

A. On Therapeutic Effects of Meditation

This section contains the only major critical review articles of the psychotherapeutic effects of meditation to date. The article by Smith (5) is a seminal article in that it was the first critical review of the literature looking at alternative explanations for the effects of meditation. Smith suggests that even though the effects of meditation are real and seem well documented, it is unclear whether these are due primarily to meditation or to expectation effects and just sitting. Although the article may err on the side of too conservative an estimation of meditation's effectiveness, it is an important in that it provided a balance for many of the claims that were being made by meditation adherents.

The article by Shapiro and Giber (6) refined Smith's article in three ways. First, the dependent variable of "psychotherapeutic effects" is refined into more specific dependent variables—stress management; the addictions; hypertension. Second, the independent variable of meditation is looked at more precisely and is broadened to include such areas as amount of subject practice, nature and length of training, therapist contact, and description of techniques. Third, meditation can be conceptualized both as a self-regulation strategy and also as an altered state of consciousness. The authors describe specific research strategies which may be appropriate depending upon the nature of the dependent variable investigated.

B1. Meditation and Stress Management

For a general review of the literature on meditation and stress management, the reader is referred to the appropriate sections in the Chapter by Shapiro and Giber (Article 6) as well as the table which is included summarizing the literature on meditation and its effectiveness in the treatment of stress, phobias, and fears.

The two articles included in this subsection, by Goleman and Schwartz (7) and Linden (8) are clear, well-designed studies which show the effects of meditation for stress reduction. In the Goleman and Schwartz study, the authors found that meditators exhibited greater autonomic responses in anticipation of the stressful scene during a film, but recovered quicker. This finding is consistent with the work on autonomic stability and meditators (see Article 30 by Orme-Johnson). Linden's study suggests that, even with children in the third grade, changes in test anxiety can occur with a relatively short 5 week intervention.

It should be noted that both of these studies were performed with normal subjects and are included here as examples of studies which show that meditation is an effective strategy in reducing stress in normal subjects. Generalizing to a clinical population seems plausible, but there are some considerations which need to be made (see Article 13 by Vahia *et al.*, and Article 14 by Glueck and Stroebel). For example, with a clinical population there should be additional checking to ensure that meditation is practiced correctly, an assessment of appropriate attentional skills, and assurance that the possible anxiety-arousing stimuli that might be accessed during meditation are not too overwhelming for the individual.

All of the articles point out the potential promise of meditation as a stress management strategy. Whether it is more effective than other self-control strategies, or equally effective with all types of stress, or with all types of subject population is not clear.

Additional developments which elaborate and refine the aforementioned expectations are presented elsewhere in this volume: (1) see Part III, Article 27 by Davidson and by Orme-Johnson (Article 30) for possible explanations of the physiological effects of meditation; (2) Article 52 by Walrath and Hamilton and by Morse *et al.* (Article 53) which suggest that meditation may not be the only way to attain physiological relaxation, or any more effective than other self-regulation strategies for gross physiological parameters; (3) Article 47 by Schwartz *et al.* which refines stress into both cognitive and somatic dimensions and suggests that meditation may be more effective with cognitive than with somatic stress; (4) Article 46 by Beiman *et al.* for client characteristics that may be relevant in determining effectiveness; (5) Article 42 by Smith for some of the component analyses which may contribute to the variance of treatment success.

