Daily Relaxation Response Breaks In a Working Population: I. Effects on Self-reported Measures of Health, Performance, and Well-being

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Abstract: An experiment conducted at the corporate offices of a manufacturing firm investigated the effects of daily relaxation breaks on five self-reported measures of health, performance, and well-being. For 12 weeks, 126 volunteers filled out daily records and reported bi-weekly for additional measurements. After four weeks of baseline monitoring, they were divided randomly into three groups: Group A was taught a technique for producing the relaxation response; Group B was instructed to sit quiety; Group C received no instructions. Groups A and B were asked to take two 15-minute relaxation breaks daily. After an eight-week experimental period, the greatest mean improvements on every index occurred in Group A; the least improvements occurred in Group C; Group B was intermediate. Differences between the mean changes in Groups A vs C reached statistical significance ($p < 0.05$) on four of the five indices: Symptoms, Illness Days, Performance, and Sociability-Satisfaction. Improvements on the Happiness-Unhappiness Index were not significantly different among the three groups. The relationship between amount of change and rate of practicing the relaxation response was different for the different indices. While less than three practice periods per week produced little change on any index, two daily sessions appeared to be more practice than was necessary for many individuals to achieve positive changes. Somatic symptoms and performance responded with less practice of the relaxation response than did behavioral symptoms and measures of well-being. (Am. J. Public Health 67:946–953, 1977)

Psychosocial stress is a pervasive aspect of modern life for most individuals, and there is evidence that such stress is associated with both increased morbidity[1–3] and increased utilization of health care.[3] Many forms of physical and mental disabilities have been associated with stressful life events. However, a major obstacle to the initiation of stress-prevention programs is access to the millions of individuals who encounter a variety of stress-producing situations every day. The workplace is an ideal setting for stress-prevention programs, since over half the adult population spends at least half its waking hours at work and large numbers of individuals can be found in single locations.

The harmful effects of prolonged stress are thought to be mediated by excessive elicitation of the hypothalamically-controlled "fight or flight" response, with its attendant increased sympathetic nervous activity.[4, 5] A reaction opposite in its physiological effects to those of "fight or flight" has been called the "relaxation response."[6, 7] The relaxation response is characterized by decreased activity in the sympathetic nervous system and is also believed to be mediated by the hypothalamus. It appears to be elicited by a variety of relaxation and meditation techniques.[6, 7]

Several studies have shown meditation to be associated with an increased rate of autonomic recovery from laboratory-induced stressful events.[8, 9] Blood pressure has been significantly reduced in both pharmacologically treated and untreated hypertensive patients.[10–13] Premature ventricular contractions have been reduced in patients with stable ischaemic heart disease.[14] Relaxation and meditation procedures have also been used with some success in the treatment of asthma,[15] stuttering,[16] and psychiatric illness.[17, 18] Individuals who begin to meditate regularly tend to become less anxious,[19–21] less neurotic,[20] less "field dependent", i.e., more self-reliant,[19, 22] and more "self actualized."[20, 23] The ability to focus one's attention has been shown to increase,[21] while reaction time on perception tests decreases.[24] These latter changes could theoretically lead to improved performance levels, and at least one retrospective study did report increased efficiency and productivity in business men who meditated regularly.[25]

Since the relaxation response appears to have such wide-ranging physiologic and psychologic effects, its usefulness in an occupational setting was explored. The purpose of the present investigation was to examine not only the physiologic and psychologic effects of the relaxation response in a working population, but also the interrelationships among these effects within a single controlled experiment. Presented below are the results of several measurements of general health, performance, and sense of well-being. Changes in systolic and diastolic blood pressures are reported separately.[26]

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Methods

Subjects

The investigation involved 140 volunteers and 54 non-volunteers from the corporate offices of a manufacturing firm.* The program was promoted as an opportunity to help determine the effectiveness of daily relaxation breaks in combating the harmful effects of stress. All 428 employees located at the single site in Wilmington, Massachusetts, were invited to volunteer, and 140 or roughly one-third did volunteer. A 25 per cent random sample of the non-volunteers were contacted by phone and asked to help evaluate the program by serving in a control group.**

Volunteers agreed to (a) fill out daily records for twelve weeks, (b) attend seven biweekly sessions where blood pressure would be measured and additional questionnaires filled out, and (c) be assigned randomly to one of the three experimental groups. The non-volunteers agreed only to attend two sessions for measurement of blood pressure and completion of questionnaires, once at the beginning of the study and again 12 weeks later.

