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Stress Reduction through Mindfulness Meditation

Effects on Psychological Symptomatology, Sense of Control, and Spiritual Experiences

Key Words
Mindfulness meditation
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Depression
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Somatization

Abstract

Background: This study examined the effects of an 8-week stress reduction program based on training in mindfulness meditation. Previous research efforts suggesting this program may be beneficial in terms of reducing stress-related symptomatology and helping patients cope with chronic pain have been limited by a lack of adequate comparison control groups. **Methods:** Twenty-eight individuals who volunteered to participate in the present study were randomized into either an experimental group or a nonintervention control group. **Results:** Following participation, experimental subjects, when compared with controls, evidenced significantly greater changes in terms of: (1) reductions in overall psychological symptomatology; (2) increases in overall domain-specific *sense* of control and utilization of an accepting or yielding *mode* of control in their lives, and (3) higher scores on a measure of spiritual experiences. **Conclusions:** The techniques of mindfulness meditation, with their emphasis on developing detached observation and awareness of the contents of consciousness, may represent a powerful cognitive behavioral coping strategy for transforming the ways in which we respond to life events. They may also have potential for relapse prevention in affective disorders.

Introduction

It has been estimated that 50% of all medical patients seen in general practice are suffering from stress-related problems [1]. The Public Health Service's 1979 report entitled 'Healthy People' [2] similarly concluded that excessive stress was a serious public health concern for Americans. Research suggests that stress may exacerbate or be a significant etiological factor in hypertension [3, 4], heart disease [5], alcohol/drug abuse [6, 7], anxiety [8], depression [9], and gastrointestinal disorders [10]. These conditions may be symptomatic of excessive psychophysiological stress or represent maladaptive attempts to cope with the challenges and stresses of life [11].

Correspondingly, when one considers the tremendous cost of treating these conditions (e.g., with anxiolytics, antidepressants, drug and alcohol rehabilitation programs, psychotherapy, over-the-counter products for gas-

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trointestinal disturbances, antihypertensive medications), stress reduction/management techniques emerge not only as potentially important preventive medicine tools but also as invaluable aids in reducing our nation's enormous health care bill. It has been estimated, for example, that in the United States stress-related disorders account for as much as US$ 17 billion a year in lost productivity at the workplace [12].

The potential health and economic benefits of stress reduction programs are in fact now being realized by several large insurance companies that have begun offering reimbursement for two notable programs, Dr. Deane Ornish's [13] 'Program for Reversing Heart Disease' and 'The Stress Reduction and Relaxation Program' developed by Jon Kabat-Zinn [14] at the University of Massachusetts [15, 16]. It is important that further clinical research be conducted in order to test the relative effectiveness of these and other stress reduction programs. The degree to which such programs are perceived as effective and legitimate health care strategies in the eyes of practitioners, insurers and the general public will depend, in part, on whether with well-controlled outcome studies these initially promising findings concerning their efficacy can be replicated.

The present study represents such an attempt. It was designed to further test the potential health benefits of an 8-week program in stress management modeled very closely after Kabat-Zinn's [14] Stress Reduction and Relaxation Program (SRRP). Despite the serious methodological limitations of using self-selected samples and not having adequate comparison or control groups, previous findings suggest this 8-week intervention may be effective both in terms of reducing overall psychological symptomatology, and helping individuals suffering from various forms of chronic pain to cope more effectively with its disabling psychological and physical effects [14, 17, 19]. Research by Kabat-Zinn et al. [18] also suggests that this program may be clinically useful for patients suffering from anxiety disorders with the majority of patients still maintaining positive changes at a 3-year follow-up.

Kutz et al. [20] also examined the effects of a stress reduction program modeled specifically after Kabat-Zinn's as an adjunct to psychotherapy. Their study explored the clinical usefulness of training in mindfulness meditation techniques in 20 patients undergoing long-term psychotherapy (presenting problems ranging from severe personality disorders to anxiety and obsessive neuroses, with psychotic patients being excluded). Significant decreases in psychological symptomatology were observed both after intervention and at 6-month follow-up. The reductions in SCL-90-R scores were similar to those observed in a recent study examining the effects of short-term psychotherapy (lasting approximately 40 weeks) for personality disorders [21].

The changes in symptomatology scores observed by Kutz et al. [20] were also consistent with therapists' clinical ratings, both after intervention and at follow-up. They rated a majority of these subjects as showing moderate to great improvement in a number of areas including overall intensity of current problems, overall psychic distress, anxiety, depression, self-assertion and insight. However, as with the previously cited research examining the clinical usefulness of this meditation-based stress program [14, 17, 19], there were serious methodological limitations, principally the absence of any type of comparison group. As a result, it is unclear whether the observed changes in symptomatology were the result of subjects' involvement in the meditation intervention, their participation in individual psychotherapy, or some combination of or interaction between the two.

In terms of reductions in symptomatology as measured by the SCL-90-R, Kabat-Zinn [14] observed mean decreases in General Severity Index (GSI) scores of 34–38%. These findings are comparable to other research on both meditation and a variety of biobehavioral techniques [22–26]. However, despite the encouraging findings on the SRRP cited above, both Kabat-Zinn et al. [17] and Kutz et al. [20] point out that further research is needed to test the effectiveness of this meditation-based intervention using better controlled, experimental designs. In an effort to control for the confounding factors of history, maturation, and testing outlined by Campbell and Stanley [27], the present study used an experimental design in which subjects were randomized into either the 8-week stress program or a nonintervention, waiting-list control group. The present study also attempted to test whether the previously reported positive changes resulting from this program might also be obtained from a nonclinical population.