Table 1. Studies on Fears and Phobias, Stress, and Tension Management

Investigator(s)	Clinical Problem	S's (N, age, sex, prior experience)	INDEPENDENT VARIABLE		DEPENDENT VARIABLE					Type of Design, Quality of Control, Methodological Problems		
			Type and Length of Treatment/Training	Frequency of Therapist (E) Contact	Subjective Effects	Behavioral	Physiological	Overt, Concurrent (e.g., medical)	Follow-up			
Boudreau 1972	Case One: fear of enclosed places, examinations, elevators, being alone. Duration of problem: 5 years.	N=1, 18 yrs., male, not stated specifically "adept at TM"	Systematic desensitization and massed desens. first (3 days x 3 hrs.), then since no improvement Transcendental Meditation (one month). TM practiced both non-contingently and contingent upon imagining phobic scenes	Sys. desens. and massed desens. done with tape recorder	Self-reported tension decrease	Avoidance behavior had disappeared	None	None	None	None	N=1 case report, an in-vivo assessment pre and post of fears would have been useful.	
	Case Two: excessive perspiration. Duration of problem: 35 years.	N=1, 40 yrs., female, took summer course in Yoga	Intervention #1: Relaxation practice w/ paired anxiety-arousing images (6 months) provided partial symptom alleviation. Intervention #2: Yoga practice (3 mos. x 1/2 hr. daily) plus additional practice during tense moments.	Not stated	Not reported	None	None	None	Daily Perspiration: mild/excessive. Intervention #1: mild perspiration decreased from 12 hrs. to 5 hrs. on average; excessive from 3 to 1 hr. Intervention #2: excessive disappeared, mild is below 1 hr. per day.	6 months: perspiration maintained at below 1 hr. daily	N=1 case report, relative effects of relaxation and Yoga not clear. Operationalizing of mild and excessive perspiration good and follow-up admirable.	
French and Tupin 1974	Case One: esophagitis. Duration of problem: 20 years.	N=1, 65 yrs., male, not stated	3 phases: (1) slowed breathing and (2) muscle relaxation followed by (3) focusing on pleasant images (in this case for 10-15 min.)	Not stated	Self-reported decrease in pain and relief of sleep disturbance	None	None	None	None	None	Patient reported successful use of method for 6 months	N=1, within subj. case report, pre and post ratings of pain severity and sleep disturbance would have been useful.
	Case Two: severe pain due to bullet wounds, anxiety and depression during 3 mos. hospitalization, poor eating, weight loss.	N=1, 22 yrs., male, not stated	Same method as above (in this case, used for 30 min. according to patient self-report)	Not stated	Self-report of improved ability to manage pain and sleep, also improvement in general mood and eating.	None	None	None	None	None	None	Same as above
	Case Three: widely disseminated oatcell carcinoma of the lung, sleep disturbance, pain, relief through narcotic use.	N=1, 53 yrs., male, not stated	Same method as above	Not stated	Found focusing technique "lightening and distressing"; used only muscle relaxation, if pain controlled by relaxation, patient could sleep without use of hypnotic.	None	None	None	None	None	None	Same as above
	Case Four: referred for psychiatric succs.; panic, neurotic fear of heart attack, used 120 mg. diazepam per day, severe sleep disturbance.	N=1, 50 yrs., male, not stated	Same method as above	Not stated	Used method to monitor heart beat and control fear of heart attack, however, fear resumed after other patient's died of myocardial infarction, patient returned to use of technique 10 min./daily for "relaxing"; no specific effect.	None	None	None	None	None	None	Pre and post ratings of fear would have been useful.
	Case Five: hospitalized for chronic back pain.	N=1, 45 yrs., male, failed at hypnotic induction	Same method as above	Not stated	Method unsuccessful in inducing relaxation, subsequent surgery revealed herniated disc at L4-5.	None	None	None	None	None	None	Case report.
Yahia, et al 1972-1973	Psychoneurosis and psychosomatic disorders that failed to respond to conventional treatment	Stage One: N=165 Stage Two: N=37 Stage Three: treatment N=21, controls: N=18, age range for all S's 15-50 yrs., experience not stated	Nine year study. Stage One: psychophysiological therapy based on concepts of Patanjali (yoga): (1) postures, (2) breathing exercises, (3) withdrawal from senses, (4) concentration on object, (5) identification with object practiced one hr., 6 days/week for 6 weeks. Stage Two: treatment compared with controls receives similar pseudotreatment with "superficial" postures, breathing exercises, and no interpretation or insight for steps 3-5 practiced one hr. each weekday for 4-6 weeks.	Not stated	Stage One: blind clinical assessment at 3 and 6 weeks for target relief symptom (heart) 70% of patients rated for anxiety, depression, hysteria and bronchial asthma showed improvement. Stage Two: patients self-reported intrusive thoughts during treatment. Taylor's Anxiety Rating Scale given pre-treatment, and at 3 and 6 weeks showed greater and consistent anxiety reduction for treatment group. MMPI and	Self-reported increase in work efficiency on the job and objective global improvement reported by patient's as friends, spouse, other relations, and colleagues.	None	Bronchial asthma assessed	None	None	Double blind used, stage two groups matched for age, sex, diagnosis and duration of illness. Same therapist used for total treatment and pseudotreatment introducing possible experimenter effect (Smith 1975).	
