the education groups changed more than the no education groups. Separate *t*-tests were conducted on the pretest and posttest differences for each group. The Ed only group showed a significant reduction in anxiety ($t = 2.97, p < .01$). The Combination group also showed a reduction ($t = 2.66, p < .05$). The Skills only group and the NTC group were not significantly different. Though the groups did not differ at pretest, consideration should be given to the initial differences between the groups as can be seen from Figure 1, the two education groups had higher initial anxiety than the non-education groups. Upon inspection of the raw data, the variance appeared to result from a few variance outlying subjects. This could have biased the test in favor of education. 50% of the Combination subjects decreased AACL scores one

standard deviation or more at posttest. 45% of the Ed only subjects decreased scores at posttest. 33% of the Skills only subjects decreased at posttest. 22% of the NTC subjects decreased at posttest. Appendix J presents the individual AACL scores for each subject. Figures 1 and 2 are graphic representations of the mean AACL scores for all groups and the Ed X Trials interaction respectively.

The orthogonal analysis of the SE data also yielded a significant education X trials interaction ($F(1,52) = 4.28, p < .05$). Differences between pretest and posttest for all groups were assessed separately using t-test. The (Ed only) group changed significantly from pretest to posttest ($t = 3.88, p < .01$). The (Combination), (Skills only) and (NTC) groups did not change significantly. Like the AACL data, consideration should be given to the initial differences between the groups at pretest. Figure 3 shows that the two education groups exhibited lower self efficacy scores than controls at pretest. It may have been that the significant result is due to the fact that the education groups had more room for improvement rather than being more powerful than the non-education groups. 0% of the (Combination) group increased their SE scores one standard deviation at posttest. 33% of the

(Ed only) subjects increased scores at posttest. 16% of the (Skills only) subjects increased at posttest. 0% of the (NTC) subjects increased at posttest. Appendix K contains the individual SE scores for each subject. Figures 3 and 4 are graphic representatives of the mean SE scores for all groups and the education X trials interaction respectively.

The correlation between the raters of the BASA was .67. The orthogonal analysis revealed a main effect on trials ($F(1,52) = 24.45, p < .01$) and a significant education X skills interaction ($F(1,52) = 6.82, p < .05$). A post hoc analysis of this interaction was undertaken by using t-tests. However, no significant differences were found. It may have been that the smaller t-tests were unable to find the specific differences of the interaction found by the larger orthogonal analysis. The smaller number of subjects in the t-tests and the consequent loss of power could account for this inability to disseminate the interaction. Figure 3 is a graphic representation of the education X skills interaction. The analysis did show that all groups changed from pretest to posttest. 50% of the (Combination) subjects decreased their BASA scores one standard deviation at posttest. 67% of the (Ed only) subjects decreased their anxiety scores

at posttest. 33% of the (Skills only) subjects decreased at posttest. 44% of the (NTC) subjects decreased their scores at posttest. Appendix L contains the individual BASA scores for each subject. Figures 5 and 6 are graphic representatives of the mean BASA scores and the education X skills interaction respectively.

Separate t-tests were performed for each group to assess therapist effects. Analysis yielded no differences between therapist groups at pretest or posttest.

A post hoc F test for homogeneity of variance was performed on the AACL, SE and BASA data. The F-max test was significant for the AACL ($F(6,6) = 23.28$, $p < .01$), SE ($F(6,9) = 5.49$, $p < .05$) and BASA ($F(6,9) = 4.92$, $p < .05$) data.

A post hoc analysis of variance of the workshop effectiveness data was performed. Analysis revealed no differences between groups in their ratings of the workshops' effectiveness.

Appendices M, N and O give the source tables for the analysis of the AACL, SE and BASA data, respectively.

A post hoc correlation of the SFSS scores with the AACL scores was performed to measure regression to the mean. A moderate correlation ($r = .43$, $N = 30$) was found between the SFSS and AACL scores suggesting the possibility of some regression to the mean. This

tendency should also be considered when interpreting the result that education was superior.

DISCUSSION

The results of this study provide preliminary support for the educational component of being the major active ingredient in stress inoculation. At the very least, education was found to have a significant contribution to the effect of stress inoculation. This conclusion should be taken conservatively, however, because of the small number of subjects, the trend toward significance in the SE and BASA data, and the initial differences at pretest. Replication of the present study is suggested.

Specifically, education alone and in combination with the skills of stress inoculation was found to have the greatest effect on decreasing AACL-anxiety scores as compared to the other groups. Also, education alone increased self efficacy scores more than the other groups. This result is somewhat unexpected and contradicts previous research (e.g. Horan et. al., 1977) that has shown that the skills of stress inoculation are responsible for the treatment effect. Although replication of present finding is indicated, it may have

been that the small number of sessions (two) biased the present treatment program toward the education component. Studies that use a greater number of skills practice and rehearsal sessions might show that the skills component is an important ingredient. If the present finding proves to be robust in light of replication, future studies should evaluate the interaction of the number of sessions of stress inoculation and the relative contributions of the education and skills components.

An improvement result was found for all treatment groups for the behavioral measure. It could be explained by simple practice effects. The speech workshops took place between the first and third speeches. Since a second speech was given between the pretest and posttest, subjects' anxiety could have been reduced by the practice of having given two speeches.

The finding of a lack of a differential effect from the educational component on the behavioral measure (BASA) requires comment. Unlike the AACL and SE, the education group did not reduce overt anxious behavior more than the other groups. A possible explanation for this finding is that the trials or practice effect for all groups was most dramatic on the behavioral measure. This reduction in overt anxiety is not surprising considering that speech classes focus on overt behavioral

mannerisms in speech delivery rather than cognitive factors. Plus the stress inoculation treatment used here was primarily directed to covert behaviors (i.e. self-statements). The different results of the AACL, SE and BASA therefore are more understandable in light of the instructional emphases of the speech class and treatment used in this study. There are a few rival hypotheses for the present results. Regression to the mean is one possibility. There is always a degree of error variance in any measure. When this occurs, the scores may suggest regression to the mean. In the present study, anxiety scores should be lower in all groups as a result of this regression. Considering that regression occurs in the control group also, the hypothesis that regression to the mean accounts for the results is not suspect. Another explanation for these results is the relative differences between groups at pretest. Though not significant, the treatment groups showed higher anxiety scores than the control group before treatment. Any changes of the education groups from pretest to posttest would be more dramatic since these groups were more anxious initially.

A related issue is that although there was an education effect from pretest to posttest, there was a lack of differences between groups at posttest. As was

stated earlier, the overall decrease in anxiety for the groups should be a consideration. Within group variance could also be a factor. In order to examine this relationship further a post hoc F-max test for homogeneity of variance was conducted. The heterogeneity of variance indicated by the F-max test suggests that subjects varied considerably within their treatment group. Using the median as the criterion for speech anxiety in the initial screening could be responsible for the within group variance. Future research in this area might use a higher criterion for the initial screening to control for this variance.

Post hoc t-tests were conducted between the two therapists to assess possible therapist bias. The results indicate no differences between them on outcome. However, due to the small number of subjects in each cell, therapist bias remains a possible contaminating factor.

In conclusion, the present investigation provides prefactory evidence that the educational phase of stress inoculation is a more potent than expected ingredient of the package. However, inconsistent results on two of the measures, small N's, regression to the mean, initial differences between groups and practice effects indicate the need for a direct replication. The finding that stress inoculation works only because of the

educational rationale is not consistent with previous research and may be related to the number of skills rehearsal and application sessions. Future research should address such an interaction.