Design

After four weeks of baseline measurement, volunteers were divided randomly, after age-stratification, into Groups A, B, and C, using a table of random numbers and a ratio among the groups of three to two to two. The non-volunteers comprised Group D. Of the original 140 volunteers, 136 were available for randomization, two had been laid off, one left the company, and one had been hospitalized. Group A (n = 58) was instructed in a technique that elicits the relaxation response. Group B (n = 39) was instructed to sit quietly and try to relax. Groups C (n = 39) and D (n = 54) received no instruction. For the next eight weeks, Groups A and B were asked to take two 15-minute relaxation breaks each day, one in the morning and one in the afternoon or evening. A quiet room with comfortable chairs which participants could use at work was set aside by the company. The relaxation breaks, however, had to be taken on employee time, either before or after work, at lunch time, or during one or both of the two 15-minute coffee breaks allowed each employee. Most participants elected to take at least one of their daily relaxation periods at home and some practiced only at home. Groups C and D took no special relaxation breaks. Groups B and C were promised and subsequently given the opportunity of learning the relaxation response at the end of the 12-week investigation.

Training

An effort was made to provide equivalent training experiences for Groups A and B except that Group A was instructed in the use of a specific technique for eliciting the relaxation response, and Group B was asked not to use any special techniques to help them relax during their breaks. The relaxation technique taught to Group A involves silently repeating the word "one" during each exhalation and passively disregarding other thoughts. Instructions for this technique have been reported elsewhere.[7, 14, 27] Participants in Group B were told that as long as they sat quietly without speaking and did not focus on any one repetitive thought, they could daydream, think about their days, listen to music, or use the time for any similar relaxing activity. Other than the method used to relax, the training of Groups A and B was the same. One person conducted all training, which took place individually and in groups of two to 20 from the same experimental group. Participants attended two or three training sessions lasting up to one hour each, during which they practiced relaxing and discussed the experience. Both groups were instructed how to sit comfortably in a chair with minimal movement for ten to 15 minutes. Both were told how to find quiet places to practice. The second and third sessions took place from one to ten days after the initial training and were included primarily to resolve any difficulties participants were having in finding regular times and places to practice.

Dependent Variables

Both volunteers and non-volunteers filled out questionnaires each time they reported to the company first-aid room to have their blood pressures measured. In addition, the volunteers filled out daily records throughout the 12-week investigation. From these data were derived two indices of general health, one of overall performance, and two for sense of well-being, as described below.

1. Symptoms Index: At the first and last sessions, all participants indicated on a four-point scale how often they had experienced each of 51 symptoms during the previous three months. The items were selected from several standard scales purporting to measure both physical and mental health. Thirty items involved predominantly physical or somatic symptoms, such as headache, nausea, rash, diarrhea and mouth sores. The other 21 items were more behavioral or non-somatic, such as difficulty getting to sleep, worrying over trifles, recurring thoughts or dreams, and nervous habits such as biting fingernails or chewing pencils. The sum of the frequency codes for all 51 symptoms constituted the Symptoms Index, with the 30 somatic and 21 non-somatic items comprising two components of the overall Symptoms Index.

2. Illness Index: Each day volunteers recorded "yes" or "no" in response to the question, "Did you feel ill, feverish, or in pain at any time today?" Whenever the answer was "yes", participants were instructed to describe the nature of the complaint(s) on the back of the Daily Record. The sum of the "yes" responses each week constituted a weekly Illness Index.

3. Performance Index: After each workday, volunteers rated their (a) level of physical energy, (b) strength of concentration, (c) handling of problems, and (d) overall efficien-

* The Converse Rubber Company, a subsidiary of the Eltra Corporation.

