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THE RELATIONSHIP OF CLIENT CHARACTERISTICS TO OUTCOME FOR TRANSCENDENTAL MEDITATION, BEHAVIOR THERAPY, AND SELF-RELAXATION

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Introduction

Considerable attention within the psychological literature has been devoted to anxiety as a clinical problem. Several procedures have been proposed for the treatment of problems related to general (nonphobic) anxiety: progressive relaxation training (Beiman, Israel, and Johnson, 1978); cognitive restructuring (Ellis, 1962; Goldfried and Davidson, 1976); self-relaxation (Benson, Greenwood & Klemchuk, 1975); and transcendental meditation (Maharishi Mahesh Yogi, 1973). These techniques have not previously been compared in the treatment of general or chronic tension and anxiety.

The present investigation combined progressive relaxation training and cognitive restructuring into one treatment package (behavior therapy). This package (BT) was compared to self-relaxation (SR), transcendental meditation (TM), and a waiting list control group (WL) on multiple self-report and psychophysiological measures using traditional statistical procedures for a treatment outcome investigation. In addition, the relationship of client characteristics to outcome was evaluated separately for each of the treatments via stepwise multiple regression analyses.

Method

Subjects

Participants were 18 males and 32 females who were selected from over 100 respondents to announcements of a research project involving tension reduction treatments for people who were generally tense and nervous. An initial screening interview was held: (1) to select participants who reported experiencing subjective discomfort due to general anxiety and tension (as opposed to a specific anxiety-provoking situation or phobia); and (2) to eliminate persons who were curiosity seekers, psychotic, experiencing serious medical problems, taking psychoactive medication regularly, or currently in therapy or had previously received one of the therapies being evaluated. Those selected were not told of the

specific treatments being evaluated, and were randomly assigned via repeating latin square for each sex to one of the treatments with the following final *n*'s for each condition: BT = 14, SR = 13, TM = 12, WL = 13.

Apparatus

Psychophysiological assessment was conducted in two adjoining sound-proof electrically shielded chambers. The control chamber contained a Grass Model 7 polygraph with standard preamplifier's except as described below. A Consol BSR/GSR preamplifier provided a constant current of 16 μ amp with one channel for skin resistance level (SRL) and one for skin resistance response (SRR). This electrodermal response was recorded using Beckman silver-silver chloride electrodes 2 cm² in area with an electrolyte of saline solution in Unibase. Arterial pulse rate (HR) was recorded using a Grass photoelectric plethysmograph. Integrated frontalis muscle action potential (EMG) was recorded using standard Beckman electrodes and paste. Time from pre- to post-assessment was balanced for all four experimental conditions and averaged approximately 4 weeks.

Procedure

Pre- and Posttreatment Self-Report Measures

After the screening interview, participants signed a consent form and were then administered the following questionnaires: Internal-External Locus of Control (IE; Rotter, 1966); Repression-Sensitization (RS; Byrne, 1961); a modification of the Autonomic Perception Questionnaire (APQ; Mandler, Mandler and Uviller, 1958); Trait Anxiety Inventory (TAI; Spielberger, Gorsuch, and Lushene, 1969); and Fear Survey Schedule (FSS; Rubin, Lawlis, Tasto, and Namenck, 1969). These same questionnaires were also administered following the posttreatment psychophysiological assessment.

Pre- and Posttreatment Psychophysiological Measures

The participant was seated in a recliner chair and the transducers were attached to the following sites: electrodermal/left palm and forearm; HR/left earlobe; EMG/frontalis muscle. The participant was then asked to sit quietly with eyes open and not to consciously relax. This period of continuous physiological recording lasted for 15 minutes, with the final 3 minutes serving as the assessment of baseline physiological response. Immediately following this baseline assessment the participant was instructed to relax as much as possible with eyes closed. Physiological recording continued for 10 minutes with the final 3 minutes serving as the assessment of the participant's ability to relax.

Treatments

There were a total of seven treatment sessions for each treatment condition. BT involved two 1½ hour sessions per week of training in: (a) progressive relaxation (Bernstein and Borkovec, 1973) as modified by Beiman, Israel, and Johnson (1978); and (b) cognitive restructuring adapted from Ellis (1962) and Goldfried and Davison (1976). The therapists were two male graduate students in clinical psychology supervised by the senior author. TM involved six 1½ hour sessions spanning a period of 2 weeks and a seventh session approximately 2 weeks later. A *certified* trainer administered this procedure precisely according to the principles of Maharishi Mahesh Yogi (1973). SR involved two 1½ hour sessions per week of training in the procedure described by Beiman et al. (1978) and was patterned after Benson,

Greenwood, and Klemchuk (1975). Therapists for SR were two male graduate students in clinical psychology supervised by the senior author. Treatment manuals for each of the treatments are available upon request from the senior author.