Along with testing, in a more controlled setting, the effectiveness of this intervention in reducing psychological symptomatology, the present study also examined this program's impact on subjects' sense of control using the Shapiro Control Inventory (SCI) [28] as well as spiritual experiences using the Index of Core Spiritual Experiences (INSPIRIT) [29].

Sense of Control

Research suggests that having a sense of control over one's cognitive, affective and behavioral experiences is

associated with greater mental health, and that a common goal of most psychotherapies is to enhance patients' feelings of control [30, 31]. Although a large body of research suggests the relationship between control and both physical and mental health is a linear one (i.e., greater perceived or actual control leads to healthier outcomes), findings from a number of studies suggest that seeking and having control can impact health *negatively* [32, 33, 53].

Because of its hypothesized links to a number of health outcomes, the present study examines the impact of the stress reduction program on subjects' sense of control (in both general and specific domains) using a multidimensional measure of control developed by Shapiro [28]. This measure also assesses Desire (or motivation) for control, Agency (or source) of control, and Mode of control. Alpha reliability coefficents for the nine subscales of the SCI range from 0.70 to 0.89 while its test-retest reliability ranges from 0.67 to 0.93 [28].

Figure 1 depicts the four modes or customary ways of exercising control assessed by the SCI. In an effort to address the possible negative consequences of seeking and gaining control discussed above, the SCI also includes two subscales that assess negative modes of exercising or gaining control. This model also attempts to go beyond previous operationalizations of control which have focused primarily on active, instrumental efforts to gain control by including an accepting or positive yielding mode of control. Shapiro [28] has suggested that psychological health is reflected in both higher scores on as well as a *balance* between positive assertive and positive yielding/accepting modes of control (quadrants I and II in fig. 1). and lower scores on negative assertive and negative yielding modes (quadrants III and IV).

Inclusion of the SCI as a dependent measure in the present study comes out of previous research [34, 35] suggesting that meditation practice may increase positive yielding control scores and that participation in a stress reduction program aimed at reducing type-A behavior can improve subjects' overall sense of control as well as scores on both positive assertive and positive yielding modes of control [36].

Spirituality

Several recent studies have emerged suggesting that spiritual factors may be significant, both in terms of predicting various health outcomes [37, 38], and as important though frequently overlooked components of general health and well-being [29, 39]. In terms of the latter, a recent review of the health promotion literature singled out the Kabat-Zinn stress reduction program as one of

Quadrant I Positive assertive Altering, change mode of control	Quadrant II Positive yielding Accepting, yielding mode of control
Quadrant III Negative assertive Overcontrol	Quadrant IV Negative yielding Too little control

Fig. 1. SCI – modes of control.

three model interventions which seemed, along with fostering greater psychophysical well-being, to promote *spiritual* health and well-being as well. In their article, Hawks et al. [39] defined spiritual health as:

> A high level of faith, hope and commitment in relation to a well-defined world-view or belief system that provides a sense of meaning and purpose to existence in general, and that offers an ethical path to personal fulfillment which includes connectedness with self, others, and a higher power or larger reality [p. 373].

In order to better study spirituality, these researchers note the importance of developing more precise methods for measuring the various subcomponents of this construct. One such effort can be seen in the work of Kass et al. [29], who, in an attempt to quantify aspects of spirituality or spiritual experiences, developed a 7-item scale termed the INSPIRIT. The INSPIRIT appears to have high internal reliability [29, reporting an alpha coefficient of 0.90]. Preliminary tests of this measure have also shown it to be positively correlated with decreased frequency of medical symptoms [29]. The inclusion of the INSPIRIT in the present study represents a further attempt to examine the relationship of the variable spirituality to health and well-being.

Overview of the Stress Reduction Program

The SRRP developed by Kabat-Zinn [14] is centered around the principles of mindfulness meditation (for a more complete description of the program see Method). Mindfulness meditation has its roots in the tradition of Theravada Buddhism (it is also referred to in the literature as satipatana vipassana or insight meditation). Although it presupposes concentrated awareness, it differs

in part from the well-known forms of concentrative meditation such as TM and its derivatives [40, 41] in that, rather than restricting attention to one single object or focal device, it emphasizes the detached observation or witnessing of perceptions, sensations, cognitions, and emotions as they arise moment to moment in the field of awareness. In mindfulness practice, no event (e.g., the wandering of the mind) is considered a distraction; rather, it is simply another object to be observed or witnessed. The emphasis is placed on attending to any and all thoughts and sensations in the field of consciousness without judgment or interpretation, or to simply notice when these have occurred.

One of the central purposes of these meditation practices, both in their original religious/spiritual context and their more modern applications in behavioral medicine, is 'to become a detached observer of one's own mental activity, so that one thereby may identify its habits and distortions' [20]. As contrasted with many cognitive-behavioral techniques, meditation involves the regulation of *attention* rather than (control of) belief or other cognitive processes [42].

