PERSONALITY AND AUTONOMIC CHANGES IN PRISONERS PRACTICING THE TRANSCENDENTAL MEDITATION TECHNIQUE

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Physiological stability and psychological adaptability increased in prisoners practicing the Transcendental Meditation technique. — EDITORS

Spontaneous skin resistance responses and personality traits as measured by the Minnesota Multiphasic Personality Inventory (MMPI) were determined for 12 prisoners from the Narcotics Rehabilitation Act program at La Tuna Federal Penitentiary before they began Transcendental Meditation and again two months later. Meditating subjects were compared with a control group of seven nonmeditating prisoners measured at the same times.

The results of three groups were compared: regular meditators who meditated at least half of the prescribed times ($N = 5$), irregular meditators ($N = 7$), and control subjects ($N = 7$). The percentage of decrease in spontaneous skin resistance responses was significantly greater for regular meditators than for irregular meditators ($p < .001$) or for control subjects ($p < .05$). The correlation between the number of meditations during the two-month period and the percentage of decrease in spontaneous skin resistance responses was also significant ($r = .74$, $N = 12$, $p < .01$). On the MMPI regular meditators decreased significantly more than controls on scale 7 (Psychasthenia, $p < .025$) and on scale 10 (Social Introversion, $p < .05$). Regular meditators also decreased more than irregular meditators on scale 7 ($p < .05$).

There was a significant correlation between the decrease in spontaneous skin resistance responses and the decrease on scale 7, which measures obsessive-compulsiveness ($r = .68$, $p < .025$). The more regularly a person meditated, the more he simultaneously gained in physiological stability and behavioral flexibility (reduced compulsiveness) accompanied by increased social outgoingness.

INTRODUCTION

The Transcendental Meditation (TM) technique, as taught by Maharishi Mahesh Yogi, produces a range of physiological changes that vary within meditations, among meditations, and among meditators. Measured changes in oxygen consumption range in different periods of meditation from −4 percent to −30 percent and in basal skin resistance from −26 percent to +350 percent (20, 21). Blood lactate levels decrease significantly (22), and respiration usually decreases, at times to as low as four breaths per minute (1).

Wallace, observing EEG changes, reported an increase in the power of 9 Hz alpha during Transcendental Meditation and the spreading of alpha from occipital to frontal areas during meditation. He also reported occurrences of high amplitude theta spindles on a background of well-defined alpha activity. Banquet described different stages of EEG during TM: predominant 10-Hz, 50-μV alpha activity, slowing after five to 20 minutes to 5- to7-Hz, 100-μV theta bursts simultaneously in all channels, followed by longer rhythmic theta trains, and finally in some subjects synchronous beta activity in all channels, corresponding to the deepest stage of meditation (2).

Applying a Fourier spectral analysis, Banquet observed the simultaneous occurrence of alpha and theta for extended periods, long chains of pure 5 Hz theta, and bursts of high amplitude 20 Hz beta spindles synchronous from all leads.

Westcott (23) reported that the EEG became statistically more in phase and more correlated in amplitude between the left and right hemispheres during TM than during ordinary relaxation or concentration, indicating an interhemispheric balancing of electrical functioning of the brain during TM.

These patterns observed by Wallace, Banquet, and Westcott are quite distinct from those seen in sleeping and drowsiness and confirm subjective experiences of inner alertness during TM. During periods of theta that appeared to be similar to the EEG of drowsiness, meditators were found to be alert to external stimuli (2). However, it

was found that a fatigued person may fall asleep in meditation for some time and then shift back into the meditative state.

Factors that we and others have found to influence the degree and direction of physiological change during TM are the following: state effects such as the initial baseline level of the subject on various physiological parameters, the quality of the experimental environment and experimenter, the subject's anxiety to replicate well-known results, the particular requirements of physiological normalization of the subject's life at the time of testing, e.g., whether he needs additional sleep or is working through a period of stress, and such trait effects as the level of psychophysiological development of the subject, which depends in part on how long he has been meditating.