Data Reduction

Raw quantification of all dependent variables was performed by paid research assistants blind to the experimental condition of each participant. For each of the baseline and relax periods of physiological recording, the raw and statistical quantification procedures were as follows. Raw SRL was sampled every 60 seconds, converted to micromhos by a reciprocal transformation and averaged. A SRR was defined as any decrease in resistance exceeding .1% of SRL; frequency was totalled for each period. HR was determined by counting blood volume pulses and converting to beats per minute. The amplitude of the integrated EMG in microvolts was sampled every 20 seconds and averaged. Physiological response during the baseline period was then subtracted from that during the relax period yielding a difference score representing the participant's self-control over tonic physiological arousal. The raw self-report and physiological data were first transferred to computer cards and all conversions, computations, and statistical analyses were performed via SOUPAC and BMD programs using the IBM 360 computer at the University of Georgia.

Results

Outcome

Four multivariate and seventeen univariate Groups \times Pre/Post analyses of variance were performed on: (a) the five self-report measures (I-E, RS, APQ, TAI, & FSS); (b) the four baseline physiological measures (SRL, SRR, HR, EMG); (c) the four relax physiological measures; and (d) the four physiological difference score measures. In no case did the multivariate tests for differential treatment effects approach significance for the two-way interaction. Only one of the seventeen univariate two-way interactions was significant and this should be attributed to chance. Descriptively, the mean change from pre to post for each dependent variable generally favored the BT condition but the within group of error variance was so large in each case that the statistical test was nonsignificant (all $p > .20$).

Relationship of Subject Characteristics to Outcome

During the design of this investigation we became interested in the extent to which certain kinds of subject variables might predict a favorable therapeutic outcome for certain treatments. We were interested in whether such a predictive relationship could be determined and, if so, whether it might be different for each of the experimental conditions. Because of this interest, we included four self-report variables generally considered to be "trait" measures (I-E, R-S, APQ, and TAI) and conceptualized the participants' pretreatment scores on these measures as predictor variables. For this more specialized set of analyses, the predicted outcome or dependent variables selected were the change scores from pre- to posttreatment (post - pre = Δ) for the FSS and the four physiological difference score measures of self-control over tonic physiological arousal.

The predictability of the participants' response to each of the experimental conditions was tested by performing stepwise multiple regressions separately for each treatment using the I-E, R-S, APQ, and TAI as predictor variables and the FSS, SRL, SRR, HR, and EMG as dependent variables. Thus for each dependent variable in each of the four experimental conditions a stepwise multiple regression analysis was performed. Table 1 presents those predictor variables which significantly predicted ($p < .05$) a dependent variable in each experimental condition. The predictor variable accounting for the largest proportion of variance in a dependent variable is listed first. A second (and third) predictor variable is listed only if it predicted a significant ($p < .05$) additional portion of the variance independently of the first (and second) predictor variable listed. The proportion of variance independently accounted for by each significant predictor variable is listed in parentheses.

Client Characteristics vs. Outcome

Also listed are the correlation coefficients for the relationship between a dependent variable and all four predictor variables. The sign of the coefficients has been set so that positive correlations indicate that the higher the score on the predictor variable prior to treatment, the greater the improvement (or reduction) in the dependent variable after treatment. Conversely, negative correlations indicate the lower the score on the predictor variable, the greater the improvement in the dependent variable. High scores on the I-E, R-S, APQ, and TAI indicate, respectively, external locus of control, sensitization, more autonomic perception, and more trait anxiety.

Transcendental Meditation

Inspection of Table 1 indicates three of the five dependent variables were significantly predicted by the trait measures. In each case the regression equation predicted more than 50% of the variance in the three dependent variables. Furthermore, in each case the I-E scale accounted for the largest proportion of the predicted variance. The more internal locus of control participants reported prior to treatment, the more they benefitted from TM, as measured by the FSS and the two electrodermal measures of autonomic arousal.

Self-Relaxation

Thirty percent of the FSS, SRR, and HR variance was predicted by the R-S, APQ, and IE scales, respectively. The more cognitive sensitization, the less autonomic perception and the more internal locus of control participants reported prior to treatment, the more they benefitted from SR.

