Acta Paedopsychiatrica (1992) 55: 115-120

Acta Paedopsychiatrica

Relaxation therapy reduces anxiety in child and adolescent psychiatric patients

Adele Platania-Solazzo [1], Tiffany M. Field [1], June Blank [1], Fred Seligman [1], Cynthia Kuhn [2], Saul Schanberg [2], and Patrice Saab [3]

[1] Department of Psychiatry, University of Miami, School of Medicine, Mailman Center for Child Development, P.O. Box 016820, Miami, FL 33101, USA
[2] Department of Pharmacology, Duke University, School of Medicine, Pharmacology Department, 449 Bryan Research Building, Durham, NC 27710, USA
[3] Department of Psychology, University of Miami, School of Medicine, P.O.Box 248185, Coral Gables, FL 33124, USA

Summary. The immediate effects of relaxation therapy (RT) were assessed in 40 hospitalized children and adolescents with diagnoses of adjustment disorder and depression. These effects were assessed using a within subjectss pre-test/post-test design and by comparison with a control group of 20 depressed and adjustment disorder patients who watched a 1-h relaxing videotape. The 1-h RT class consisted of yoga exercise, a brief massage and progressive muscle relaxation. Decreases were noted in both self-reported anxiety and in anxious behavior and fidgeting as well as increases in positive affect in the RT but not the video group. In addition, adjustment disorder patients and a third of the depressed patients showed decreases in cortisol levels following RT, while no changes were noted in the video group. Thus, both diagnostic groups appeared to benefit from the RT class.

Key words: Relaxation therapy - Depression - Adjustment disorder

Relaxation therapy (RT) typically reduces tension and anxiety by training individuals to relax their muscles. A variety of relaxation techniques has been investigated including progressive muscle relaxation and yoga exercises. For progressive muscle relaxation the patient is instructed to relax each of the body's muscle groups in succession. After relaxing the muscle groups, guided imagery is often used. For this segment the patient is asked to imagine a pleasant place/experience that has been enjoyable or to visualize becoming stronger and healthier. The patient often shows a relaxation response such as a decrease in muscle tension, heart rate and cortisol levels [4,7]. Relaxation may also be enhanced by yoga stretching and breathing. Although heart rate and cortisol levels may temporarily increase, as a result of the physical activity involved, the general effect of a yoga session is typically a relaxation response [5]. It appears, then, that RT has a "quieting" effect on behavior as well as physiology.

Offprint requests to: T. M. Field

RT is also noted to decrease self-reported anxiety. The State Anxiety Inventory (STAI), for example, has been used by Hosmand et al. [6], who found a significant reduction in state anxiety in adult psychiatric patients after nine RT sessions. Significant improvement in mood has also been reported in a study using the Profile of Moods Scales (POMS) [8], and symptoms of depression have been reduced [1]. In one study of depressed adults, for example, RT was simply used as a control group for receiving additional attention. However, it was as effective as psychotherapy and pharmacotherapy in reducing depression-related anxiety [10].

Very few studies have examined the effects of RT on child and adolescent psychiatric patients, most particularly on depressed and adjustment disorder patients. Among those few, Corder et al. [3] found that adolescent psychiatric patients showed less acting out behavior after RT sessions. However, because they used non-standardized self-report measures and inadequate behavior observations, their results are difficult to evaluate. In another study, Reynolds and Coats [13] compared the efficacy of cognitive behavior therapy, RT, and a waiting list control for the treatment of moderately depressed adolescents. Although both treatment groups showed a greater reduction in depressive symptoms than the waiting list control, the relaxation group showed lower anxiety levels than the other two groups during follow-up assessments. Thus, for the treatment of anxiety symptoms in depressed children and adolescents, RT may be a viable approach. Although RT has not been studied in children and adolescents with adjustment disorder, anxiety is typically present in these patients as well, so RT may also reduce anxiety in this group.

The present study examined the immediate effects of RT on anxiety in children and adolescents who were hospitalized for depression or adjustment disorder using a more extensive battery of self-report physiological and behavioral observation measures. The depression and adjustment disorder groups were targeted because of their prevalence among hospitalized children and adolescents. The control group (comprised of subjects having either diagnosis) simply viewed a relaxing videotape of the same length as the RT class. The anticipated

effects were: (a) that self-report anxiety and depressed mood [on the State Anxiety Inventory for Children (STAIC) and the POMS] would diminish following the RT class but not following the relaxing videotype; (b) that motor activity, anxious and fidgety behavior would decrease, and alertness, positive affect, and cooperation would increase following the RT class (but not the video) as measured by behavior observation ratings; and (c) that heart rate and salvia cortisol levels taken after RT class would be lower than baseline levels and lower than the levels of the video group.

