School-Based Relaxation: Attempting Primary Prevention

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Abstract

Three controlled studies involving progressive relaxation (PR) with public school children were conducted. The first compared PR and biofeedback training with anxious grade ten students involved in public speaking. The second compared PR and an attention control group (Career Education) with grade eight students. The third study compared PR and an alternative Health and Personal Fitness elective with grade 11 and 12 students. The results indicate regular practice with PR produces reductions in both physiological, and paper and pencil dependent measures, but expectancy effects also can result in similar reductions in both types of measures. Higher program compliance coupled with greater reductions in anxiety and stress symptoms were observed in the grade 11 and 12 sample.

Résumé

Trois études contrôlées utilisant la relaxation progressive (RP) auprès d'enfants frequantant l'école publique ont été conduites. La première comparait RP et le programme d'entraînement du biofeedback avec des étudiants de dixième année anxieux lorsqu'il s'agissait de s'exprimer en public. La deuxième comparait RP et un groupe d'étudiants de huitième année (Education à la Carrière) travaillant sur la concentration. La troisième étude comparait RP et un programme optionnel de Santé et de Conditionnement Physique Personnel avec des étudiants de 11ième et 12ième années. Les résultats indiquent que la pratique régulière de la RP amène une diminution du stress et de l'anxiété dans les deux mesures dépendantes: le plan physiologique et la mesure papier-crayon, mais que les effets attendus peuvent aussi résulter d'une diminution similaire dans les deux types de mesures. Une plus grande adaptabilité au programme jumelée avec une plus grande diminution des symptômes d'anxiété et de stress ont été observées dans l'échantillon de la 11ième et de la 12ième années.

Stress-related problems in the general population have continued to increase in the recent past. The cost to business and to society is high (Matteson & Ivancevich, 1987). Among young people, the incidence of stress-related problems is high also (Eklind, 1981; Hiebert & Eby, 1985). It seems judicial then to explore alternative approaches to stress control, perhaps with a preventive focus (cf. Forman & O'Malley, 1985). Training in relaxation and other stress control procedures could help young people reduce the stress they experience, as well as preventing more serious stress-related problems in later adulthood.

This paper reports a series of field tests investigating the effects of relaxation training with public school students. Initially, our goal was to determine whether school students could learn relaxation techniques in a classroom setting, and if so, what resulting effects would be observed on stress and anxiety. Also, we wished to determine whether classroom

teachers could deliver such programs effectively. Initially, we piloted a progressive relaxation program in a grade 12 English class (Hiebert & Eby, 1985). The program was delivered by the regular classroom teacher, with supervision and limited assistance from the first author. The results indicated that the teacher could deliver the program effectively. About two-thirds of the class was sufficiently motivated to complete the program. Significant reductions in state and trait anxiety, and on a variety of stress-related symptoms were observed.

Following that initial success, we sought to continue our investigations in a more controlled context. First, we wanted to compare our progressive relaxation program with some other approaches to relaxation training and obtain physiological evidence of the students' relaxation abilities. Following that, we conducted two controlled field tests using progressive relaxation in classroom instructional settings.

STUDY NUMBER ONE

The purpose of the first study was to replicate our initial pilot in a controlled setting and to obtain more specific evidence of the effects of our relaxation training program. To do this, we compared our progressive relaxation (PR) procedure to most reactive modality biofeedback training (BFT) and a no-contact control condition (NCC). We collected both paper and pencil, and physiological measures across time.

Subjects

The subjects were anxious grade 10 students in a large suburban secondary school in Western Canada who were involved in public speaking. Public speaking was a compulsory component of the grade 10 English curriculum and teachers observed that anxiety had a strong deleterious influence on the performance of many students. In order to participate in the study, students had to be identified by their teachers as experiencing substantial public speaking anxiety and score above the third sten on the IPAT Anxiety Scale (Cattell, 1976). Information meetings were held with potential participants and their parents so that all parties would be aware of the nature of the project prior to participation. In the end, 40 students (30 females and 10 males, ages 15-17, Mean=15.6 years) volunteered to participate in the study. They were assigned randomly to the three treatment conditions.