Table 1. Significant Predictions From the Stepwise Multiple Regression Analyses for Each Treatment Condition and Correlations Between Predictor and Dependent Variables^a

Dependent variable	Predictor variables			'IE	'RS	'APQ	'TAI
Transcendental meditation							
Δ FSS	IE (.430)	RS (.092)		-.656	+.356	-.343	-.024
Δ SCL	IE (.622)	RS (.052)	TAI (.021)	-0.787	-0.164	-0.196	+.126
Δ SRR	IE (.340)	RS (.230)	TAI (.080)	-.587	-.439	-.131	+.153
Self-relaxation							
Δ		RS (.318)		+.059	+.564	+.321	+.300
Δ SRR		APQ (.306)		-0.134	+0.006	-.554	-.432
Δ HR		IE (.312)		-.559	-.124	-.210	-.370
Behavior therapy							
Δ HR		APQ (.312)	TAI (.150)	+.174	+.439	+.558	+.479
Wait-list control							
Δ HR		TAI (.309)		+.215	+.431	+.510	+.556

^aSee text for full explanation of table. Proportion of variance independently accounted for by each significant predictor is listed below it in parentheses.

Behavior Therapy

The APQ and TAI combined to predict 45% of the variance in HR. The more autonomic perception and trait anxiety participants reported prior to treatment, the more control over HR they exhibited after treatment.

Wait List Control

The TAI predicted 30% of the variance in HR with more trait anxiety associated with greater control over HR after treatment.

Discussion

The results of the stepwise multiple regression analyses presented in Table I indicate that participant characteristics prior to treatment predicted a surprisingly large proportion of the variance in the participants' response to treatment. The results suggest participant characteristics interacted with treatment in such a way as to produce differential outcomes within each of the treatments. This was particularly true for transcendental meditation and self-relaxation, although the pattern of results for TM was more consistent than that for SR.

For transcendental meditation, the Internal-External Locus of Control scale predicted 34–62% of the variance in three of the five dependent variables analyzed. Higher internal locus of control presumably reflecting greater psychological adjustment (Rotter, 1966) prior to training, was consistently associated with more improvement in the dependent variables after training in meditation. Conversely, the less well-adjusted participants benefitted less from meditation. This finding seems to have particularly important implications for the future use of TM as a psychotherapeutic technique. The present results, when considered with the review by Smith (1975), suggest the therapeutic potential of TM for clinical problems has not been established. This does not seem surprising given the standardization of training in TM, and thus the apparent absence of means by which meditation training could be tailored to the particular problems of a given client.

On the other hand, the present results provide empirical support for the view that TM leads to measurable adaptive benefits in individuals who perceive themselves as experiencing more internal than external control over events occurring in their world. This is consistent with the introductory lectures on TM which present it as promoting positive growth rather than the therapeutic remediation of psychological dysfunction (Maharishi Mahesh Yogi, 1973).

The finding that locus of control predicted self-report and physiological responses to meditation also has methodological implications for future research. This result suggests the IE scale should be considered a potential control variable in future meditation research. This could be accomplished by assuring equivalence of groups on locus of control measures prior to any experimental manipulation. An alternative would be to simply assess locus of control, randomly assign participants to various experimental conditions, and then use analysis of covariance (with locus of control as the covariate) to statistically remove any potential biasing of the results. Research designs which compare experienced versus nonexperienced meditators are potentially subject to the criticism that the groups may not have been equivalent on locus of control prior to training. This threat to internal validity may be particularly relevant if "internals" practice meditation more regularly than "externals" and consequently have a higher probability of being selected for inclusion in an experienced meditation group.

The results of the regression analyses for self-relaxation training were not as consistent as those for TM. Three different predictors individually accounted for 30% of the variance in three of the dependent variables such that a different predictor was associated with each dependent variable. Less perception of physiological cues and more internal locus of control were associated with more control over autonomic arousal as a result of SR training. This suggests that participants who did not rely on interoceptive physiological cues, but instead used a more global cognitive strategy were better able to develop control over their autonomic arousal. This is consistent with previous research (Bergman and Johnson, 1971; Ray

and Lamb, 1974). SR has been proposed as an alternative clinical procedure to progressive relaxation training (Greenwood and Benson, 1977), although Beiman, Israel, and Johnson (1978) found PRT was superior to SR for training self-control over autonomic arousal. The Beiman *et al.* investigation employed the standard statistical analyses for an outcome study and did not evaluate the relationship of client characteristics to outcome. It is possible that SR could be equivalent to PRT for certain clients and this issue seems to deserve further investigation considering the relative efficiency afforded by SR training. The statistical analyses used in the present investigation would be appropriate for addressing such a question.

