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A Program of Stress Management in a College Setting

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ABSTRACT. During the Spring semester of 1982, a program of stress management workshops was developed at Baruch College to bring the benefits of stress reduction to students. The program employed the Open Focus attention training technique. Data for 4 Semesters have been examined to evaluate the results of using Open Focus attention in this program. During the first two semesters, Open Focus attention training was used without biofeedback training. In Spring 1983, biofeedback training was incorporated into the program and used during the Spring and Fall 1983 semesters. Changes in grade point average (GPA), stress-related symptoms, and physiological measures were examined. Two studies have been previously reported (Valdes, 1985a, 1985b). In the first study, the experimental subjects' stress data were reported. In the second study, changes in GPA and stress data for experimental and control subjects were reported. The third study, reported in the present paper, introduced an additional controlled group: the conversation "rap session" control group. Changes in the same variables for experimental, control non-treatment, and conversation "rap session" control subjects were evaluated. Students in the control group showed decreased GPA, while those who participated in Open Focus training showed a trend toward improved GPA. All selected stress-related variables representative of different categories of stress showed significant improvement, as did physiological measures in all biofeedback modalities in which the experimental subjects were trained. Significantly greater improvement was shown by the experimental subjects over the control non-treatment and "rap session" control groups. No significant change was found between the two control groups. As in the previous studies, these results support the hypothesis that the workshops were successful in reducing stress levels, and suggest that additional research, with other populations, be conducted to replicate these findings.

A program to study the efficacy of the Open Focus attention training technique by itself, and in conjunction with biofeedback training in reducing stress in a college population was developed at Baruch College during the Spring semester of 1982.

Open Focus attention training exercises were used in the program workshops. These exercises were developed over a 10-year period by Lester G. Fehmi, PhD, in conjunction with electroencephalographic (EEG) biofeedback. Open Focus training exercises have also been used with EMG, Thermal and GSR biofeedback modalities (Alson & Fehmi, 1982; Fritz, Fehmi & Hitchcock, 1982). Mastery of Open Focus practice produces an attentional flexibility which facilitates the normalization and self-regulation of body processes and functions (Fritz & Fehmi, 1982a, 1982b, 1983).

"Open Focus training establishes permissive conditions for a state of attention which is non-exclusive, tension-diffusing, non-judgmental, and self-integrating" (Fehmi & Selzer, 1975, p. 115). The Open Focus training is a process of attention which is all inclusive and integrating of experience. "In Open Focus attention, the individual becomes immersed in, and attentive to, all modalities of sensory experience: sight, hearing, smell, taste, thoughts, body feelings, emotions, a sense of time, and the context in which these sensations occur, i.e, space, volume, and void. In addition, further integration of experience is facilitated through achieving greater proximity to experience" (Valdes, 1985b).

Data dealing with pre to post differences in stress-related and biofeedback variables for experimental subjects, who participated in the Open Focus attention training workshops, have previously been reported (Valdes, l985a). The majority of the stress-related variables reported in a stress level assessment form showed significant improvement. In each biofeedback modality in which the participants were specifically trained (EEG, EMG, GSR and Thermal), the improvement was significant.

Data have also previously been reported for both experimental subjects, who participated in the workshops, and control subjects, who participated only in the pre- and post-workshop assessment procedures (Valdes 1985b). Two studies were reported. The first dealt with changes in GPA, and the second with stress-related and biofeedback variables. The GPA study indicated that students in the control group showed decreased GPA, while those who participated in Open Focus attention training showed a trend toward improved GPA, or at least the absence of lowered GPA. The second study indicated that the stress-related symptoms associated with anxiety and management of emotional problems showed significant post-training improvement, as did physiological measures in all of the biofeedback modalities in which the experimental subjects were specifically trained (EEG, EMG, GSR and Thermal).

