J. Behav. Ther. & Exp. Psychiat. Vol. 14, No. 2, pp. 99-107, 1983.
Printed in Great Britain.

0005-7916/83$3.00+ .00

BEHAVIORAL RELAXATION TRAINING AND ASSESSMENT*

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Summary—Behavioral Relaxation Training (BRT), a set of ten overt behaviors directly taught by prompting and performance feedback, was compared with frontalis EMG Biofeedback (BIO), Progressive Muscle Relaxation (PMR), and a Music "attention focusing" (MUS) control, on five dependent measures of relaxation, in four groups of volunteers for a "stress-reduction" project. The dependent measures consisted of the Behavioral Relaxation Scale (BRS), frontalis EMG, finger temperature, skin conductance level, and self-report. BRS scores decreased in the BRT, BIO, and PMR, but not MUS groups. EMG decreased in the BRT and BIO groups, but not in PMR or MUS. BRT retained its improvements at 4–6 week follow-up. All groups reported similar improvements on the self-report scale, Temperature and skin conductance were not systematically related to training procedures. Significant correlations between BRS and EMG were obtained.

Relaxation can be regarded as a complex response class involving responses in the physiological, cognitive and overt behavioral areas. Relaxation training typically focuses on one area and the effects are assumed to generalize to other members of the response class. Examples of popular training methods include progressive muscle relaxation (Jacobson, 1938; Wolpe, 1973) in the behavioral area, EMG biofeedback, (Budzynski and Stoyva, 1969) in the physiological area, and autogenic training (Schultz and Luthe, 1959) in the cognitive area.

Assessment of relaxation involves dependent measures in one or more of the above response classes, for example electromyographic (EMG) levels (Budzynski and Stoyva, 1969) in the physiological realm, and self-report of calmness or disturbance in the cognitive realm (Wolpe, 1973). Systematic measures of overt behavior while engaged in relaxation are notably lacking (Hillenberg and Collins, 1982; Luiselli, 1980). Correspondence between the various measurement systems is assumed but rarely determined (Luiselli *et al.*, 1979).

The practicing clinician typically does not have physiological measurement equipment and most often relies on client self-report for assessment of arousal and relaxation. Self-report is subject to many factors besides the person's internal state (Paul and Bernstein, 1976) and may not correspond to physiological measures (Mathews, 1971; Qualls and Sheehan, 1981; Reinking and Kohl, 1975). Wolpe (1973) notes that "the assessment of a patient's ability to relax depends upon his report of the degree of calmness that relaxation brings about in him, and partly upon impressions gained from observing him" (p. 108). Observable behavior mentioned by some of the major developers of progressive muscle relaxation (Bernstein and Borkovec, 1973; Jacobson, 1938; Wolpe, 1958, 1973) include slow regular breathing, jaw dropped, feet sprawled apart, absence of swallowing, and no restless movement of eyes, fingers or other body parts. These behaviors have made up a clinical lore on what a relaxed person should look like, but little systematic investigation has been done.

The first author, during a clinical internship

*Appreciation is expressed to Fred Ribet, Jerry Maurer, Jerry Duvinsky, and Paul Erlandson for their assistance in data collection, and to Bercedis Peterson for her assistance in data analysis. Portions of this paper have been presented at the annual meeting of the Biofeedback Society of America (March, 1981) and the Association for Behavior Analysis (May, 1981).
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with pre-delinquent and learning-disabled boys, for whom progressive muscle relaxation was not effective, developed a procedure to train relaxed behaviors directly. A focus on observable behaviors rather than subjective states of tension and relaxation appeared to be easier for both clients and therapist. The present study is a systematic investigation of training overt relaxed behaviors, through modeling, prompting, and performance feedback, termed Behavioral Relaxation Training (BRT). One purpose of the present study is to compare BRT with more commonly practiced relaxation training methods on behavioral, verbal and physiological measures.