** Of the 72 non-volunteers in this sample, six could not be reached due to hospitalization or leave of absence, three could not schedule measurement sessions, and nine refused to cooperate.

cy on six-point scales from "poor" to "excellent". The sum of the mean ratings on each of these four performance indicators constituted a weekly Performance Index.

4. Sociability-Satisfaction Index: At each biweekly session, all participants were asked: "During the past two weeks, how have things been going for you in the following areas? (a) home or roommates, (b) close friends, (c) people at work, (d) satisfaction with your work, (e) confidence in yourself, and (f) satisfaction with yourself." Answers were recorded on five-point scales from "poorly" to "better than ever." The sum of the six items constituted the Sociability-Satisfaction Index, with the first three items representing a Sociability component and the last three items, a Satisfaction component.

5. Happiness-Unhappiness Index: At each biweekly session, participants also indicated how often they had experienced each of nine moods during the previous week. The moods, taken from Bradburn's Happiness-Unhappiness Scale,[28] were comprised of four positive or "happy" states and five negative or "unhappy" states, each of which was rated on a four-point frequency scale from "not at all" to "often". Examples of the positive moods are "on top of the world feeling" and "particularly excited or interested in something"; negative moods included items such as "bored" and "the feeling that you had more to do than you could possibly get done." The sum of the nine items (after the scales for the negative items were reversed) constituted the Happiness-Unhappiness Index, with separate Happiness and Unhappiness components.

Practice Rate

Throughout the experimental period (eight weeks), participants in Groups A and B reported on daily records when and where they took relaxation breaks. The total number of breaks taken each week was recorded as the weekly Practice Rate for each subject.

Equivalence of Groups

The volunteers and non-volunteers were roughly equivalent on a range of demographic and personal characteristics. On the average, the population was young (mean age = 33.4 years), married (63 per cent), and Catholic (68 per cent). Just over one-half (54 per cent) were female; and 48 per cent held clerical positions. Volunteers differed from non-volunteers only in being somewhat younger, in having a shorter employment history at the company, and in having tried other forms of meditation or relaxation exercises more often in the past.

The four groups experienced approximately the same dropout rates, which were due primarily to a series of layoffs initiated during the study. At the end of the investigation, there were 54, 36, 36, and 52 subjects remaining in Groups A, B, C, and D respectively.

The randomization process combined with subsequent dropout patterns provided roughly equivalent groups of volunteers as revealed by comparisons on 35 personal and demographic variables. However, as expected when making so many multiple comparisons, differences among the groups were statistically significant on three variables: marital status, perceived job stress, and use of safety belts. Compared to Groups A and B, Group C had significantly more participants who had been separated, divorced, or widowed ($p < 0.01$); and compared to Groups B and C, Group A had significantly more participants who, at the beginning of the study, reported (a) their jobs involved periods of heavy pressure "almost daily" or more ($p < 0.01$), and (b) they usually wore safety belts in automobiles ($p < 0.01$). However, stratification on these variables demonstrated that none were associated with differential changes on any of the dependent variables.

Overall mean practice rates for Groups A and B were 8.5 and 8.8 relaxation breaks per week for the eight-week experimental period. Only 30 per cent of Group A and 19 per cent of Group B averaged less than seven practice periods a week, and 52 per cent and 58 per cent averaged ten or more practice periods a week. Thus overall cooperation with the Program was good and roughly equivalent in the two groups taking relaxation breaks.

Statistical Procedures

One-way analyses of variance were used to compare differences in mean values among the groups both for initial values of the dependent variables and for mean changes after the experimental period. Two-tailed t-tests were performed on all pairs of groups to determine which group(s) were responsible for any significant variation. Since all possible combinations were tested in each case, the t-tests were corrected for degrees of freedom by multiplying the regular t-test probability by the number of pairs in the set. Pearson product-moment correlation coefficients were computed between initial indices and changes in the indices. Since there were significant correlations between the initial indices and their changes, and since the study groups in some cases differed on the initial indices, analyses of covariance were performed on the mean changes to remove the influence of the initial indices.