Dependent Measures

Paper and pencil measures. The State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1977) was used to assess predisposition to anxiety (A-Trait) and situational anxiety (A-State). The STAI has been used frequently in research of this nature

(e.g., LaBoeuf, 1977; Townsend, House & Addario, 1975) and has demonstrated acceptable validity and reliability. In addition, treatment subjects self-monitored their heart rate, respiration rate, and finger temperature before and after home practice sessions, and recorded these measures, along with subjective impressions of the practice session. This self-monitoring procedure has been reported previously as a useful indicator of skill acquisition, in addition to having motivational effects on subjects (cf. Hiebert, Cardinal, Dumka & Marx, 1983; Hiebert, Cardinal & Dumka, 1983; Hiebert & Eby, 1985; Lamott, 1975).

Physiological measures. The physiological measures were obtained using a Psychophysiological Stress Profile (PSP) (Budzinski & Peffer, 1980), involving simultaneous monitoring of frontal EMG, GSR, and peripheral skin temperature (PST) under baseline and stressor conditions. In our PSP we used a 14 minute initial relaxation baseline, followed by three standard stressors separated by two minute recovery periods, and a final 14 minute relaxation baseline. For stressors, we used a three minute serial sevens task (Budzinski & Peffer, 1980), a two minute reading comprehension task, and two minute public speaking imagery task. This procedure is similar to that used by others (cf. Budzinski & Peffer, 1980; Corson, Schneider, Biondi & Meyers, 1980) and has been used previously in our own lab (Petersen & Hiebert, 1984). EMG readings were obtained from an Autogen 1700, ST from an Autogen 2000b, and GSR from an Autogen 3400. All data was collected automatically using the Autogen 5600 Data Acquisition Center. EMG was monitored from a standard forehead placement with active electrodes placed above the centre of each eye, mid-way between the eyebrows and the hair-line, and a reference electrode mid-way between. According to manufacturer's specifications, the band pass was set for 100-200 Hz and electrode impedences of 10K ohms or less was maintained throughout. ST was monitored from the palm surface of the end phalanx of the middle finger of the dominant hand. GSR was recorded by attaching sensors to the nondominant hand in accordance with manufacturer's specifications. All recording took place in a quiet, temperature monitored, converted storage room at the school.

Procedure

Three research assistants (RAs), senior students in a Master's program in Counselling Psychology, conducted all training and assessment sessions. One RA administered all the dependent measures and was blind to the group assignment of the subjects. The other RAs were trainers, following a standard treatment protocol to ensure uniform training across subjects and sessions. Following pretesting, subjects were assigned randomly to each treatment-trainer combination so that each trainer worked with half of the subjects in each training condition.

Treatment

Biofeedback. The results of the PSP were used to determine each subject's most reactive physiological modality, incorporating baseline levels and physiological variability on the PSP for each subject (see Petersen & Hiebert, 1984). Although BFT utilized the most reactive physiological modality, all three signals (EMG, PST, GSR) were monitored simultaneously during training. Subjects were seated in a comfortable recliner in front of a television monitor. Feedback consisted of a colour bar on the television and an analogue beep. As the subject relaxed, the beep decreased in pitch and frequency while the colour bar became shorter. The Autogen 9400 Signal Matrix was used to generate the biofeedback signal so that all subjects received the same feedback signal regardless of the training modality. Training occurred across eight forty-minute, weekly sessions or until subjects attained apriori training criteria. The training criterion for EMG was 1.5 μv or one-half of PSP relaxation baseline maintained for ten minutes on two successive sessions. For PST the criterion was a bidirectional temperature change of 1°F/min. or maintenance of 90°F or higher for ten minutes across two successive sessions. For GSR the criterion was maintenance of one-half of baseline level over two successive sessions. The trainer and equipment bank were located out of the subject's field of vision.