(Yahia et al., 1972-1973 continued)			both groups given placebo tablets, support and reassurance. Stage Three: treatment compared with controls using anxiolytic and antidepressant drugs (e.g. Amitriptyline and chloridiazepoxide).		Rorschach tests given pre- and post-treatment. 73% of S's in total therapy showed improvement of at least 50% on basis of clinical assessment, while 42% of S's in "pseudo-treatment" showed significant improvement. MMPI showed greater overall improvement for total therapy group. Those who showed greater ability to meditate to total therapy group displayed more clinical improvement than those who did not. Stage Three: pre-treatment, 3 and 6 week assessment with Taylor's Anxiety Rating Scale, Hamilton's Depression Rating Scale, and Bell's Social Adjustment Scale, treatments equally effective on depression rating; psychophysiological therapy showed greater reduction than drug therapy on anxiety scale, and psychophysiological therapy patients showed reduction on social adjustment scale.							
Girido 1974	Patients diagnosed as "anxious," "neurotic," length of illness: 5-71 months.	N=9, 7 male, 2 female, ages 18-42 years, not stated	"TM like" meditation on mantric sound used 20 min., twice per day used for all patients; combined with imaginal flooding procedure and relaxation for 4 patients who failed to show anxiety decrement after 8 sessions with meditation alone (total length of treatment: 6-8 months)	Patients seen every 7-14 days	Anxiety-symptom questionnaire (administered every 2 weeks) showed reduction in anxiety symptomatology by 4th session of meditation. 4 patients found meditation unbeneficial, but experienced relief of symptoms with flooding. Note: later analysis showed difference in group successful with meditation treatment (mean group duration of symptoms—14.2 months and mean "cognitive" symptom severity of 9.5) and group successful with flooding (mean group duration of symptoms—44.2 months and mean "cognitive" symptom severity of 16.4)	None	Degrees of somatic symptoms reported in questionnaire	None	6 month mailed follow-up questionnaire	Patients as own controls, patients told to expect "calm relaxation", etc. from technique introducing expectation effect, no control group.		
Shapiro 1976	Complaining of "free-floating anxiety."	N=1, female college student, no prior experience	(1) 2 weeks: monitoring of anxiety with counter; (2) weekend Zen workshop teaching anxiety contingent Zen breath meditation plus covert self modeling (3) 3 weeks with instructions to meditate 10 min., 2x per day, to continue anxiety monitoring and practice informal breath meditation when anxious	Therapist (E) did not contact patient during 3 week meditation period.	Significant decrease in feelings of anxiety during intervention phase (3 weeks) and positive self perception change on semantic differential	Wrist counter used as anxiety monitor	None	None	None	None	N=1 design, relative effect of formal vs. informal meditation in relief of anxiety not clear, also possible reactive effect from initial self monitoring.	
Smith 1976	Anxiety (isolating effect of TM from expectation of relief and daily sitting)	Exp. 1: N=139, college students, mean age 22 yrs., 70 male, 69 female, no prior meditation experience Exp. 2: N=54, college students, mean age 21.5 yrs., 27 male, 27 female.	Exp. 1: 1) Pretreatment: Elaborate placebo procedure with control treatment. Rationale given. Assessment included STAI A-Trait Inventory, Epstein-Fenz Manifest Anxiety Scale, and other supplementary measures including test of skin conductance reactivity. 2) Random assignment of S's to: 1) Standard TM training (N=49) 2) Control treatment called (PSI) "Periodic Somatic Inactivity" (sitting, eyes closed) (N=51) 3) No treatment - (waiting list) (N=39) Exp. 2: 1) No treatment controls, Exp. 1 (N=24) and others (N=30) given similar pretreatment assessment (cf. Exp. 1) placebo procedure 2) Random assignm. of S's to: 1) TM-like meditation called "Cortically Mediated Stabilization" 2) "Anti-meditation" exercise involving sitting with eyes closed, actively generating pos. thoughts	Exp. 1: Placebo treatment matched with TM procedure for similar amount of therapist contact and treatment credibility. Exp. 2: Both treatments taught in similar fashion by experimenter with elaborate treatment rationales given.	Subjective Exp. 1: TM and PSI groups did not differ significantly on post-test STAI-A Trait Scale (trait anxiety) scores; symptoms of striated muscle tension and autonomic arousal (Epstein-Fenz Manifest anxiety scale). Both TM and PSI post-test means significantly lower than No Treatment on all dep. var. Exp. 2: Groups did not differ significantly on dep. var. measures. T-test of within group differences reveal significant impact, on STAI-A Trait and symptoms of autonomic arousal for both groups.	None	None	None	Exp. 1: No treatment S's post-tested at 3.5 mos., TM and PSI S's post-tested at 6 mos., including assessment on drug use, and subjective responses to treatment. Exp. 2: Same post-tests (Exp. 1) given at 11 weeks	Useful study is beginning to isolate aspects of treatment variance.		