The present paper reports two additional studies. The first deals with changes in GPA, and the second with stress-related and biofeedback variables. Data for 3 groups were examined: (a) the experimental group; (b) the control non-treatment group; and (c) the conversation "rap session" control group. The conversation "rap session" group session was introduced in the Fall 1983 semester to determine the effect of giving the students an equal amount of time without allowing them to actually participate in the Open Focus workshops. We wanted to determine whether the differences between the experimental versus the non-treatment and "rap session" control groups, as well as between both control groups were significant, and thus determine the power of the "placebo" factors. Only the experimental subjects participated in the Open Focus workshops.

SUBJECTS

Subjects were undergraduate volunteers, regular full-time students, with no previous biofeedback training, who were informed that they were part of a stress management program. In the first study the GPAs of 49 experimental students who had participated in the workshops, and 46 control students were examined. In the second study, 15 experimental students, 13 control non-treatment students, and 9 "rap session" control students responded to the stress-related variables and had their physiological measurements taken. Ages of students ranged from 17 to 38, with an average age of 21.

APPARATUS

A stress level assessment (SLA) form was developed for use in the workshops. It provided intake data and information on stress-related symptoms (variables) associated with 8 categories of stress. The symptoms on the SLA form were self-reported for intensity and frequency. Only intensities are reflected in these results. Frequencies were used to monitor the individual progress of the experimental subjects, together with the stress control log (SCL) form completed daily by the students (Valdes, 1985b).

Two cassettes with pre-taped Open Focus training exercises were used for daily home practice (Fehmi, L. G., 1977). The SCL form was used to record this practice. The biofeedback measurements were taken on: (a) American Biofeedback Corp. (ABC), EMG (Model A3); (b) ABC, digital temperature unit (Model A4); (c) ABC, GSR (Model A3); (d) Computer Instruments Corp. Pulse Minder (Model 7830); and (e) Labtron Scientific Corp. regular blood pressure cuff. A one channel EEG (Model A3) from ABC

was used for training purposes only (see Valdes, 1985a and 1985b for additional details).

PROCEDURE

The subjects were randomly assigned to one of the following groups: (a) the experimental group; (b) the control non-treatment group; and (c) the conversation "rap session" control group.

Experimental Group. The changes in the students' stress levels were measured by the intensities of the stress-related symptoms, self-reported in the initial and final SLA forms completed by each subject. The official Baruch College records were used to obtain the pre- and post-workshop GPAs for each participant. Initial and final physiological measurements were taken using the Thermal unit, GSR, EMG, heart rate monitor, and blood pressure cuff.

The workshops were conducted over a 9-week period. The weekly group sessions lasted 1-1/2 hours. During the group sessions the students practiced the pre-taped Open Focus exercises for about 1/2 hour, which were progressively introduced by the trainer. In addition, topics relevant to stress reduction were discussed after each practice.

The 8 weekly individual biofeedback-assisted attention training sessions lasted 45 minutes each. The subjects trained on the Thermal, EMG, GSR, and EEG biofeedback modalities. Each modality was used twice during the training period (please refer to Valdes, 1985a and 1985b for additional details).

Control Non-Treatment Group. The control non-treatment subjects completed the same initial and final SLA forms as the experimental group. Their physiological measurements were taken at the beginning and end of the training program. Their GPAs were obtained from official school records. These subjects did not participate in either the Open Focus workshops or individual biofeedback training sessions.

Conversation "Rap Session" Control Group. The subjects in the "rap session" control group completed the SLA forms and had their physiological measurements taken in the same manner as the experimental and control non-treatment group. Their GPAs were also obtained from the school records. The students attended 1-1/2 hour conversation sessions every week with the same trainer, in which the trainer conversed with them on any subject of their interest. They visited the biofeedback lab on a regular basis in order to become familiar with the room and the instruments. These students did not participate in either the Open Focus workshops or individual biofeedback training sessions.

Statistical Comparisons. Comparisons between the experimental and both control groups were based on pre-posttreatment changes in the experimental group versus changes between initial and final measurements in the two control groups, for the same variables, during the same period of time. This was done so that the significance of the results was not compared to no change, but rather to change which could have occurred during the 9-week period due to other life or academic circumstances.