BFT proceeded according to a three-stage model of awareness, control, and transfer (see Budzinski, 1973). In the first two sessions, subjects were encouraged to try a variety of strategies to make the tone go down and shorten the colour bar, indicating a more relaxed state. In sessions three to five, subjects were encouraged to become more selective in their choice of strategy. They were encouraged to develop a greater sense of control over the physiological modality being trained. The concept of passive volition was introduced as the underlying mechanism for relaxation to avoid the paradoxical increase in tension that sometimes comes from trying too hard to relax. The final three sessions were for weaning and transfer, to promote the development of internal cues that signaled relaxation and to ensure that subjects were not dependent on the equipment to become relaxed. To promote transfer, subjects were encouraged to develop an internal signal to relax and were instructed in the use of cue-controlled relaxation. They also were given practice visualizing their use of the relaxation cue in a variety of school-related situations. To promote weaning, one-minute no-feedback periods were gradually introduced into training, with subjects instructed to see if they could maintain the relaxation with the feedback signal turned off. In addition, subjects were instructed to practise duplicating the feeling they experienced in the training sessions at home in a quiet place for 20 minutes each day, and to record the self-monitored measures.

Progressive relaxation. PR proceeded according to the procedure we had field-tested earlier (Hiebert & Eby, 1985). In the first two sessions,

subjects received information about how the relaxation response was the physiological opposite of the stress response. They were taught to self-monitor their HR, RR, and PST (the latter using a small finger thermometer), and began a standard tense-relax PR sequence. The importance of regular home practice was emphasized. In the third session subjects began training with a shorter script that retained the same muscle sequence they had been practising, but focused only on producing relaxation in those muscles. In sessions four and five, the concept of cue-controlled relaxation was introduced and subjects began rehearsing their cues at the close of the relaxation sequence. The format for the last three sessions was similar to that used in the BFT group. Subjects received instruction and visualization practice in using cue-controlled relaxation in a variety of school-related situations. All sessions were conducted individually, on the recliner in our training room, with EMG, PST, and GSR monitored throughout.

Control. Subjects in the NCC group were told that all possible training time periods had been filled and that they would have to wait until later to begin training. We also told them that we wanted to determine the stability of their physiological reactions to a variety of school-related tasks and therefore would be conducting two monitoring sessions prior to beginning training. At the end of the treatment period, control subjects were assigned randomly to each treatment-trainer condition for treatment.

TABLE 1

STAI-S and STAI-T Means and Standard Deviations for 38 Grade 10 Public Speaking Anxious Students

			Time	
Measure	*Group*	*n*	*Pretest*	*Posttest*
STAI-S	Biofeedback	14	46.12 (11.71)	36.43 (5.97)
	Progressive Relaxation	11	43.82 (10.20)	38.09 (8.19)
	Control	13	45.85 (11.80)	42.92 (10.16)
STAI-T	Biofeedback	14	44.07 (8.26)	44.43 (10.60)
	Progressive Relaxation	11	43.00 (13.76)	41.18 (15.80)
	Control	13	42.23 (7.19)	41.85 (7.87)

(Standard deviations in this and all subsequent tables are in parentheses.)

RESULTS

The STAI-S and STAI-T results were analyzed using 3×2 ANOVAs for repeated measures (Group×Time). There was a statistically significant main effect for time on the STAI-S, $F(1, 35) = 12.48$, $p < .01$. There were no other significant main or interaction effects. (See Table 1.) This indicates that state anxiety was lower for our sample as a whole at posttest, but that there were no differential reductions in anxiety across treatment conditions.

The PSP results were analyzed using three 3×2×5 ANOVA for repeated measures, repeated on the last two factors (Group×Pre/Post× PSP Condition). There was a significant main effect for condition for all three physiological variables, $F(4, 140)=2.43$, $p=.05$ for EMG, $F(4, 136) = 48.78$, $p < .01$ for GSR, $F(4, 136)=20.23$, $p < .01$ for PST. (See Table 2). Post-hoc analyses with Scheffe indicated that subjects' arousal levels were higher under stressor conditions than under baseline conditions. In addition, there was a significant Time×Condition interaction for GSR, $F(4, 136)=2.73$, $p=.03$. Post-hoc Scheffe's indicated that subjects recovered to lower levels during Baseline 2 at posttest than at pretest. However, this result was similar for all treatment conditions.