The Illness Index, Performance Index, and Practice Rates were estimated from daily records which were returned weekly. However, 11 per cent of these daily records were never received, with total return rates being 91 per cent, 89 per cent, and 86 per cent in Groups A, B, and C respectively. Since only slightly more than one-half the participants in each group returned every daily record, the weekly Illness and Performance Indices were averaged for the first and last four-week periods, with subjects being omitted altogether if more than one daily record was missing in either of these periods. In computing mean practice rates, a weekly rate of zero was recorded for each missing record, resulting in possible underestimates of actual practice rates for some individuals.

Pearson product-moment correlation coefficients were computed between practice rate and changes in the dependent variables to identify any linear dose-response relationships.

Results

Symptoms Index

At the first session, there were no significant differences in the mean Symptoms Index among Groups A, B, and C, but all three groups of volunteers reported significantly more symptoms than did the non-volunteers (Table 1). Between the first and last sessions, the greatest mean decrease in the Symptoms Index was in Group A; the least change occurred in Groups C and D; and the mean decrease for Group B was intermediate. Only Group A, the group practicing the relaxation technique, showed a significant mean change ($p < 0.001$).

This same pattern of mean decreases among the four groups was observed for both the Somatic and Non-somatic components of the Symptoms Index, and for both the total number of different symptoms reported and the mean frequency with which given symptoms were reported. In each case, the largest and only significant mean decrease occurred in Group A; the least changes occurred in Groups C and D; and Group B was intermediate.

Illness Index

There were no significant differences among the three groups of volunteers either in the initial mean Illness Index or in the mean changes in this index between the baseline period and the last four weeks of the experimental period (Table 1). The observed decrease in the Illness Index for Group B was somewhat higher than that for Group A, but Group B had a higher mean Illness Index during the baseline period. That the mean decrease in Group A was equivalent in relative magnitude to that in Group B was demonstrated by the analysis of covariance, which removed the effect of baseline status. And, unlike the F-test conducted on the unadjusted mean changes, the F-test for the adjusted mean changes in the Illness Index was statistically significant ($p < 0.05$).

Performance Index

During the baseline period, the mean Performance Index was roughly equivalent in the three groups of volunteers (Table 1). Mean changes in this index between the baseline period and the last four weeks of the experimental period were greatest in Group A, least in Group C, with Group B intermediate. Only the difference between Groups A and C was statistically significant ($p < 0.01$).

The correlation between the initial Performance Index and change in this index was approximately -0.3 in each of the groups ($p < 0.05$). Although this does not represent an especially high degree of correlation, the negative sign does indicate that the higher the initial index, the less the index improved after the experimental period. Thus an upper limit to potential change may have been imposed by the six-point rating scale on which the Performance Index was based.

Sociability-Satisfaction Index

At Session 1 the mean Sociability-Satisfaction Index for Group C was significantly lower than for Group D ($p < 0.001$) and Group A ($p < 0.05$) (Table 1). At the end of the investigation, the mean increases in this index were greatest in Group A and least in Group D, with the magnitude of the changes decreasing in order from Groups A through D. The changes for both Groups A and B were significantly higher than for Group D ($p < 0.05$) but not for Group C. The analysis of covariance, which adjusted for the differences among the groups in the initial indices, did not alter the pattern or statistical significance of these mean changes.

Changes in the Satisfaction component of the Sociability-Satisfaction Index were more responsible for the pattern of significant differences found among the groups than changes in the Sociability component. However, on both components, Groups A and B changed more than Groups C or D.

Happiness-Unhappiness Index

At the beginning of the investigation the mean Happiness-Unhappiness Index for Group C was significantly lower than for Group D ($p < 0.01$) (Table 1). At Session 7, the greatest improvement in this index of well-being was in Group A; the least improvement (actually a decrease) was in Group D, with the changes decreasing in magnitude in order from Groups A to D. However, the differences between the changes in Groups A and B were small, and none of the mean changes represented a statistically significant change from baseline.

The Happiness component of the Happiness-Unhappiness Index showed virtually no changes after the experimental period. However, the Unhappiness component decreased significantly ($p < 0.001$) in all three groups of volunteers when compared to the non-volunteers.