In order to do BRT, it was necessary to define objectively the target behaviors and criteria for success. Accordingly, an observational measurement system was developed, termed the Behavioral Relaxation Scale (BRS), consisting of a time-sampling procedure of observing ten classes of behavior. BRT thus consisted of training the behaviors measured on the BRS. If the BRS is an index of relaxation, other methods of training, such as frontalis EMG biofeedback and progressive muscle relaxation, should also produce changes in relaxed behavior as measured by the BRS. A second purpose of the present study was to determine the effects of various training methods on the BRS, and to relate the BRS to physiological and verbal measures of relaxation. A behavioral measure of relaxation would fill a major deficit that now exists for clinician and researcher (Luiselli *et al.,* 1980).

METHOD

Subjects

Thirteen males and nineteen females aged 20–29 yr (mean = 24 yr), were recruited from newspaper advertisements and posted notices asking people who were "tense or anxious" to participate in a "stress reduction project". Persons who responded were screened by telephone for current participation in psychotherapy, current psychotropic or tranquilizing medication and prior experience in relaxation or meditative techniques. Those reporting none of the above were scheduled for an initial session.

Setting

Training was carried out in a room 3 by 3.6 m. It contained a reclining chair for the subject and two chairs for the experimenter and reliability observer. All electronic equipment was in plain view on a table, but was not visible when the subject was reclined. Behind the recliner, out of the subject's view, were automatically timed cue lights controlled by solid-state programming equipment in an adjoining room.

Apparatus

Electromyographic activity was monitored by an Autogenic Systems Inc. (ASI) model 1700, with the bandpass set at 100–200 HZ and a time-averaging value of 1 sec. Gold-plated silver/silver-chloride electrodes with a non-saline conductive gel were attached to the subject's forehead, thoroughly cleansed with alcohol, in a standard frontalis placement (Autogenic Systems, Inc., 1975). Output, in microvolts (μV), was determined by the integral averaging method. Peripheral temperature was measured by an ASI model 1000b. A 5 mm. diameter thermistor (Yellow Springs Instrument Co.) with an absolute temperature resolution of 0.025°F, was attached with porous paper tape to the volar surface of the right index finger so as not to occlude blood flow. Subjects were instructed not to let the thermistor touch the chair or body surfaces. Output was measured in degrees Farenheit. Skin conductance levels were measured by an ASI model 3000. Electrodes were attached to the volar surface of the index, middle and third fingers of the subject's left hand with velcro straps. Output was measured in micromhos. Physiological data were collected by an ASI 5400, a special purpose computer which took readings at the rate of 2 per sec and printed averages in digital form at preset intervals.

Taped material, as required for particular groups, was played by a stereo cassette system over speakers facing the subject's chair.

Procedure

All subjects received the same general format. The first session consisted of a standard introduction to the measurement procedures, obtaining informed consent, an explanation of the physiological sensors, an adaptation period and a pre-training measurement period. Next, subjects were instructed in their particular training procedures depending on their group assignment (see below). Subjects then received their first training period, followed by a second measurement period. The second to seventh sessions consisted of adaptation, training and measurement periods. Adaptation periods were 5 min, training periods were 21 min and measurement periods were 5 min in length. The eighth session consisted of adaptation and the post-training measurement period. These eight sessions were scheduled within no more than a 14-day interval, so no home practice instructions were given. The ninth session was a follow-up adaptation and measurement period, scheduled 4–6 weeks after the previous session; debriefing also occurred at this time and subjects received $10 for attending all sessions and follow-up. Subjects were seated in a fully reclined position throughout all adaptation, training and measurement periods.

Five dependent measures were monitored during each measurement period: (1) Behavioral relaxation scale, (2) frontalis EMG, (3) skin conductance level, (4) finger temperature and (5) self-report.

