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ABSTRACT

Mathematics anxiety involves feelings of tension and stress that interfere with the solving of mathematical problems in academic and daily life situations. To investigate the relative effectiveness of group negative practice and group anxiety management training in reducing mathematics anxiety, 72 math-anxious high school students were divided into one of the two training groups, the placebo treatment group, or the no-treatment group. Results indicated that both treatment groups exhibited significantly less anxiety than the no-treatment control group. The placebo procedure produced treatment effects that were not significantly different from the recognized treatments. There was no significant difference between the treatment and control groups in grades in mathematics. The findings support the hypothesis that the treatments reduce math anxiety and improve performance in math. (Author/JAC)

The Relative Efficacy of Negative Practice and Anxiety Management Training in the Treatment of Mathematics Anxiety

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Mathematics anxiety involves feelings of tension and stress that interfere with the solving of mathematical problems and manipulation of numbers in varied academic or daily life situations.

Anxiety management training (AMT) has been found useful in the treatment of mathematics anxiety (Richardson and Suinn, 1973). It involves training the student to relax in response to imaginary scenes which has previously been anxiety evoking. The theoretical basis for AMT is similar in principle to systematic desensitization in that anxiety is reduced through reciprocal inhibition.

Negative practice is a behavior therapy treatment which involves the repeated evocation of anxiety responses through the use of imaginal stimuli. Negative practice has been shown to be an effective technique in the treatment of test anxiety in students (Graff, MacLean and Loving, 1971; O'Brien, 1976) and as mathematics anxiety has been considered to be a special case of test anxiety (Richardson, 1978), negative practice appears to be a useful technique in this case as well. The most popular theoretical explanation of negative practice follows from Hull's (1943) work on extinction through conditioned inhibition.

The present study investigated the relative effectiveness of group negative practice and group anxiety management training in the reduction of mathematics anxiety. Treatment groups were compared with an attention-placebo group that received a pseudotherapy imagery procedure (Holroyd, 1976) and a waiting-list control group.

Method

Subjects

Seventy-two math-anxious high school students were assigned to one of the treatment or control conditions. The sample included 41 females and 31 males. Pretest-posttest measures were taken on the Math Anxiety Rating Scale (Richardson and Suinn, 1972), the numerical abilities section of the Differential Aptitude Test (DAT), (Bennett, Seashore and Wesman, 1948) and grades in math courses.

Treatments

Negative Practice - The procedure for this group followed O'Brien's (1976) negative practice treatment. Students were instructed to practice exaggerating their anxiety responses to aversive imaginal stimuli.

Anxiety Management Training - The AMT treatment emphasized training in identification of early signs of anxiety increases and utilization of self-controlled relaxation as an inhibitor of anxiety responses.

Attention-Placebo Control Procedure - This procedure followed Holroyd's (1976) pseudotherapy treatment. It utilized a meditation technique involving increased attentiveness to bodily sensations and feelings and imaginal exercises involving imagining as clearly as possible a number of everyday scenes.

Waiting-list Control Group - Participants in this group were contacted after the preassessment meeting and informed that there was not sufficient space in the program at this time, but that as soon as there were openings they would be contacted. After the treatment program was completed, these participants were administered the post-test MARS and the DAT.

Procedure

Participants met for six 45-minute weekly sessions. Two therapists were utilized to control for possible idiosyncratic experimenter effects. Each therapist conducted one group of each type so that therapists and groups were completely crossed. Control subjects were given the opportunity to receive treatment the following marking period.

Results

The results of a multivariate analysis of covariance with pretest scores as the covariate indicated that the treatment groups exhibited significantly lower self-reported anxiety on the MARS than the waiting list (no treatment) control group after treatment. The treatment groups performed significantly better on the DAT than the waiting-list control group after treatment with the group factor accounting for 65% of outcome variance. Figure 1 illustrates pretest and adjusted means on the MARS for each group. Figure 2 illustrates pretest and adjusted means on the DAT for each group. The attention-placebo procedure produced treatment effects not significantly different from the recognized treatments. There were no significant differences between the treatment and control groups in grades in mathematics.