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Table 1
 Mean Pretest and Posttest Scores Of
 Each Measure for All Groups

TREATMENT	AACL*		SE**		BASA*	
	mean	s.d.	mean	s.d.	mean	s.d.
Combination						
pre	14.5a	3.7	59.67a	15.9	37.25a	14.8
post	10.5b	4.0	63.67a	15.3	26.88b	10.8
Skills only						
pre	12.67a	3.8	64.0a	17.1	46.36a	17.0
post	11.5 a	0.8	65.5a	20.5	34.62b	13.1
Ed only						
pre	14.11a	3.2	54.56a	13.5	40.41a	11.1
post	10.78b	3.0	63.78b	13.4	25.63b	12.6
NTC						
pre	12.11a	3.8	60.33a	13.7	42.73a	11.5
post	11.56a	2.7	60.33a	8.7	21.91b	7.6

* Higher numbers indicate more anxiety.
 ** Higher numbers indicate more self efficacy.
 Means with the same postscript are statistically equal;
 those with different ones are statistically
 different.

Combination	△	_____	△
Ed only	⊠	_____	⊠
Skills only	○	_____	○
NTC	□	_____	□

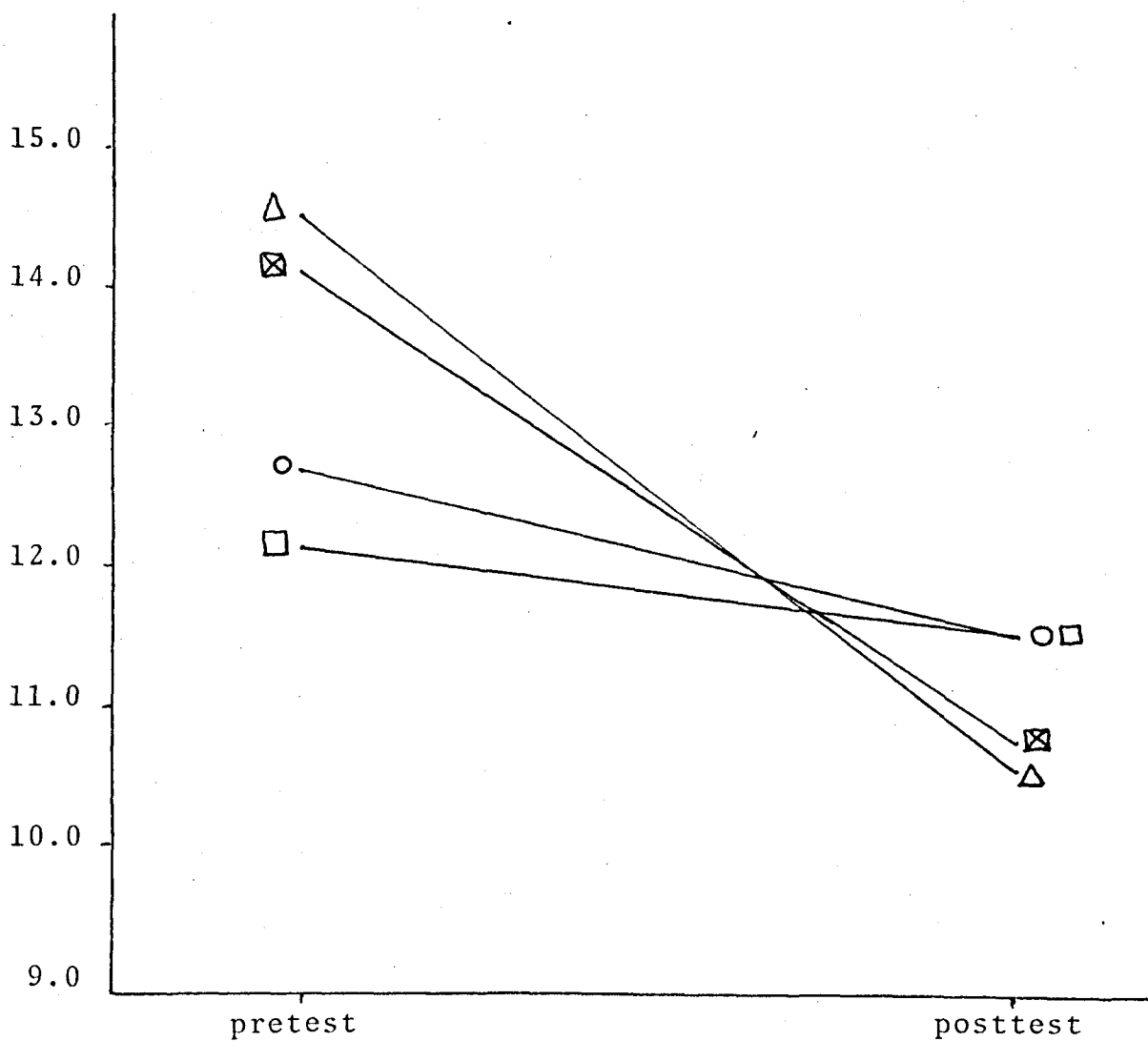


Figure 1. Mean AACL scores for all groups at pretest and posttest

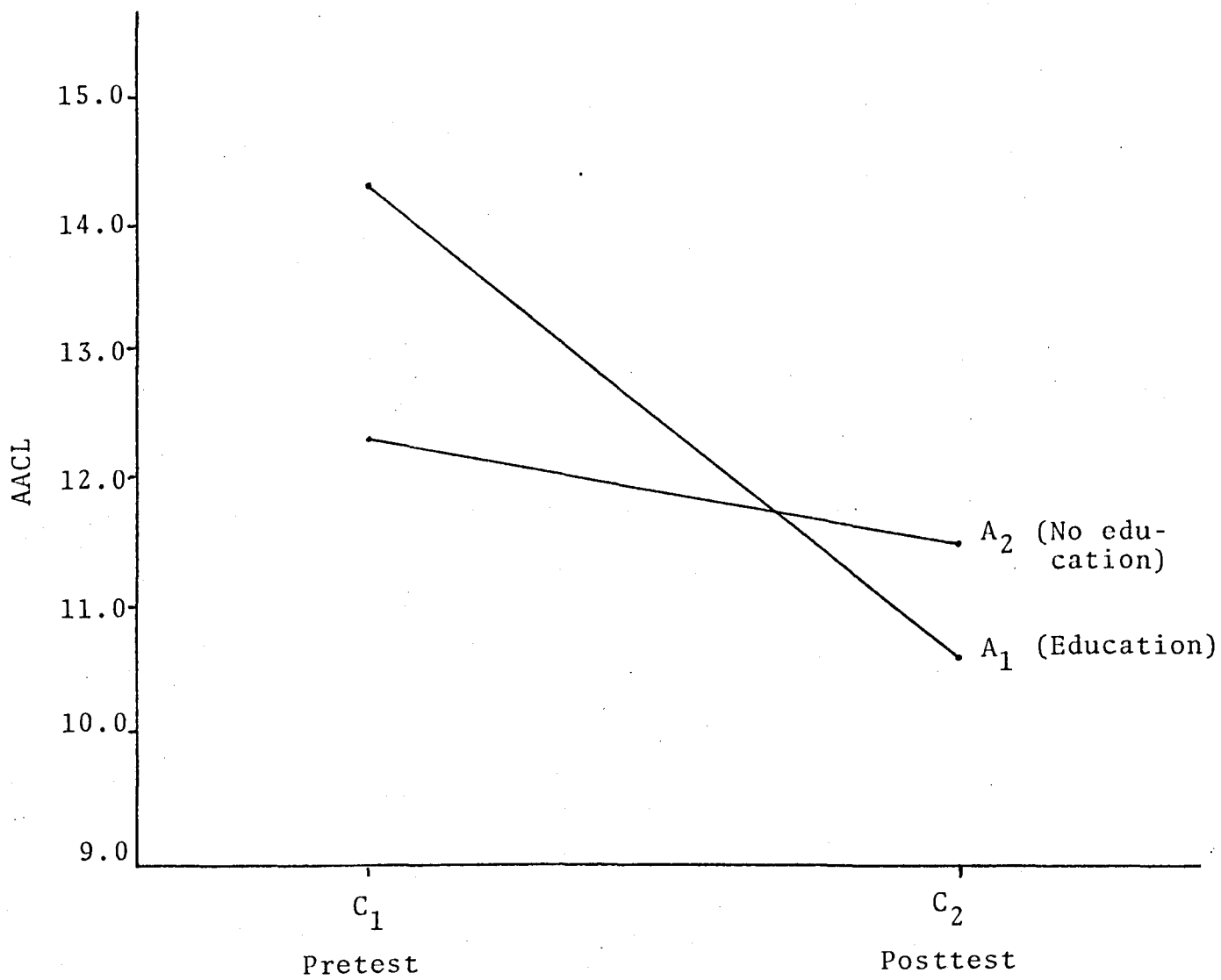


Figure 2. Mean AACL scores for the Education and No Education groups at pretest and posttest.