Mindfulness meditation, both as it is traditionally taught [43] and as it is learned in Kabat-Zinn's stress program, contains elements of both concentrative meditation (e.g., stabilizing attention on a specific object such as the breath) and nonfocal or opening-up meditation [44]. Emphasis is also placed on cultivating this mindful awareness more informally, making *conscious attention* to one's internal and external environment as much a way of life as a formal technique practiced once or twice daily.

Hypotheses to Be Tested

Based on the research findings cited above, participation in the present study's stress reduction program is hypothesized: (1) to reduce overall psychological symptomatology as measured by the GSI of the Symptom Checklist 90-Revised (SCL-90-R). Reductions will be observed on the SCL-90 scales which reflect somatic (e.g., Somatization scale) as well as psychological (e.g., Anxiety and Depression scales) components; (2) to affect individuals' mode of control positively (customary ways of exercising control in their lives), as evidenced by higher scores on positive assertive and positive yielding modes on the SCI and/or lower scores in negative assertive, negative yielding following the intervention; (3) to affect positively individuals' overall sense of control in both the general and specific domains on the SCI, and (4) to contribute to an increase in spiritual experiences/feelings as measured by the INSPIRIT.

Method

Twenty-eight undergraduate students in an upper-division Behavioral Medicine class volunteered to participate in this study. Following the administration of a series of preintervention measures (see below), 14 of these students were randomly selected for the intervention group with the remaining 14 serving as nonintervention controls. These control subjects were told that they would be administered a second set of measures in 8 weeks and also that they would be notified of the next available stress reduction program being offered. There was no other contact between the researcher and the control subjects following the period of initial testing and prior to administering the postintervention measures. Of the 14 individuals who received the intervention, 12 completed the entire 8-week program and were administered the set of postintervention measures. There were 11 females and 1 male. Seven of the 14 individuals serving as nonintervention controls responded to our request to take the series of postintervention measures. There were no males among the controls.

Measures

The following measures served as the principal quantitative dependent variables in the study:

(1) Hopkins SC-90-R [45]: A 90-item instrument consisting of the following 9 subscales: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, and an additional-items scale comprised of 7 questions, 5 of which relate to disturbances in sleeping and eating. The SCL-90-R provides one with a measure of overall psychological distress, calculated as the GSI.

(2) SCI [28]: This 187-item instrument provides information in four major areas: (a) one's perceptions of or *sense* of control, both in the general domain and in seven specific domains (body, mind, relationships, self, career, environment, and 'other' – consisting of items on alcohol, drugs, gambling, smoking, violence, and time management); (b) one's *mode* of control, describing individuals' characteristic cognitive/behavioral style of responding to control-related issues along four different quadrants: positive assertive, positive yielding, negative assertive, negative yielding; (c) *motivation* for control which includes information on one's desire for control, and over-control issues, and (d) information on one's *agency* of control which identifies the sources of one's sense of control (e.g., internal and/or external). As part of the motivation for control scale, the SCI also assesses the degree to which people are satisfied with or concerned about their control in the seven specific domains (body, mind, relationships, career, self, environment, and other). If a parameter is of concern they are asked whether they would like to use active change to alter the area or gain greater acceptance of what is.

(3) INSPIRIT [29], a 7-item scale designed to assess two characteristic elements of core spiritual experiences: (1) a distinct event and a cognitive appraisal of that event which resulted in a personal conviction of God's existence (or of some form of Higher Power as defined by the person) and (2) the perception of a highly internalized relationship between God and the person (i.e., God dwells within and a corresponding feeling of closeness to God) [29]. Scores calculated for this measure can range from 1 to 4 (with higher scores reflecting a greater number of spiritual experiences).

In addition to the above measures, participants in the intervention were asked to complete daily compliance diaries where they recorded which stress reduction techniques were practiced and for

how long. Immediately following the 8-week program, participants were also asked to respond to the following question: On a scale of 1–10, rate how true this sentence is for you: 'I feel I received something of lasting value and importance from this stress reduction program.' They were then asked to comment specifically on what they felt they received as a result of their participation. They were also asked to rate the relative effectiveness of the intervention's different components.

Structure of the Stress Reduction Program

Participants attended weekly 2-hour meetings held at the University of California, Irvine. These sessions were facilitated by this researcher, who has extensive training and experience in the areas of meditation and stress management. All questionnaires were administered and scored by the researcher as well. During these group meetings participants received training in the following meditative practices [adapted from 14]: (1) body scan, a gradual sweeping or movement of attention through the body from feet to head, focusing on proprioception, with periodic suggestions of breath awareness and relaxation, practiced in the supine position; (2) sitting meditation involving mindfulness of breath and other perceptions, practiced primarily in the sitting position on a cushion or chair (see instructions below); and (3) Hatha Yoga which involved simple stretches and postures designed to strengthen and relax the musculoskeletal system and develop mindfulness (greater awareness) during movement.