The distribution of the raw data was not normal and tended to contain extreme values which greatly affected the mean and standard deviation. Therefore, statistical tests, which use the ranks of the data instead of the actual data points were used. The Wilcoxon Rank Sum Test was used for the experimental and control groups comparisons. The Wilcoxon Matched-Pairs Signed-Ranks Test was used for the experimental pre to post group comparisons. An analysis of Variance of Rank Data was used for the comparisons between experimental, control non-treatment, and conversation "rap session" control groups. ALL tests were on a one-tailed basis since this study is concerned with reduction in stress Levels.

RESULTS AND DISCUSSION

Table I shows the results of the Wilcoxon Rank Sum Test when applied to the difference in the pre-post-changes between the experimental and control groups for several GPA semesters. The control group observed in the Fall 1983 semester was the control non-treatment. This was done to allow for continuity with a previously reported study (Valdes, 1985b). The results in Table 1 indicate significance for all GPA groups.

Table 1

Grade Point Average

Wilcoxon Rank Sum Test Results

Experimental vs. Control

	Experimental n	Control n	Test Results of z	p[a]
Spring & Fall '82	23	17	2.72	.003
Spring '83	11	17	1.79	.0368
Fall '83	15	12	2.29	.0109
Spring & Fall '83	26	29	3.25	.0006
Spring & Fall '82 and '83	49	46	4.18	.0001

[a]One tailed level of significance

No student had exactly the same GPA

The pre-posttreatment GPA means for the same groups included in Table I are shown in Table 2. The results in Table 2 would tend to indicate that the drop in the control group GPA was largely responsible for the significant results in Table 1. The results in Table 2, however, indicate an increase in each experimental group GPA mean, except that of the smallest group (Spring 1983), which showed a slight decline. A consistent decrease in the GPA mean of each control group was found.

The analysis of variance of rank data applied to the Fall 1983 GPA data for experimental, control non-treatment and "rap session" control groups showed a significantly greater improvement in the experimental group over both control groups (p=.001). No change between the two control groups was indicated (p=.3289).

Table 2

A Comparison of Pretreatment vs. Posttreatment Semester

Grade Point Average Means for Experimental and Control Groups

	Experimental		Control	
	Before	After	Before	After
Spring & Fall '82	2.27	2.45	2.44	1.92
Spring '83	2.56	2.52	2.49	2.06
Fall '83	2.33	2.55	2.46	1.95
Spring & Fall '83	2.43	2.54	2.38	2.00
Spring & Fall '82 and '83	2.36	2.50	2.46	1.98

No student had exactly the same GPA

A pre-posttreatment comparison of the stress-related variables for the 3 groups is indicated in the analysis of variance of rank data shown in Table 3.

The stress-related variables indicated in the SLA form were grouped into 8 categories. Representative variables within each of these categories were selected. Table 3 shows the significance of the differences in the pre-post-changes, between the experimental versus the control non-treatment and "rap session" control groups, as well as between the two control groups, for these representative variables. The results indicate a significantly greater improvement in the experimental group over both control groups, in the majority of the stress-related variables and in all representative variables. The

Table 3

Pre- Posttreatment Comparison of the Experimental, Control & Rap Groups
Results of Analysis of Variance of Rank Data*
Fall 1983 Semester

Experimental (N=15)
Control (N=13)
Rap (N= 9)