Subjects and methods

The sample comprised 60 children and adolescents who were hospitalized on a child and adolescent psychiatric unit and were recruited for the study upon admission. The sample was randomly selected from all patients whose parents signed consent forms upon admission, who had not yet participated in an RT session and who were diagnosed as depressed or adjustment disorder. Diagnoses were made following a 1-h intake interview by a staff psychiatrist who employed DSM III-R criteria. The final sample ranged in age from 8 to 19 years (mean = 13.4), with half the sample being adolescent. The RT group comprised 20 depressed patients (14 females) and 20 adjustment disorder patients (10 females). The control group was comprised of 10 depressed patients (6 females) and 10 adjustment disorder patients (4 females). Approximately one-quarter of the patients had previous admissions to a psychiatric facility, and the average hospital stay at the time of the study was 6 days. Analysis of variance conducted on these background variables suggested no significant differences between adjustment disorder patients and depressed patients and between RT and video subjets on age, intelligence quotient (all were normal), previous admissions, duration of hospital stay or medications (approxiamately 30% of each group were receiving medications).

Relaxation therapy

These subjects engaged in a 60-min relaxation therapy class which was routinely offered (2 times a week in the late afternoon) on the unit by a relaxation therapist, but was the first session for each of the subjects. In a given class of 8-10 children and adolescents, 1-3 per session would be subjects in this study because only three observers were available for a given session. The class began with the patients lying in a supine position on exercise mats for approximately 30 min of yoga stretching exercises. These were followed by a very brief massage (approximately 2-3 min) simultaneously given to the different patients by the relaxation therapist and the three observers. For this segment a rolling pin was used on the subject's back, and the shoulders were massaged by hand. For the remainder of the class (approximately 30 min) a modified version of progressive muscle relaxation was administered by the relaxation therapist. The participants were instructed to breathe deeply for several minutes. Then the therapist asked the subjects to relax and then tense eight different muscle groups (in a feet to head progression). Finally, the therapist used visual imagery to enhance the feelings of relaxation while the subjects continued to breathe deeply.

The control subjects were observed for a similar period of time while they watched a relaxing videotape (of pleasant sounds and visual images) in the company of an observer. These subjects were asked to remain still and quiet for the duration of the videotape. This group was included to control for: (a) the potentially positive effects of experimenter attention; and (b) the effects of diminished activity on the dependent measures along with any diurnal changes, for example, in cortisol levels.

Assessments

The following assessments were made by one of three research assistants, who were the participant observers in RT classes and video sessions:

A. Thirty minutes prior to the RT class/video session the following baseline measures were taken: heart rate (pulse), saliva sample for cortisol, the STAIC, and the depression factor of the POMS. Actometer readings (activity level as recorded on an activity watch) and behavior observation ratings were also made based on the 30-min period prior to the class.

B. At the end of the yoga exercise portion of the class or 30 min into the video following measures were taken: heart rate, saliva cortisol and actometer reading.

C. At the end of class/video session heart rate was measured, an actomenter reading was taken, and ratings were made of the behaviors observed during the class.

D. Thirty minutes after the class/video session the baseline measures were repeated: heart rate, saliva cortisol, actometer reading, STAIC, POMS, and behavior observation ratings based on the 30-min period following the class/video session.

The STAIC

The STAIC is an adaptation of the State Anxiety Inventory specifically designed for the study of anxiety in school age children and adolescents who are below average in reading level [16]. The inventory consists of 20 items. The subject completes statements such as, "I feel .... very calm, calm, or not calm." As expected, because state anxiety is variable, test-retest reliability for the STAIC form is low (ranging from 0.31 to 0.47) regardless of elapsed time intervals. The test, requiring approximately 5 min to complete, was administered individually prior to the class/video session and 30 min after the RT class/video session was finished.