Table 1. Studies on Fears and Phobias, Stress, and Tension Management (cont'd.)

Investigator(s)	Clinical Problem	S's (N, age, sex, prior experience)	DEPENDENT VARIABLE		INDEPENDENT VARIABLE					Type of Design, Quality of Control, Methodological Problems	
			Type and Length of Treatment/Training	Frequency of Therapist (E) Contact	Subjective Effects	Behavioral	Physiological	Overt, Concurrent (e.g. medical)	Follow-up		
Goleman and Schwartz 1976	Ability to reduce stress in lab situation in response to stressful film.	Group One: N=30, avg. age approx. 25 yrs., more than 2 years TM experience Group Two: N=30, avg. age approx. 23 yrs., non-meditators interested in TM or Yoga. Note: Difference in "life-style" found; meditators reported reduced usage of licit and illicit drugs, alcohol, cigarettes and coffee and dietary changes (e.g., less meat and candy).	Experimental Procedure - Note: S's assigned serially to 1 of 3 experimental conditions 1) 4 min. baseline 2) 20 min. treatment - 3 conditions a) Meditation: eyes closed (not using mantra) b) Relaxation: eyes open c) Relaxation: eyes closed 3) 5 min. rest 4) 12 min. exposure to stressful film	S's assigned serially to 1 of 3 experimental conditions	Pre and post treatment testing on State-Trait Anxiety Inventory A State Form (Spielberger, 1970) showed meditators reported less state and trait anxiety before and after treatment. Affective Adjective Checklist (Zuckerman, 1960) showed meditators reported feeling more positive upon entering lab and throughout treatment. Activity Preference questionnaire (Lykken & Katzenmeyer, 1960) administered post treatment found S's in meditation condition were less anxiety prone after leaving lab though no between group differences. Post treatment testing on Eysenck Personality Inventory showed meditators significantly less neurotic and more stable than non-meditators.	None	None	Physiological Meditators heart rate less than controls during treatment, increase heart rate more in response to anticipation of stress or impact, then recover more quickly post impact. On phasic skin conductance—all groups decrease equally in response frequency during treatment; meditators increase more in anticipatory minute prior to stressor impact and decrease more during post impact minute. Meditators compared to controls had higher skin conductance response (few peaks and lower troughs).	None	None	Treatment conditions randomized and controlled; eyes open/closed factor. "Life-style" differences between groups suggest importance of other factors besides meditation in stress response.
Linden 1973	Test anxiety, field independence, and reading ability.	N=15 male and 15 female randomly assigned to each treatment condition. S's drawn from upper half (in reading ability) of third grade classes of school in disadvantaged urban areas.	Group One: Taught Zen breath meditation (Maupin, 1965) and visual fixation task (Deikman, 1963); practiced 2x per week x 13 weeks for 20-25 min. Group Two: Given guidance counseling focusing on improving study skills; met 45 min. per week for 18 weeks in 3 groups of 10 S's. Controls: Controlled for by guidance condition.	Same as above	Pre and Post Treatment Test Results: Meditating group showed gain in field independence (Children's Embedded Figures Test) and decrease in test anxiety (Test Anxiety Scale for Children over controls. There was no effect on reading achievement).	Never	None	None	None	Follow-up to be reported	Well designed study; between groups design.
Lazar, Farwell and Farrow 1977	Anxiety	Group A: N=12, 7 male, 5 female, mean age 23.66 yrs., 4 weeks meditation experience Group B: N=11, 5 male, 6 female, mean age 24.10 prospective meditators.	Standard TM training	Same as above	IPAT anxiety scale questionnaire administered pre and post—(after 2 weeks) meditation instruction found mean group average reduction from 80th to 65th pop. percentile (Group B). Mean posttest score of Group A (50th percentile) was significantly lower than pretest score of Group B and insignificantly different from their posttest score.	None	None	None	None	None reported	Employed recurrent Institutional Design (Campbell & Stanley, 1963).
Woolfolk et al., 1976	Chronic insomnia	N=24, mean age approx. 44.3 yrs., 6 male, 18 female. Avg. duration of trouble with insomnia — 14.1 yrs.	All S's suspended sleep medication. Group One: N=8, taught meditation technique involving immobility, closed eyes and a passive focus on breathing. Breathing focus shifted (session 2) to mantra and then, to focus on a specific image (session 3). Group Two: N=8, taught in 4 weekly 1 hr. sessions in groups. S's instructed to practice 30 min./2x daily at home. Group Three: Waiting list controls, asked to keep records of sleep patterns for 4 more weeks with promise of treatment at end of experiment.	4 wks x 1 hr. treatment	S's retrospective rating initial belief in potential effectiveness of treatments revealed no significant differences in treatment groups. College students asked to rate credibility of treatment procedures and rationale on same scale showed no significant differences between treatments.	Behavioral Treatments reported on— (1) Latency of Sleep Onset Means (in minutes) Pretest Post-test Follow-up Meditation 74.08 34.19 24.51 Progressive Relaxation 65.01 29.20 26.73 Control 67.21 66.61 — Treatments equally effective. Both meditation and Progressive Relaxation groups showed significant improvement over pretreatment, while pretreatment and follow-up means for control group did not differ. (2) Rated Difficulty of Falling Asleep (10 — extremely difficult) Pretest Post-test Follow-up Meditation 5.92 2.91 2.94 Progressive Relaxation 6.35 3.48 3.28 Control 5.38 5.79 —	None	None	6 month in form of 1 week of daily sleep records.	Techniques called "self-control" skills protecting against meditation placebo effect. Excellent study.	
Tupple et al., 1971	Ischemic Heart disease Group One: all but 2 patients with history of myocardial infarct. Period from infarction to time of study ranged from 1 to 10 yrs., avg. 3.9 yrs., no relief from antianginal drugs. Group Two: recent myocardial infarct.	Group One: N=23, avg. age=48.5 yrs., male, "all of high economic class with sedentary habits except 1 farmer." Group Two: N=21, avg. age=32.4 yrs., 19 male, 2 female, "all except 1 belonged to a sedentary occupation"	11 Hatha Yogic positions (asana) practiced until patient was symptom free (e.g., stable heart rate, and blood pressure, and absence of complications of E.C.G.) Positions practiced daily.	Not stated specifically	Group One: Patients who performed exercises regularly expressed "feeling of physical well-being" and ability to work without fatigue. Group Two: Similar subjective feelings reported. Ambulation achieved during 2nd week in 10 cases and 3rd week in 10 cases. Rehabilitation effected during 5th week in 8 cases and before 9th week in others.	None	None	Physiological Group Two: 150 observations made before & after exercise on heart rate, B.P., & respiration Behavioral Group One: Report states: "Patients unable to return to their full occupation, even after a year from infarct, could be rehabilitated after about a month of starting these exercises."	None	One month to 7 years	Patients in group one had been treated by one of experimenters in past; measure of "well-being" not reported; no controls, no statistical data reported.
Honsberger and Wilson 1973	Bronchial asthma	N=22, no prior experience with TM	Treatment Group (N=11) Practiced Transcendental Meditation for 3 months Control Group (N=11) read related material daily x 3 months	Not reported	74% of patients reported TM was beneficial their asthma; 63% thought it had helped their general health; 63% reported TM assisted their emotional life. None reported worse. No large changes in airway resistance after TM in comparison to control values.	None	None	Pulmonary function data obtained at baseline, 3, & 6 months GSR showed 79% of patients effectively meditated. 94% of patients had improved airway resistance after TM in comparison to control values.	Physicians asked to compare pre and post treatment periods. Reported 55% of patients better with TM. 27% worse. No large changes in medication but severity of symptoms reduced in TM group (according to daily diaries kept).	At 6 months 80% of patients still meditating, only 60% thought it was helping their asthma	Parameters of "general health" and emotional assistance from TM, vague.