In learning meditation, subjects are instructed to first bring their attention to the primary object of observation (e.g., the breath, sound, thoughts, bodily sensations) and simply be aware of it from moment to moment. Whenever the attention wanders or drifts into thoughts, memory, fantasy, etc., they are told to notice simply, without evaluation or judgment, that it has wandered and to return to the present moment observation of the primary object. In addition, when a strong feeling or emotion arises (e.g., a fear, anxiety, pain), they are instructed to direct their attention to the feeling as it occurs, simply being with it, observing it. When it subsides, they should return to the object of attention. They are asked to try and distinguish between observation of the experience itself and thoughts about or interpretations of the experience. Finally, they are instructed to observe the thinking process itself without becoming involved in the content of individual thoughts. They are asked to observe thoughts as impermanent mind events and not necessarily accurate, treating all thoughts as equal in value without pursuing or rejecting them.

The use of a variety of objects of attention in the meditation practices was designed to help subjects bring mindfulness or awareness to the varied experiences and circumstances (whether stressful or not) encountered in life.

The weekly group meetings also included didactic presentations and discussions on the psychology and physiology of the stress response and the practical application of these meditative techniques for coping with stress. At the meetings, participants also received cassette tapes containing further instructions on the stress reduction techniques and were asked to practice with them at home for 45 min per day, 5 days a week.

The 8-week program described above was facilitated by this researcher. Although modeled closely after the SRRP [14], the present program was slightly modified in two respects. First, participants were asked to practice 5 times per week as contrasted with 6 times in the SRRP. Second, participation in the Kabat-Zinn program includes one all-day (8-hour) retreat/group meeting devoted to practicing the stress reduction techniques. This all-day meeting was not included in the present study. It was felt that these two modifications to the program would be more appropriate for a nonclinical population in which motivation to practice might not be as great.

Statistical Analyses

Analysis of covariance (Ancova) was performed using as the dependent variable the difference between before and after scores (e.g., post-SCL-90-R total score minus pre-SCL-90-R score = change variable) and using the baseline level of that variable as a covariant (all Ancova results that follow similarly used baseline levels of the dependent variable as covariants). The stress reduction treatment served as the independent variable (coded as dummy variable of treatment or no treatment).

Results

To check on the efficacy of the random assignment process, intervention and control groups were compared by analysis of variance on their pretreatment GSI levels. Results showed no significant differences between the two groups on this measure, $F(2,16) = 0.39$, $p = 0.55$. The groups also did not differ significantly on 'before' levels of overall sense of control, INSPIRIT, or in terms of age.

SCL-90-R

Significant effects for the stress reduction intervention were observed on the GSI, $F(2,16) = 15.87$, $p < 0.002$ and on the following subscales (table 1): Depression, $F(2,16) = 12.34$, $p < 0.005$; Anxiety, $F(2,16) = 7.05$, $p < 0.02$; Obsessive-compulsive, $F(2,16) = 9.55$, $p < 0.01$; Somatization, $F(2,16) = 16.73$, $p < 0.005$; Interpersonal sensitivity, $F(2,16) = 7.94$, $p < 0.05$; Psychoticism, $F(2,16) = 9.27$, $p < 0.01$; and Paranoid ideation, $F(2,16) = 9.87$, $p < 0.01$.

The mean decrease in the GSI of 64% following participation in the stress reduction program is even larger than the changes observed in previous research on this program. Kabat-Zinn [14], for example, reported mean changes of 34–38% on this measure of psychological symptomatology (see Discussion).

Shapiro Control Inventory

Sense of Control. Ancova revealed that those who participated in the stress reduction program, compared to the controls, showed significantly greater change in overall sense of control in the specific domains, $F(2,16) = 7.29$, $p < 0.02$ (fig. 2). Among these experimental subjects, increases in the overall sense of control in the general domain, though in the expected direction, were not significant ($p < 0.20$).

Mode of Control. Ancova results indicated a positive effect of the treatment in quadrant II (Positive yielding or

Fig. 2. SCI scores pre- and postintervention.

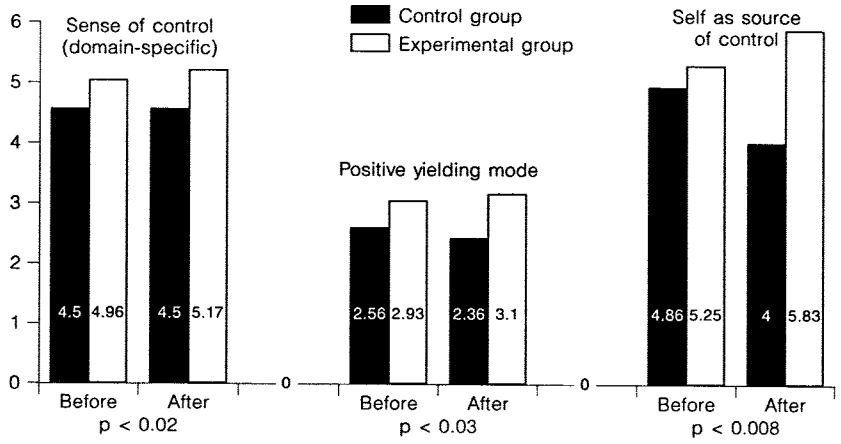

Table 1. Change in scores on SCL-90-R following treatment (12 experimental subjects, 7 control subjects)