Combination \triangle ————— \triangle
Ed only \boxtimes ————— \boxtimes
Skills only \circ ————— \circ
NTC \square ————— \square

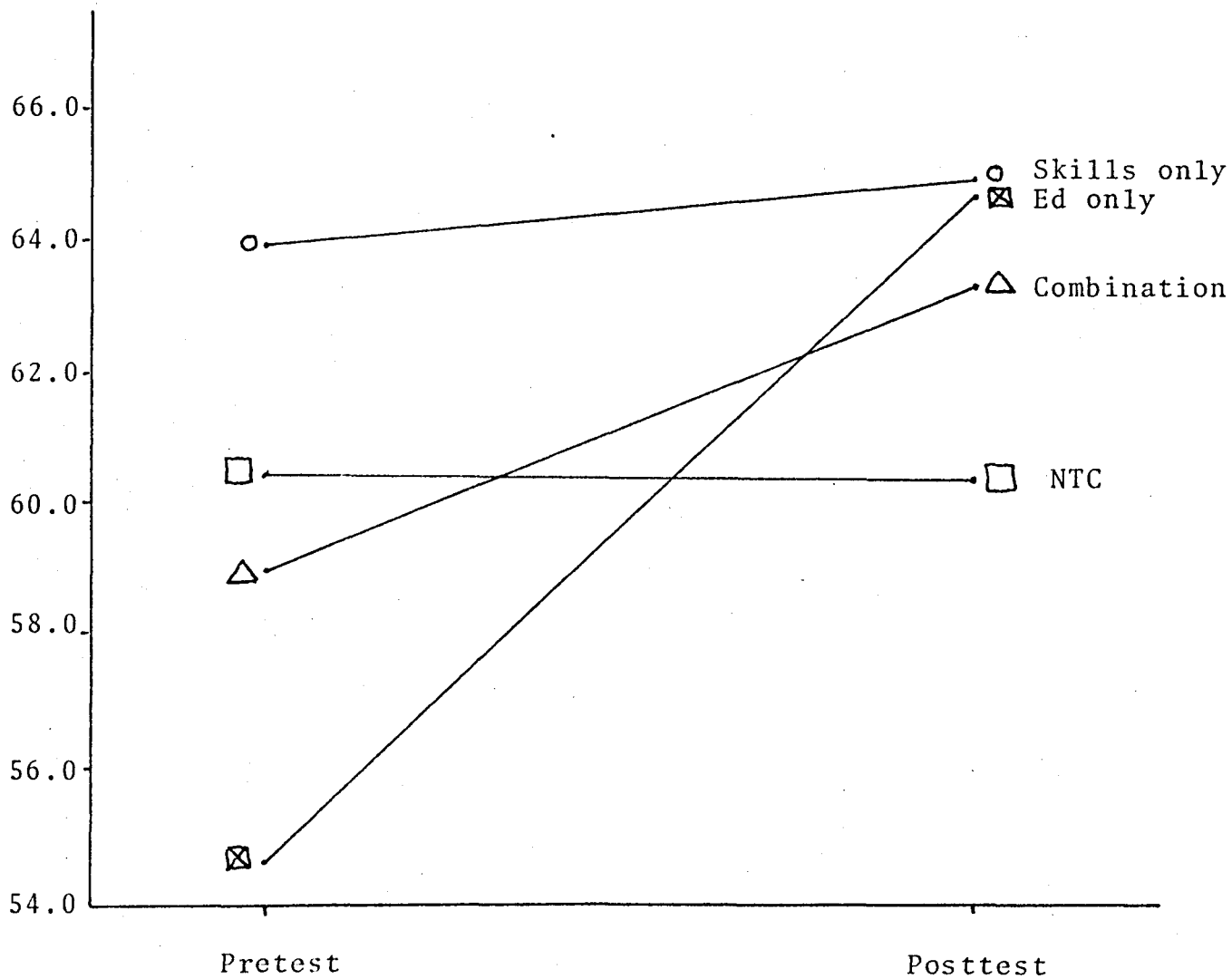


Figure 3. Mean Self Efficacy scores for all groups at pretest and posttest

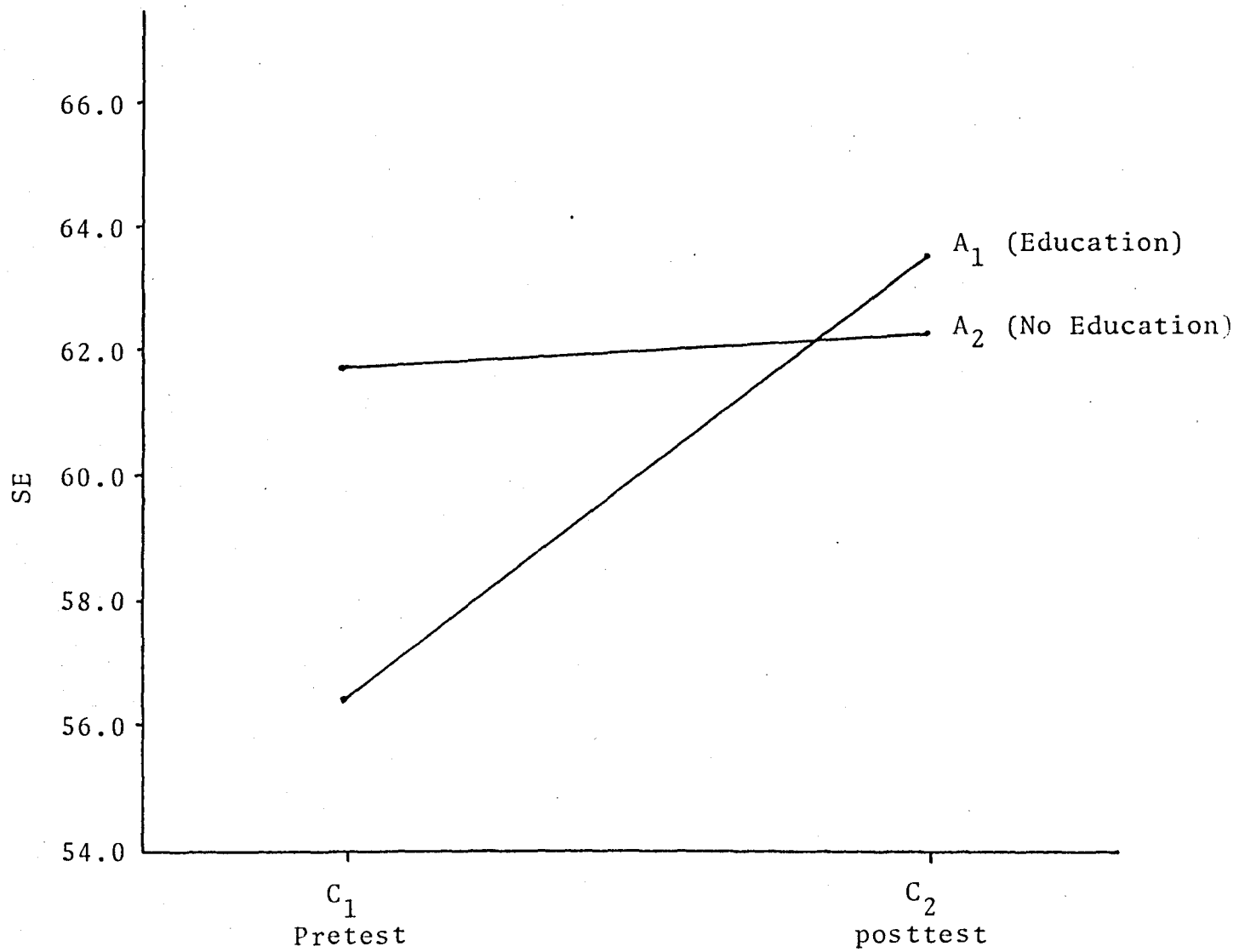


Figure 4. Mean Self Efficacy scores of the Education and No Education groups at pretest and posttest