The POMS

The POMS is a five-point adjective rating scale asking the subject to describe how well an adjective describes his/her

feelings for the past 2 weeks, including today. The questionnaire, which includes adjectives such as happy or gloomy, consists of 65 items [11]. This study utilized those 14 items that comprise the depression factor of the POMS. The answer choices are 0 = not at all, 1 = a little, 2 = moderately, 3 = quite a bit, 4 = extremely. The test-retest reliability ranges from 0.43 to 0.64 in a time period ranging from 4 to 12 weeks [11]. The authors propose that the POMS is a sensitive measure for assessing mood changes of psychiatric patients following different forms of therapy. This questionnaire was individually administered prior to the RT class/video session (requiring approximately 5 min) and again 30 min after the RT class/video session was finished.

Behavior observation ratings and activity level

Behavior observation ratings were completed three times, based on behavior observed (a) during the 30 min prior to the RT class/video session; (b) during the class/video session itself; and (c) during the 30-min period after the class/video session was finished. Based on pilot observations we designed a behavior rating scale comprised of 7 items. The observers rated the behavior of each subject on a three-point continuum on seven scales including state, affect, activity, anxiety, fidgeting, vocalization and cooperation. The seven scales were summed to yield a summary score (with anxiety and fidgeting scores reversed for this summary score). The summary score ranged from a low score of 7 to a high score of 21 (with a high score being positive). Observers were given descriptors and examples of each level of the seven scales. Interobserver agreement was assessed by two independent observers recording simultaneously across the observation period for one-third of the subjects. Reliability was calculated using Cohen's kappa [2], a chance-corrected statistic (mean k = 0.84, range = 0.71 to 0.96) (see Table 2 to for reliability coefficients). An actometer (T IMEX) was used to measure the subjects' activity level. The actometer is a watch that cumulatively records movements in the horizontal and vertical plane. It is worn on the subject's wrist like a normal watch. Activity level was calculated by subtracting the reading taken from the monitor at the beginning from the reading taken at the end of each segment of the RT class (i.e., baseline, exercise, RT and follow-up) and the equivalent time periods of the video sessions. The difference was then divided by the number of seconds that had elapsed and multiplied by 100 to yield a whole number.

Physiological measures

Heart rate was measured by taking the subject's radial pulse for 30 s one half-hour prior to the class, during the class (following the yoga exercises), at the end of the class, and at the end of the 30-min follow-up period (and the equivalent time periods of the video sessions). Saliva cortisol samples were collected one half-hour prior to class, following the exercise portion of the class, and one half-hour after the class was finished. Due to the 20-min lag in cortisol change, saliva samples reflected cortisol levels at 40 min prior to class, at the middle of the yoga exercise portion of the class and at the end of the relaxation portion of the class. Saliva samples of the control group subjects were obtained at three assessment times approximating the times of the RT group: baseline, 50-60 min after baseline, and 120 min after baseline.

Saliva cortisol samples were obtained by having subjects place a cotton dental swab dipped in sugar-free lemonade crystals along their gumline for 30 s. The swab was then placed in a syringe, and the plunger was depressed to squeeze the saliva into a 1.5 micro centrifuge tube. The saliva samples were frozen and subsequently assayed for cortisol levels at Duke University. Saliva cortisol was measured by high-pressure liquid chromatography - purified tritiated tracer, 3 H cortisol, antiserum with standards purchased from Radioassay System Laboratories (Carson City, Calif.). Antibody bound and free hormone were separated by the dextran-coded charcoal technique. Samples were measured by liquid scintillation spectrometry using toluene-based scintillation fluid. Performance of the assay sensitivity is 0.0005 ng/tube. The range of the standard curve is 0.0005 to 2.0 ng/ml.

Results

Firstly, a correlation analysis was performed to determine whether age, sex, number of previous admissions, medication and length of hospital stay were correlated with diagnosis. Because sex was significantly correlated with diagnosis (r = 0.38, $P < 0.05$) (there being more depressed female than depressed male patients), this factor was entered into the repeated measures analysis of variance as a covariate. However, no significant effects were noted for sex as a covariate in any of the subsequent analyses ($P > 0.05$). Repeated measures and analyses of variance were conducted on the self-report, behavioral and physiological variables, with assessment period as the repeated measures, and diagnosis (depression/conduct disorder) and treatment (RT/video) as grouping factors. All significant interaction effects were examined by Bonferroni T-tests.