SCL-90-R	Experimental group % reduction	Controls % reduction	F	p<
GSI	64	14	15.87	0.002
Depression	59	7	12.34	0.005
Anxiety	60	10	7.05	0.02
Obsessive-compulsive	59	23	9.55	0.01
Somatization	73	23	16.73	0.005
Interpersonal sensitivity	59	27	7.94	0.05
Psychoticism	76	39	9.27	0.01
Paranoid ideation	73	−1	9.87	0.01
Additional items[1]	73	2	32.20	0.0001
Hostility	32	32	1.70	0.22
Phobic anxiety	58	32	1.13	0.31

[1] Seven items dealing with poor appetite, overeating, sleep disturbances, and feelings of guilt.

accepting mode of control), $F(2,16) = 6.2$, $p < 0.03$. Although not statistically significant, differential changes in the other modes were also in the expected direction following the intervention – i.e., higher scores in quadrant I (positive assertive), lower scores on quadrants III and IV (negative assertive and negative yielding).

Agency of Control. Compared to controls, participants in the intervention evidenced a significantly greater increase on the measure of self as source of control, $F(2,16) = 9.30$, $p < 0.008$ (fig. 2). These individuals also tended to show an increase on the measure of other as source of control but this finding was not significant ($p = 0.18$).

Motivation for Control. Ancova revealed that the intervention group showed a greater increase in overall mode satisfaction, $F(2,16) = 7.30$, $p < 0.02$ (this is a measure of the degree to which individuals would prefer to stay the same or change in terms of the different words/phrases – e.g., assertive, trusting – reflecting the four modes of control). Ancova also indicated a significantly greater increase in acceptance as the preferred response mode for those who received the stress reduction intervention, $F(2,16) = 5.02$, $p < 0.04$.

Index of Core Spiritual Experiences

Ancova revealed a significant increase for those individuals participating in the stress program, $F(2,16) = 6.6$, $p < 0.03$, with mean scores from before and after increasing from 2.78 to 2.94. However, in contrast with previous

findings discussed earlier [29], in the present study sample, higher scores on the INSPIRIT did not correlate significantly with decreased symptomatology as measured by the SCL-90-R.

Compliance

Results from participants' compliance diaries indicated that on average, subjects practiced the stress reduction techniques 30 min per day, 3.5 days a week, over the course of the 8-week program (they were instructed to practice for 40–45 min, 5 days a week). The amount of practice and the degree of change in SCL-90-R scores on the GSI were found to be unrelated.

Evaluation of the Stress Program by Participants

Participants' mean ratings of the relative importance of each component of the stress program were as follows (1 = greatest importance): *awareness of breath in daily life* (1.1), *facilitator* (2.4), *yoga* (2.9), *sitting meditation* (2.9), *group support/feedback* (3.0), and *body scan* (3.7). In an effort to test whether the positive effects of the intervention were simply the product of attention from the facilitator or the group, correlations were obtained which revealed no significant relationship between how individuals ranked the relative importance of the group and the facilitator and the degree to which their scores on the SCL-90-R improved.

In response to the question, 'On a scale of 1–10, rate how true this sentence is for you: I feel I received something of lasting value and importance from this stress reduction program', participants' mean rating was 9.3. The following is a sampling of open-ended feedback regarding their evaluation of the stress reduction program:

(I feel) less paralyzed by difficult emotions

Realized that I need to take a step back and enjoy what's going on in the moment and not get caught up in the rat race

I now have a sense of direction and am not afraid to pursue it despite the obstacles; I have more self-confidence and self-esteem. I am a happier individual ...

Nothing is as bad as it seems ... I am in control of my body's reactions to things ... Think before you act

I see the importance of breathing, stepping back and looking at stressful situations differently

Finally, several participants also reported some noticeable behavioral changes. One woman reported fewer tension headaches, another a reduction in low back pain and 2 reported sleeping better.

Follow-Up Analyses

Follow-up questionnaires were obtained from 5 of the 12 subjects in the intervention group (we were unable to obtain follow-up information on control subjects). The completed measures were received from 6 to 9 months following completion of the program. Follow-up GSI scores from the SCL-90-R were compared with both before and after levels of this measure. Paired t tests revealed that there was no significant difference between post-GSI scores (mean = 0.13) and follow-up scores (mean = 0.28) for these 5 subjects. However, the decrease from pre-GSI (mean = 0.50) to follow-up GSI levels for these 5 subjects was not significant ($p < 0.09$; one-tailed).

Discussion

Major findings of this study suggest that participation in this 8-week meditation-based stress reduction program was effective in terms of: (1) reducing overall psychological symptomatology, with significant improvements seen on the following subscales of the SCL-90-R: Depression, Anxiety, Obsessive-compulsive, Somatization, Interpersonal sensitivity, Psychoticism, and Paranoid ideation; (2) increasing participants' overall, domain-specific sense of control; (3) increasing the degree to which participants utilized a positive yielding or accepting mode of control as well as greater overall satisfaction with their modes of control; (4) contributing to positive changes in participants' sense of self as agency or source of control; (5) increasing scores on a measure of spiritual experiences. The results also suggest that this meditation-based stress reduction program is potentially quite effective in reducing levels of psychological distress in a nonclinical population.

These observed reductions in psychological symptomatology are consistent with the findings of other researchers who have been studying this stress reduction program [18–20]. Participants showed a mean before-after reduction of 64% in SCL-90-R GSI scores. These positive changes were further supported by participants' qualitative feedback that the program was of considerable value and usefulness to them in their personal lives.

