

# INCREASES IN POSITIVE PSYCHOLOGICAL CHARACTERISTICS WITH A NEW RELAXATION-RESPONSE CURRICULUM IN HIGH SCHOOL STUDENTS

HERBERT BENSON

Harvard Medical School, Mind/Body Medical Institute, Deaconess Hospital

ARTHUR KORNHABER, CAROL KORNHABER, AND MILA N. LECHANU

The St. Francis Academy and The Foundation for Grandparenting

PATRICIA C. ZUTTERMEISTER

Mind/Body Medical Institute

PATRICIA MYERS

State University of New York, Stony Brook

RICHARD FRIEDMAN

Harvard Medical School, Mind/Body Medical Institute, and

State University of New York, Stony Brook

Self-esteem and locus of control were evaluated in a group of high school students prior to, during and following a single academic year. Using a randomized, crossover experimental design, students were exposed to either a health curriculum based on elicitation of the relaxation response and then a follow-up period, or to a control health curriculum and then the relaxation-response based curriculum. Exposure to the relaxation-response curriculum, but not the control curriculum, resulted in significant increases in self-esteem and a tendency toward greater internal locus of control scores. Furthermore, teacher observations indicated a high degree of student acceptance of relaxation-response training. These results suggest that incorporation of the relaxation response into high school curricula may be a practical and efficient way to increase positive psychological attitudes.

For many, adolescence is a difficult period of adjustment, fraught with problematic behaviors. Low self-esteem and an external locus of control have been shown to be associated with negative behavior and can contribute to feelings of depression (Goldney, 1982) and anxiety (Fimian & Cross, 1986). They have also been associated with poor academic performance (Downs & Rose, 1991), delinquent behaviors (Downs & Rose, 1991), and increased drug and alcohol use (Uribe & Ostrov, 1989).

Because of the relationship between these psychological characteristics and problematic behaviors, programs to increase self-esteem among adolescents have become common in school curricula. Programs such as Project CHARLIE (Chemical Abuse Resistance Lies in Education) (1992) developed in

Minnesota, and STAR (Students Taught Awareness and Resistance) (Pentz, et al., 1989) developed at the University of Southern California, involve teaching interpersonal skills and resistance training to better equip children to resist peer pressure to take drugs and alcohol. Programs such as these are generally integrated into several grade levels and include many components. But, because school administrators and parents resist programs which adhere to strict experimental design regimens, meaningful outcome data are difficult to obtain.

There have been attempts, however, to develop quantifiable outcome studies. For example, Pentz, et al., (1989) evaluated the effectiveness of STAR which has been administered in 42 schools in the Midwest. The program included 10 sessions of education in skills training for resistance to drug use and 10 homework sessions involving role-plays with parents and family members. Analyses indicated a sig-

Supported by grants from the Nathan Cummings Foundation, the Taff bequest to Harvard Medical School and a partnership with the Fetzer Institute.

nificant decrease in prevalence rates for drug use at 1-year program follow-up. Caplan, et al. (1992) examined the effectiveness of another multidimensional program and reported gains in adolescents' self-reported ratings of problem-solving efficacy as well as improvements in impulse control and conflict resolution with peers, as rated by teachers. Many programs include some training in relaxation but, to our knowledge, no program has integrated the elicitation of the relaxation response as a primary curriculum component.

In the present study, systematic training in the relaxation response was incorporated into a health curriculum for high school sophomores. Relaxation-response training may be ideal for adolescents, who are typically resistant to commit to programs for change, because the relaxation response is simple to learn and elicit and can be easily incorporated into daily routines.

As Benson (1975) has previously described, the relaxation response is the psychological and physiological opposite of the arousal or stress response. More specifically, the physiological arousal associated with stress, anxiety and anger is characterized by increased metabolism, heart rate, blood pressure and rate of breathing. It has a counterpart in physiological relaxation characterized by decreased metabolism, blood pressure, rate of breathing and heart rate. Whereas the stress response is accompanied by increased anxiety, depression and anger, the relaxation response is associated with feelings of calmness and control. Benson (1975) observed that various cultural practices such as meditation and yoga, and religious practices such as repetitive prayer, as well as progressive relaxation and systematic desensitization have historically and consistently been associated with these common psychological and physiological changes. Benson further observed that the secular and religious approaches all involved two basic components. The relaxation response is a description of the generic psychological and physiological effects of engaging in this simple two-step procedure. These two steps are mentally focusing on a word, phrase, prayer, image or physical activity and maintaining a passive attitude toward distracting thoughts.