Self-report anxiety measures

As can be seen in Table 1, significant repeated measures by group interaction effects were noted for the STAIC and for the POMS with scores on both measures improving following the RT class but not the video session. Self-reported anxiety and depression levels were diminished following RT.

Behavior observation scale ratings

As can be seen in Table 2, the following results emerged: (a) the depressed subjects were more alert (higher state rating) than adjustment disorder subjects during the exercise portion of the class; (b) affect became more positive across the three

Table 1. Means for the self-report measures pre- and post- relaxation therapy sessions (means for video control group are in parentheses)

	Assessment periods				
Measure	Pre		Post		Effect
STAIC	32.7	(33.1)	29.1	(32.9)	R·G**
POMS	14.0	(14.4)	9.6	(13.6)	R·G*

Poms, Profile of Moods Scales; R·G, repeated measures by group interaction effect; STAIC State Anxiety Inventory for Children

* $P < 0.05$; ** $P < 0.01$

Table 2. Mean behavior observation scale ratings for baseline (A), immediately after class (B), and 30 min after class (C) (Means for control group in parentheses)

	Groups						
	Depressed			Adjustment disorder			Effect
	A	B	C	A	B	C	
Behavior ratings State (0.87)[a]	2.8(2.7)	2.9(2.9)	2.7(2.8)	2.4(2.4)	2.3(2.5)	2.5(2.5)	D[2]

	Assessment periods			
	A	B	C	Effect
Affect (0.88)	2.0 (1.9)	2.3 (2.0)	2.3 (2.0)	RG[1]
Activity (0.80)	1.9 (1.9)	2.2 (1.6)	2.0 (1.9)	RG[1]
Anxiety (0.93)	1.9 (1.8)	1.5 (1.8)	1.5 (1.9)	RG[3]
Fidgeting (0.86)	1.7 (1.8)	1.4 (1.7)	1.3 (1.8)	RG[2]
Vocalization (0.71)	1.8 (1.9)	1.9 (1.7)	1.9 (1.9)	NS
Cooperation (0.96)	2.3 (2.4)	2.5 (2.5)	2.7 (2.3)	NS
Summary (0.86)	14.2 (14.2)	16.9 (14.0)	17.2(14.5)	RG[4]

D, Diagnostic effect; RG, repeated measures by group interaction effect
[a] Inter-observer reliability coefficients are in parentheses

[1] $P < 0.05$; [2] $P < 0.01$; [3] $P < 0.005$; [4] $P < 0.001$

Table 3. Means for activity level (as measured by the actometer) and heart rate (means for video control group in parentheses)

	Assessment periods				
Measures	A	B	C	D	Effect
activity level	57 (59)	116 (42)	53 (69)	57 (73)	RG**
heart rate	77 (80)	84 (70)	73 (84)	76 (87)	RG*

A, baseline; B, post-exercise; C, post-relaxation (end of class); D, 30 min after end of class. RG, repeated measures x group interaction effects

* $P < 0.01$; ** $P < 0.001$

assessment periods but only for the RT subjects; (c) the RT subjects showed an increase in activity level from baseline to class time in contrast to the video group, which showed a decrease in activity level during the session; (d) significant decreases in anxiety ratings occurred between the first and second and between the first and third assessment periods

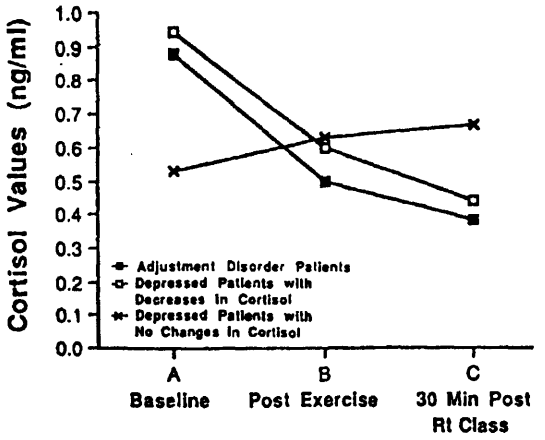

Fig.1. Group by assessment period;interaction for Cortisol values

Table 4. Means for cortisol (ng/ml) measures by diagnostic group (means for video control group in parentheses)