The effects of TM are known to be cumulative. For example, studies of college populations indicate that TM produces physiological and psychological improvements. Autonomic stability (15) and positive personality changes including increased self-sufficiency, increased acceptance of self, increased spontaneity, increased capacity for warm interpersonal relations, and increased recognition of the causal connection between one's behavior and its consequences have also been reported (8, 13, 16). These results indicate the development of self-actualization as defined by Maslow and increased inner control as defined by Rotter's Locus of Control Scale. Those practicing TM also report spontaneously giving up the use of nonprescribed drugs (4, 17). Applied clinically, TM is reported to relieve insomnia (12), hypertension (3), and asthma (9, 10) and to significantly improve the prognosis of hospitalized psychiatric patients in a number of diagnostic categories (6).

This variety of research indicating that the Transcendental Meditation program has a generalized beneficial effect on health and psychological well-being encouraged us to offer the technique to a group of prison inmates in a pilot study. The two measures used were the Minnesota Multiphasic Personality Inventory (MMPI), the most widely used and researched clinical personality test, and the frequency of phasic responses in skin resistance that occur independently of external noise or movement by the subject (5, 11, 18, 19). Spontaneous skin resistance responses (SSRR) were chosen as a measure for study because of their known correlation with a number of physiological and psychological parameters that suggest that autonomic stability-lability defined in terms of skin resistance comprises an important dimension of psychophysiological development. Evidence for and against this interpretation of phasic skin resistance response will be discussed in a separate paper.

METHOD

SUBJECTS—The subjects were 17 male inmates of La Tuna Federal Penitentiary near El Paso, Texas, who had been incarcerated for narcotics-related crimes and who were participating in the Narcotics Rehabilitation Act (NARA) program at La Tuna. Fifteen subjects were in their early 20s and two subjects were in their early 30s; approximately one-half were of Mexican-American origin, a quarter were black, and a quarter were Caucasian.

APPARATUS—Spontaneous skin resistance responses (SSRR) were recorded on a Lafayette polygraph with silver–silver chloride contoured electrodes, 4×6 cm on the palm and 1.5×2 cm on the middle finger. Respiration and EKG were also recorded on a physiograph, and Hewlett-Packard Electrolyte Redux creme electrode paste was used.

PROCEDURE—In early June, 1971, the inmates from the NARA program attended an introductory lecture on the Transcendental Meditation program at the prison. Twelve who planned to start TM and five who did not plan to start were given the MMPI the following week. Phasic electrodermal activity, EKG, and respiration were also measured that week. After electrodes were attached, the subject sat resting in a chair with eyes open for a five-minute adaptation period followed by a ten-minute measurement period. Thus, physiological measures were taken on the

TABLE 1

ELECTRODERMAL MEASUREMENTS BEFORE AND AFTER TWO MONTHS OF THE TRANSCENDENTAL MEDITATION PROGRAM

GROUP		SPONTANEOUS SKIN RESISTANCE RESPONSES (responses per 10 minutes)				BASAL SKIN RESISTANCE (kilohms)	
		Pretest	Posttest	Difference	% Change	Pretest	Posttest
Regular meditators	Mean	48.8	6.6	42.2	88	18.0	14.0
	S.D.	29.1	5.4	. . .	. . .	11.1	3.8
Irregular meditators	Mean	28.7	17.9	10.8	37.5	19.7	12.4
	S.D.	12.5	6.5	. . .	. . .	11.4	4.8
Nonmeditators	Mean	34.0	11.7	22.3	65.6	12.6	*
	S.D.	27.3	13.0	. . .	. . .	13.4	*

*No data.