Because of the well-documented physiological effects of the relaxation response, its elicitation has become a common adjunctive treatment for a variety of medical conditions that are caused or exacerbated by stress (Domar, Friedman, & Benson, 1992; Friedman, Stuart, & Benson, 1992). Eliciting the

relaxation response can produce immediate changes in central and peripheral nervous system activity that are consistent with decreased sympathetic nervous system activity and opposite to those induced by stressful circumstances (Beary & Benson, 1974). These include decreased blood pressure, heart rate, rate of breathing and metabolism. Continued practice can result in more lasting changes in biochemical and physiological functioning that counteract hormonal changes induced by stress.

In addition to its physiological benefits, the relaxation response has been shown to produce profound psychological benefits. For example, Stuart, et al. (1987) examined 98 hypertensive patients and found that relaxation training given in conjunction with patient education on cardiovascular risk factors, nutrition, and exercise, not only resulted in lowered blood pressure but also decreased self-reported psychological symptoms of anxiety, depression, and hostility. The magnitude of the relaxation response-mediated reduction in psychological symptoms was comparable to those observed in patients who have been exposed to long-term psychotherapy. Furthermore, elicitation of the relaxation response via meditation facilitated psychotherapeutic goals in patients in therapy (Kutz, Borysenko & Benson, 1985).

Elicitation of the relaxation response has also resulted in changes in psychological functioning in college students. Hart and Means (1982) found that, compared to controls, college students who were trained to elicit the relaxation response on a daily basis reported a positive effect on self-actualization. Similar results were found by Turnbull and Norris (1982) among adults. The generally positive effect of regular elicitation of the relaxation response has resulted in widespread acceptance in medicine (Stapleton & Fine, 1988) and in psychotherapy (Task force report of the American Psychiatric Association, 1989). However, its incorporation into academic settings to contribute to positive psychological and behavioral changes has been limited. The rationale for examining the specific effects of relaxation-response training on the student population is based on the reports of adults who have regularly elicited the relaxation response in clinical settings. The reduction in negative psychological symptoms has frequently been linked to an increase in self-esteem and an increase in internal locus of control. When questioned as to the reasons why regular elicitation of the relaxation response results in such increases, subjects frequently report that a heightened sense of self-

control and empowerment results in an enhanced self-concept. We have chosen to focus on self-esteem and locus of control in the present study since these variables are of particular relevance in adolescence.

The present study exposed two groups of adolescent students to an academic curriculum specially developed to include instruction in elicitation of the relaxation response. The curriculum was administered to one group during the fall semester and to the other in the spring. Psychological and physiological responses were measured before and after a semester of training to detect changes as a result of exposure to the curriculum. Pre- and postintervention scores were compared between students randomized into control and relaxation-response intervention groups. Every student, including those in the control condition, was exposed to the relaxation response at some point in the study because the school administration felt that all students should have the opportunity to experience the potential benefits of the intervention. In addition, the experimental design included a follow-up period because we hypothesized that the beneficial effects of the relaxation response might not be manifest until weeks or months following the active intervention. The study was conducted during the course of a single academic year.

## METHODS

*Participants and procedures.* All sophomores from a high school in Lake Placid, New York were recruited for the study. The students were randomly assigned by dividing them into two groups using an alternating method. Students assigned to the relaxation response/follow-up group (RR/FU,  $n=26$ ) were exposed to a health curriculum incorporating relaxation-response training during the fall semester and provided follow-up data on its effects during the spring semester. Students assigned to the control/relaxation-response group (C/RR,  $n=24$ ) were not exposed to the school health curriculum containing the relaxation response during the fall semester, but were exposed to it during the spring semester.