Analyses of the physiological data recorded during training indicated similar reductions in arousal across the eight training sessions for both treatment groups. There was a significant group=session interaction for EMG, indicating that the EMG readings were higher for the PR group during sessions one and two. This was probably because of the muscle tension component of the PR exercise. EMG readings were similar by session eight, which also was lower than session one. Unfortunately, the number of subjects assigned to each biofeedback training condition was not large enough to permit an analysis that would determine which training modality our subjects found easiest to master. In all, our results confirm that subjects in both BFT and PR experienced similar reductions in physiological arousal during each training session and over the eight sessions of treatment.

In order to probe for unanticipated effects, several additional ANOVAs were conducted using gender, trainer, and teacher-rated English ability as classification variables. The only significant difference encountered was that subjects with average teacher-rated ability demonstrated significantly greater success with training than subjects in either the below-average or above-average groups.

CONCLUSIONS

The most powerful conclusion arising from this study can be summarized by the old adage "Everybody plays, everybody wins." The training data shows that subjects in our PR program experienced similar physiological changes during training as the subjects receiving biofeedback. However,

TABLE 2

Stress Profile Means and Standard Deviations for 38 Grade 10 Public Speaking Anxious Students

			pretest condition					*posttest condition*				
Meas.	*Group*	*n*	*B1*	*S1*	*S2*	*S3*	*B2*	*B1*	*S1*	*S2*	*S3*	*B2*
EMG	BF	14	7.72	8.12	7.41	6.78	7.23	7.74	7.74	8.04	7.21	6.88
			(3.10)	(3.07)	(2.86)	(2.71)	(2.67)	(5.05)	(5.23)	(5.39)	(5.13)	(4.58)
	PR	11	8.45	7.42	15.37	6.33	7.47	9.40	8.98	9.26	7.89	8.33
			(4.29)	(3.24)	(8.18)	(3.04)	(3.42)	(4.48)	(4.50)	(4.60)	(3.94)	(4.25)
	NCC	13	10.41	10.85	10.34	9.48	10.59	8.66	8.61	8.56	7.72	8.25
			(4.23)	(5.11)	(4.84)	(5.01)	(5.39)	(4.05)	(3.84)	(4.27)	(3.85)	(4.05)
GSR	BF	14	11.93	17.98	18.69	18.08	16.32	12.59	18.51	19.83	18.28	14.12
			(4.11)	(5.93)	(6.06)	(6.76)	(7.32)	(15.83)	(17.31)	(17.37)	(16.83)	(11.66)
	PR	11	11.47	19.93	19.55	20.29	17.70	12.13	16.30	19.97	18.00	14.66
			(7.01)	(12.35)	(11.57)	(12.99)	(11.37)	(9.84)	(12.31)	(13.76)	(12.96)	(9.21)
	NCC	13	9.60	14.68	16.28	15.45	14.60	9.20	13.98	16.67	15.31	14.36
			(4.85)	(6.86)	(6.20)	(7.09)	(8.39)	(6.22)	(8.65)	(10.03)	(10.29)	(10.46)
PST	BF	14	88.58	87.43	86.06	84.93	83.57	89.67	87.99	86.98	86.14	86.87
			(8.15)	(6.94)	(6.80)	(7.28)	(7.68)	(7.60)	(7.70)	(7.72)	(8.25)	(8.42)
	PR	11	83.19	84.06	83.16	81.48	81.40	83.01	82.81	82.54	81.84	82.10
			(8.14)	(7.93)	(7.35)	(7.64)	(8.73)	(9.00)	(8.79)	(8.45)	(8.11)	(7.82)
	NCC	13	88.13	86.51	86.11	84.75	85.31	90.41	89.64	88.52	87.30	85.70
			(7.08)	(6.41)	(6.73)	(7.20)	(6.87)	(4.50)	(3.34)	(3.55)	(3.82)	(4.56)

this result is overshadowed by the observation that control subjects demonstrated as much change as the treatment subjects on both paper and pencil, and physiological measures. This finding underscores the need for controlled studies in research of this nature. Apparently the strong expectation effect arising from having "outside experts" conduct training is sufficient to produce substantial cognitive and physiological change, regardless of the treatment condition the subjects receive.