TABLE 2

STASTICAL COMPARISONS: SPONTANEOUS SKIN RESISTANCE RESPONSES

GROUP	PRETEST		POSTTEST		DIFFERENCE		% CHANGE	
	t	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Regular meditators and irregular meditators	1.65	NS*	3.18	<0.005	2.50	<0.025	4.92	<0.001
Regular meditators and controls	0.90	NS	0.82	NS	1.28	NS	1.89	<0.05

*NS = not significant.

subjects while awake with eyes open and not during meditation. The equipment and two experimenters were in the same quiet room as the subject, and the subject was seated so that he could not see the equipment but so that he could easily be observed by the experimenters. Only electrodermal responses over 100 ohms in amplitude that were not correlated with movements by the subject or external noise were scored as spontaneous.

The following week prisoners planning to start Transcendental Meditation were instructed in TM through the standard four-day course. They were asked to meditate 20 minutes twice a day. Meditators met with their instructor for a few minutes each day for two weeks and weekly after that for verification of their practice. Over the two-month period of the experiment, meditators and nonmeditators engaged in the same daily prison routines, except that the meditators practiced TM and attended the verification sessions. The experimenters did not see the meditators or control subjects during their intermeasurement period to control for degree of acquaintance with the experimenter. Two months after TM instruction subjects from both groups were retested on the MMPI and on the physiological measures. After physiological measurements were taken meditators filled out a questionnaire on their regularity of meditation. Therefore, at the time of recording and scoring of spontaneous skin resistance responses the experimenters did not know whether a subject had meditated regularly or not.

RESULTS

SPONTANEOUS SKIN RESISTANCE RESPONSES—Of the 12 meditators posttested, five were found to have meditated regularly. Regularity was defined as meditating at least 60 out of the optimal 120 times during the two months. The results are presented in table 1 in terms of three groups: regular meditators (N = 5), irregular meditators (N = 7), and controls (N = 7). At the pretest there were no statistically significant differences among the three groups on spontaneous skin resistance responses (SSRR) (table 2) or basal skin resistance (SR), although regular meditators tended to have higher initial levels of SSRR (fig. 1). On posttesting there were no statistically significant differences between regular and irregular meditators on basal SR, but regular meditators scored significantly lower on the frequency of SSRR ($t = 3.18$, $p < .005$; all t-tests are one-tailed).

All groups decreased in SSRR on posttesting, probably a laboratory adaptation effect, but the percentage of decrease was significantly greater for regular meditators than for irregular meditators ($t = 4.92$, $p < .001$) or for control subjects ($t = 1.89$, $p < .05$). The correlation between the number of meditations during the two months and the percentage of decrease in SSRR was $r = .738$, N = 12, $p < .01$ (fig. 2). Thus, the greater the regularity of meditation, the greater was the increase in autonomic stability.

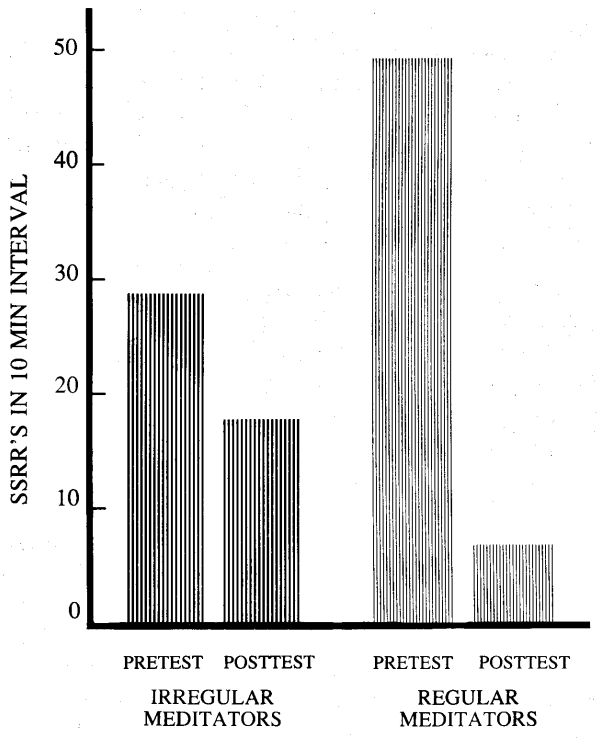

FIG. 1. FREQUENCY OF SPONTANEOUS SKIN RESISTANCE RESPONSES FOR REGULAR AND IRREGULAR MEDITATORS. Regular meditators tended to have a higher level of SSRR than irregular meditators before the experiment, but showed a lower level after two months of regular meditation.