Training in the relaxation response was provided at the beginning of a health class that was held three times weekly. Specific instructions on paced breathing, muscular relaxation, focused attention, and a passive attitude toward distraction were included. Each classroom session began with the group actually eliciting the relaxation response together for

15 minutes. Students were encouraged to practice eliciting the relaxation response, in abbreviated fashion, throughout the day in response to anxiety-provoking situations. The curriculum also included education in stress management, self-esteem enhancement, nutrition, drug use, and human sexuality. All students were psychologically and physiologically evaluated prior to the start of the fall semester: (T1); following the end of the fall semester: (T2); and following the end of the spring semester: (T3).

*Psychological testing.* The Piers-Harris Children's Self-Concept Scale (Piers, 1984) and the Nowicki-Strickland Locus of Control Scale (Nowicki & Strickland, 1973) were administered at each evaluation point. These two psychological tests were chosen because they have both been extensively used in adolescent research and are considered valid instruments by educational researchers (e.g. Gordon, 1977; Hillman, Wood & Sawilowsky, 1992).

*Physiological testing.* A computerized psychophysiological examination was administered at each of the evaluation points using a Davicon Medac 3000 physiological monitor. Heart rate and electrodermal response were automatically measured during a resting baseline and during a mental arithmetic stress task. In addition, blood pressure was obtained manually during the baseline and mental stress periods.

Statistical analyses involved an independent univariate analysis of variance (ANOVA) for each of the outcome measures examining the main effects of group assignment, time and the group by time interaction. These ANOVAs were followed by post-hoc pairwise comparisons using Tukey's Significant Difference procedures.

## RESULTS

Table 1 presents the results for the self-esteem and locus of control measures. Despite reasonable efforts at randomization, students in the relaxation response/follow-up group (RR/FU) and the control/relaxation-response group (C/RR) differed on these measures prior to the onset of the study. The RR/FU group exhibited significantly less self-esteem and significantly less internal locus of control than the C/RR group ( $p < .01$ ).

The within-group results were more directly related to the hypotheses of the study. The RR/FU group exhibited a trend toward increased self-esteem during the semester in which they were exposed to the

Table 1  
*Psychological Scores at the Start of the Academic Year (T1), Following the First Semester (T2), and Following the Second Semester (T3).*

	T1	Relaxation Response		Follow-up
		T2	T3	T3
Self-Esteem	51.00 (11.02)	53.38 (12.09)	58.76 (11.76)	
<b>RR/FU<sup>a</sup></b> <i>n</i> =21				
Locus of Control	14.67 (5.07)	14.33 (4.82)	13.43 (5.06)	
		Control Intervention	Relaxation Response	
	T1	T2	T3	
Self-Esteem	62.69 (9.19)	61.37 (10.26)	63.44 (8.82)	
<b>C/RR<sup>b</sup></b> <i>n</i> =16				
Locus of Control	10.88 (4.94)	11.25 (5.21)	9.75 (4.71)	

Note. Entries represent means and (standard deviations).

<sup>a</sup>RR/FU: Students exposed to the relaxation-response intervention during the first semester and follow-up testing at the end of the second semester.

<sup>b</sup>C/RR: Students exposed to the control intervention during the first semester and the relaxation-response intervention during the second semester.

relaxation response. The C/RR group exhibited a small reduction in self-esteem during the same semester when they were exposed to the control intervention. However, from T2 to T3, the RR/FU group exhibited a statistically significant increase in self-esteem ( $p < .01$ ). During the same semester, the C/RR group showed a significant increase in self-esteem in response to the relaxation-response intervention ( $p < .05$ ). Combining the data from the two groups and comparing the 37 self-esteem scores just prior to the relaxation-response intervention (mean = 57.73) resulted in a statistically significant increase ( $p < .05$ ) in self-esteem.

With respect to locus of control, from T1 to T2, neither the RR/FU nor the C/RR group exhibited a significant change. From T2 to T3, only the C/RR group, being exposed to the relaxation response, exhibited a statistically significant shift toward internality ( $p < .05$ ). When the data from the two groups were combined and the 37 locus of control scores obtained just prior to the semester in which the relaxation response was taught (mean = 13.19) were compared to the scores immediately following that semester (mean = 12.35), no statistically significant effect was observed.