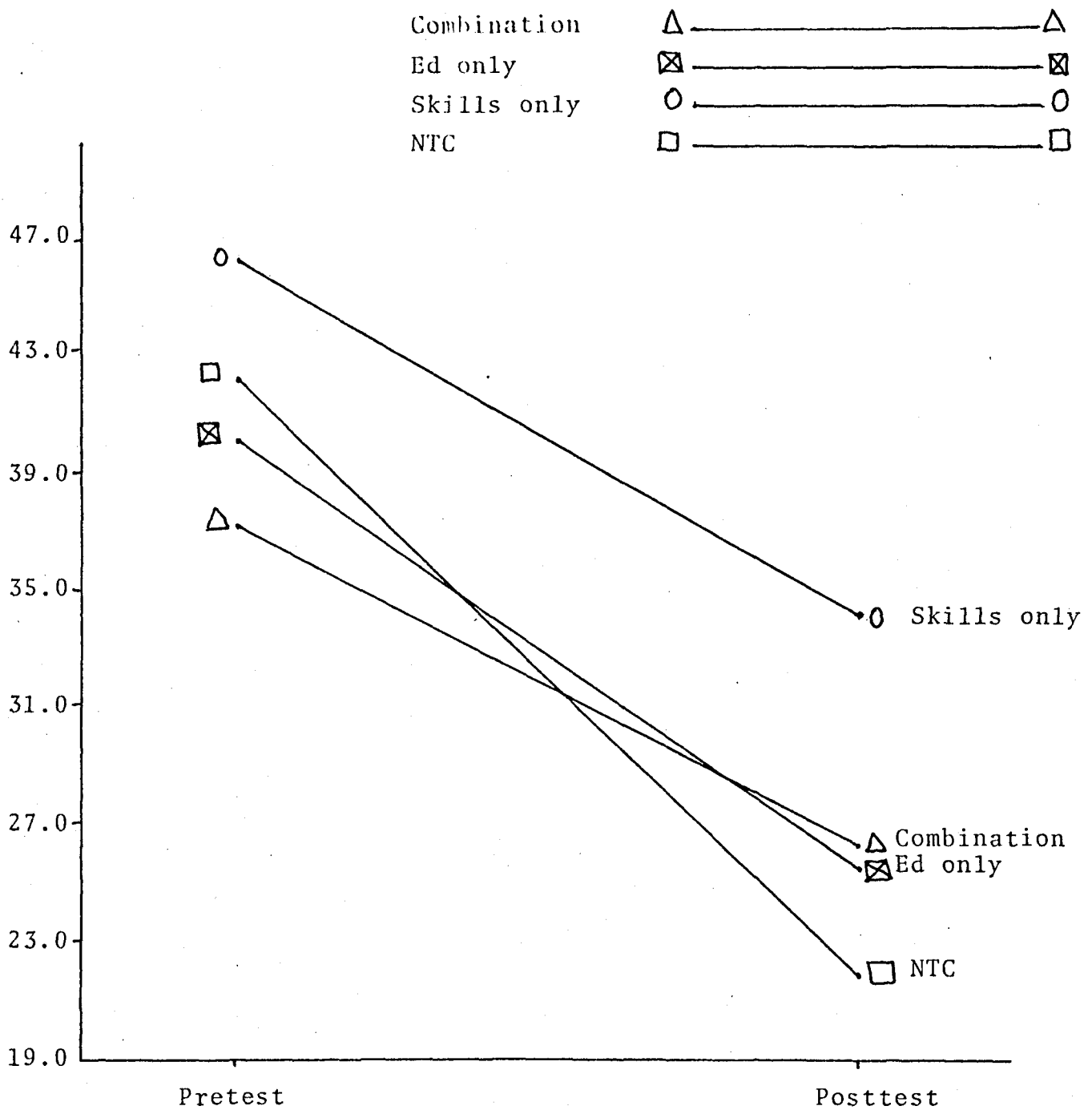


Figure 5. Mean BASA scores for all groups at pretest and posttest

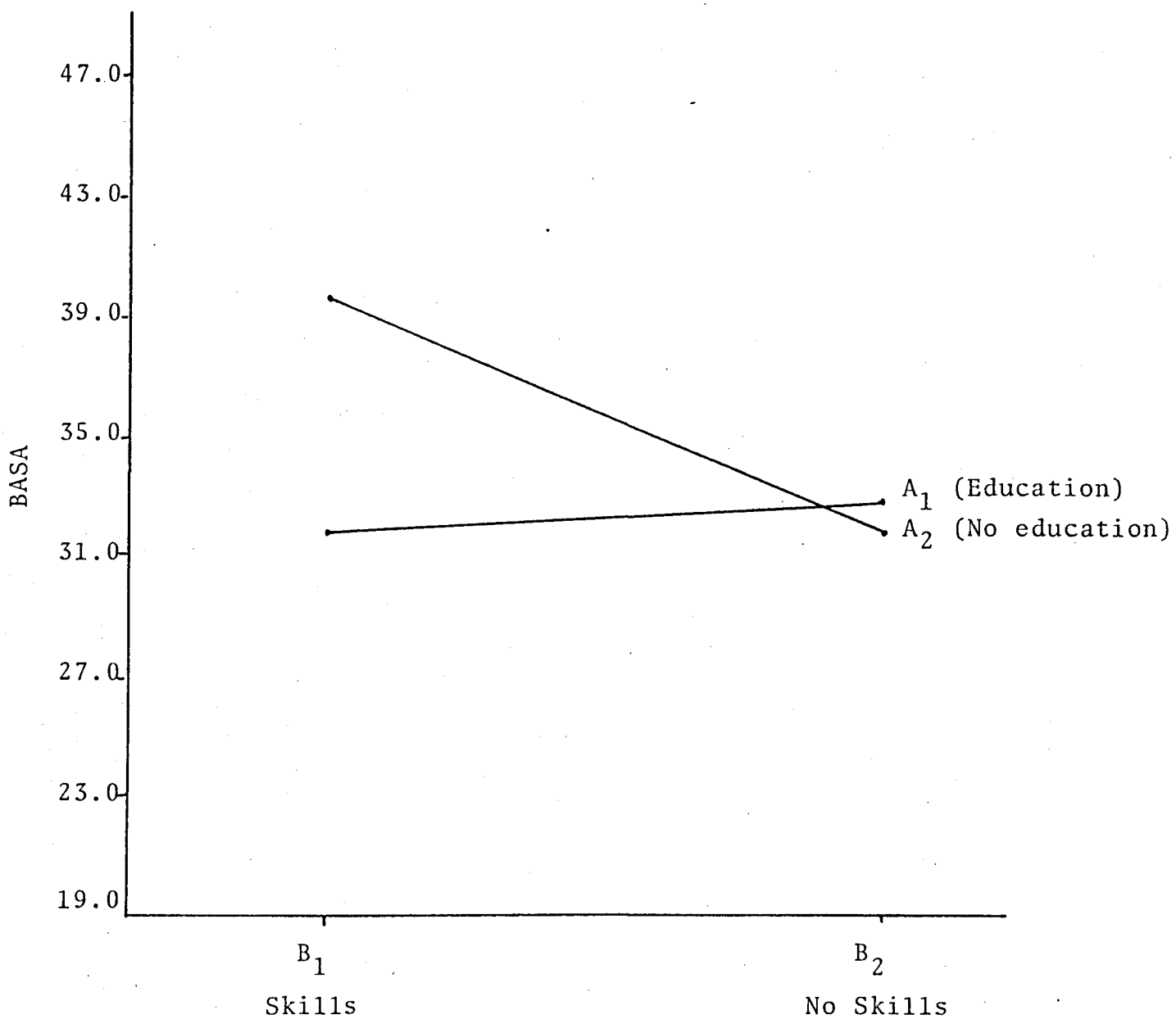


Figure 6. Mean BASA scores of the Education and No Education groups with skills and without skills