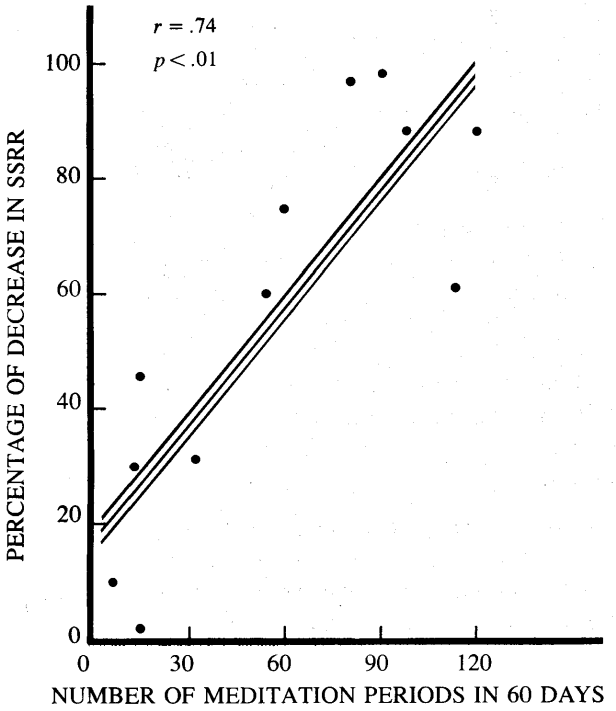

FIG. 2. SCATTER DIAGRAM FOR THE PERCENTAGE OF DECREASE IN SPONTANEOUS SKIN RESISTANCE RESPONSE AS A FUNCTION OF REGULARITY OF MEDITATION. The positive correlation of $r = .74$ was statistically significant.

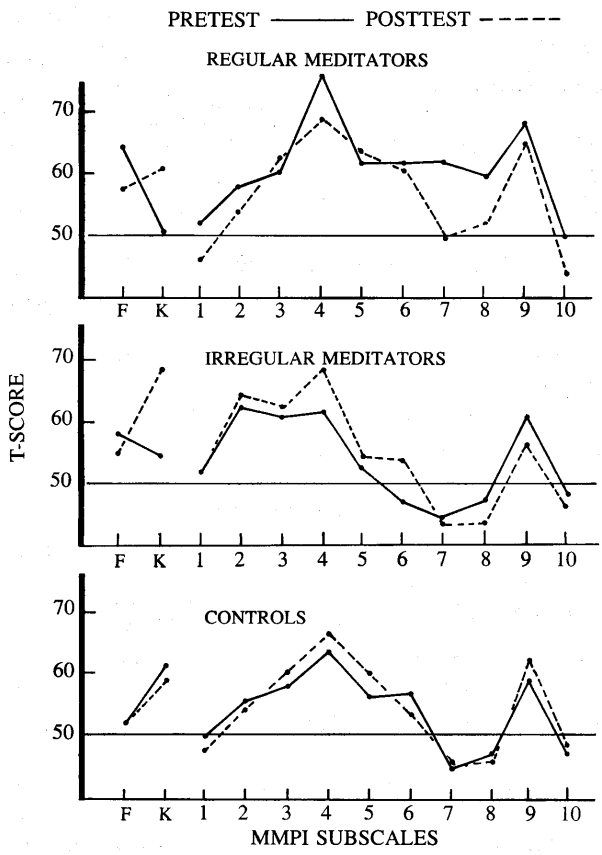

FIG. 3. MMPI RESULTS. All groups showed peaks on scales 4 (Psychopathic Deviate) and 9 (Hypomania), a typical pattern for this population of inmates incarcerated for drug-related crimes. Regular meditators decreased significantly on scale 7 (Psychasthenia) and scale 10 (Social Introversion). Other scales are 1—Hysteria, 2—Depression, 3—Hypochondria, 5—Masculine/Feminine, 6—Paranoia, and 8—Schizophrenia.