STUDY NUMBER TWO

Our initial success with PR in our pilot investigation, with the physiological evidence that PR subjects were learning to lower arousal levels and the strong Hawthorne effect observed in Study #1, convinced us of the need to retain a control group design in our investigations, but to attempt a more "low profile" approach in our interaction with teachers and students. We accomplished this by working with school counsellors who already had some familiarity with PR and having them deliver the PR training program. In this way we could ensure that training was delivered competently while reducing the large expectancy effects of having the "Heavy-Duty Experts from the University" doing the training.

Subjects

The subjects were all grade eight students in a large junior-senior high school in a large suburban centre in Western Canada (a different school than Study #1). This comprised 113 students who were assigned randomly by classes to a stress management (treatment) or career education (control) module in grade eight guidance. There were 28 girls and 34 boys in the treatment group and 29 girls and 22 boys in the control group. All students were either 13 or 14 years old.

Dependent Measures

We used three paper and pencil measures. The STAI, previously described, was used to assess both chronic and situational anxiety. The Symptoms of Stress Inventory (SOSI), (Leckie & Thompson, 1979) was used to measure frequency of stress-related symptoms. The SOSI is a 59-item self-report questionnaire in which subjects report how frequently they have experienced common stress-related symptoms over the past two weeks. The SOSI has been used in other research of this nature (cf. Pennebaker, 1984) and has demonstrated adequate internal consistency and reliability (Leckie & Thompson, 1979). Finally, we included a self-concept measure, based on suggested relationships between anxiety and self-esteem (cf. Dobson, 1982). We used the Self-Description Questionnaire (SDQ), (March & Smith, 1981), a 72-item self-report measure

based on a multi-dimensional model of self-concept. The SDQ yields seven subscales as well as total scores for NonAcademic, Academic, and Overall Self-Concept. The SDQ has received extensive psychometric examination and demonstrates adequate reliability, internal consistency, and convergent and discriminant validity (March & O'Neill, 1984; March, Smith & Barnes, 1983; March, Smith, Butler & Barnes, 1983).

Procedure

The study took place from February to March, ending just before Easter exams. Four teachers, who also were guidance counsellors in the school, acted as trainers. Initially, there was a three-hour briefing with the counsellors to review the treatment program and the administration of the dependent measures, and to establish procedures for monitoring fidelity to the training protocol. Classes met three times per week for 11 sessions, each lasting one hour. The dependent measures were administered in a battery on the first and last classes.

Treatment

PR proceeded as outlined earlier. At each class meeting, home practice results were discussed, new concepts were introduced and practised, and home practice was assigned. The control group received a unit on Career Education, focusing on identifying personal strengths and preferences, clarifying values, developing decision-making skills, and exploring how these concepts related to the world of work.

RESULTS

The results were analyzed using a 2×2 MANOVA for repeated measures (Group×Time). There was a significant main effect for Time, $F(5, 73)=53.18$, $p < .01$, and a Group×Time interaction, $F(5, 73)=2.18$, $p=.06$. Posthoc univariate tests indicated a significant redution across time in the SOSI scores for both groups, $F(1, 77) = 235.44$, $p < .01$, and a differential increase in academic self-concept favouring treatment subjects, $F(1, 77)=7.56$, $p < .01$. (See Table 3 for means and standard deviations.) Additional analyses with treatment subjects were conducted to see if similar results were obtained from boys and girls and from different classes taught by different teachers. These results indicated that treatment subjects experienced significant reduction in STAI-T, $F(1, 41)=5.57$, $p=.02$ in addition to the changes reported above. These results were consistent regardless of both the subject's sex, and which teacher delivered the program.