Assessment period	A	B	C
Depressed	1.07 (1.09)	0.90 (1.13)	1.24 (1.07)
Adjustment disorder	0.91 (0.97)	0.52 (0.92)	0.37 (0.89)

A, Baseline; B, post-exercise; C, follow up (30 min after class). It should be noted that the cortisol values represent levels 20-30 min earlier than measured

(baseline and follow-up), but only for the RT subjects; (e) a significant decrease in fidgeting behavior occurred between the first and second assessment periods an between the first and third assessment periods, but only for the RT subjects; and (f) the summary scor increased, suggesting an overall improvement in behavior for the RT group. Except for the reducation in activity level during the video session, no behavior changes were noted for the video control group.

Activity level and heart rate

As can be seen in Table 3, higher activity levels were noted following the exercise portion of the RT class as compared with any of the other assessment periods (baseline, immediately after class, or 30 min after class). Like the activity level data, heart rate was significantly higher following the exercise component of the class than at any other assessment period. Activity level was lower (as was heart rate) for the video subjects during the second assessment period (comparable to the end of exercise segment). However, heart rate was significantly lower following the RT session versus the video session and 30 min after the end of the RT versus the video session.

Cortisol levels

As can be seen in Table 4, adjustment disorder patients showed a tendency for lower cortisol levels following the RT class, whereas the depressed subjects showed a slight increase in cortisol levels following RT, and cortisol levels did not

change for the video subjects. A closer examination of the depressed group data revealed that 62% of the depressed subjects had slightly higher-than-baseline cortisol levels and 38% had lower cortisol levels following RT, contributing to the large amount of variance in cortisol values among the depressed patients (see Fig. 1).

These results suggested that two types of depressed patients were being sampled. Thus, further analyses were conducted to determine whether the differences in cortisol levels among depressed patients were associated with differences on any other measures of anxiety. The STAIC (self-reported anxiety) scores tended to decrease more following RT for the decreasing cortisol versus the increasing cortisol subjects (a decrease of 9 versus 2 points).

Discussion

These results on child and adolescent psychiatric patients consistent with studies on other samples showing a decrease in anxiety following relaxation therapy [9,14]. Following the RT condition, patients' self-reported anxiety scores (STAIC) were significantly lower, while the scores for the video control group remained the same. A less impressive increase in positive mood was noted following RT. RT has been noted to reduce anxiety, but not necessarily to relieve depressed mood[9].

Ratings on the behavior observation scale also changed following RT, while they remained the same for the video control group except for diminished activity during the video session. The children and adolescents showed more positive affect following RT, and they showed less fidgeting and anxious behavior during and after the RT class. The consistency of their self-report and behavior observation data support the use of RT for children and adolescents on psychiatric units [13].

As might be expected, the activity level and heart rate of the subjects were higher following the excerise portion of the class than at the other assessment times. The relatively low activity and heart rate levels during the baseline and post-relaxation periods were not expected. However, they probably related to the subjects engaging in sedentary activities (completing questionnaires) at these times and to the situational constraints of the unit; the RT and video sessions occurred immediately following school sessions, so the children and adolescents were in passive/sedentary situations prior to these sessions.

The cortisol data were somewhat surprising. As would be expected, the values were lower during and after the RT sessions than during or after the video sessions, indicating that the reductions in cortisol resulted from the RT and were not related to simple diurnal or activity level changes in cortisol; activity level diminished in the control group during video sessions but was not accompanied by cortisol level decreases. The decreases in cortisol occurred, however, only for the adjustment disorder group and approximately one-third of the depressed group. Although higher cortisol values have been noted in depressed patients, and particularly during the mid-afternoon [15], when these sessions were conducted, the depressed patients' cortisol increases were inconsistent with the decreases noted in their self-reported anxiety and behavioral observation ratings.

These data suggest the possibility that cortisol may not be as reliable an index of stress reduction in depressed patients. Alternatively, the depressed children and adolescents may simply be showing socially desirable improvements in behavior while remaining physiologically aroused. Still another possibility is that two types of depression are represented in this group, one having a stronger anxiety component than the other. The anxious-depressed subjects may have shown the expected decrease in cortisol levels, owing to an apparent decrease in behavioral anxiety. It is also possible that those who showed an increase or no change in cortisol values may have endogenous depression, while those who showed an appropriate decrease in cortisol following relaxation therapy may have psychogenic depression [17]. Finally, this small subsample of depressed patients (the "decreasing" group) may have been misdiagnosed or they may have symptoms of both depression and anxiety, as has been described for adolescents who have comorbidities of depression and conduct disorder [12].