Variables	Exp. $\bar{X}$	Control $\bar{X}$	Rap $\bar{X}$	Control vs. Rap F	Control vs. Rap p	Control & Rap vs. Experimental F	Control & Rap vs. Experimental p
ANGER							
Temper outbursts you could not control	-3.67	3.69	1.78	1.60	.2148	38.36	.0001
ANXIETY: PERFORMANCE							
Feeling anxious when taking tests	-2.33	1.69	1.11	0.82	.3723	8.88	.0053
ANXIETY: SOMATIC EXPRESSION							
Sweating	-3.00	2.46	2.56	0.00	.9631	18.55	.0001
ANXIETY: SPEECH							
Feeling anxious when asking a question	-2.03	2.62	2.11	0.74	.3969	24.53	.0001
ANXIETY: SUBJECTIVE FEELING							
Feeling anxious when in a new social situation	-3.07	1.00	1.00	0.14	.7126	13.82	.0007
CARDIOVASC. OR RESP. PROBLEMS							
Heart Racing	-1.33	2.08	1.11	1.01	.3220	9.84	.0035
EATING PROBLEMS							
OVEREATING	-2.67	1.77	1.22	0.26	.6152	10.22	.003
EMOTIONAL PROBLEMS							
Feeling others do not understand you or are unsympathetic	-2.93	3.69	3.00	0.53	.4707	31.64	.0001
GASTRO-INTESTINAL PROBLEMS							
Nausea, upset stomach, vomiting	-1.87	0.85	2.22	1.40	.2452	8.59	.006
MUSCLE TENSION							
Grinding of Teeth	-3.20	2.54	1.00	2.04	.1628	18.07	.0002
SLEEPING PROBLEMS							
Difficulty in falling or staying asleep	-2.80	0.54	2.00	1.64	.2089	25.40	.0001

*Because of extreme variability of data, non-parametric statistics were used. An accepted approximation to doing non-parametrics is to rank the data and then use standard statistics on the ranks rather than the original data.

results also show no significant diffcrence between the two control groups. In addition, as anticipated, the results manifest that the means of the experimental group representative variables decreased in value, indicating a reduction in stress levels. The means of the same variables increased in value for the control groups, indicating sustained or increased stress levels.

Table 4 shows the results of the analysis of variance of rank data for the 3 groups when applied to the pre-post-training physiological measurements. The results shown in Table 4 indicate that the differences in the pre-post-changes between the experimental versus control non-treatment and "rap session" control groups was significant for all biofeedback modalities, including those for which no specific training was provided. The students were trained using only skin resistance, thermal, EMO (Forehead), and EEG biofeedback. The results also manifest no significant difference between the two control groups. As in the case of the stress-related variables, the experimental group's means for all physiological measurements indicated a decrease in stress levels, A reduction in stress is usually associated with higher skin resistance and temperature means, and lower means for all other biofeedback modalities shown in Table 4. Again, the means for both control groups showed an opposite movement to those of the experimental group, an indication of sustained or increased stress levels. The results of the Wilcoxon Matched-Pairs Signed-Ranks Test, when applied to the experimental group pre-posttreatnient representative stress-related variables, are shown in Table 5. The results in Table 5 show significant positive change or improvement for all representative variables. Table 6 shows the results of the

Wilcoxon Related Samples Test for the experimental group's physiological measurements. These results indicate a significant improvement in all biofeedback modalities. As previously mentioned, the students were specifically trained in skin resistance, thermal, EMO (Forehead), and EEG biofeedback only.

Table 4

Biofeedback-Related Variables

Pre- Posttreatment Comparison of the Experimental, Control & Rap Groups

Results of Analysis of Variance of Rank Data*

Fall 1983 Semester

Experimental (N=15)
Control (N=13)
Rap (N= 9)

Variables	Exp. $\bar{X}$	Control $\bar{X}$	Rap $\bar{X}$	Control vs. Rap F	Control vs. Rap p	Control & Rap vs. Experimental F	Control & Rap vs. Experimental p
Heart Rate	-7.40	7.15	5.78	0.04	.8400	34.17	.0001
G S R	1181.73	-69.72	-305.56	0.52	.4744	46.50	.0001
Temperature	8.64	-2.33	-4.42	2.03	.1637	51.92	.0001
Blood Pressure (Systolic)	-15.33	7.69	14.78	1.32	.2581	50.32	.0001
Blood Pressure (Diastolic)	-7.00	5.62	7.00	0.75	.3924	47.49	.0001
E M G (Forehead)	-9.31	6.00	6.44	0.53	.4704	73.94	.0001
E M G (Temporalis)	-11.16	8.85	6.39	1.11	.2988	23.11	.0001
E M G (Forearms)	-11.40	8.27	7.94	0.23	.6332	71.25	.0001

*Because of extreme variability of data, non-parametric statistics were used. An accepted approximation to doing non-parametrics is to rank the data and then use standard statistics on the ranks rather than the original data.