Based on the work of Shapiro [28, 46], the observed increases in scores on the positive yielding mode of control suggest movement in the direction of greater psychological health following participation in the stress program. These findings are consistent with previous research that showed positive changes in individuals' control profile following participation in an intervention

aimed at reducing type-A behaviors [36] and in an intensive meditation retreat [34, 35]. These changes suggest that emphasis of mindfulness meditation on accepting and trusting one's present-moment cognitive, affective and bodily experiences (rather than trying to alter them) may have positive carryover effects in terms of how one relates to or copes with life experiences in general.

Shapiro's research, which suggests that a positive sense of control can serve as an indicator of psychological 'healthiness' was supported in this sample in that baseline levels of overall sense of control correlated negatively ($r = -0.63$; $p < 0.01$) with baseline levels of the SCL-90-R.

Changes in scores on the INSPIRIT, though statistically significant, are difficult to interpret given their relatively small size. However, the observed changes suggest the importance of incorporating into this type of research measures that assess the spiritual dimension of individuals' experience. This seems especially important given both the significance of these issues in people's lives [39] and the research suggesting spiritual well-being may be an important predictor of psychophysical health [29, 38, 47]. It is interesting to note that two of the three programs which emerged in the Hawks et al. [39] review utilized, as a central component, meditation techniques which were not originally conceived of as stress reduction exercises but rather as contemplative practices specifically designed to *foster* spiritual growth and understanding.

The present study represents an attempt to test the stress reduction program's effectiveness controlling for testing, history and/or maturation effects [27]. Although the use of a randomized, nonintervention control group enabled us to control for these confounding factors, several rival hypotheses were not eliminated by the present study design, most notably the possibility of a placebo effect, which could explain the observed reductions in symptomatology (see further discussion on this point below).

Follow-up analyses suggest that, although the positive changes in symptomatology scores was maintained (for 5 of the 12 participants) 6–9 months following the program, there appeared to have been some slight regression (i.e., the change from before levels to follow-up was no longer significant). However, because of the poor response to our requests for follow-up data, substantive conclusions regarding any long-term effects of the stress program cannot be drawn at this time. One could speculate that the positive changes observed might have been better maintained had there been some follow-up meetings or refresher courses for study participants.

Limitations and Suggestions for Future Research

In this final section, a number of limitations in the present study as well as directions for future research are summarized. First, generalizability of the study's findings is limited by the relatively homogeneous nature of the sample in terms of gender (only 1 male in the study), age, and occupation (it is quite possible that as students in a Behavioral Medicine course, subjects receiving the program as well as waiting-list controls knew about both the typical design of a randomized controlled trial and the expected results). Although the sample was fairly heterogeneous in terms of ethnicity (58% Caucasian, 25% Hispanic, 16% Asian), the small numbers precluded any analysis of interactions between race and treatment effects.

Second, while the current study shows the positive effects of this type of intervention reported in earlier studies can be replicated with a different facilitator working with a different client population, the possibility remains that experimenter effects could account, in part, for the fairly dramatic reductions in symptomatology that were observed after intervention. This seems especially plausible given the close, personal contact between the experimenter, who also served as group facilitator, and the subjects.

Third, as discussed earlier, an often cited limitation of clinical designs such as that of the present study is the failure to control for the possibility of placebo effects adequately [48, 49]. However, it could be argued that attempts to control for these effects may be questionable since expectancy of relief may be a critical component in many if not most health-related interventions and therefore not something one necessarily wants to eliminate if s/he is interested in a study being ecologically or externally valid. In addition, unlike pharmacologically oriented interventions in which one can simply administer a sugar pill as the placebo treatment, in more psychologically oriented interventions as in the present study, it may be unrealistic (and potentially unethical) to think that one can give subjects the impression they are receiving something therapeutic when in fact they are not (i.e., there may not be a psychological or biobehavioral corollary to the sugar pill).

Fourth, it is important to assess the long-term benefits of participating in such a program and the effects of incorporating these stress reduction/relaxation strategies into one's life over a period of time. This is supported by research demonstrating that many individuals continue practicing these techniques and maintaining positive health benefits from them for up to 4 years following the intervention [18].

Fifth, although this was not within the scope of the present study, it would be important to direct future research efforts toward demonstrating whether or not programs such as the SRRP offer significant economic benefits. For example, as was discussed in the introduction, it would be important for longitudinal studies to be conducted that could assess the extent to which participants in these stress reduction programs become less likely to utilize traditional health care services.

Lastly, it is important that future research efforts address the possible explanatory mechanisms that may account for the positive effects of this program. Based on the work of Kabat-Zinn and others as well as the present researcher, the observed effectiveness of mindfulness meditation as a stress reduction technique or self-regulatory coping strategy might, in part, be explained by the following:

First, the essence of mindfulness meditation training is to simply attend to sensations, perceptions and cognitions as they arise moment to moment in the field of awareness. Through the practice of these techniques one begins: (1) to observe the ways in which awareness (the mind) typically becomes involved in or preoccupied with various memories, opinions, judgments, and desires, and (2) to recognize the effects this persistent, though oftentimes unconscious, internal dialogue has upon our lives and relationships, for example. According to the systems model of disregulation proposed by Schwartz [50] (which states that stress-related disorders may result when individuals disattend to critical cognitive/emotional or physiological feedback, resulting in a breakdown in communication between the organism's various subsystems), one might hypothesize that mindfulness meditation would serve to increase the amount of communication in the system thereby leading to greater psychophysiological regulation and balance.