APPENDIX A
Specific Fear Survey Schedule

	F							T
1. I try to avoid occasions in which I have to speak to a group.	0	1	2	3	4	5	6	7
2. I am easily downed in an argument.	0	1	2	3	4	5	6	7
3. I enjoy speaking to a group of people.	0	1	2	3	4	5	6	7
4. When I am speaking to a group, I am fairly relaxed.	0	1	2	3	4	5	6	7
5. I would feel more self-confident if I could speak in public.	0	1	2	3	4	5	6	7
6. I frequently have to fight against showing that I am nervous when I am speaking to a group of people.	0	1	2	3	4	5	6	7
7. I find it hard to talk when I meet new people.	0	1	2	3	4	5	6	7
8. I would like to be a good speaker.	0	1	2	3	4	5	6	7
9. I feel anxiety about something all the time when I am speaking to a group.	0	1	2	3	4	5	6	7
10. I am not usually self-conscious when I speak to a group.	0	1	2	3	4	5	6	7

11. I love to go to meetings in 0 1 2 3 4 5 6 7
 which I have to give a speech.
12. I believe people would like me 0 1 2 3 4 5 6 7
 more if I could speak in public.
13. When in buses, trains, etc. I 0 1 2 3 4 5 6 7
 often speak to strangers.
14. I wish that I would never have to 0 1 2 3 4 5 6 7
 speak to a group.

APPENDIX B

Affect Adjective Checklist

active	contented	frank
affectionate	contrary	free
afraid	cool	friendly
agitated	cooperative	frightened
agreeable	critical	furios
aggressive	cross	gay
alive	cruel	gentle
alone	daring	glad
amiable	desperate	gloomy
amused	destroyed	good
angry	devoted	good-natured
annoyed	disagreeable	grim
awful	discontented	happy
bashful	discouraged	healthy
bitter	disgusted	hopeless
blue	displeased	hostile
bored	energetic	impatient
calm	enraged	incensed
cautious	enthusiastic	indignant
cheerful	fearful	inspired
clean	fine	interested
complaining	forlorn	irritated

jealous	powerful	terrified
joyful	quiet	thoughtful
kindly	reckless	timid
lonely	rejected	tormented
lost	rough	understanding
loving	sad	unhappy
low	safe	unsociable
lucky	satisfied	upset
mad	secure	vexed
mean	shaky	warm
mEEK	shy	whole
merry	soothed	wild
mild	steady	willful
miserable	stubborn	wilted
nervous	stormy	worrying
obliging	strong	
offended	suffering	
outraged	sullen	
panicky	sunk	
patient	sympathetic	
peaceful	tame	
pleased	tender	
pleasant	tense	
polite	terrible	

APPENDIX C
Self Efficacy Measure
Speech Skills Survey

Please rate the extent to which you feel able to do the things required of each of the following aspects of public speaking.

1. Choosing an appropriate topic.

1	2	3	4	5	6	7	8	9	10
Great			Moderately				Completely		
Uncertainty			Uncertain				Certain		

2. Finding relevant information for the topic and/or supporting arguments for the topic.

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

3. Practicing the speech alone.

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

4. Practicing the speech with a friend.

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

5. Reading a speech from a manuscript.

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

6. Delivering the speech from notes (extemporaneously).

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

7. Delivering an impromptu speech.

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

8. Delivering a speech which is not for a grade.

1 2 3 4 5 6 7 8 9 10

9. Delivering a speech for a grade.

1 2 3 4 5 6 7 8 9 10

10. Receiving criticism from the class and discussing
your weaknesses in speaking with someone else.

1 2 3 4 5 6 7 8 9 10

APPENDIX D

Behavior Assessment of Speech Anxiety

0	1	2	3	4	5	6	7	8	9
not at all			slight			moderate			strong
Category	Variable		Wt.	Rating	Score				
Voice	1.	Quivering or tense voice	1.33	_____	_____				
	2.	Too fast	1.03	_____	_____				
	3.	Too soft	0.40	_____	_____				
	4.	Monotonous, lack of emphasis	.66	_____	_____				
Verbal Fluency	5.	Nonfluencies, stammers, halting	1.42	_____	_____				
	6.	Vocalized pauses	1.13	_____	_____				
	7.	Hunts for words, speech blocks	1.28	_____	_____				
Mouth and Throat	8.	Swallows	0.82	_____	_____				
	9.	Clears throat	0.68	_____	_____				
	10.	Breathes heavily	0.98	_____	_____				

Category	Variable	Wt.	Rating	Score
Facial Expression	11. Lack of eye contact, extraneous eye move- ments.	1.19	_____	_____
	12. Tense face muscles, grimaces, twitches	1.22	_____	_____
	13. "Deadpan" facial expression	0.73	_____	_____
Arms and Hands	14. Rigid or tense	1.20	_____	_____
	15. Fidgeting, extrane- ous movement	1.39	_____	_____
	16. Motionless, lack of appropriate gestures	0.99	_____	_____
Gross bodily movement	17. Sways, paces, shuffles feet	2.00	_____	_____
Overall	18. Overall anxiety esti- mate	1.00	_____	_____

APPENDIX E
INFORMED CONSENT AGREEMENT

My participation in this experiment has been explained to me. I am fully aware of the following points and I volunteer to participate.

1. I will be asked to fill out a questionnaire concerning my feelings toward speaking in public. I may choose not to complete the questionnaire or omit any item I desire.
2. My responses will be seen only by Dr. Jaremko, Mr. Hadfield and my speech professor. The questionnaire may be returned to me upon request.

signature

date

address

phone

APPENDIX F

Post Workshop Effectiveness Questionnaire

The following questions pertain to your assessment of the workshop and how it has affected your speaking. Please answer the questions as honestly as possible. (Circle one number on each line)

1. The effect of the workshop on my speaking was

'	'	'	'	'	'	'	'	'	'	'
5	4	3	2	1	0	1	2	3	4	5
Detrimental				No effect			Helpful			

2. My anxiety after the workshop compared to previous speeches was

'	'	'	'	'	'	'	'	'	'	'
5	4	3	2	1	0	1	2	3	4	5
Much Greater			Unchanged				Much Lower			

3. I have found the techniques described in the workshop to be

'	'	'	'	'	'	'	'	'	'	'
5	4	3	2	1	0	1	2	3	4	5
Detrimental			Irrelevant				Helpful			

Thank you for your help!

APPENDIX G

Treatment Procedure for the Combination Group

SESSION ONE

I. Introduction and Purpose

The basic format of this treatment is lecture/discussion. As it turns out, the emphasis gets placed on lecture due to the relative unassertiveness of students who are attracted to a speech anxiety workshop. In introducing the workshop, the important point is to make it seem relevant to the participant. In a short set of opening remarks (circa five minutes), the leader states that the participants have indicated anxiety while giving speeches by way of the specific fear survey schedule. The "phenomenology" of this speech anxiety is anticipated by the leader in these opening remarks. In this way the participants come to know that the leader is aware of or in touch with what their problem is. He may ask questions about how a particular student feels physically before speaking. Or he may merely provide a list of general anxiety symptoms. The point is to establish rapport by a form of "anticipatory empathy."