Behavioral relaxation scale (BRS). This consisted of ten items scored as either relaxed or unrelaxed during five 1-min intervals of the measurement period. Each minute was divided into a 30-sec period to count breathing rate, a 15-sec period to observe the other nine items, and a 15-sec period to record on a data sheet. These time segments were signalled by cue lights behind the subject's head. The ten items, briefly, consisted of the following: (1) breathing—scored as relaxed if less than the baseline rate; (2) quiet—no vocalizations; (3) body—no movement of the trunk; (4) head—in midline, supported by recliner; (5) eyes—closed with smooth eyelids; (6) jaw—lips parted in center; (7) throat—no movement; (8) shoulders—sloped and even, no movement; (9) hands—curled in "clawlike" position; (10) feet—pointed away from each other forming an approximate 90° angle. Scores on the BRS could range from 50 to zero, with lower scores indicating greater relaxation.

Frontalis EMG (EMG). The mean EMG level, in microvolts, for the first 45 sec of each of the 5 min of the measurement period, corresponding to each 45 sec of behavioral observation, was computed by the ASI 5400. An overall mean for the five 45-sec segments was also computed.

Skin conductance level (SCL). The average level, in micromhos, was computed for the first 45 sec of each minute of the measurement period, as well as an overall mean for the five 45-sec segments.

Finger temperature (TEMP). The mean temperature, in degrees Farenheit, was computed for the first 45 sec of each minute of the measurement period, as well as an overall mean.

Self-rating scale (S-R). This consisted of a page containing the numbers seven to one, each with a brief descriptor, e.g. "7 = feeling extremely tense throughout my body; 4 = feeling relaxed as in my normal resting state; 1 = feeling more deeply and completely relaxed than I ever have". The page was handed to the subject at the end of each measurement period and he/she was asked to select a number that best corresponded to how he/she felt over the preceding several minutes.

Subjects were randomly assigned to one of the four training conditions, with the restriction that the number of males and females be equal across groups. Actually, three groups contained three males and five females, and one group contained four males and four females. There were no group differences with respect to age. The training conditions were as follows:

Behavioral relaxation training (BRT). In the first training session each of the ten items on the BRS was modeled in unrelaxed and relaxed forms by the experimenter and the subject was asked to imitate the relaxed behaviors. Verbal prompts and manual guidance were used as needed. A feedback procedure was described, in which the experimenter simply said the one-word name of any area that was noted to be unrelaxed, at 2-min intervals, during the training period (e.g. "hands"). If all items were relaxed, the experimenter said "Good" or "You're doing well". On subsequent training sessions, the subject was simply reminded that he/she would be told the name of any item that was unrelaxed. During training, the experimenter's observation periods were cued by an audio tape played over headphones.

Frontalis EMG biofeedback (BIO). A pulsed auditory tone was presented which decreased in pitch and frequency with decreases in EMG levels. In the initial session the subject was asked to raise his/her eyebrows and to move around to demonstrate the relation between muscle activity and sound. The subject was informed that below a certain level of tension the tone would turn off and that this level would change from time to time. The mean value of the pre-training measurement period was set as the initial threshold. A systematic shaping procedure was employed in which the ASI 5400 calculated the percent time the subject was below the threshold value (tone off) for successive 1-min periods during training, as well as the average EMG for each min. If this percentage was between 25 and 75%, the threshold was not changed. If it exceeded 75%, the threshold was decreased to the mean value of the preceding minute; if it was less than 25%, the threshold was increased to the preceding mean value. On subsequent training sessions, the initial demonstration was omitted.

Progressive muscle relaxation (PMR). A standard relaxation protocol was employed (Bernstein and Borkovec, 1973). In the initial session, the experimenter demonstrated each tense/relax exercise to be learned. The actual training instructions were taped, by a soft female voice, and played over speakers. A sequence of four tapes was employed. Tape 1, on sessions 1 and 2, described half of the "16-muscle group" sequence: eight specific exercises for the arms and head. Tape 2, on sessions 3 and 4, described the other half of the "16-muscle group": eight specific exercises for the torso and legs. Tape 3, on sessions 5 and 6, described the "7-muscle group" exercises for muscle groupings throughout the body. Tape 4, on session 7, described exercises for five general areas of the body, The latter tape was 6 min shorter than the others and was supplemented by the experimenter giving standard comments to focus on the feelings of calmness, heaviness and relaxation.