B3. Hypertension

For a review of the hypertension studies, readers are referred to the summary in the Article by Shapiro and Giber (Article 6) and to the accompanying table.

The studies included in this section are representative of the hypertension literature and were chosen because they used meditation as the primary treatment variable. In the Benson *et al.* study (Article 11), there was a definite reduction of systemic arterial pressure in hypertensive and borderline hypertensive subjects who practiced transcendental meditation and did not take any drugs. Stone and DeLeo's study (Article 12) used a meditation procedure of counting breaths. The experimental group showed a reduction of mean arterial pressure which averaged 12 mm. Stone and DeLeo also measured dopamine β -hydroxylase under the assumption that it provided an index of sympathetic nervous system function, and was more sensitive than catecholamines. They found that there was, in fact, a significant reduction in dopamine β -hydroxylase in the experimental group.

Both of these studies suffer from a limitation of not having a randomized placebo control group. However, the results are suggestive and promising. One excellent study (not included here for reasons of space), is by Patel (1975). Although Patel's study is a more elegant experimental design, it is difficult to ferret out the effects of treatment due to the combination of meditation and biofeedback.

Table 3. Studies on Hypertension

Investigator(s)	Clinical Problem	S's (N, age, sex, prior experience)	INDEPENDENT VARIABLE		Frequency of Therapist (S) Contact	Subjective Effects	DEPENDENT VARIABLE		Follow up	Type of Design, Quality of Controls, Methodological Problems
			Type and Length of Treatment/Training	Physiological (Note: BP measures given systolic/diastolic unless otherwise noted)						
Benson and Wallace, 1972a	Hypertension	N=22, no prior experience	Standard TM training by Student's International Society—8½ hrs. S's instructed practice technique 2x20 min/daily	Not stated	None reported	Found decreased resting systemic arterial blood pressure levels Mean BP levels prior to meditation—150±17/94±5mmHg (mean ± one S.D.) Mean BP levels post meditation—141±11/87±7mmHg (mean ± one S.D.)	4-63 weeks	N=1, S's as own control pre, during, and post meditation		
Benson et al., 1974a	Borderline hypertension with S's not using anti-hypertensive drugs	N=22, avg. age approx. 43.1 ± 12.9 yr. (mean ± one S.D.) 10 male, 12 female, volunteers from introductory TM lecture group	Same as above	Not stated	None reported	Found decreased resting blood pressure levels Mean BP levels prior to meditation—146.5±13.7/61.7±6.96mmHg Mean BP levels post meditation—139.5±12.61/90.75±8.76mmHg	Post meditation instruction measurement every 2-3 weeks x 25 weeks	N=1, S's as own control 6 weeks prior to meditation instruction baseline measurement		
Benson et al., 1974b	Hypertension with S's using anti-hypertensive drugs	N=14, avg. age approx. 53.3 yrs. (S.D. 9.19) 6 males, 8 females, no prior experience, volunteers from introductory TM lecture.	Same as above	Not stated	None reported	Found decreased resting blood pressure levels Mean BP levels prior to meditation—145.6±8.38/91.3±11.9mmHg Mean BP levels post meditation—135.0±8.32/87.0±11.34mmHg S's diet and antihypertensive drug use (mean 1 one S.D.) monitored by questionnaire	Post instruction measurement 10 days x 20 weeks	1 x 6 weeks prior to meditation instruction measurements taken, study unbiased in regard to alterations in antihypertensive agents or significantly altered diet		
Patel 1973, 1975a follow-up	Hypertension with S's using anti-hypertensive drugs. Duration of hypertension from 1-20 years (avg. 6.8 years). Symptomatology & tiredness (14 patients), headache (13), depression on exertion (11), dizziness (8), irritability (8), chest pain (6), anxiety (2), palpitation (6), and nervousness and depression in (5).	Group One: N=20, avg. 57.35 yrs. 9 males, 11 females Group Two: N=20, controls matched for age and sex	Patients instructed to practice Yoga, breath meditation, muscle relaxation, and concentration meditation on an idea, also biofeedback of GSR through audio signal of "relaxometer" given continuously. Patients also told pre and post session BP levels.	3x per week x 3 months for ½ hr relaxation training	Report stated: "patients responded favourably; criteria of subjective effects not stated."	1) Alteration in BP over 3 months of Relaxation Training "Practical" BP Treatment Group 159.1±15.9/100.1±12.8 Control Group 163.1±20.9/99.9±12.8 "End of trial" BP Treatment Group 138.7±16.0/85.9±8.7 Control Group 162.6±24.4/97.0±12.0 2) Follow-up Results End of trial arrival BP Treatment Group 144.6±11.0/86.0±5.74 Control Group 167.7±9.73/97.1±6.54 Final follow-up measured BP Treatment Group 144.4±9.83/86.7±3.33 Control Group 163.6±9.42/98.1±7.83 (12 months/9 months)	3, 6, 9 and 12 months	Variance of treatment effect attributable to Yoga, biofeedback and role of therapist not clear		
Patel 1975b	Hypertension with S's using anti-hypertensive drugs	Phase One (N=34) Group One (treatment) N=17, mean age 49.5 yrs., 6 male, 11 female Group Two (control) N=17, mean age 58.6 yrs., 7 male, 10 female Phase Two former control group (2) given treatment	Treatment procedure (2 sessions per week x 6 weeks) 1) Educational discussion about hypertension, physiology of relaxation, etc. and patients. 2) Instruction in methodical (yogic) relaxation and slowed breathing 3) After mastery of step 2, "transcendental meditation-like" technique taught. 4) Biofeedback (e.g., audio signal of GSR level) given continuously by "relaxometer" during steps 2 and 3. 5) S's urged to practice informal relaxation and meditation outside of treatment when tense (e.g., each patient had a red disc on his watch as a reminder to relax when he looked at the time).	Extensive doctor-patient interaction between doctor and patients	None reported	1) BP before trial Treatment Group 167.5±23.6/99.6±9.3mmHg Control Group 168.9±20.0/100.6±11.4mmHg 2) Mean final BP Phase 1 Treatment Group 141.4±8.4mmHg Control Group 160.0/96.4mmHg 3) Mean BP Phase 2 Mean initial BP Treatment (formerly control) 176.6/104.3 Control (formerly treatment) 148.8/87.8 Mean final BP Treatment (formerly control) 148.8±9.3 Control (formerly treatment) 146.2/86.2	2 wks. x 3 months after phase one, then 2 month interval prior to phase two Phase two, single used follow-up examination	Same criticism as above		
Datay et al., 1969	Hypertension with chronic hypertensive (essential) hypertension—32 patients, non-12 arteriolecular—3 Symptomatology, Oddness (30 patients), headache (28), chest pain in 12 (angina 7), palpitation in 12, breathlessness on exertion in 10, exhaustion in 10, insomnia in 8, irritability and nervousness in 8.	N=47, avg. age 46 yrs., 37 male, 10 female Group One: N=10, not using anti-hypertensive drugs Group Two: N=22, BP well controlled with anti-hypertensive drugs Group Three: N=15, BP inadequately controlled with anti-hypertensive drugs	"Shwādhāna" yogic breathing concentration and muscle relaxation done 30 min. daily for approx. 30 weeks. EMG feedback of frontalis muscle tension used as check of muscle relaxation	Not stated specifically "experienced supervisor" checks exercising patients for correctness in breathing exercise.	Report states: "patients experienced a sense of well-being after exercise, improvement reported among almost all patients in somatic symptoms (e.g., headaches, giddiness, nervousness, irritability, and insomnia)	Decreases in avg. mean blood pressure to 40 weeks Group One 124mmHg to 107mmHg (reduction 27mmHg) Group Two 102.100mmHg unchanged (since patient's BP well controlled by drugs, therapy aimed at reducing drug dosages for 13 S's (53%); avg. drug requirement was reduced to 32% of original dose irregularly) Group Three 120mmHg to 110mmHg, drug requirement reduced to 29% of original in 6 patients (40%); dosage unchanged in 7 patients (of these, 2 were regular and 2 could not perform exercise correctly); doses had to be increased in 2 patients (regular with exercise); Essential (62.5%), Renal (42%), not statistically significant, arteriolecular (not favorable response)	Placebo tablets given S's not using anti-hypertensive drugs one month prior to treatment, data substantiating report of improvement in somatic symptoms needed, also follow-up needed.			
Stone and DeLeo 1976	Mild or moderate hypertension (defined as mean arterial BP greater than 105mmHg during at least 50% of 14 pretreatment examination) with S's who had never received anti-hypertensive therapy	N=19 Group One (controls) N=5, avg. age 28, all male Group Two (treatment) N=14, avg. age 28, (21 yrs) (mean ± s.e.m.) Baseline BP for both groups similar	"Buddhist" meditation taught (e.g., counting breaths) in five 20 min. training sessions S's told to repeat technique 2x daily for 10-15 min.	Not stated specifically	None reported	Effect of Physiologic Relaxation on Arterial Blood Pressure (mean ± Standard error mean systolic/diastolic BP in mmHg) Group One (controls) Baseline—Supine 144±6/90±2 Upright 147±6/93±2 6 mos—Supine 145±7/92±3 Upright 145±3/93±2 Group Two (treatment) Baseline—Supine 141±3/90±3 Upright 132±3/82±2 6 mos—Supine 146±2/95±2 Upright 131±4/85±2 Found lowered mean (by 12mmHg) BP for treatment group over controls. Changes in dopamine beta-hydroxylase activity in blood plasma elevated; showed decrease among treatment group which correlated with BP reduction. Also reduction in furosemide-stimulated renin activity (PRA) uncorrelated with BP changes. No significant changes in blood volume.	6 months	Effect of possible dietary salt restriction, assessed by measuring urinary sodium excretion, controls nonrandomized with small N, reduction in adrenergic activity (DPH) may be statistically significant but not a physiologically important alteration.		