The leader goes on to say that we will view giving a speech as a stressor. It sets off a set of reactions

that the student can learn to deal with by the skills he or she will learn tonight. Specifically, two purposes are given for the workshop: (1) to enable students to become effective speakers and (2) to learn how "cognitive" techniques are used in dealing with speech stress. The remainder of the workshop is organized in the three phases of stress inoculation purposed by Meichenbaum and his colleagues.

II. Education Phase

A. Model of emotion

The students are told that the name of this procedure is stress inoculation (SI) and that the reason for the name is important. The person is given a set of skills which can be used to cope with stress--any stress but mainly speech anxiety.

By using a blackboard or other visual aid the leader constructs the modified Shacterian model used in this variety of SI. A stressor, be it speaking, having a date, or taking an exam, leads to a predictable set of reactions that are cyclic in nature. The following diagram is used:

STRESSOR

PHYSICAL AROUSAL

POINT C

SELF STATEMENTS
(usually negative
in people who are
anxious

POINT A

APPRAISAL OF SITUATION
AS ANXIETY (usually
"automatic")

POINT B

Each phase (physical arousal, appraisal, and self statements) is discussed Socratically with the participants. The leader asks them for their own instances of each phase. He or she also provides overall examples to show the cyclic nature of this model. Three examples were used: asking someone for a date, taking a final exam, and giving a speech. The leader also anticipates the reflective student by briefly talking about the automatic, involuntary and seemingly nonconscious nature of this cycle. In people who are truly anxious it seems as if the model will not fit because this model requires explicit "talking to yourself." Some anxious people are just anxious and do not have thoughts like that. The appeal to the automatic nature of some stress reaction seems to satisfy this objection.

This phase of the treatment (which takes 15 to 20

minutes) is closed by stating that the idea of SI is twofold: (1) to provide a set of coping skills to break up the cycle at points A, B, and C and (2) to think a different set of thoughts so that the "automaticity" of the cycle is "slowed down" enough to enable the person to use the coping skills.

III. Rehearsal Phase

The idea here is to impart the skills that will be used in the application phase. We suggest that the name of this phase be changed to "Skills" phase (or some equivalent) since this latter label seems more appropriate to what is actually done here.

A. Relaxation: Two methods are used to teach the students to deal with Point A of the diagram. The first is to identify with each participant where they are most likely to feel tension. Since relatively unsophisticated students will probably model each other and say the same general kind of tension response, it is best to start this section off by listing some major types of idiosyncratic physiological arousal. In our study we used rapid or constricted breathing, tension in the neck, tension in the anal sphincter muscles, tension in the area around the forehead, eyes, and nose, and tremulousness.

Each student is then asked where he or she feels

the physical arousal the most. Each one is given a technique, e.g., "counter" tension, or slow breathing, to counteract their own idiosyncratic arousal. This part of the SI takes five to ten minutes.

Secondly, deep breathing is introduced as a skill for all to use right before they speak. As a group, we all practice deep breathing for a minute or two. They are told to use deep breathing immediately before the stressor hits.

B. Appraisal

Since speech anxious people size up the situation as stressful and as anxiety, the SI model tries to get the students to look at the stress in a coping way. To this end the four stage model of the Meichenbaum group is offered as the skill to use at Point B of the chart. This skill is imparted also in a lecture/discussion format. The four phases are preparing for a stressor, confronting it, being overwhelmed by it, and rewarding oneself for having coped. The self statements provided in Meichenbaum and Turk (1976) are merely read to the students and their reactions are elicited, e.g., "Yeah, I can see how that works" or "I find that _____ works as well." This phase takes about ten minutes.

C. Self Statements (Replacement phase)

The coping technique is introduced and defined. The major idea here is for the student to identify the negative self statements that underlie his or her anxiety and then to replace them with positive coping statements reflective of the reversal of affect strategy. Reversal of affect (REV) is the strategy of looking at the bright side of an unpleasant situation. Examples of the use of REV are derived by going over studies done in lab situations to show its effect. In our study we described two studies done in our lab-- one with the cold pressor task in which the person is asked to interpret the water as cool and refreshing and the other with an infant's crying in which the person is asked to think of the interesting fluctuations and variations of the child's wailing.

Students are then asked to generate their own example of REV from daily life. They usually come up with such things as coping with the drudgery of study by saying that at least you learn something or perhaps they volunteer the valuable experience of "breaking up."

This section (which lasts about 20 minutes) ends by the group generating a list of REV statements to use with public speaking. It may be important to "wait them out" until the students come up with the specific

statements. We did this and they generated five REV statements:

- (1) At least I learned something.
- (2) It will help me later.
- (3) I have one less speech.
- (4) By doing this, I'll feel better about myself.
- (5) The group will learn something about my topic.

This completes the first session.

SESSION TWO

I. Review

The purpose here is to determine if the students remember the model provided in the first session. This is done Socratically by asking questions about stress and how to deal with it. Some of the questions we used were "What are three reactions to a stressor?" "How is a stress reaction cyclic?" "How do you cope with anxious appraisal of a stressor?," etc. A question is given to each student in turn and the leader simply "goes around the room" until the entire model is reviewed. The leader answers or clarifies any question a student can't answer. This takes about 15 minutes.

II. Application phase

Here the idea is to use the skills to cope with a real stressor--giving a speech to this group.

Before this is done the replacement stage is individualized. Each person generates two negative self statements they emit when speaking. These are written on a paper in front of them. They then pick two REV statements that they are most comfortable with. This cognitive restructuring is then used in the application phase.

Each student is assigned a speech topic and is given five minutes to prepare a speech on that topic. A set procedure designed to use the skills of SI was then described. When it came time to give his or her speech, the student was to disclose the negative thoughts he had had (while still seated), replace those thoughts with two REV statements, and counteract their idiosyncratic physical arousal. As they walked to the head of the table, they were to breathe slowly and deeply. The speech was given and as they walked back to the seat, the person was to reward themselves for having coped.

The students were then called on in a random order to give the speech and go through the coping skills. The leader coaches the coping by instructing the student to do each of the steps described above. It should be noted that little emphasis is given to the reappraisal model of four stages of stress used by Meichenbaum. This was simply due to expedience. Other procedures

can emphasize it to whatever degree desired. This practice speech lasted 30 - 45 minutes and completed the workshop.

APPENDIX H

Treatment Manual for the Skills Only Group

SESSION ONE

This group was introduced as was the Combination group. It is after the introduction that the groups in our study differed. Unlike the stress inoculation with education group, this group did not receive the educational phase of the treatment. They were merely told that they could control speech anxiety by using the following sets of skills.

A. Relaxation: Two methods are used to teach the students to deal with physical arousal. The first is to identify with each participant where they are most likely to feel tension. Since relatively unsophisticated students will probably model each other and all say the same general kind of tension response, it is best to start this section off by listing some major types of idiosyncratic physiological arousal. In our study we used rapid or constricted breathing, tension in the neck, tension in the anal sphincter muscles, tension in the area around the forehead, eyes and nose, and tremulousness.

Each student is then asked where he or she feels the physical arousal the most. Each one is given a

technique, e.g., "counter" tension, or slow breathing, to counteract their own idiosyncratic arousal. This part of the SI takes five to ten minutes.

Secondly, deep breathing is introduced as a skill for all to use right before they speak. As a group, we all practice deep breathing for a minute or two. They are told to use deep breathing immediately before the stressor hits.

B. Appraisal

The four stage model of the Meichenbaum group is offered as the skill to reappraise stress. This skill is imparted also in a lecture/discussion format. The four phases are preparing for a stressor, confronting it, being overwhelmed by it, and rewarding oneself for having coped. The self statements provided in Meichenbaum and Turk (1976) are merely read to the students and their reactions are elicited, e.g., "Yeah, I can see how that works" or "I find that _____ works as well." This phase takes about ten minutes.