Second, although not its specific goal or emphasis, a physiological state of hypoarousal often accompanies this and other forms of meditative practice. This attenuation of sympathetic arousal (elicitation of what Benson refers to as the relaxation response) [40] has been shown to be an effective treatment for a wide variety of stress-related disorders. In addition to the formal meditation techniques, participants in this 8-week program also receive training in specific relaxation exercises which may serve as an additional aid in countering the effects of excessive psychophysiological arousal. However, in the absence of any studies comparing the mindfulness-based stress reduction program with standard relaxation exercises (such as progressive muscle relaxation), the possibility exists that any observed effects from the mindfulness training were solely the result of its relaxation components.

Finally, based on the theory that it is our cognitive-emotional interpretation or appraisal of life events that gives rise to (or at least compounds) the stress we experience in life [51, 52], the techniques of mindfulness meditation, with their emphasis on developing *detached observation and awareness of the contents of consciousness,* may represent a powerful cognitive-behavioral coping strategy for transforming the ways in which we respond to life events since we must *first* become aware of the nature and existence of these maladaptive cognitive appraisals before we can effectively alter them. In this sense, these techniques may have potential for relapse prevention in affective disorders [53, 54].

References

1 Manuso J: Testimony to the president's commission on mental health. Report of the President's Commission on Mental Health, vol 2, Appendix. Washington, US Government Printing Office, 1978.

2 Department of Health, Education and Welfare: Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention. Public Health Service Publication No. 79-55071, 1979.

3 Shapiro D, Goldstein IB: Biobehavioral perspectives on hypertension. J Consult Clin Psychol 1982;50:841–858.

4 Fredrickson M, Matthews KA: Cardiovascular responses to behavioral stress and hypertension: A meta-analytic review. Ann Behav Med 1990;12:30–39.

5 Treiber FA, Davis H, Musante L, Raunikar RA, Strong WB, McCaffrey F, Meeks MC, Vandernoord R: Ethnicity, gender, family history of myocardial infarction, and hemodynamic responses to laboratory stressors in children. Health Psychol 1993;12:6–15.

6 Baer PE, Garmezy LB, McLaughlin RJ, Pokorny AD, Wernick MJ: Stress, coping, family conflict, and adolescent alcohol use. J Behav Med 1987;10:449–466.

7 Brennan PL, Moos RH: Life stressors, social resources, and late-life problem drinking. Psychol Aging 1990;5:491–501.

8 Jacobson E: You Must Relax. New York, McGraw-Hill, 1978.

9 McGonagle KA, Kessler RC: Chronic stress, acute stress, and depressive symptoms. Am J Community Psychol 1990;18:681–706.