Table 4. Additional Findings: Normal Subjects

Investigator(s)	Focus of Investigation	S's (N, age, sex, prior experience)	INDEPENDENT VARIABLE		Frequency of Therapist (E) Contact	DEPENDENT VARIABLE		Follow-up	Type of Design, Quality of Controls, Methodological Problems
			Type and Length of Treatment/Training	Subjective Effects (unless otherwise noted)					
Seeman, Nidich and Banta 1972	"Self Actualization"	Group One control N=20, 10 male, 10 female Group Two meditation N=15, 8 male, 7 female. Prior experience not stated	Standard Transcendental Meditation training, 30-60 min. initial instruction 3 days, verification + further instruction, then S's instructed to meditate 2x daily for 15-20 min	Not stated	Shostrom's Personal Orientation Inventory, 1966 (POI) tested 2 days prior to and 2 months post TM instruction showed meditators moved in positive "self actualizing" direction compared to controls.	None reported	Group selection and/or matching procedures not stated. Need behavioral measures of such items as spontaneity, capacity for intimate contact, tolerance for verbal aggression, willingness to self disclose.		
Nidich, Seeman and Dreskun 1973	"Self Actualization"	Group One N=9 non-meditating controls Group Two N=9 meditation	Same as above	Not stated	Shostrom's POI measured pre and post (10 weeks) TM instruction showed meditators moved in direction of "self actualization." Controls showed no significant differences in testing.	None reported	Same as above		
Stek and Bass 1973	Tested differences between those interested and not interested in meditation in "perceived locus of control" and "personal adjustment"	Group One N=17, median age 20 yrs., 12 male, 5 female, attended free meditation lectures, paid TM initiation fee Group Two N=32, median age 18 yrs., 14 M, 20 F, attended 1 TM lecture Group Three N=27, median age 19 yrs., 12 M, 15 F, uninterested in meditation Group Four N=30, median age 19 yrs., 18 M, 12 F, controls	Tests given pre-meditation training	Not stated	Administration of Rotter's IE Locus of Control Scale (1966) and Shostrom's POI (time competence + internal support) found no significant difference between test scores for all 4 groups and common scores for college students	None reported	Study might indicate that initial group differences between meditators and non-meditators are insignificant, however, group differences may exist in willingness to change, etc.		
Hjelle 1974	"Anxiety," "Locus of control" and "Self Actualization"	Group One N=15, 7 M, 8 F, meditating experience = 22.63 mo. Group Two N=21, 11 M, 10 F, tested 1 week prior to receiving meditation instruction	Standard TM training	Not stated	Regular meditators (group one) scored significantly lower than beginners on Bendig's Anxiety Scale (1956) and Rotter's Internal-External Locus of Control Scale (1966) and significantly higher on 7 of 12 POI scales (Shostrom, 1966)	None reported	Possible demand characteristics in testing; study supports Seeman, Nidich & Banta.		
Otis 1974	Self concept change, improvement in physical and/or behavioral problems	Group One (N=10) Transcendental Meditation Group Two (N=15) Passive Controls, took pre and post tests Group Three Active Controls, A sitting quietly 15-20 min/2x daily, B "meditative" treatment, repeating "I am a witness only" 15-20 min/2x daily	Group One standard TM training for 3 months. All S's baseline physiological measurements for 3 months	Not stated	Psychological tests: Questionnaire on self-concept (Otis Descriptive Personality List) and checklist on variety of behavioral and physical problems (Otis Physical and Behavioral Inventory) found no overall differences between TM and pooled control S's. However, item analysis revealed TM S's claimed more specific benefits than passive controls. Interview conducted 3 months post-training indicated that specific benefit claims of active controls and TM S's did not differ. Author suggests that simply resting may account for benefits.	To 18 months	Treatment conditions not matched for expectation of relief		
Udupa et al. 1973	Performance, Intelligence, and Memory Quotients; Neuroticism, Mental Fatigue, and Psychological Health assessed. Plasma Acetylcholine and Serum Cholinesterase monitored	N=12, avg. age 23.0 ± 3.36 yrs., from a uniform socioeconomic class	Hatha Yoga exercises (done in group) for 1 hour daily x 6 months. Exercises involved graduated sequence of muscle coordination exercises, postures (āsana), breathing (prāṇāyāma) meditation, etc.	One hour daily x 6 months with trained Yoga instructor	Table I. Certain Psychological Changes Induced by the Practice of Yoga	None reported	Within subject design, S's served as own controls.		