C. Self Statements (Replacement phase)

The coping technique is introduced and defined. The major idea here is for the student to identify the negative self statements that underlie his or her anxiety and then to replace them with positive coping statements reflective of the reversal of affect strategy. Reversal

of affect (REV) is the strategy of looking at the bright side of an unpleasant situation. Examples of the use of REV are derived by going over studies done in lab situations to show its effect. In our study we described two studies done in our lab--one with the cold pressor task in which the person is asked to interpret the water as cool and refreshing and the other with an infant's crying in which the person is asked to think of the interesting fluctuations and variations of the child's wailing.

Students are then asked to generate their own example of REV from daily life. They usually come up with such things as coping with the drudgery of study by saying that at least you learn something or perhaps volunteer the valuable experience of "breaking up."

This section (which lasts about 20 minutes) ends by the group generating a list of REV statements to use with public speaking. It may be important to "wait them out" until the students come up with the specific statements. We did this and they generated five REV statements:

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- (2) It will help me later.
- (3) I have one less speech.

(4) By doing this, I'll feel better about myself.

(5) The group will learn something about my topic.

This completes the first session.

SESSION TWO

Since this group did not receive the educational phase of the treatment a review of the previous session will not be included.

Application phase

Here the idea is to use the skills to cope with a real stressor--giving a speech to this group. Before this is done the replacement stage is individualized. Each person generates two negative self statements they emit when speaking. These are written on a paper in front of them. They then pick two REV statements that they are most comfortable with. This cognitive restructuring is then used in the application phase.

Each student is assigned a speech topic and is given five minutes to prepare a speech on that topic. A set procedure designed to use the skills of stress inoculation was then described. When it came time to give his or her speech, the student was to disclose the negative thoughts he had had (while still seated), replace those thoughts with the two REV statements, and counteract their idiosyncratic physical arousal. As

they walked to the head of the table, they were to breathe slowly and deeply. The speech was given and as they walked back to the seat, the person was to reward themselves for having coped.

The students were then called on in a random order to give the speech and go through the coping skills. The leader coaches the coping by instructing the student to each of the steps described above. This practice speech lasted 30 - 45 minutes and completed the workshop.

APPENDIX I

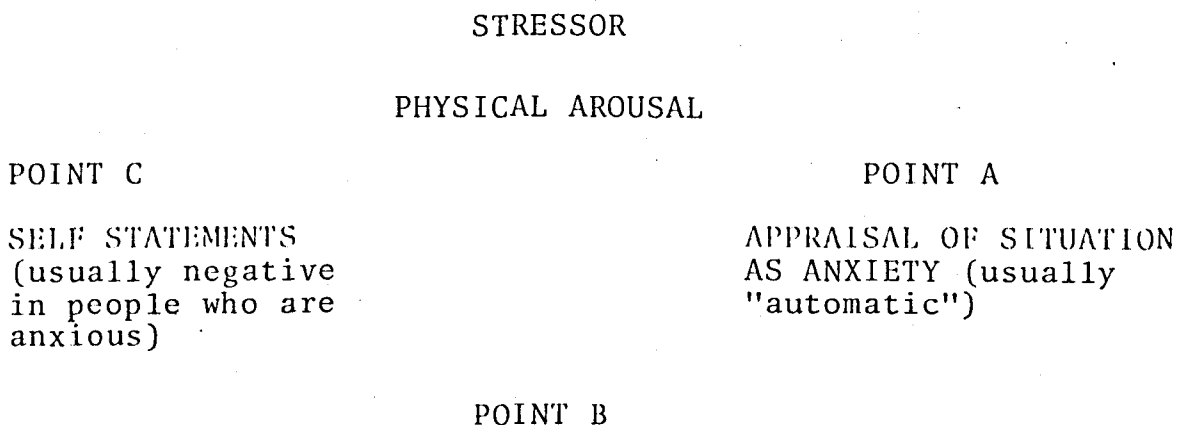
Treatment Manual for the Education Only Group

II. Education Phase

A. Model of emotion

The students are told that the name of this procedure is stress inoculation (SI) and that the reason for the name is important. The person is given a set of skills which can be used to cope with stress--any stress but mainly speech anxiety.

By using a blackboard or other visual aid the leader constructs the modified Shacterian model used in this variety of SI. A stressor, be it speaking, having a date, or taking an exam, leads to a predictable set of reactions that are cyclic in nature. The following diagram is used:



Each phase (physical arousal, appraisal, and self statements) is discussed Socratically with the participants. The leader asks them for their own instances of each phase. He or she also provides overall examples to show the cyclic nature of this model. Three examples were used: asking someone for a date, taking a final exam, and giving a speech. The leader also anticipates the reflective student by briefly talking about the automatic, involuntary and seemingly nonconscious nature.

TREATMENT PROCEDURE

SESSION ONE

I. Introduction and Purpose

The basic format of this treatment is lecture/discussion. As it turns out, the emphasis gets placed on lecture due to the relative unassertiveness of students who are attracted to a speech anxiety workshop. In introducing the workshop, the important point is to make it seem relevant to the participant. In a short set of opening remarks (circa five minutes), the leader states that the participants have indicated anxiety while giving speeches by way of the specific fear survey schedule. The "phenomenology" of this speech anxiety is anticipated by the leader in these opening remarks. In this way the participants come to know that the

leader is aware of or in touch with what their problem is. He may ask questions about how a particular student feels physically before speaking. Or he may merely provide a list of general anxiety symptoms. The point is to establish rapport by a form of "anticipatory empathy."

The leader goes on to say that we will view giving a speech as a stressor. It sets off a set of reactions that the student can learn to deal with by the skills he or she will learn tonight. Specifically, two purposes are given for the workshop: (1) to enable students to become effective speakers and (2) to learn how "cognitive" techniques are used in dealing with speech stress. The remainder of the workshop is organized in the three phases of stress inoculation proposed by Meichenbaum and his colleagues of this cycle. In people who are truly anxious it seems as if the model will not fit because this model requires explicit "talking to yourself." Some anxious people are just anxious and do not have thoughts like that. The appeal to the automatic nature of some stress reaction seems to satisfy this objection.

This phase of the treatment (which takes 15 to 20 minutes) is closed by stating that the idea of SI is twofold: (1) to provide a set of coping skills to break

up the cycle at points A, B, and C and (2) to think a different set of thoughts so that the "automaticity" of the cycle is "slowed down" enough to enable the person to use the coping skills.

SESSION TWO

This session was a review of this model and a general filler discussion of the nature of stage fright. This discussion of stage fright or speech anxiety was borrowed from the students' speech class text book. Five main ideas were discussed. (1) Speech anxiety is a misnomer. Speech anxiety is viewed as an increase in tension caused by heightened drive or motivation as one approaches the performance situation. (2) Stage fright is not peculiar to certain individuals or groups of people, but is a normal form of emotional tension, occurring in anyone confronted with a situation in which the performance is important and the outcome uncertain. (3) Stage fright causes helpful physiological reactions that can prepare the speaker for more effective mental and physical efforts. (4) Stage fright can be harmful if the speaker fails to understand it properly and control it. (5) Stage fright can be controlled by the speaker by developing a proper attitude toward it, by getting much experience in a broad variety of speak-

ing situations, by preparing well for any speaking effort by using effective bodily action in presenting the speech, by remembering that listeners generally want to see the speaker succeed.

