

Is Spirituality a Critical Ingredient of Meditation? Comparing the Effects of Spiritual Meditation, Secular Meditation, and Relaxation on Spiritual, Psychological, Cardiac, and Pain Outcomes

Amy B. Wachholtz^{1,2} and Kenneth I. Pargament¹

Accepted for publication: October 26, 2004

This study compared secular and spiritual forms of meditation to assess the benefits of a spiritual intervention. Participants were taught a meditation or relaxation technique to practice for 20 min a day for two weeks. After two weeks, participants returned to the lab, practiced their technique for 20 min, and placed their hand in a cold-water bath of 2°C for as long as they could endure it. The length of time that individuals kept their hand in the water bath was measured. Pain, anxiety, mood, and the spiritual health were assessed following the two-week intervention. Significant interactions occurred (time × group); the Spiritual Meditation group had greater decreases in anxiety and more positive mood, spiritual health, and spiritual experiences than the other two groups. They also tolerated pain almost twice as long as the other two groups.

KEY WORDS: meditation; pain; anxiety; depression; spirituality.

Stress causes a variety of physiological changes in the body, including increased cortisol levels, increased anaerobic cellular activity, increased heart rate and blood pressure (Rabin, 1999). Over time, these repeated actions produce permanent negative consequences on health. Acute reaction to stress has been shown to be a good predictor of future hypertension and mental health difficulties (Carroll *et al.*, 2001; Kasagi *et al.*, 1995; Weidner and Messina, 1998). Research indicates that meditation can suppress these stress reactions and, perhaps, even reverse some of the negative consequences caused by prolonged exposure to a stressor, such as chronic pain (Alexander *et al.*, 1991; Astin, 1997; Dillbeck and Orme-Johnson, 1987).

Previous research offers substantial evidence that one form of spiritual meditation, transcendental meditation (TM), can reduce heart rate, lower blood pressure, and improve mental health. Further, in a meta-analysis comparing various meditation and relaxation protocols, these effects were found more often after the use of TM than secular meditation techniques (Alexander *et al.*, 1991). While TM instructors state that TM is not a religious practice, they do suggest that it is the spiritual dimension of TM that leads to more positive results than those yielded by secularly focused relaxation techniques (Dillbeck and Orme-Johnson, 1987; Alexander *et al.*, 1994). Theoretically, the spiritual nature of TM shifts the mind away from physical and mundane concerns to a focus on the larger universe and the individual's place within it. While this study does not replicate TM techniques, given the limited research on non-TM forms of spiritual meditation, TM provides a model on which to base spiritual meditation research. As yet, few studies have directly compared the effects of (non-TM) spiritual and secular meditation

¹Bowling Green State University Bowling Green OH 43403.

²To whom correspondence should be addressed at Department of Psychology, Bowling Green State University, Bowling Green OH 43403; e-mail: amywach@bgsu.edu.

techniques. The question remains whether spiritual meditation has advantages over secular meditation.

BENEFITS AND HARM OF RELIGIOUS AND SPIRITUAL PRACTICES

Although a number of studies have shown positive correlations between religion, and health (Hixon *et al.*, 1998; Levin and Vanderpool, 1989; Moore, 1996; Pargament, 1997), mental stability (Koenig *et al.*, 2001; Payne *et al.*, 1992), and longevity (Koenig *et al.*, 2001), there have been few studies utilizing a treatment-outcome design to compare religious or spiritual interventions with their secular counterparts (Harris *et al.*, 1999). While religion and spirituality could prove to be a powerful source of strength and comfort to assist therapy clients in achieving their goals, without further research, it is impossible to state what role, if any, religious therapies play in improving treatment outcomes. McCullough (1999) emphasizes the point in his meta-analysis; he notes that research is lacking about the relative levels of treatment satisfaction, spiritual well-being/improvements, or relapse prevention in secular and religious forms of counseling.

In their 10-year literature review published in Worthington *et al.* (1996) found that the role of spirituality in therapy had not been adequately addressed in the research literature. The authors reported only two studies published since 1984 that utilized a religious meditation technique, and one of these was limited solely to the use of TM. Thus, only one study attempted to compare a religious devotional or meditative practice with a secular practice.

In Harris *et al.* (1999) reviewed the available literature on spiritual and religious interventions. The authors specifically identify two categories of religious or spiritual interventions. The first are those methods, theories, or models that added religious or spiritual content to secular approaches in order to improve clients' responsiveness. The second major area includes those interventions that implicitly or explicitly originated from a religious tradition. The authors state that spiritually based therapies and interventions offer modest improvements in the efficacy of health care. However, they call for more research and point specifically to the issues this study addresses. Future research, they suggest, "should focus in on comparing explicitly religious or spiritually oriented meditation interventions with more secularized versions. . ." (Harris *et al.*, 1999, p. 420).