Table I. Certain Psychological Changes Induced by the Practice of Yoga

Observations	Test Used	Initial (baseline)	3rd month	6th month	Direction
Performance quotient (PQ)	Alexander's Passalong Test	93.15±12.50	102.6±16.40	108.2±14.70	Increased significantly
Intelligence quotient (IQ)	Koh's Block Design Test	92.17±18.60	100.3±6.40	106.2±16.70	Increased significantly
Memory quotient (MQ)	Wechsler Memory Scale	89.75±9.15	97.3±13.20	100.8±9.60	Increased significantly
Neuroticism index (MPI)	Murley Personality Inven.	19.50±9.95	11.40±10.70	9.82±8.40	Decreased
N		27.10±5.60	28.40±6.80	26.54±8.40	
E		2.66±5.53	1.00±2.19	2.58±5.57	
Q					
Mental fatigability	Digit Cancellation Test	3.52±0.68	3.31±0.90	3.03±0.41	Lowered
Time taken		5.54±4.69	1.31±1.73	3.64±3.30	
Mistake score		1.59	0.40	1.20	
Fatigue index					
Health Index	Cornell Medical Index				
Physiological complaints		125	83	64	Lowered
Psychological complaints		67	31	30	

Note: Significant values in decreased complaints on Cornell Medical Index include gastrointestinal, psychoneurological, and respiratory complaints (physiological), and anxiety, tension, and inadequacy complaints (psychological).

Investigator(s)	Focus of Investigation	S's (N, age, sex, prior experience)	INDEPENDENT VARIABLE		Frequency of Therapist (E) Contact	DEPENDENT VARIABLE		Follow-up	Type of Design, Quality of Controls, Methodological Problems
			Type and Length of Treatment/Training	Subjective Effects (unless otherwise noted)					
Shapiro 1978a	Daily covert behavior and "Global" self perception	N=15, college students in class on "Zen Buddhism and Self Management", no prior meditation experience	Experimental Group (N=9) 1) 2 weeks behavioral observation on 9 variables 2) weekend Zen experience workshop 3) formal Zen breath meditation practiced 2x daily plus contingent informal breath meditation and continued behavioral observation for 3 weeks Control Group (N=6) 1) 5 weeks behavioral observation 2) weekend Zen experience workshop	During intervention phase (weeks 3-5) experimenter had no contact with either group	Data from pre and post testing on Semantic Differential, Rotter's I-E Locus of Control showed no significant group differences but moved in hypothesized (positive) direction. Stanford Hypnotic Susceptibility Scale (form C, Group Variant) showed increase in susceptibility for experimental group and decrease for controls.	None reported	Modified multiple time series design (cf. Campbell & Stanley, 1963, pp. 55-57). Positive direction looked at daily change as well as global pre/post. Weakness: need overt covarying variables with daily self-reported change of feelings.		
Lesh 1970	Counselors measured on empathic ability and openness to experience	All S's were college students taking counseling courses Group One N=16, taught Zen breath meditation. Group Two N=12, controls Group Three N=11, group "definitely against" meditation exercise.	Group One: Zen breath meditation practiced 30 min./day x 4 weeks	Meditation Instructions given by tape to avoid bias	Pre and Post Treatment Measures 1) Increased empathy among meditating group on Affective Sensitivity Scale (ASS) responses to videotaped client situation. Both control groups did not show improvement in empathic ability. 2) No correlation found between ASS and blind ratings of subjective response to meditation (Maupin, 1965). 3) Positive correlation found between openness to experience (Experience Inquiry, Fitzgerald, 1966) and response to meditation. 4) Positive correlation between individual scores on openness to experience and ASS 5) Correlation found between high scores on ASS and "self-actualization" measure (Shostrom's POI).	None reported	Between subjects design, possible selection bias.		
Leung 1973	Counselors measured on empathic ability and ability to respond selectively to clients (e.g., hearing of "notice authority" statements)	N=57, avg. age 22.75 yrs., 22 male, 45 female, prior experience not stated Group E-1: Deep breathing training first + external concentration training Group E-2: External concentration training first + deep breathing training (E-1 + E-2 N=37) Group 3: N=20, controls; given no training	Training for groups 1 + 2: 7 hrs training in meditative deep breathing. 7 hrs training in external concentration on a specific verbal stimuli on tape. Social verbal reinforcement given S's for correct performance of exercises.	Not stated	Criterion Measures: Group E-1 - Measured S's predictive analytical empathy in response to videotaped sequences of acted client situations (40 min. total). Analytic empathy measurement taken after 10 minute portions of videotape. Group E-2 - Indicated to E number of "notice authority" statements made by actor "clients" in videotape. In second part of training the criterion measures were reversed. Both (E) groups showed more accurate analytic empathy and heard more notice authority statements by clients than controls. E-1 showed more predictive ability on self-other attitude scale and heard more notice authority statements than E-2.	None reported	Post-test only control group design.		

C1. Attentional/Perceptual Issues

There is an old Zen saying that if one wants to understand the true meaning of Zen, one needs only to follow the prescription of the following three words: *attention, attention, attention*. There are two well-designed studies in this section which relate to the issues of attention and perception. The first article by Pelletier (19) is a clear, well-designed study that shows that over a course of 3 months, meditators become more field-independent than a control group which just sits. The correlations and interpretations between this increased perceptual sensitivity and personality style is still open to much interpretation and debate. However, there can be little debate that, in fact, there is an increased perceptual acuity following meditation. The second study by Davidson, Goleman, and Schwartz (20), uses the Tellegan absorption scale and shows that attentional absorption increases in direct proportion to the length of meditative practicing experience.

For discussion of the importance of the issue of attention and a summary of recent findings, see Article 6 by Shapiro and Giber. The accompanying table summarizes other related studies on perception and attention.