The physiological data are presented in Table 2. For the RR/FU group, there was insignificant reduction in baseline systolic and diastolic blood pressure from preintervention, but a significant reduction from postintervention to follow up in both systolic and diastolic blood pressures ( $p < .05$ ). During the control period, the C/RR groups showed no reduction in baseline blood pressures. There was a reduction in blood pressure subsequent to the relaxation-response intervention but it reached statistical significance only for the diastolic measure ( $p < .01$ ). Resting heart rate did not change during the course of the study for either group. Resting electrodermal levels did not change in the RR/FU group, but did decrease in the C/RR group following the relaxation-response semester ( $p < .05$ ). The physiologic changes during the mental arithmetic task almost always increased the levels of blood pressure, heart rate and electrodermal response. The magnitude of the responses, defined as the stress level minus the baseline level, were not significantly altered during the study.

## DISCUSSION

These results provide preliminary evidence that a relaxation-response based curriculum results in positive psychological changes in high school sophomores. Despite the relatively small numbers, statistically significant changes in self-esteem were observed following exposure to the relaxation-response based curriculum when the scores of the two groups were combined. No such trend was evident following exposure to the control curriculum. With respect to locus of control, the group exposed to the relaxation-response curriculum during the spring semester exhibited a statistically significant change toward internality.

The observations of the classroom teachers involved in the study are also worth noting. There appeared to be excellent acceptance of the relaxation-response curriculum and few students refused to elicit the relaxation response. Anecdotal reports of classroom observers indicated a reduction in inappropriate classroom behaviors. Subsequent studies should quantify these behavioral variables and also examine the effects of the relaxation-response based curriculum on academic performance.

These results are promising in that they suggest that a curriculum which includes the elicitation of the relaxation response can be integrated into a high school and that relaxation practice may contribute to positive psychological changes among adolescents.

Table 2  
 Physiological Measures at the Start of the Academic Year (T1), Following the First Semester (T2), and Following the Second Semester (T3)

	T1		Relaxation Response		Follow-up		
	Baseline	Stress	T2		T3		
			Baseline	Stress	Baseline	Stress	
RR/FU <sup>a</sup> n=21	Systolic	120.93	125.07	118.71	119.90	113.14	116.71
	BP <sup>c</sup>	(11.99)	(11.31)	(13.86)	(12.21)	(11.50)	(11.57)
	Diastolic	68.64	74.60	65.98	68.00	60.36	65.10
	BP <sup>c</sup>	(11.14)	(9.57)	(11.95)	(12.38)	(8.60)	(10.44)
	Heart Rate	72.21	80.21	72.55	77.38	72.14	80.95
		(10.37)	(8.28)	(13.80)	(11.27)	(9.36)	(12.27)
	EDR <sup>d</sup>	8.79	10.86	9.82	12.48	7.95	9.88
		(3.45)	(4.27)	(3.51)	(5.14)	(4.26)	(4.84)
C/RR <sup>b</sup> n=16	Systolic	121.72	124.78	117.25	119.22	116.47	115.66
	BP	(10.36)	(10.94)	(8.56)	(9.37)	(9.30)	(8.00)
	Diastolic	72.16	74.50	70.97	73.81	62.44	66.88
	BP	(7.65)	(8.04)	(10.46)	(10.44)	(8.28)	(10.18)
	Heart Rate	75.72	85.56	79.06	82.75	76.25	79.16
		(15.36)	(15.63)	(12.86)	(11.34)	(15.81)	(12.85)
	EDR	9.12	10.84	8.91	12.02	6.96	8.91
		(5.46)	(6.90)	(3.70)	(5.24)	(3.14)	(3.52)

Note: Entries represent means and (standard deviations).

<sup>a</sup>RR/FU: Students were exposed to the relaxation-response intervention during the first semester and follow-up testing at the end of the second semester.

<sup>b</sup>C/RR: Students exposed to the control intervention during the first semester and the relaxation-response intervention during the second semester.

<sup>c</sup>BP=Blood Pressure.

<sup>d</sup>EDR=Electrodermal Response.

Low self-esteem and feelings of external locus of control have been associated with an increased incidence of a wide variety of problematic behavior

well-received behavioral addition to curricula the relaxation response may facilitate a reduction in these problematic behaviors.