RELIGIOUS MEDITATION AND HEALTH

Meditation has a long history of association with spiritual and religious practices. Cultures around the world integrate meditative practices into their religious and spiritual disciplines. Many of these forms of meditation use meditative phrases to focus the mind on spiritual concepts.

Spiritual meditation has been utilized to lower heart rate, blood pressure (O'Halloran *et al.*, 1985; Wenneberg *et al.*, 1997); metabolism (Elias *et al.*, 2000; Titlebaum, 1998); galvanic skin response, respiration rate and alter EEG readings (Dillbeck and Orme-Johnson, 1987); enhanced autonomic stability during stress (Alexander *et al.*, 1991); and altered endocrine responses to stress (Infante *et al.*, 1998). Additionally, participants report improved health and greater relaxation after religious/spiritual meditation (Elkins *et al.*, 1979; McKinney and McKinney, 1999). It has been suggested that spirituality can also affect pain tolerance. Among advanced oncology patients, religious beliefs correlate with general happiness and life satisfaction as well as with decreased reports of pain (showing increased tolerance) and less perceived pain (Yates *et al.*, 1991).

Spiritual and religious meditation may have an impact on stress reactivity, pain perception, and pain tolerance through several possible pathways. Meditation correlates with feelings of spiritual experiences/support and may moderate mood which, in turn, correlates to strengthened impulse control (Tice and Bratslavsky, 2000). Additionally, spiritual meditation may affect stress reactivity through the pathways of spiritual connection (McKinney and McKinney, 1999), peace, calm, and reduced anxiety (Alexander *et al.*, 1991; Carlson *et al.*, 1988), increased self-efficacy (Keefe *et al.*, 2001) and result in an improvement of mood (Bush *et al.*, 1999), greater internal loci of control (Ferguson, 1980), and decreased focus on the body (Alexander *et al.*, 1994). Thus, spiritual meditation may exert its effects on stress reactivity through a number of possible pathways.

Meditation Intervention Studies

Despite the inclusion of spiritual meditation in most major world religions, Transcendental Meditation (TM) remains one of the few well-studied forms of this technique. Spiritually based TM consistently yields more positive effects than secular

relaxation techniques. Alexander *et al.* (1994) performed a meta-analysis on 19 studies (1972–1990) that compared various methods of relaxation and meditation techniques to TM. Compared to secular techniques, TM practitioners showed significantly more improvements on measures of trait anxiety, drug use/abuse, self-actualization, and health factors.

Elkins *et al.* (1979) conducted one of the few research projects that statistically compared devotional practices (prayer) with a relaxation technique (progressive muscle relaxation). Forty-two participants from similar religious and cultural backgrounds were divided into three groups (relaxation training, daily prayer, control). After 10 days, both experimental groups reported significant reductions in subjective stress.

Prayer, as Elkins *et al.* (1979) utilized it, involved either verbalization or thought in communication with God, which required conscious control. Carlson *et al.* (1988) performed a study to compare a more free form Christian devotional practice to progressive muscle relaxation. They divided 36 Christian participants into three groups: Devotional Meditation (DM) group, Progressive Muscle Relaxation (PMR) group, and Control group. Each participant practiced his or her technique for 20 min a day for two weeks. At the end of the program, the DM group reported less anxiety and anger than those who underwent the two-week PMR program. In addition the DM group had less muscle tension (reduced EMG activity). Their findings indicated quiet religious reflection was associated with better results than progressive muscle relaxation. Since both TM and DM involve quiet contemplation as part of the course of meditation, it would be interesting to explore whether the subject material that the individual reflects upon during the course of their meditation can alter the efficacy of meditation.

Conclusion

The current study, examines whether spiritual meditation is associated with more beneficial outcomes than other forms of meditation and relaxation. Specifically, it is hypothesized that individuals in the spiritual meditation group will have more pain endurance, reduced anxiety, improved mood, and report more feelings of spiritual well being than the other two groups.

METHOD

Participants

The project involved 84 college age students. Four participants were removed due to mechanical difficulties with the automated heart rate monitor/recorder (2 SecM, 2 Rlx). Eleven participants were removed for not completing the adherence diary at least 12 of the 14 days of the project (4 SpM, 4 SecM, 3 Rlx). One participant was removed for seemingly random responding to the questionnaires creating an outlier effect on most outcome points (SecM). There were no identifiable patterns of attrition. The individuals who were removed or chose to discontinue the project did not differ on demographic, pre-test psychological or spiritual variables from their assigned group nor from those who completed the project. Participant demographics can be found in Table I.