CONCLUSIONS

Our GPA study suggests a relationship between improved GPA and reduced stress levels, and vice versa, worsened GPA and sustained or increased stress levels. The GPA results reported here, pose the same questions raised in a previously reported GPA study (Valdes, 1985b). Is the drop in the control group GPA indicative that students under stress, who are not treated, are potential failures at school? What is the impact of untreated stress on the attrition rate? In addition, it will be interesting to see the extent to which the results of this study can be replicated in other student populations with different assignment designs, with other non-student populations, and with other performance variables.

The results of the second study indicate that the program was successful in reducing students' stress levels. The experimental group's significantly greater improvement in most stress-related variables and in

Table 5

Change in Pre- Posttreatment Stress-Related Variables (N=15)

Wilcoxon Matched-Pairs Signed-Ranks Test

Fall 1983 Semester

Experimental Group

Variables	Number of Non-Zero Differences	Sum of Positive Ranks	p[a]
ANGER Temper outbursts you could not control	13	2.0	.005
ANXIETY: PERFORMANCE Feeling anxious when taking tests	14	18.0	.025
ANXIETY: SOMATIC EXPRESSION Sweating	12	6.0	.005
ANXIETY: SPEECH Feeling anxious when asking a question	13	13.5	.025
ANXIETY: SUBJECTIVE FEELING Feeling anxious when in a new social situation	14	9.5	.005
CARDIOVASCULAR OR RESPIRATORY PROBLEMS Heart Racing	10	11.0	.05
EATING PROBLEMS Overeating	10	5.0	.01
EMOTIONAL PROBLEMS Feeling others do not understand you or are unsympathetic	13	8.0	.005
GASTRO-INTESTINAL PROBLEMS Nausea, upset stomach, vomiting	7	1.0	.01
MUSCLE TENSION Grinding of teeth	9	1.5	.005
SLEEPING PROBLEMS Difficulty in falling or staying asleep	13	2.5	.005

[a]One tailed level of significance

all the selected representative variables, and more homeostatic levels of the physiological measurements, suggests that a decrease in overall stress levels occurred for these students. The results also seem to support the generalization effect of the training to biofeedback modalities in which the subjects were not specifically trained. These results are even more interesting given the limited amount of individual biofeedback training provided by the workshops. Further research is encouraged to examine possible implications of the results reported in this second study. Was biofeedback training a contributing factor in these results? Could the same effects be brought about with Open Focus attention training alone?

The significant positive changes in the experimental group when compared to the control non-treatment and "rap session" control groups, together with the lack of significant change between the two control groups, suggest that the training program is the independent variable responsible for the positive changes. These results apply to both the representative stress-related variables and the physiological measurements. The attention given to the conversation "rap session" control group, and its familiarization with the biofeedback lab surroundings, did not produce any significant difference between this group and the control non-treatment group. This non-experimental variable showed no statistical power in this study.

Table 6

Change in Pre- Posttreatment Biofeedback-Related Variables (N=15)

Wilcoxon Related Samples Test

Fall 1983 Semester

Experimental Group

Variables	Number of Non-Zero Differences	Sum of Positive Ranks	p[a]
Heart Rate	13	4.5	.005
G S R	14	104.0	.005
Temperature	15	117.0	.005
Blood Pressure (Systolic)	15	5.0	.005
Blood Pressure (Diastolic	14	7.0	.005
E M G (Forehead)	15	3.0	.005
E M G (Temporalis)	15	18.0	.01
E M G (Forearms)	15	3.0	.005
E E G	13	91.0	.005

[a]One tailed level of significance

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