Music "attention focusing" (MUS). A 90-min stereo tape of a composition advertised as a stress-reduction aid ("Spectrum Suite", Halpern Sounds, Inc.) was employed. In the initial session, subjects were instructed to free their mind from intruding thoughts and focus on the music, allowing their body to become relaxed. A 5-min selection from the tape was played, corresponding to the period in which other groups received demonstrations. The tape was divided into four 21-min segments which were repeated after the fourth training session.

Experimenter contact was equated across groups by carefully matching the instructions for each condition in length, descriptive content, statements of the positive effects to be obtained from relaxation, and the efficacy of the particular technique. The demonstration time, prior to the first training session, was also equated for each group. The experimenter was present during all sessions, and delivered standard positive comments at the conclusion of each session (e.g. "It looks like you are doing well").

All observers were trained to a criterion accuracy of 90% on the BRS and were periodically "recalibrated" to guard against observer drift. They were also trained to observe and deliver feedback in the BRT condition to a criterion of 90% agreement. Reliability of observation on the BRS was measured at least twice per subject, once during training and once during either the pre-training, post-training, or follow-up measurement periods. A second observer sat unobtrusively in the corner of the experimental room; his/her presence was explained to the subject as necessary to check that the experimenter was administering the procedures properly. Reliability was calculated as

$$\frac{\text{Agreements}}{\text{Agreements} + \text{Disagreements}} \times 100.$$

Reliability ranged between 86 and 100%, with an overall mean of 95.7%.

RESULTS

A two-way mixed design ANOVA was performed on each of the five dependent measures; group assignment was the independent factor and measurement sessions was the repeated factor. The results of these ANOVA's are shown in Table 1. Where significant effects were obtained, *post-hoc* analyses, employing the Newman-Keuls procedure (Bruning and Kintz, 1977) were carried out within groups and between groups, where appropriate, at the pre-training, post-training, and follow-up sessions.

With respect to performance on the BRS, significant main effects of groups and sessions and a significant interaction were found. Mean performance of the groups on this measure is shown in Fig. 1. *Post-hoc* analyses (Table 2A) indicate that the BRT group showed a large decline in unrelaxed behaviors from pre- to post-training.

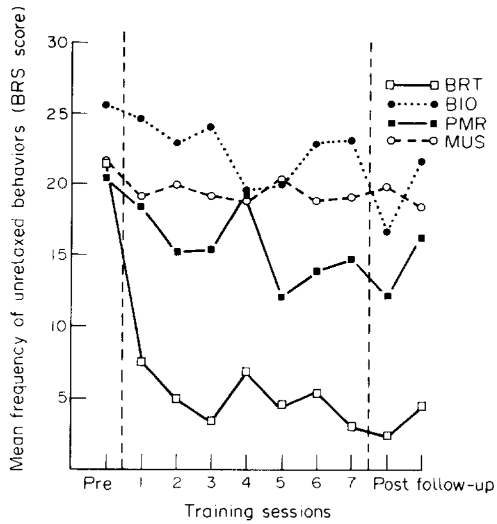

Fig. 1. Mean behavioral relaxation scale scores for behavioral relaxation training, frontalis biofeedback, progressive muscle relaxation, and music groups.

Table 1. Two-way mixed-factor analyses of variance on each of five dependent measures

Dependent measure	Source	df	Mean square	F	P
BRS	Group	3	3723.23	37.66	<0.00001
	Error	28	98.86		
	Session	9	208.29	10.81	<0.00001
	Group × session	27	53.84	2.80	<0.00001
	Error	252	19.26		
EMG	Group	3	2.22	1.22	0.32
	Error	28	1.82		
	Session	9	1.24	4.80	<0.00001
	Group × session	27	0.48	1.88	<0.007
	Error	252	0.25		
SCL	Group	3	1772.43	4.91	<0.007
	Error	28	360.66		
	Session	9	75.22	2.11	<0.02
	Group × session	27	39.20	1.10	0.34
	Error	252	35.65		
TEMP	Group	3	495.76	1.66	0.19
	Error	28	299.51		
	Session	9	13.12	0.44	0.91
	Group × session	27	34.29	1.15	0.28
	Error	252	29.79		
SELF	Group	3	5.83	1.81	0.16
	Error	28	3.21		
	Session	9	10.45	13.82	<0.00001
	Group × session	27	0.71	0.95	0.53
	Error	252	0.75		