Examination of the training logs indicated that 13 of the treatment subjects recorded home practice five or more times per week, as intended, for all four weeks of the program. An additional 20 subjects recorded home practice for three weeks. Average HR reductions of 6-7 bpm

occurred during practice and resting HR decreased from 71.5 bpm to 67.9 bpm over the four week period. Averarge RR reductions of 3-4 rpm occurred during practice and resting RR decreased from 18.7 bpm to 16.9 rpm over the four week period. Average finger temperature increased 1-2°F. during practice, and resting FT increased from 82.7°F to 86.2°F over the four week period. Subjects reported using relaxation in situations such as studying, writing exams, and promoting sleep onset. Some said they had not liked the relaxation program at first, but had found it useful after they practised it.

SUMMARY

There were mixed results regarding the inclusion of a relaxation unit in our grade eight guidance classes. For the 33 students, approximately half of the treatment subjects, who completed at least three quarters of

TABLE 3

Self-Concept, Stress Symptoms, and Anxiety Scores for 79 Grade 8 Students

			Time	
Measure	*Group*	*n*	*Pretest*	*Posttest*
SDQ-A	Treatment	44	95.59 (16.55)	100.48 (15.85)
	Control	35	105.20 (25.04)	103.29 (26.79)
SDQ-NA	Treatment	44	155.14 (20.28)	155.54 (22.11)
	Control	35	148.71 (25.73)	148.92 (27.99)
SOSI	Treatment	44	86.41 (48.61)	26.30 (19.50)
	Control	35	89.69 (44.11)	34.77 (29.02)
STAI-S	Treatment	44	40.02 (7.51)	37.98 (8.30)
	Control	35	38.31 (7.90)	38.51 (10.57)
STAI-T	Treatment	44	41.05 (7.92)	38.93 (7.88)
	Control	35	42.23 (8.77)	41.71 (9.91)

the home practice component of the program, there was substantial skill acquisition observed over the four weeks of the program. Taken as a whole, the treatment group did demonstrate significant decreases in trait anxiety and a larger increase in academic self-concept than the control group. However, no other significant differential changes were observed. Moreover, about half of the treatment subjects were not sufficiently motivated to follow the program as intended, although they did engage in classroom practice three times a week. The counsellors informed us that this type of compliance was typical for students in that school, and were in fact surprised that the proportion of students engaging in regular home practice was as high as it was. However, it seems to us that regular home practice by a larger proportion of the treatment group is a crucial factor if more extensive treatment effects are to be obtained.

STUDY NUMBER THREE

Our third field test was conducted with grade 11 and 12 students at the same school as Study #2. Our goal was to conduct a controlled field test with an age group more closely approximating our initial pilot project.

Subjects

The subjects were 30 grade 11 and 12 students (19 males and 11 females) in a Health, Recreation, and Fitness Class. All of the students were 17 or 18 years old. PR was offered as one of a series of course modules that students elected. Other modules consisted of racket sports, golf, or aerobic excercise. Sixteen students elected to take the PR module, leaving 14 students in the control group. Complete data is available for 12 treatment and nine control subjects, due to absences on either pretest or posttest days.

Dependent Measures

The same dependent measures were used as in Study #2, and were administered on the first and last classes of the module.

Procedure

The same procedure was used as in Study #2, with one of the counsellors (who also was responsible for instruction in the Health, Recreation, and Fitness Class) conducting the PR class and a colleague working with the other group.