Discussion

One may conclude that these techniques appear to be useful in the treatment of mathematics anxiety although there were no significant differences between relaxation and conditioned inhibition based treatments. While the results supported the hypothesis that the treatments would effectively reduce mathematics anxiety and improve performance in math, the finding of significant treatment effects for the attention-placebo suggested that this procedure may contain actual therapeutic components. This hypothesis was supported by physiological measures showing increased relaxation as a function of the placebo condition.

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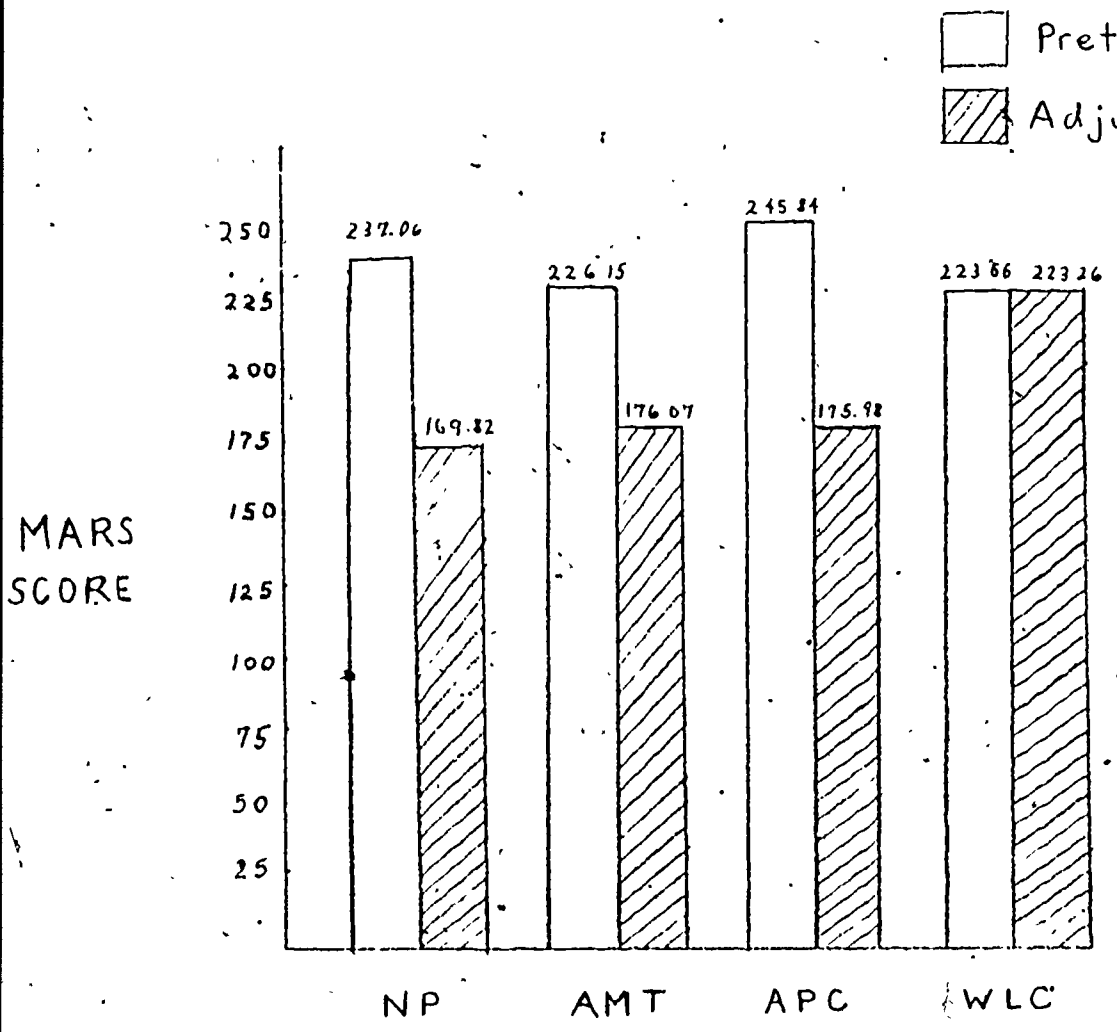