Table 2. *Post-hoc* (Newman-Keuls) analyses of significant effects

A. Analyses of BRS data

Within group

	BRT			BIO			PMR			MUS		
	Diff.	Crit. diff.	*P*	Diff.	Crit. diff.	*P*	Diff.	Crit. diff.	*P*	Diff.	Crit. diff.	*P*
Pre-vs post-	19	6.38	<0.01	9	6.38	<0.01	8.3	6.38	<0.01	1.7	4.29	>0.05
Post-vs follow-up	2.1	4.29	>0.05	4.9	4.29	<0.05	4.2	4.29	>0.05	1.4	4.29	>0.05
Pre-vs follow-up	16.9	5.64	<0.01	4.1	4.29	>0.05	4.1	4.29	>0.05	3.1	5.13	>0.05

Between Groups

	Pre			Post			Follow-up		
	Diff.	Crit. diff.	*P*	Diff.	Crit. diff.	*P*	Diff.	Crit. diff.	*P*
BRT vs BIO	4.2	12.2	>0.05	14.2	12.2	<0.05	17.0	16.8	<0.01
BRT vs PMR	0.8	10.1	>0.05	9.9	10.1	>0.05	12.0	10.1	<0.05
BRT vs MUS	1.1	10.1	>0.05	17.4	16.8	<0.01	13.9	12.2	<0.05
BIO vs PMR	5.0	13.4	>0.05	4.3	10.1	>0.05	5.0	12.2	>0.05
BIO vs MUS	4.1	10.1	>0.05	3.2	10.1	>0.05	3.1	10.1	>0.05
PMR vs MUS	0.9	12.2	>0.05	7.5	13.4	>0.05	1.9	10.1	>0.05

B. Analyses of EMG data

Within group

	BRT			BIO			PMR			MUS		
	Diff.	Crit. diff.	*P*	Diff.	Crit. diff.	*P*	Diff.	Crit. diff.	*P*	Diff.	Crit. diff.	*P*
Pre-vs post-	1.02	0.73	<0.01	0.72	0.59	<0.05	0.22	0.49	>0.05	0.29	0.49	>0.05
Post-vs follow-up	0.17	0.49	>0.05	0.46	0.49	<0.05	1.11	0.73	<0.01	0.11	0.49	>0.05
Pre-vs follow-up	0.89	0.64	<0.01	0.26	0.49	>0.05	0.89	0.64	>0.01	0.40	0.59	>0.05

The PMR and BIO groups also showed significant decreases with no change evidenced by the MUS group. The BRT group maintained their low BRS scores at follow-up, while the BIO group showed a slight but significant increase and the PMR group increased to a point midway between their pre- and post-training levels. Between groups, analyses indicated that the BRT group had significantly lower BRS scores at post-training and follow-up, while the other groups did not differ among themselves. Pre-training differences between groups were not statistically significant (Table 2A).

Mean performance of the groups on the frontalis EMG measure is shown in Fig. 2. A significant effect of sessions and a session by group interaction were found for this measure (Table 1). *Post-hoc* analyses (Table 2B) confirm that the BRT group had a marked reduction in frontalis EMG which was maintained at follow-

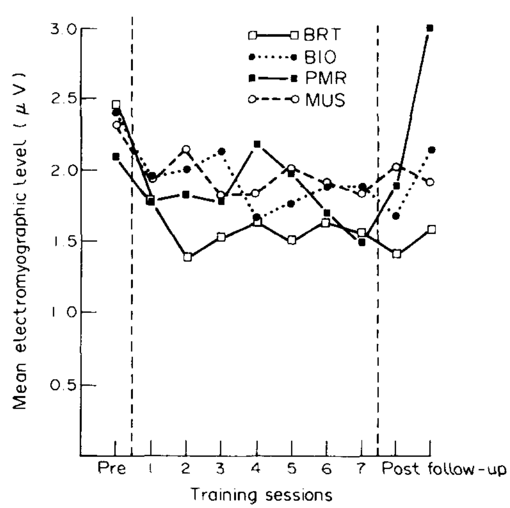

Fig. 2. Mean frontalis EMG levels for behavioral relaxation training, frontalis biofeedback, progressive muscle relaxation and music groups.