RESULTS

The results were analyzed using a 2=2 MANOVA for repeated measures (Group=Time). There was a significant main effect for Time, $F(5,16)=$

5.21, $p < .01$, and a Group=Time interaction, $F(5, 16)=2.64$, $p=.06$. Posthoc univariate tests indicated a significant increase across time in the nonacademic self-concept scores for sample as a whole, $F(1, 20)=15.98$, $p < .01$, and a differential decrease favouring treatment subjects in stress symptoms, $F(1, 20)=5.66$, $p=.03$, state anxiety, $F(1, 20)=7.57$, $p=.01$, and trait anxiety, $F(1, 20)=4.96$, $p=.04$. (See Table 4 for means and standard deviations.) Examination of the home practice logs indicated that all of the treatment subjects completed at least five home practice sessions per week over the entire four week program.

SUMMARY

These results support our use of PR with grade 11 and 12 students. There was a substantially higher program compliance rate than with our grade 8 field test. This suggests that the grade 11 and 12 students

TABLE 4

Self-Concept, Stress Symptoms, and Anxiety Scores for 22 Grade 11 Students

			Time	
Measure	*Group*	*n*	*Pretest*	*Posttest*
SDQ-A	Treatment	13	82.08 (25.38)	84.38 (14.84)
	Control	9	82.78 (13.40)	77.33 (11.91)
SDQ-NA	Treatment	13	148.15 (22.50)	158.15 (31.65)
	Control	9	140.00 (16.36)	154.89 (18.17)
SOSI	Treatment	13	95.38 (52.41)	70.84 (45.58)
	Control	9	91.33 (24.28)	97.33 (31.31)
STAI-S	Treatment	13	44.38 (13.65)	33.46 (9.61)
	Control	9	37.33 (8.99)	41.66 (14.60)
STAI-T	Treatment	13	42.00 (12.25)	36.00 (7.79)
	Control	9	39.56 (9.42)	43.44 (15.31)

were more motivated to learn PR than their grade 8 counterparts, perhaps because they chose to take that program, or were more mature, or encountered greater demands and could foresee greater relevance for acquiring PR skills. This higher rate of program compliance was likely responsible for the differential decrease in stress-related symptoms, state anxiety, and trait anxiety for the treatment subjects relative to the controls.

CONCLUSIONS

Based on our experience teaching relaxation in public school settings, several conclusions and suggestions can be offered. First, our results underscore the necessity for including adequate control groups in research of this nature. In Study #1, there were significant changes in cognitive and physiological dependent measures by both treatment and control groups. This likely represents an expectancy effect, considering there was blind administration of the dependent measures. Without the control group as a reference we might have incorrectly attributed greater efficacy to our treatments.

Second, there is a need to expand the array of assessments used in studies such as these. This should include methods for a multi-faceted assessment of treatment outcome as well as ways to assess treatment fidelity (by the trainers) and program compliance (by the subjects). (See Horan, 1980). Our treatment fidelity procedure, coupled with the detailed treatment protocols we prepared, gave us assurance that the treatment was delivered in a competent fashion. The program compliance data aided in determining that the larger treatment gains with grade 11 and 12 students were largely a function of closer adherence to the treatment plan, rather than the inability of grade 8 students to learn relaxation skills. We found it helpful also to have a multiple-assessment of treatment outcome. In some cases, there was change in stress symptoms by both treatment and controls and differential change in anxiety or self-concept. In other cases, the treatment group showed differential change in stress symptoms and anxiety measures. Such multiple-assessment can be helpful in discovering the nature of treatment effects with different groups of subjects.

Generally speaking, this series of studies offers some encouragement for incorporating PR into school curricula. Our data suggests that junior and senior high school students can learn relaxation, and that such learning is accompanied by changes in both physiological and cognitive measures. However, many younger students might not be sufficiently motivated to complete a PR program. It may be that the potential usefulness of PR is not obvious to grade eights and therefore they see little reason to engage in the sort of regular practice necessary to acquire relaxation skill. On the other hand, grade 11 and 12 students

who elect to pursue relaxation training seem to be more diligent in their practice and as a group demonstrate greater treatment gains. We hope that our initial attempts to investigate the use of PR in regular classroom contexts might encourage others to explore creative ways for incorporating relaxation training in the school curriculum.

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