Fig. 1 Pretest and Adjusted Posttest Means on the MARS

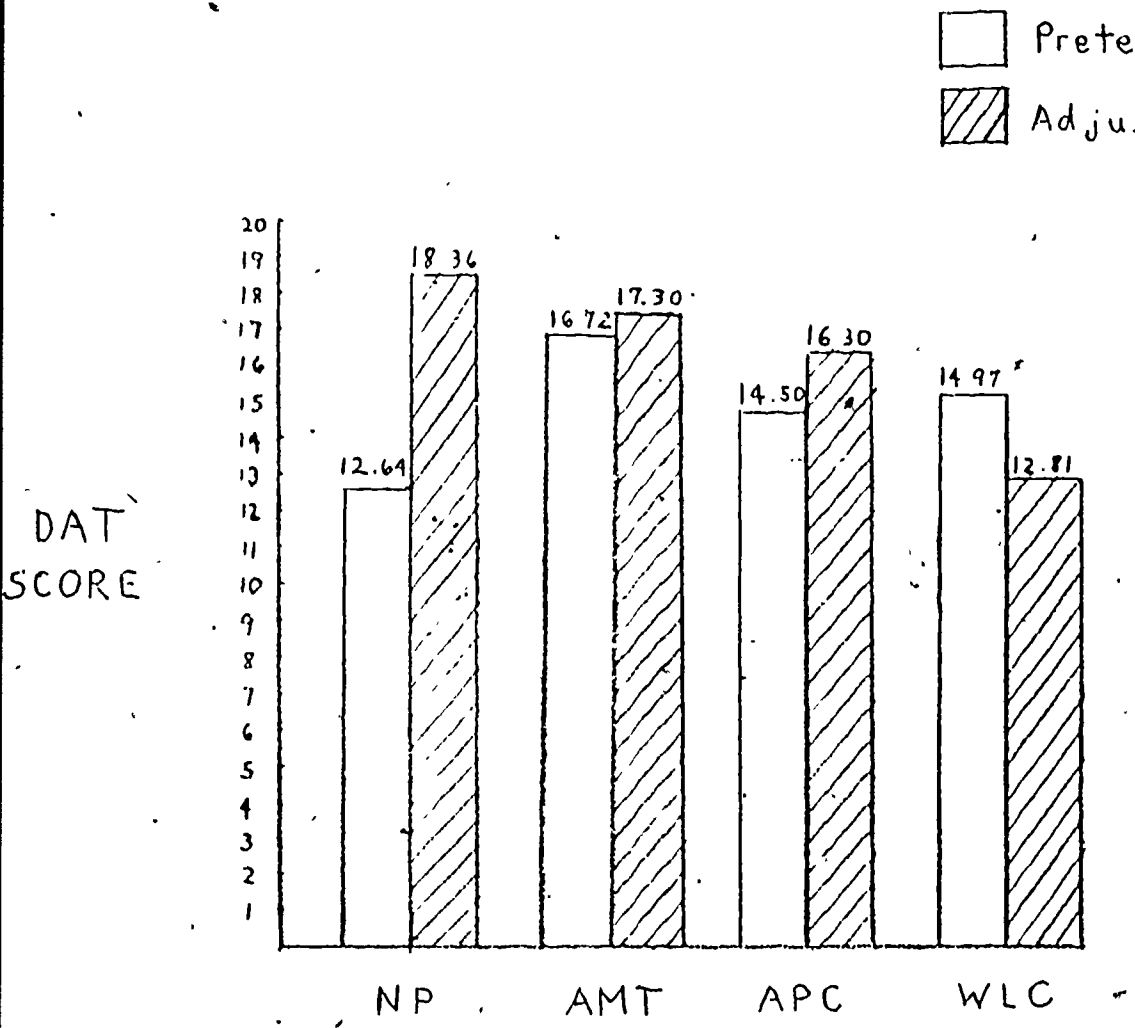

Fig. 2 Pretest and Adjusted Posttest Means on the DAT