MMPI—All groups showed similar MMPI profiles with peaks on scales 4 (Psychopathic Deviate) and 9 (Hypomania), which have been found to be characteristic of narcotics addicts (7, 14). This combination indicates an aggressive personality and the tendency to act out impulses in a socially unacceptable way.

There were no initial statistically significant differences among groups on any of the subscales of the MMPI, although initially regular meditators did tend to show a lower K-score, suggesting a more frank attitude towards answering the questions, and slightly higher scale values than the other two groups (fig. 3). On posttesting K increased about the same amount for regular and irregular meditators, but stayed the same for nonmeditator controls. However, the level of K on posttesting was almost identical for regular meditators and controls, and none of the differences among groups on K-scores were statistically significant, suggesting that the subjects' attitudinal sets towards taking the test were not significantly different. Regular meditators decreased more than control subjects on scale 7 (Psychasthenia, $t = 2.53$, $p < .025$) and on scale 10 (Social Introversion, $t = 2.22$, $p < .05$). Figure 4 shows that meditators tended to have a higher initial level on scale 7, but this difference did not reach statistical significance. Regular meditators decreased more than irregular meditators on scale 7 ($t = 2.14$, $p < .05$). Scale 7 measures the degree of obsessive-compulsive behavior, and the decreases on this scale shown by meditators indicate an increase in flexibility of behavior. Decreases in scale 10 (fig. 5) indicate an increase in social ease and outgoingness for the regular meditators. Correlations between physiological and psychological variables for meditators indicate a significant correlation of $r = .68$ between the degree of decrease on scale 7 and degree of decrease on SSRR ($p < .025$, N = 12). This relationship indicates that an increase in physiological stability was accompanied by an increase in behavioral flexibility, suggesting the simultaneous development of stability and adaptability in meditators.

DISCUSSION

The higher initial values on SSRR for regular meditators compared with irregular meditators suggest that more labile subjects were more inclined to be regular in meditation, possibly because of a greater contrast they experi-

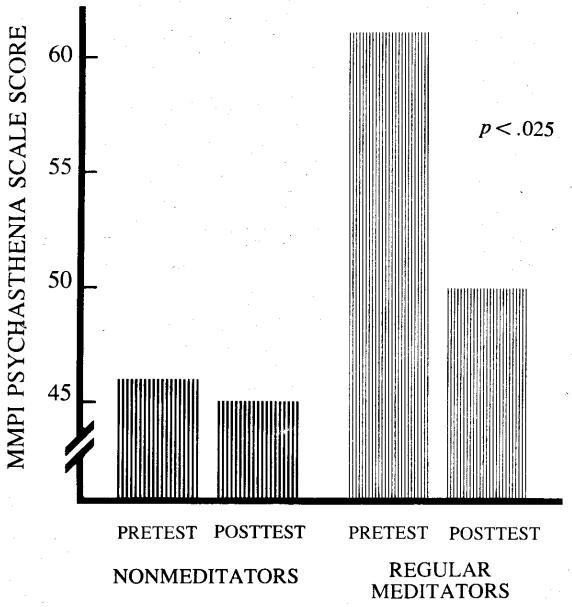

FIG. 4. PSYCHASTHENIA SCALE OF THE MMPI. This figure shows the change on the Psychasthenia scale of the MMPI for regular meditators and nonmeditating controls.