Changes as a Function of Practice Rate

None of the correlation coefficients between weekly practice rate and change on the five indices were significant in either Group A or B. For Group A, the coefficients between practice rate and change on the Symptoms, Illness, Performance, Sociability-Satisfaction, and Happiness-Unhappiness Indices were -0.15, -0.09, 0.28, 0.18, and 0.01 respectively; corresponding correlations for Group B were 0.12, 0.15, -0.01, -0.06, and 0.13.

While there were no linear dose-response relationships between amount of practice and change on any of the indices, change was not completely unrelated to practice, at least in Group A. The largest decreases in the Symptoms Index occurred among participants in Group A who practiced an average of six to eight times a week. Additional practice among Group A participants was not associated with additional change, but less practice was associated with less change. For the Performance Index, three to five practice periods a week were associated with as much relative change in Group A as higher practice rates; while substantial changes in the Sociability-Satisfaction Index were associated only with nine or more practice periods a week. The Illness and Happiness-Unhappiness Indices showed no clear relationship to practice rate in Group A, as was the case for all five indices in Group B.

TABLE 1—Mean Changes on Five Indices of Health, Performance, and Well-being

Index		Group A Relaxation Response (n = 54)[1]	Group B Sit Quietly (n = 36)[1]	Group C Control (n = 36)[1]	Group D Non-Volunteer (n = 52)[1]
Symptoms Index (51 Symptoms on 0-3 scale re frequency)					
Session 1	$\bar{x}$	43.5	43.3	47.6	30.2
	(S.D.)	(21.5)	(21.7)	(17.9)	(15.4)
Mean change at Session 7[2]	$\bar{x}$	−10.4	−4.5	−3.6	+0.7
	(S.D.)	(14.5)	(14.7)	(11.6)	(10.6)
Adjusted mean change[3]	$\bar{x}$	−9.8	−3.9	−1.8	−2.4
Correlation[4]	r	−0.7***	−0.4**	−0.0	−0.2
Illness Index[1] (Days per week of feeling "ill, feverish, or in pain")					
Weeks 1-4	$\bar{x}$	1.2	1.7	1.6	—
	(S.D.)	(1.3)	(1.7)	(1.8)	—
Mean change in Weeks 9-12[2]	$\bar{x}$	−0.9	−1.1	−0.6	—
	(S.D.)	(1.2)	(1.7)	(1.5)	—
Adjusted mean change[3]	$\bar{x}$	−1.0	−1.0	−0.5	—
Correlation[4]	r	−0.9***	−0.9***	−0.8***	—
Performance Index[1] (4 Items on 1-6 scale from "poor" to "excellent")					
Weeks 1-4	$\bar{x}$	16.6	17.0	16.4	—
	(S.D.)	(2.6)	(3.1)	(2.6)	—
Mean change in Weeks 9-12[2]	$\bar{x}$	1.6	0.9	−0.1	—
	(S.D.)	(2.0)	(1.8)	(2.4)	—
Adjusted mean change[3]	$\bar{x}$	1.6	1.0	−0.1	—
Correlation[4]	r	−0.4*	−0.2	−0.4*	—
Sociability-Satisfaction Index (6 Items on 1-5 scale from "poorly" to "better than ever")					
Session 1	$\bar{x}$	21.9	21.5	20.4	22.5
	(S.D.)	(3.1)	(3.4)	(3.2)	(2.7)
Mean change at Session 7[2]	$\bar{x}$	1.6	1.4	0.6	0.3
	(S.D.)	(3.2)	(2.5)	(3.3)	(2.9)
Adjusted mean change[3]	$\bar{x}$	1.6	1.3	0.3	0.4
Correlation[4]	r	−0.6***	−0.5**	−0.4**	−0.4**
Happiness-Unhappiness Index (9 Items on 1-4 scale re frequency)					
Session 1	$\bar{x}$	24.0	23.7	22.9	25.2
	(S.D.)	(4.0)	(3.3)	(3.6)	(4.1)
Mean change at Session 7[2]	$\bar{x}$	1.0	0.9	0.8	−0.4
	(S.D.)	(3.8)	(3.1)	(3.5)	(4.8)
Adjusted mean change[3]	$\bar{x}$	1.0	0.8	0.4	0.1
Correlation[4]	r	−0.7***	−0.6***	−0.5*	−0.6***

* = $p < 0.05$
** = $p < 0.01$
*** = $p < 0.001$

[1]Since the Illness and Performance Indices were calculated from the Daily Records, no data was obtained from the non-volunteers and n = 47, 30, and 30 for Groups A, B, and C respectively.