## REFERENCES

- Benson, H. (1975). *The relaxation response*. New York: Avon.
- Beary, J. F., & Benson, H. (1974). A simple psychophysiological technique which elicits the hypometabolic changes of the relaxation response. *Psychosomatic Medicine*, 16, 115-120.
- Caplan, M., Weissberg, R. P., Grober, J. S., Sivo, P. J., Grady, K., & Jacoby, D. (1992). Social competence promotion with inner-city and suburban young adolescents: Effects on social adjustment and alcohol use. *Journal of Consulting and Clinical Psychology*, 60, 56-63.
- Domar, A. D., Friedman, R., & Benson, H. (1992). Behavioral therapy. In C. A. Warfield (Ed.), *Principles and practice of pain management* (pp. 437-444). New York: McGraw-Hill.
- Downs, W. R., & Rose, S. R. (1991). The relationship of adolescent peer groups to the incidence of

- psychosocial problems. *Adolescence*, 26, 473-492.
- Fimian, M. I., Cross, A. H. (1986). Stress and burnout among preadolescent and early adolescent gifted students: A preliminary investigation. *Journal of Early Adolescence*, 6, 247-267.
- Friedman, R., Stuart, E. M., Benson, H. (1992). Nonpharmacologic adjuncts of therapy. In J. P. Cooke & E. D. Frohlich (Eds.), *Current management of hypertensive and vascular diseases* (pp. 1-7). St. Louis: Mosby.
- Goldney, R. D. (1982). Locus of control in young women who have attempted suicide. *Journal of Nervous Mental Disorders*, 170, 198.
- Gordon, D. A. (1977). Children's beliefs in internal-external control and self-esteem as related to academic achievement. *Journal of Personality Assessment*, 41, 383-386.
- Hart, D. E., & Means, J. R. (1982). Effects of meditation vs. professional reading on students' perception of paraprofessional counselors' effectiveness. *Psychological Reports*, 51, 479-482.
- Hillman, S. B., Wood, P. C., & Sawilowsky, S. S. (1992). Externalization as a self-protective mechanism in a stigmatized group. *Psychological Reports*, 70, 641-642.
- Kutz, I., Borysenko, J. Z., & Benson, H. (1985). Meditation and psychotherapy: A rationale for the integration of dynamic psychotherapy, the relaxation response, and mindfulness meditation. *The American Journal of Psychiatry*, 142, 1-8.
- Nowicki, S., Strickland, B. R. (1973). A locus of control scale for children. In J. P. Robinson & P. R. Shaver (Eds.) *Measures of social psychological attitudes* (pp. 206-211). Ann Arbor: Survey Research Center, Institute for Social Research.
- Pentz, M. S., Dwyer, J. H., MacKinnon, D. P., Flay, B. R., Hansen, W. B., Wang, E. Y. I., & Johnson, C. A. (1989). A multicomunity trial for primary prevention of adolescent drug abuse: Effects on drug use prevalence. *Journal of the American Medical Association*, 261, 3259-3266.
- Piers, E. U. (1984). *Piers-Harris self-concept scale* (revised manual). Los Angeles: Western Psychological Services.
- Project CHARLIE*. (Rev. 1992). Edina, MN: Project CHARLIE.
- Stapleton, A., & Fine, R. (1988). Hypertension management. In W. Skach, C. L. Daley, & C. E. Forsmark (Eds.) *Handbook of medical treatment* (p. 129). Greenbrae, CA: Jones Medical Publications.
- Stuart, E. M., Caudill, M., Leserman, J., Dorrington, C., Friedman, R., & Benson, H. (1987). Nonpharmacologic treatment of hypertension: A multiple-risk-factor approach. *Journal of Cardiovascular Nursing*, 1, 1-14.
- Task force report of the American Psychiatric Association. (1989). *Treatment of psychiatric disorders* (pp. 2429-2430). Washington, D.C.: American Psychiatric Association.
- Turnbull, M. J., & Norris, H. (1982). Effects of TM on self-identify indices and personality. *British Journal of Psychology*, 73, 57-68.
- Uribe, V. M., & Ostrov, E. (1989). Correlations of substance abuse and self-image among socially diverse groups of adolescents and clinical implications. *Hillside Journal of Clinical Psychiatry*, 11, 25-34.