up. The BIO group also showed a reduction in EMG with a tendency toward recovery at follow-up. The PMR group showed no reduction but displayed an unusual increase at the follow-up session. No changes were found for the MUS group. Between group differences in EMG at pre-, post-, or follow-up were not significant.

Mean performance of the groups on the skin conductance measure is shown in Fig. 3. ANOVA of this measure indicated main effects of groups and sessions, but no interaction (Table 1). Inspection of Fig. 3 shows high variability between groups and across sessions. The groups effect reflects the generally high levels of the BIO and PMR groups and the generally low levels of the MUS and BRT groups. The sessions effect reflects a general downward trend. However, *post-hoc* analyses failed to find significant differences between groups at pre-, post-, or follow-up, or between the pre- and post-training sessions within any group.

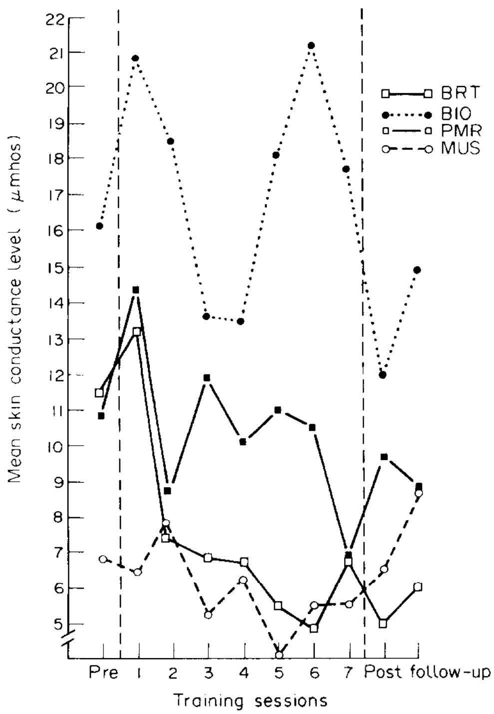

Fig. 3. Mean skin conductance levels for behavioral relaxation training, frontalis biofeedback, progressive muscle relaxation training and music groups.

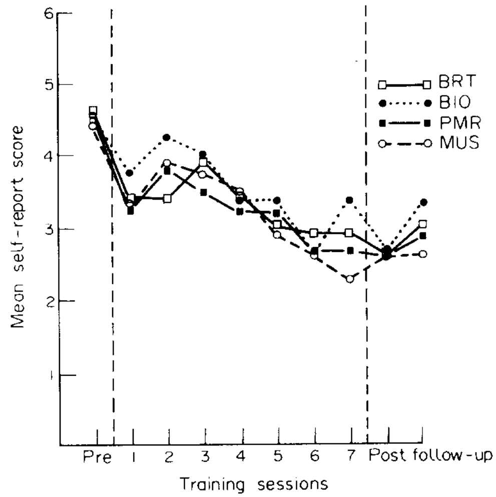

Fig. 4. Mean self-report scores for behavioral relaxation training, frontalis biofeedback, progressive muscle relaxation and music groups.

No systematic changes in finger temperature were obtained (Table 1). Performance on this measure fluctuated across groups and sessions. It was not possible to hold ambient temperature constant, either indoors or outdoors, across times of day and seasons of the year, which may have contributed to the lack of sensitivity of this measure.

All groups were virtually identical on the self-report measure, showing a significant main effect of training (Table 1). As shown in Fig. 4, all groups reported similar improvement in feelings of relaxation (decreased self-report scores) which was maintained at follow-up, regardless of the training method or other measures of relaxation.