[2]Probability Levels for Significance Tests among the Mean Changes were as follows:

		T-tests Corrected for Degrees of Freedom					
Mean Change	All Groups	A vs B	A vs C	A vs D	B vs C	B vs D	C vs D
Symptoms	< 0.001	0.194	0.042*	< 0.001***	> 0.500	0.348	0.479
Illness	0.297	> 0.500	> 0.500	—	0.480	—	—
Performance	0.004**	0.381	0.006**	—	0.247	—	—
Soc.-Sat.	0.049*	> 0.500	0.182	0.036*	0.198	0.042*	> 0.500
Hap.-Unh.	0.262	> 0.500	>0.500	0.107	> 0.500	0.156	0.196

[3]Adjusted mean changes were produced by analyses of covariance performed on the mean changes to remove the influence of the initial indices. The adjusted mean changes are most meaningful when there is significant correlation between the initial index and changes on that index and the groups differ on the initial index. Probability levels for F-tests on these adjusted mean changes were as follows:

Symptoms	0.009**
Illness	0.015*
Performance	0.003**
Soc.-Sat.	0.042*
Hap.-Unh.	0.485

[4]Correlation coefficients are between the initial index and the change in that index for individuals within each group.

The practice rates used in the above analyses were averaged over the entire eight-week experimental period, with a weekly rate of zero assigned to all missing daily records. However, none of the relationships described above were altered substantially when practice rates were calculated for the first four weeks of the experimental period, for the last four weeks, or when missing records were simply omitted from the calculations.

Relations among the Dependent Variables

In most cases, there were small but significant intercorrelations among the initial values of the five indices. However, only changes in the two indices of sense of well-being (Sociability-Satisfaction and Happiness-Unhappiness) were correlated significantly in all three groups, the overall correlation coefficient being 0.47 ($p < 0.001$). There was also a slight but consistent tendency for decreases in the Symptoms Index to be associated with increases in the two indices of well-being; the overall correlations were -0.24 and -0.29 (p's < 0.01). With these exceptions, there was no consistent tendency for changes in one index to be associated with changes in any of the others.

Discussion

On each of the five indices of health, performance, and well-being examined above, Groups A and B showed the greatest improvements and Groups C and D, the least improvement. There was a marked tendency for the amount of improvement on each of the indices to decrease in order from Group A through Group D. The differences among the adjusted mean changes for the experimental groups were statistically significant on every index except the Happiness-Unhappiness Index.

In previous investigations with the relaxation response, subjects were usually expected to practice their relaxation or meditation technique twice a day.[9–11, 13, 14, 20–23] However, attempts to relate compliance with this practice regimen to the dependent variables are rare. The present study suggests that twice a day may be more practice of the relaxation response than is needed for changes to occur in some individuals. Furthermore, different indices may require different amounts of practice for maximum changes to occur. On three of the five indices (Symptoms, Performance, and Sociability-Satisfaction), there appeared to be minimum levels of practice which were necessary for stable changes to occur. Not surprisingly, the Illness and Happiness-Unhappiness Indices, which showed the least differential effect of the experimental treatments (Table 1), showed no consistent relationship between practice rate and mean change. However, all these results must be interpreted with caution since the different practice rates were not assigned randomly to the participants, the numbers of subjects who practiced at the lower rates were small, some of the practice rates were underestimated, and the initial indices were different among those practicing at the different rates.

Groups B and C were included in this study to control for potential placebo effects of repeated measurements, desire to participate in the program, special attention, and simply taking time each day to relax. The three groups of volunteers received the same amount of measurement; and Groups A and B received comparable amounts of attention and relaxation practice. Efforts were made to make participants in Group B feel as important as those in Group A so they would take their relaxation breaks equally seriously. Nearly equal practice rates in the two groups demonstrated equivalent motivation.