The third article in this section, by Brown and Engler (21), is a Rorschach study of the stages of mindfulness meditation—a quite innovative and creative study. Rorschach protocols were given to individuals who were rated as either a beginners' group, a samadhi group, an advanced insight group, and a masters' group. Individuals in this study were meditators who had attended a 3-month meditation retreat, an advanced study of meditation, or a South Asian study. Although only a preliminary study, it illustrates the importance of utilizing experienced long-term meditators. As such, it provides a counterpoint to many of the articles in this collection, whose data is based upon individuals who have engaged in comparatively short practice of meditation.

Table 5. Studies on Attention and Perception

Investigator(s)	Clinical Problem	S's (N, age, sex, prior experience)	INDEPENDENT VARIABLE		Frequency of Therapist (E) Contact	Subjective Effects	DEPENDENT VARIABLE		Type of Design, Quality of Controls, Methodological Problems
			Type and Length of Treatment/Training				Behavioral, Physiological, Overt, Concurrent Data		
Van Nuys 1973	Meditation, attention and hypnotic susceptibility	N=47, males, prior experience not reported	Task: Concentration on doorstep and flame, breath meditation Session One: Individual tests of 15 min. focused attention on each object Session Two: Same	Not reported	Tests given post-task Session One: Embedded Figures Test Session Two: Stroop Color Word Test, A's Experience Inquiry, Harvard Scale of Hypnotic Susceptibility, Field Depth of Hypnosis Test. Found correlation between 2 measures of hypnotic susceptibility and number of intrusions reported during meditation	Behavioral Self-report of intrusions of thought during attention task	None reported	Within subject, S's served as own controls	
Pelletier 1974	Autokinetic perception ("perceptual style")	N=40, avg. age 24.7 yrs., 20 male, 20 female Group One: Meditators, volunteers from intro. TM meeting Group Two: Sitting controls	Group One: Standard TM instruction, 3 mos. practice Group Two: Instructed to sit quietly 20 min. each morning (x 3 mos.)	Not reported	Pre and post tests of autokinetic effect shifted towards field indep. On Rod and Frame Test (Cancro & Voch, Wikun et al.) meditators showed increased accuracy. On Embedded Figures Test (Gardner et al.) meditators showed shorter latency time	None reported	None reported	Half of S's in each group not pre-tested to control for possible interaction effects of perceptual measures and meditation	
Shaw and Kolb 1977	Simple reaction time	Group One: N=9, meditators, one mo. or more experience Group Two: N=9, non-meditators	1) Learning trials 2) 100 trials with reaction device 3) Rest or meditation (20 min.) 4) 100 more trials	Not reported	Report states "Meditators brighter in mood and more responsive in conversation after meditating"	Behavioral Meditators had shorter reaction than non-meditators in first test. After resting, meditators improved, non-meditators were slower in reacting	None reported	Test of statistical significance not reported. Matching of groups not reported	
Brown, Stuart & Blodgett 1974	1) 2 point threshold determination of skin sensitivity 2) visual brightness discrimination 3) simple reaction time 4) complex reaction time	Group One: N=11, 18-22 yrs., female meditators with experience from "few weeks" to few mos. Group Two: N=11, 18-22 yrs., female non-meditating controls	1) Pre-state performance measurement 2) Pre-state resting (eyes open) 3 min. 3) Group One: Transcendental Meditation (15 min.) Group Two: resting, eyes closed (15 min.) 4) Post-state resting (eyes open) Note: meditators took 3 min. avg. to open eyes 5) Post-state performance measures	Not reported	Not reported	Behavioral Tests given pre and post meditation or sitting for 3 meditators meeting physiological criteria: performance improved on all measures. One control also met meditative criteria. Performance of all controls worsened. Physiological Note: heart and respiratory rates, presence of frontal EEG alpha and kappa rhythms used to define "meditation state" -only 3 S's met this criteria	None reported	Small N, short meditation time used (15 min.), and only 1 trial reported. Experimenter anecdotes suggest meditators may have been sleeping.	
Graham 1975	Frequency and amplitude discrimination of auditory threshold	Study Group: N=8, experience with TM not reported	Condition One: 20 minutes meditation Condition Two: 20 minutes rest with 3 to 10 days interval between conditions	Not reported	Not reported	Behavioral Pre and post tests showed greater percentage improvement after meditating (+25.4%) than after reading (-3.2%) in auditory discrimination and +37.0% and -15.1% respectively for frequency discrimination. Meditators seem to evidence lower perceptual thresholds after practice.	None reported	S's divided into 2 groups, AB, BA design. Study does not report S's selection procedures.	
Pirot 1973	Perceptual auditory discrimination of tones	N=32, 8 in each cell, prior experience not stated	Stimuli: 40 pairs of tones, one 2,000 milliseconds and one 2,225 milliseconds in length (1,000 Hz, 30 dB). S's had to discriminate longest tone after TM or relaxation	Not reported	Not reported	Behavioral Meditators performed better post-meditation than relaxation, despite in which order they had meditated. Physiological CSR, EMG, finger pulse volume and EKG measures to be reported.	None reported	Four groups with all possible disorders of meditation and relaxation represented. Repeated measured and one-way between groups analysis performed.	
Davidson, Goleman, and Schwartz 1976	Differences in attentional absorption and trait anxiety	N=58, mean age 20.81 yrs., (S.D. 2.77), 36 male, 23 female	Meditation practice ranged from TM to Zen breath meditation Group One (N=11): Controls expressing interest in meditation. Group Two (N=14): Beginners: one month's meditation exp. or less. Group Three (N=18): Regular practice of meditation for 1-24 months. Group Four (N=15): Long-term meditators (greater than 24 month's exp.)	Tests given as "take home" among battery of other personality and attitude questionnaires.	S's rested on Shor Personal Experience Questionnaire (PEQ), Tellegen Absorption Scale (TAS), and Spielberger State-Trait Anxiety Inventory (STAI). Reliable increment in PEQ and TAS (e.g., increase in capacity to attend) and reliable decrement in STAI (trait anxiety) observed across groups from controls through long-term meditators.	None reported	Cross-sectional design		