APPENDIX J
Individual Pretest and Posttest AACL Scores

Combination

Subject	Pre	Post
1	12	11
2	12	11
3	13	3
4	21	14
5	17	14
6	12	10

Skills only

Subject	Pre	Post
1	9	11
2	9	12
3	13	12
4	15	10
5	19	12
6	11	12

Ed only

Subject	Pre	Post
1	15	15
2	19	16
3	18	10
4	13	7
5	9	8
6	15	10
7	12	11
8	11	11
9	15	9

NTC

Subject	Pre	Post
1	14	12
2	13	13
3	13	15
4	15	7
5	4	8
6	10	11
7	15	15
8	16	11
9	9	12

APPENDIX K

Individual Pretest and Posttest Self Efficacy Scores

Combination

Subject	Pre	Post
1	52	56
2	72	74
3	85	89
4	57	47
5	42	55
6	50	61

Skills only

Subject	Pre	Post
1	71	66
2	87	80
3	67	69
4	55	83
5	36	26
6	68	69

Ed only

Subject	Pre	Post
1	42	41
2	30	46
3	74	80
4	66	75
5	57	76
6	47	66
7	52	58
8	58	63
9	65	69

NTC

Subject	Pre	Post
1	57	56
2	51	55
3	57	51
4	82	77
5	51	58
6	77	69
7	71	66
8	39	51
9	58	60

APPENDIX L

Individual Pretest and Posttest BASA Scores

<u>Combination</u>			<u>Skills only</u>		
Subject	Pre	Post	Subject	Pre	Post
1	27.48	19.83	1	24.33	31.80
2	31.59	20.95	2	50.71	40.14
3	27.55	10.42	3	40.38	16.42
4	26.01	39.63	4	71.09	52.01
5	59.48	34.11	5	57.93	43.38
6	51.39	31.36	6	33.69	23.97

<u>Ed only</u>			<u>NTC</u>		
Subject	Pre	Post	Subject	Pre	Post
1	32.26	25.95	1	38.28	24.58
2	56.55	3.86	2	53.27	9.89
3	46.48	28.37	3	34.63	18.64
4	35.12	24.53	4	40.51	29.67
5	28.22	33.43	5	49.26	19.38
6	40.65	16.29	6	25.23	18.18
7	58.68	37.14	7	35.57	26.73
8	32.90	15.17	8	64.34	15.01
9	32.82	45.93	9	43.44	34.41

APPENDIX M

Orthogonal Analysis of Variance on AACL Scores

	A ₁		A ₂		A ₁		A ₂		C	ENid ² _i	E ^x _H	F = S ² _H /S ² _W	F.95
	B ₁		B ₂		B ₁		B ₂						
	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂					
N=	6	6	9	9	6	6	9	9					
Ex=	87	63	127	97	76	69	109	104					
H ₁ :	3	-3	-2	2	-3	3	2	-2	1	360	.0028	.0005	4.04
H ₂ :	3	-3	2	-2	-3	3	-2	2	101	360	28.3361	4.5050	4.04 *
H ₃ :	3	-3	-2	2	3	-3	-2	2	23	360	1.4694	.2336	4.04
H ₄ :	3	3	-2	-2	-3	-3	2	2	-7	360	.1361	.0126	4.04
H ₅ :	3	-3	2	-2	3	-3	2	-2	163	360	73.8030	11.7334	4.04 *
H ₆ :	3	3	-2	-2	3	3	-2	-2	11	360	.3361	.0311	4.04
H ₇ :	3	3	2	2	-3	-3	-2	-2	37	360	3.8028	.3519	4.04

$$H_1: A_1B_1C_1 - A_2B_1C_1 - A_1B_2C_1 + A_2B_2C_1 - A_1B_1C_2 + A_2B_1C_2 + A_1B_2C_2 - A_2B_2C_2 = 0$$

$$H_2: A_1C_1 - A_2C_1 - A_1C_2 + A_2C_2 = 0$$

$$H_3: B_1C_1 - B_2C_1 - B_1C_2 + B_2C_2 = 0$$

$$H_4: A_1B_1 - A_2B_1 - A_1B_2 + A_2B_2 = 0$$

$$H_5: C_1 - C_2 = 0$$

$$H_6: B_1 - B_2 = 0$$

$$H_7: A_1 - A_2 = 0$$

APPENDIX N

Orthogonal Analysis of Variance of SE Data

	A ₁				A ₂				C	ENid ² i	EX ² H	F=S ² H/SW	F.95
	B ₁		B ₂		B ₁		B ₂						
	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂					
N=	6	6	9	9	6	6	9	9					
Ex=	358	382	491	574	384	393	543	543					
H ₁ :	3	-3	-2	2	-3	3	2	-2	157	360	68.4694	1.7304	4.04
H ₂ :	3	-3	2	-2	-3	3	-2	2	-247	360	169.4690	4.2828	4.04 *
H ₃ :	3	-3	-2	2	3	-3	-2	2	103	360	29.4690	.7448	4.04
H ₄ :	3	3	-2	-2	-3	-3	2	2	-105	360	30.6250	.1444	4.04
H ₅ :	3	-3	2	-2	3	-3	2	-2	-301	360	251.6694	6.3601	4.04 *
H ₆ :	3	3	-2	-2	3	3	-2	-2	213	360	126.0250	.0594	4.04
H ₇ :	3	3	2	2	-3	-3	-2	-2	-129	360	46.2250	.2179	4.04

$$H_1: A_1B_1C_1 - A_2B_1C_1 - A_1B_2C_1 + A_2B_2C_1 - A_1B_2C_1 - A_1B_1C_2 + A_2B_1C_2 + A_1B_2C_2 - A_2B_2C_1 = 0$$

$$H_2: A_1C_1 - A_2C_1 - A_1C_2 - A_2C_2 = 0$$

$$H_3: B_1C_1 - B_2C_1 - B_1C_2 + B_2C_2 = 0$$

$$H_4: A_1B_1 - A_2B_1 - A_1B_2 + A_2B_2 = 0$$

$$H_5: C_1 - C_2 = 0$$

$$H_6: B_1 - B_2 = 0$$

$$H_7: A_1 - A_2 = 0$$

APPENDIX O

Orthogonal Analysis of Variance of BASA Data

		A ₁		A ₂										
		B ₁	B ₂	B ₁	B ₂									
		C ₁	C ₂	C ₁	C ₂	C ₁	C ₂							
N=	Ex=	6	6	9	9	6	6	9	9					
		223	156	363	230	278	208	384	197	C	ENid ² _i	E ^x ² _H	F=S ² _{H/S²_W}	F.95
H ₁ :		3	-3	-2	2	-3	3	2	-2	99.03	360	27.2415	.22	4.04
H ₂ :		3	-3	2	-2	-3	3	-2	2	-118.29	360	38.8681	.31	4.04
H ₃ :		3	-3	-2	2	3	-3	-2	2	-227.87	360	144.2350	1.14	4.04
H ₄ :		3	3	-2	-2	-3	-3	2	2	-603.41	360	1011.3990	6.82	4.04 *
H ₅ :		3	-3	2	-2	3	-3	2	-2	1053.53	360	3083.1263	24.45	4.04 *
H ₆ :		3	3	-2	-2	3	3	-2	-2	244.81	360	166.4776	1.12	4.04
H ₇ :		3	3	2	2	-3	-3	-2	-2	-292.89	360	238.2904	1.61	4.04
H ₁ :		A ₁ B ₁ C ₁ - A ₂ B ₁ C ₁ - A ₁ B ₂ C ₁ + A ₂ B ₂ C ₁ - A ₁ B ₁ C ₂ + A ₂ B ₁ C ₂ + A ₁ B ₂ C ₂ - A ₂ B ₂ C ₂ = 0												
H ₂ :		A ₁ C ₁ - A ₂ C ₁ - A ₁ C ₂ + A ₂ C ₂ = 0												
H ₃ :		B ₁ C ₁ - B ₂ C ₁ - B ₁ C ₂ + B ₂ C ₂ = 0												
H ₄ :		A ₁ B ₁ - A ₂ B ₁ - A ₁ B ₂ + A ₂ B ₂ = 0												
H ₅ :		C ₁ - C ₂ = 0												
H ₆ :		B ₁ - B ₂ = 0												
H ₇ :		A ₁ - A ₂ = 0												

VITA

Robert Steven Hadfield was born on June 1, 1954 in Cumberland, Rhode Island. He grew up and attended public schools in Cumberland, Rhode Island and graduated from Cumberland High School in 1972.

From 1972 to 1973 Mr. Hadfield attended Western New England College in Springfield, Massachusetts. He transferred to the University of Maine at Orono, Maine in January, 1974. He graduated from that institution in May 1976 with a B. A. in Psychology.

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