However, despite attempts to equalize attention in Groups A and B, participants in Group A may have expected more positive changes than Group B, and these expectations may have influenced their responses to the questionnaires. Similarly, Group B may have expected more positive changes than Group C because they were receiving more attention and taking periodic relaxation breaks. The consistency with which Group B changes fell between those of Groups A and C is striking and could lend support to an explanation based on level of expectation. However, if expectation played a primary role, one would expect to find a stronger linear correlation between practice rate and changes in the indices, since participants were encouraged to make every effort to practice twice a day to achieve maximum results. More importantly, changes in the dependent variables were ascertained from repeated measurements, separated by days, weeks, or months. It would have been difficult for respondents to sustain consistent changes on these indices if their answers were based entirely on unmet expectations. The location of Group B changes between those of Groups A and C may also reflect a real effect of taking time each day to stop one's routine and relax. At the end of the study, 70 per cent of Group B, compared to 81 per cent of Group A, reported that they thought the relaxation breaks had benefited them in some way. The added value of practicing the relaxation technique during these breaks was not statistically significant on any of the indices reported here, and on the Illness and Well-being indices, changes in Group B were more similar to changes in Group A than to changes in Group C. Nonetheless, differential expectations cannot be ruled out as an explanation of the results.

At the first measurement session, Group D reported significantly fewer symptoms of all types than did the three groups of volunteers. This may reflect a true difference between volunteers and non-volunteers in that employees who had fewer symptomatic manifestations of stress or anxiety simply felt no need to join a relaxation program. Alternatively, as non-volunteers, Group D may have been less careful in recalling and/or reporting their symptoms.

The Happiness-Unhappiness Index was the least sensitive indicator of the differential changes among the groups. This index was taken from a standard scale for measuring sense of well-being.[28] The other indices used in this study were developed primarily on the basis of their face validity and the assumption that participants would answer such direct items honestly. While no effort was made to check honesty in answering the items, confidentiality was assured and participants were reminded throughout the study that the validity of the results depended on their answering as truthfully as possible. Company-based measures of health and per-

formance were not available, due in part to the nature of the work and mode of operation at the corporate offices of a firm. However, objective data in the form of blood pressures were available, and the same pattern of changes among the groups found for the five indices reported here were also found for both systolic and diastolic blood pressures.[26]

While the trends among the mean changes and adjusted mean changes were striking in their consistency from one index to the next, the magnitude of the mean changes on most of the individual indices was not large. Greater changes might have been observed if other indices had been used or if the experimental period had been extended. Negative correlations between the initial measurements and positive changes on three of the five indices (Performance, Sociability-Satisfaction, and Happiness-Unhappiness) suggest that limits to the measurement of change may have been imposed by the upper limits of the scales. (The equivalent correlations for the Symptoms and Illness Indices were negative since improvements on these indices were indicated by decreases rather than increases.) Since the relaxation response appears to influence many different aspects of physical and psychic health, but not necessarily the same aspects in different individuals, indices composed of a large number of items, such as the Symptoms Index, may be more appropriate measures of self-reported changes than indices composed of fewer, more convergent items.

This investigation has demonstrated that it is feasible for volunteer officeworkers to incorporate relaxation breaks into their daily routines; and that, compared to following one's "normal" routine, taking such relaxation breaks may be associated with improvements in one's perception of one's health and performance and in one's self-satisfaction. Furthermore, practicing a relaxation technique during these breaks is associated with greater improvements than sitting quietly without using special relaxation techniques. Additional studies are needed to investigate alternative practice patterns, alternative indices of change, and predictability of individual change. Such future studies may establish the use of relaxation response breaks in the work setting as a practical and inexpensive method for some individuals to cope with everyday stresses.

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Self-Love in Medicine

Of the greatest cosmogony in medicine there are several departments, and each professor never fails to magnify his own, by counting the cost of time and labour, which you must be prepared to bestow if you wish to make any reasonable progress in it.

From Aphorisms from Latham, collected and edited by William B. Bean, MD. The Prairie Press: Iowa City, 1962.