A Pearson product moment correlation matrix among the five dependent measures was completed for each subject, based on their mean scores in the 10 measurement periods. Individual correlations were computed in view of the Laceys' (1958) findings on idiosyncratic arousal response patterns. The most consistent correlation was between BRS and EMG, with a total of 18 of the 32 subjects displaying a significant postive relationship (Table 3). A significant number of subjects showed this relationship in each group except for the PMR condition. The

Table 3. Number of subjects showing significant correlations ($r \geqq 0.62$, $P < 0.05$) between dependent measures

	Groups				
Measures correlated	BRT ($n = 8$)	BIO ($n = 8$)	PMR ($n = 8$)	MUS ($n = 8$)	TOTAL ($n = 32$)
BRS-EMG	6‡	7‡	1	4‡	18‡
BRS-SCL	3†	0	0	0	3
BRS-TEM	0	0	0	0	0
BRS-S-R	1	2*	2*, 1§	1	6†, 1§
EMG-SCL	4‡	1	0	1	6†
EMG-TEM	1	0	2*	1	4*
EMG-S-R	5‡	2*	1	1	9‡
SCL-TEM	1	1	2*§	0	2, 2§
SCL-S-R	2*	2*	0	0	4*
TEM-S-R	1	0	1	0	2

*$P \cong 0.05$; †$P < 0.01$; ‡$P < 0.001$. Probability of the obtained number of significant correlations ($P = 0.05$, $q = 0.95$) determined by the binomial distribution; c.f. Glass and Stanley (1970) §Correlation sign reversed from expected direction.

next most frequent correlation was between EMG and Self-Report. Only three subjects (all in the PMR group) displayed correlations in a "reversed" direction; two of these involved TEMP and SCL and may represent an idiosyncratic physiological pattern.

DISCUSSION

The BRS appears to be a useful measure of relaxation. External validity for this scale stems from two lines of evidence. First, significant decreases on the BRS occurred for subjects receiving accepted relaxation training procedures, namely PMR and frontalis EMG biofeedback, while no systematic changes occurred for those receiving a placebo procedure. Secondly, strong correlations were found between BRS scores and frontalis EMG. More direct evidence for the relationship between the BRS and muscle tension has been found by Poppen and Maurer (1982). They showed that the relaxed postures included on the BRS consistently resulted in significantly lower EMG levels in the specific muscle groups associated with each posture (e.g. forearm flexors and extensors for "hands") when compared to unrelaxed postures. Thus, the more relaxed behaviors that are exhibited the more generally relaxed the person may be said to be.

As pointed out in recent reviews (Hillenberg and Collins, 1982; Luiselli *et al.*, 1979) researchers and clinicians have been hampered by the lack of a reliable, valid, observable measure of relaxation. Luiselli (1980) described a Relaxation Checklist which was reported to discriminate a group of college students receiving a single relaxation session from those receiving a control procedure. It was also reported to be related to expert and self-ratings of relaxation. Six of the body areas on the Checklist appear to overlap with the BRS, though the scoring criteria differ, and a 5-point rating scale was used rather than the interval recording technique.

Given the paucity of information, much research remains to be done to determine the validity, reliability and efficiency of behavioral measures of relaxation. Additional research may show that modifications of the BRS are indicated. But at present, the BRS is available as an assessment tool which may be useful for both the clinician (e.g. to assess relaxation during desensitization) and the researcher.

To the degree that the relaxed behaviors of the BRS are valid indications of relaxation, direct training of those behaviors appears to be an effective, rapid method of teaching relaxation. BRT subjects were able to achieve minimum levels of unrelaxed behaviors, as measured by the BRS and frontalis EMG, apparently within two training sessions. They were also able to assume the relaxed postures after a 4–6 week period of no training, displaying no decrement on either the EMG or BRS measures. Good retention may be due to overt postures being easier to discriminate and reproduce than subjective feelings of tension. Not surprisingly, BRT produced much larger and more rapid changes on the BRS than any of the other training methods, it was as effective as biofeedback in producing decreases in frontalis EMG, and it was as effective as any method in producing self-reports of relaxed feelings.