10 Whitehead WE: Behavioral medicine approaches to gastrointestinal disorders. J Consult Clin Psychol 1992;60:605–612.

11 Everly GS Jr: The Clinical Guide to the Treatment of the Human Stress Response. New York, Plenum, 1989.

12 Taylor SE: Health Psychology. New York, McGraw-Hill, 1995.

13 Ornish D: Dr. Dean Ornish's Program for Reversing Heart Disease. New York, Random House, 1990.

14 Kabat-Zinn J: An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. Gen Hosp Psychiatry 1982;4:33–47.
15 Matsumoto N: The burgeoning art of healing with the head. Los Angeles Times, 1994, September, pp E1, 4.
16 Miller L: Mind over matter: Meditation goes mainstream. USA Today, 1994, July, pp 9A, 10A.
17 Kabat-Zinn J, Lipworth L, Burney R: The clinical use of mindfulness meditation for the self-regulation of chronic pain. J Behav Med 1985; 8:163–190.
18 Kabat-Zinn J, Massion AO, Kristeller J, Peterson LG, Fletcher KE, Pbert L, Lenderking WR, Santorelli S: Effectiveness of a meditation based stress reduction program in the treatment of anxiety disorders. Am J Psychiatry 1992;149:936–943.
19 Kabat-Zinn J, Lipworth L, Burney R, Sellers W: Four-year follow-up of a meditation-based progrm for the self-regulation of chronic pain: Treatment outcomes and compliance. Clin J Pain 1987;2:159–173.
20 Kutz I, Leserman J, Dorrington C, Morrison C, Borysenko JZ, Benson H: Meditation as an adjunct to psychotherapy. Psychother Psychosom 1985;43:209–218.
21 Winston A, Laikin M, Pollack J, Samstag LW, McCullough L, Muran JC: Short-term psychotherapy of personality disorders. Am J Psychiatry 1994;151:190–194.
22 Lehrer PM, Woolfolk RL, Rooney AJ, McCann B, Carrington P: Progressive relaxation and meditation: A study of psychophysiological and therapeutic differences between two techniques. Behav Res Ther 1983;21:651–662.
23 Carrington P: Freedom in Meditation. New York, Doubleday, 1977.
24 Andrews VH, Hall HR: The effects of relaxation/imagery training on recurrent aphthous stomatitis: A preliminary study. Psychosom Med 1990;52:526–535.
25 Kuile ter MM, Spinhoven P, Linssen ACG, Zitman FG, Van Dyck R, Rooijmans HGM: Autogenic training and cognitive self-hypnosis for the treatment of recurrent headaches in three different subject groups. Pain 1994;58:331–340.
26 Kaplan KH, Goldenberg DL, Galvin-Nadeau M: The impact of a meditation-based stress reduction program on fibromyalgia. Gen Hosp Psychiatry 1993;15:284–289.
27 Campbell DT, Stanley JC: Experimental and Quasi-Experimental Designs for Research. Boston, Houghton-Mifflin, 1963.
28 Shapiro DH: Manual for the Shapiro Control Inventory. Palo Alto, Behaviordyne, 1994.
29 Kass JD, Friedman R, Lesserman J, Zuttermeister PC, Benson H: Health outcomes and a new index of spiritual experience. J Sci Study Religion 1991;30:203–211.
30 Strupp HH: Specific versus non-specific factors in psychotherapy and the problem of control. Arch Gen Psychiatry 1970;23:393–401.
31 Frank JD: Therapeutic components shared by all psychotherapies; in Harvey JH, Parks MM (eds): Psychotherapy Research and Behavior Change. Washington, APA, 1982, Master Lecture Series, vol 1, pp 9–37.
32 Glass DC: Behavior Patterns, Stress, and Coronary Disease. Hillsdale, Erlbaum, 1977.
33 Shapiro DH, Lindberg J, Daniels JM, Breur AM, Astin JA: Assessing the relationship between a multidimensional psychological control profile and cardiovascular risk. Int J Psychosom 1994;41:11–16.
34 Easterline B: Measuring stress and control in mediators through trait, state, and in vivo experience sampling. Unpublished Doctoral Dissertation, California Institute of Integral Studies, 1992.
35 Shapiro DH: A mode of control and self-control profile for long-term mediators. Psychologia 1992;35:1–11.
36 Shapiro DH, Friedman M, Piaget G: Changes in mode of control and self-control for post myocardial infarction patients evidencing type A behavior: The effects of a cognitive-behavioral intervention and/or cardiac counseling. Int J Psychosom 1991;38:4–12.
37 Oxman TE, Freeman DH, Manheimer ED: Lack of social participation or religious strength and comfort as risk factors for death after cardiac surgery in the elderly. Psychosom Med 1995;57:5–15.
38 Levin JS: Religion and health: Is there an association, is it valid, and is it causal? Soc Sci Med 1994;38:1475–1482.
39 Hawks SR, Hull ML, Thalman RL, Richins PM: Review of spiritual health: Definition, role, and intervention strategies in health promotion. Am J Health Promot 1995;9:371–378.
40 Benson H: The Relaxation Response. New York, Morrow, 1975.
41 Carrington P, Collings GH, Benson H: The use of meditation-relaxation techniques for the management of stress in a working population. J Occup Med 1980;22:221–231.
42 Goleman DJ, Schwartz GE: Meditation as an intervention in stress reactivity. J Consult Clin Psychol 1976;44:456–466.
43 Nyanaponika T: The Heart of Buddhist Meditation. New York, Weiser, 1962.
44 Shapiro DH: Meditation: Self-Regulation Strategy and Altered State of Consciousness. New York, Aldine, 1980.
45 Derogatis L: The SCL-90-R: Administration, Scoring and Procedures Manual 1. Baltimore, Clinical Psychometric Research, 1977.
46 Shapiro DH, Potkin S, Jin Y, Brown B, Carreon D: Measuring the psychological construct of control: Discriminant, divergent, and incremental validity of the Shapiro Control Inventory and Rotter's and Wallston's Locus of Control Scales. Int J Psychosom 1993;40(1–4):35–46.
47 Kass JD, Friedman R, Lesserman J, Caudill M, Zuttermeister PC, Benson H: An inventory of positive psychological attitudes with potential relevance to health outcomes: Validation and preliminary testing. Behav Med 1991;17:121–129.
48 Lehrer PM, Woolfolk RL: Research on clinical issues in stress-management; in Lehrer PM, Woolfolk RL (eds): Principles and Practice of Stress-Management. New York, Guilford Press, 1993, pp 521–539.
49 Smith JC: Psychotherapeutic effects of transcendental meditation with controls for expectation of relief and daily sitting. J Consult Clin Psychol 1976;44:630–637.
50 Schwartz GE: Psychobiology of repression and health: A system approach; in Singer J (ed): Repression and Dissociation: Implications for Personality Theory, Psychopathology and Health. Chicago, University of Chicago Press, 1990, pp 337–387.
51 Beck AT: Cognitive Therapy and the Emotional Disorders. New York, International Universities Press, 1976.
52 Ellis A: Reason and Emotion in Psychotherapy. New York, Lyle Stuart, 1962.
53 Ryff CD, Singer B: Psychological well-being: Meaning, measurement, and implications for psychotherapy research. Psychother Psychosom 1996;65:14–23.
54 Fava GA: The concept of recovery in affective disorders. Psychother Psychosom 1996;65:2–13.