Despite the careful timing of the behavior observations, physiological measures and saliva sampling, no conclusions can be drawn regarding causality. It is not clear what the effective treatment component was in this study, i.e., whether yoga exercise, massage (as brief as it was) or RT effected changes in reported feelings, behavior, and cortisol levels. Although this study was simply intended to evaluate the effectiveness of a typical RT session, it is clear that the individual components of those sessions and the contexts in which they are provided (e.g., variable baseline conditions) are worthy of further study. Although psychiatric staff members appreciate even short-term gains in the management of patients, these positive effects would, it might be hoped, continue as the techniques are practiced by the patient, independent of the RT classes. Nonetheless, future studies are needed to examine the long-term effects of RT such as the effects on patient management, length of stay and readmission. In the interim, RT can be considered an easily administered, noninvasive, effective form of treatment for reducing anxiety in child and adolescent psychiatric patients.

Acknowledgements. This research was supported by grants MH40779 and MH00331 to Tiffany Field was conducted in partial fulfillment of the requirements for a Ph.D. by Adele Platania-Solazzo.

The authors thank the children and adolescents who participated in this study. In addition, we are grateful to the Jackson Memorial nursing staff and to Sheri Goldstein, Susan Perry, Tom Flaa and Jean Greer for their assistance with the study.

References

1. Blaney PH (1981) The effectiveness of cognitive and behavior therapies. In: Rehm LP (ed) Behavior therapy for depression: present status and future directions. Academic Press, New York, pp 1-32
2. Cohen T (1968) Weighted kappa: Nominal scale agreement with provision for scaled disagreement or partial credit. Psychol Bull 70: 213-220
3. Corder B, Whiteside R, Haslip T (1986) Biofeedback, Cognitive training

and relaxation technique as a model adjunct therapy for hospital aides: a pilot study. Adolescence 21: 339-346
4. DeGood DE, Redgate ES (1982) Interrelationship of plasma cortisol and other activation indices during EMG biofeedback training. J Behav Med 5: 213-223
5. Funderbark J (1979) Science studies - yoga: a review of physiological data. Yoga Life 28: 3-11
6. Hosmand L, Helmes E, Kazarian S, Tekatch G (1985) Evaluation of a relaxation training program under medical and non-medical conditions. J Clin Psychol 41: 23-29
7. Jasonski ML, Kugler J (1987) Relaxation, imagery and neuroimmodalities. Ann NY Acad Sci 496: 722-730
8. Matthew AM, Gelder MG (1969) Psychophysiological investigations of brief relaxation training. J Psychosom Med 13: 1-12
9. McGrady A, Younker R, Tan S, Fine T, Woerner M (1981) The effect of biofeedback assisted relaxation training. Biofeedback Selfregul 6: 343-353
10. McLean PD, Hakistian R (1979) Clinical depression: comparative efficacy of outpatient treatments. J Clini Consult Psychol 47: 818-836
11. Mc Nair D, Lorr M, Dropelman L (1971) Profile of mood states manual. Educational & Industrial Testing Services, San Diego
12. Puig-Antich J (1982) Major depression and conduct disorder in prepubescents. J Am Acad Child Psychiatry 21: 118-128
13. Reynolds W, Coats K (1986) A comparison of cognitive-behavioural therapy and relaxation training for treatment of depression in adolescents. J Consult Clin Psychol 54: 653-660
14. Richter NC (1984) The efficacy of relaxation therapy with children. J Abnorm Child Psychol 12: 319-344
15. Sacher EJ (1981) Psychobiology of affective disorders. In: Kandel ER, Schwartz JR (eds) Principles of neural science. Elsevier/North Holland, New York, pp 218-254
16. Spielberger CD, Goursuch RL, Lushene RE (1970) The state-trait anxiety inventory. Consulting Psychologists Press, Palo Alto
17. Zerssen D van, Berger M, Doerr P (1984) Neuroendocrine dysfunction in subtypes of depression. In: Shah D (ed) Psycho-neuroendocrine dysfunction. Plenum Press, New York, pp 23-28