Although the subjects were not strictly clinical referrals, BRT has important clinical implications. The ease of training may be useful for systematic desensitization, which typically requires extensive relaxation training before actual desensitization begins (Wolpe, 1958, 1973). BRT is also potentially useful for persons who have difficulty with current methods, such as the developmentally disabled or "hyperactive" (Luiselli, 1980; McGimpsey *et al.*, Note 1). Objective postures and activities are employed rather than subjective feeling states which may be difficult for such persons to discriminate. Also, BRT lends itself well to a response-consequation system in which a client could earn tokens for exhibiting relaxed behaviors. Of course, the effects of BRT on clinically important conditions such as subjective anxiety or headache pain, awaits further research.

EMG frontalis biofeedback training in the present study resulted in decreases in both frontalis muscle tension and in BRS scores, as well as self-report. Frontalis biofeedback has been criticized as an ineffective method of training relaxation (Surwit and Keefe, 1978), and its efficacy, beyond nonspecific situational effects, has been questioned (Blanchard and Epstein, 1977; Tarler-Benlolo, 1978). Qualls and Sheehan (1981) have pointed out that the data on frontalis biofeedback training are inconclusive and suggest that procedural and client characteristic variables may account for some of the inconsistency. Specifically, clinical subjects and sufficient training are more likely to be related to differential biofeedback effects. In the present study, the number of training sessions was comparable to those studies which reported biofeedback to be more effective than some other technique (Qualls and Sheehan, 1981). And although the subjects were not clinical referrals, they were volunteers for "stress reduction" rather than students fulfilling a class requirement. Another factor which may have contributed to the effectiveness of biofeedback training was the objective specification of the shaping criteria for changing threshold values. The parametric effects of shaping criteria are in need of further research.

PMR in the present study resulted in significant decreases in unrelaxed behavior, which is in line with earlier clinical observations (Bernstein and Borkovec, 1973; Wolpe, 1973), and with studies described in Luiselli (1980). The training method followed recommended standardized procedures and the number of sessions exceeded that in most published studies of relaxation (Hillenberg and Collins, 1982). Expected EMG decreases did not occur for this group though the literature on this point is equivocal (Borkovec and Sides, 1979). Perhaps one factor is the use of taped relaxation instructions. Both BRT and BIO subjects received individualized training, whereas the PMR subjects all received the same pace of instructions. Research has indicated that in some instances individualized relaxation training is superior to taped instructions (Hillenberg and Collins, 1982; Paul and Trimble, 1970), though this is not a consistent finding (Israel and Beiman, 1977) and taped instructions are widely employed in clinical practice. Borkovec and Sides (1979) conclude that PMR is more likely to result in greater physiological effects than control procedures with clinical as opposed to normal subjects, live as opposed to taped instructions, and multiple as opposed to a single training session. Still, the present results are not consistent with a comparable study (Reinking and Kohl, 1975), which employed multiple sessions of taped instructions with normal subjects, and found that PMR resulted in significantly greater EMG decreases than self-relaxation controls.

The MUS procedure was presented to subjects as an effective training method, with a rationale developed from the sales literature of Halpern Sounds, Inc. The potency of this technique is seen in changes in the self-report measure, which was equivalent to the other groups, even though behavioral and physiological changes were not evident. Several subjects asked to buy the tapes and some expressed disbelief in the debriefing session when their physiological and behavioral results were explained. This group points up, once again, the fact that self-report is influenced by many factors, notably instructions and impressive gimmickry, necessitating the use of additional measures of relaxation.

In conclusion, BRT appears to have much potential as a relaxation training method, and awaits application to various clinical populations. It also could be easily combined with other methods, such as biofeedback, autogenic training, or meditation, with perhaps mutually enhancing effects. The BRS is available as an assessment device which allows the clinician an objective measure of progress in a client without expensive physiological equipment. And it provides relaxation researchers with a consistent method of communicating results.

REFERENCE NOTES

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