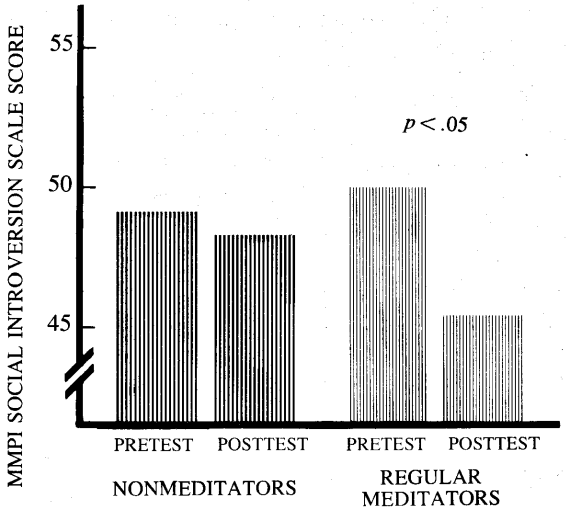

FIG. 5. SOCIAL INTROVERSION SCALE OF THE MMPI. This figure shows the change on the Social Introversion scale of the MMPI for regular meditators and nonmeditating controls.

enced from before to after meditation; i.e., they perceived greater benefits. The fact that the posttest frequency of SSRR was lower for regular meditators than for irregular meditators indicates that the benefits of practicing Transcendental Meditation were real and that the initially more labile subjects became more stable as a function of regular meditation. The change seen in regular meditators was not just an effect of regression towards the mean, because their posttest scores went below the mean level of stability. This result and the significant correlation between regularity of meditation and degree of increase in stability indicate that the prisoners who participated in the TM program benefited in proportion to their regularity of meditation. Even those subjects who were moderately regular (meditating half the time is very minimal participation in the program) showed measurable physiological and psychological benefits.

The MMPI result on scale 7 (Psychasthenia) could be interpreted as a regression towards the mean effect, since regular meditators scored higher initially on this scale (fig. 4). However, the significant correlation of 0.68 between the degree of autonomic stability gained and the degree of decrease on scale 7 suggests that the scale 7 changes produced by meditation were real.

The changes seen in regular meditators on scale 7, reduced psychasthenia, can be interpreted as reduced rigidity, reduced obsessive thoughts, and reduced compulsive behavior, all of which scale 7 purports to measure. From this result, Transcendental Meditation can be said to increase the flexibility of thinking and action. The significant correlation of scale 7 changes with autonomic stability suggests a very interesting psychophysical relationship of autonomic stability covarying with behavioral and cognitive flexibility.

These changes in regular meditators demonstrate the utility of TM as a rehabilitative measure and point out the value of regular meditation for maximum effectiveness. At La Tuna prison TM was only a pilot project and was secondary to other available programs. Several of the subjects complained that they could not find the time or a place to meditate, although some subjects did manage to meditate regularly, indicating that it was possible. Their motivation to practice TM appeared to be the physiological contrast experienced between their initial autonomic lability and the deep relaxation of TM.

The subjective reports of meditators were favorable. All reported increased relaxation, a reduction of tension, and greater mental clarity. From our experience we recommend that TM be tried in a serious and systematic way as a major treatment modality in correctional institutions. The important question about TM for those interested in rehabilitation is how well TM could work under optimal conditions in which the participants were encouraged or even given incentives to meditate regularly and provided with a systematic follow-up course. It is our feeling that a large group of meditators would experience an even more powerful and beneficial therapeutic and preventative effect than a few meditators isolated in a tense environment, which was the case in this experiment.

We look forward to large-scale programs of sociological significance, especially in the area of prevention, for which the low cost, wide availability, and universal effectiveness of the Transcendental Meditation program

make it an ideal modality for improving the quality of life on all levels.

In the four years since this pilot project was conducted (1971) there have been on the order of 100 scientific experiments completed on the Transcendental Meditation program, making TM the most thoroughly researched technique in the behavioral sciences. These experiments have been categorized to show that TM simultaneously develops life in a holistic way, increasing stability, adaptability, integration, purification, and growth in physiology, psychology, sociology, and ecology—the fundamentals of progress. We urge those concerned with the well-being of society to take advantage of the wide availability of this technique and to value time in implementing it quickly.

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