The regression analyses for behavior therapy indicated more autonomic perception and trait anxiety prior to training were associated with more control over autonomic arousal after training. This provides empirical support for Paul and Bernstein's (1973) speculation that perception of physiological cues may be important in developing relaxation skills via PRT and is consistent with a recent review of PRT research (Borkovec and Sides, 1978). Thus the present results suggest that progressive relaxation training and cognitive restructuring should be the treatment package of choice when clients have high general anxiety and are aware of interoceptive physiological indicants of tension. Because PRT promotes self-control over autonomic arousal, it has been recommended as a stress-reduction treatment for stress-mediated medical problems (Beiman, Israel and Johnson, 1978). Consistent with this view, Beiman, Graham, and Ciminero (1978) found PRT to be an effective nonpharmacological alternative treatment for stress-mediated hypertension. This line of behavioral medicine research seems to have considerable clinical promise.

Unfortunately, the large within-group variance prevented an adequate test of the differential effectiveness of the training procedures employed. This variance may have been a function of our heterogeneous client population, a state of affairs which is usually undesirable in an outcome study. This heterogeneity, however, probably facilitated the detection of relationships between client characteristics and differential response to each of the treatments. We, therefore, conclude that the research strategy of employing a moderate degree of subject heterogeneity in outcome investigations, and subsequently using regression techniques to isolate sources of variance attributable to subject characteristics, may have considerable potential for determining the optimal matching of clients with treatments in future research.

Summary

Male and female respondents ($n=52$) to an ad for anxiety-reduction therapy were randomly assigned to transcendental meditation, behavior therapy, self-relaxation, or a wait list control group. They were evaluated before and after treatment on multiple self-report and psychophysiological measures. The results of multivariate analyses of variance indicated there were no significant differential treatment effects. The results of stepwise multiple regression analyses performed separately for each experimental condition indicated client characteristics accounted for significant portions of the variance in one or more of the dependent variables for each treatment. Clients who reported perceiving more internal locus of control benefitted more from transcendental meditation than clients who reported greater external locus of control.

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References

- Beiman, I, Graham, L. E., and Ciminero, A. R. Self-control progressive relaxation training as an alternative nonpharmacological treatment for essential hypertension: Therapeutic effects in the natural environment. *Behaviour Research and Therapy*, 1978, 16, 371-375.

- Beiman, I., Israel, E., and Johnson, S. A. The during and posttraining effects of live and taped progressive relaxation, self-relaxation and electromyogram biofeedback. *Journal of Consulting and Clinical Psychology*, 1978, **46**, 314-321.
- Benson, H., Greenwood, M., and Klemchuk, H. The relaxation response: psychophysiological aspects and clinical applications. *International Journal of Psychiatry in Medicine*, 1975, **6**, 87-98.
- Bergman, J. S., and Johnson, H. J. The effects of instructional set and autonomic perception on cardiac output. *Psychophysiology*, 1971, **8**, 180-190.
- Bernstein, D. A., and Borkovec, T. D. *Progressive relaxation training: A manual for the helping professions*. Champaign, Illinois: Research Press, 1973.
- Borkovec, T. and Sides, J. Critical procedural variables related to the physiological effects of progressive relaxation: A review. *Behavior Therapy*, 1978.
- Byrne, D. The repression-sensitization scale: Rationale, reliability and validity. *Journal of Personality*, 1961, **29**, 334-349.
- Ellis, A. *Reason and emotion in psychotherapy*. New York: Lyle Stuart, 1962.
- Goldfried, M. and Davison, G. *Clinical behavior therapy*. New York: Holt, Rinehart & Winston, 1976.
- Greenwood, M. M., and Benson, H. The efficacy of progressive relaxation in systematic desensitization and a proposal for an alternative competitive response—the relaxation response. *Behavior Research and Therapy*, 1977, **15**, 337-343.
- Mahesh Yogi, Maharishi. *The science of being and the art of living*. Los Angeles: SRM publications, 1973.
- Mandler, G., Mandler, J. M., and Uviller, E. T. Autonomic feedback: The perception of autonomic activity. *Journal of Abnormal and Social Psychology*, 1958, **56**, 367-363.
- Paul, G. L., and Bernstein, D. A. *Anxiety and clinical problems: Systematic desensitization and related techniques*. Morristown, New Jersey: General Learning Press, 1973.
- Ray, W. J., and Lamb, S. B. Locus of control and the voluntary control of heart rate. *Psychosomatic Medicine*, 1974, **36**, 180-182.
- Rotter, J. B. Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 1966, **80** (Whole No. 609).
- Rubin: S. E., Lawlis, G. F. Tasto, D. L., and Namenck, T. Factor analysis of the 122 item fear survey schedule. *Behaviour Research and Therapy*, 1969, **7**, 381-386.
- Smith, J. C. Meditation as psychotherapy: A review of the literature. *Psychological Bulletin*, 1975, **82**, 558-564.
- Spielberger, C., Gorsuch, R., and Lushene, R. *Manual for the self-evaluation questionnaire*. Palo Alto: Consulting Psychologists Press, 1969.