There were 25 participants in the Spiritual Meditation group and 21 participants in the Secular Meditation group. The Relaxation group included 22 participants. These three groups were not significantly different on the demographic variables, nor did they differ on the psychological and spiritual surveys included in the pre-intervention packet (see Table II).

Psychological Measures

A number of well-established psychological measures were used in this study. Psychological measures of positive and negative emotions were the Positive and Negative Affect Scale, and the State-Trait Anxiety Inventory. Table II contains means, standard deviations, and internal reliability information for the current study.

In addition to the psychological measures, the study included two surveys developed for the study. The first was a short series of manipulation check questions that asked individuals to rate their subjective experience of stress and pain from the Cold Pressor (CP) task (explained below), and their subjective experience of relaxation and spirituality while using their technique. The second was an adherence diary in which participants recorded their meditation daily practice.

Mood

The Positive and Negative Affect Scale (PANAS) consists of two-10 item subscales, positive

Table I. Participant's Demographic Characteristics

	Total	Spiritual meditation	Secular meditation	Relaxation
Age in years (SD)	19.1 (1.03)	18.9 (1.26)	19.1 (.89)	19.4 (.85)
Sex (%)				
Male	32.0	24.0	38.1	36.4
Female	68.0	76.0	61.9	63.6
Race (%)				
Caucasian	94.0	88.0	95.2	100
African-American	3.0	8.0		
Hispanic/Latino-a	3.0	4.0	4.8	
Denominational affiliation (%)				
Protestant	38.2	48.0	23.8	40.9
Roman Catholic	42.7	40.0	52.4	36.4
Other	8.8	8.0	14.3	9.1
None	10.3	4.0	9.5	13.6
Practice prayer or meditation (%)				
Never	5.9	8.0	4.8	4.5
In formal situations	17.6	4.0	23.8	27.3
In times of stress	36.8	44.0	33.3	31.8
Regular part of life	39.7	44.0	38.1	36.4
Self-rated religiosity level (%)				
Not religious at all	11.8	12.0	9.5	13.6
Slightly religious	30.9	28.0	38.1	27.3
Moderately religious	47.1	52.0	38.1	50.0
Very religious	10.3	8.0	14.3	9.1
Self-rated spirituality level (%)				
Not spiritual at all	5.9	4.0	9.5	4.5
Slightly spiritual	36.8	20.0	52.4	27.3
Moderately spiritual	41.2	56.0	23.8	31.8
Very spiritual	16.2	20.0	14.3	36.4

Note. None of the differences between the groups were statistically significant; Due to rounding the percentages do not always equal 100%.

mood (PPANAS), and negative mood, (NPANAS). Both the positive and negative scales show high internal consistencies, .89 for positive affect, and .85 for negative affect with a $-.15$ negative correlation between the two scales (Watson *et al.*, 1988).

Anxiety

The State-Trait Anxiety Inventory (STAI) is a frequently used measure of anxiety. It is a self-report survey that assesses transient and stable mood states. A recent survey (Scott and Melin, 1998) created modern norms for the state scale (STAI-S), yielding a mean of 35.57 ($SD = 9.40$). Both STAI-S and trait (STAI-T) scales have high internal reliability ($\alpha = .91$) (Spielberger, 1983).

Spirituality Measures

Spiritual measures were administered at two times. Portions of the Multi-dimensional Measure-

ment of Religiosity/Spirituality Scale were given as a screening tool to compare the different treatment groups prior to the treatment.

Religious/Spiritual Demographics

Parts of The Brief Multidimensional Measure of Religiosity/Spirituality developed by the Fetzer/National Institute on Aging Working Group assessed participants' spiritual life (Fetzer Institute, 1999). The survey norms are based on a national sample from the 1998 General Social Survey. Two subtests were particularly pertinent to this study, The Religious Intensity Questionnaire, and the Private Religious Activities Questionnaire (see Table I). The two-item Religious Intensity has reasonably good reliability ($\alpha = .77$) and explores the self-reported levels of religiosity and spirituality. The five-item Private Religious Activities also has acceptable reliability ($\alpha = .72$) and inquires about spiritual or religious practices that the individual performs alone (Fetzer Institute, 1999).

Table II. Means, Standard Deviations (S.D.) and Cronbach’s Alphas for Pre- and Post-Intervention Psychological and Spiritual Measures

Scale	Alpha	Total mean (SD)	Spiritual meditation mean (SD)	Secular meditation mean (SD)	Relaxation mean (SD)	F-test
Pre-test						
STAI-T	.90	41.4 (8.11)	40.6 (6.84)	41.1 (9.83)	42.7 (7.88)	0.40 (2,65) NS
DSE	.90	52.1 (10.98)	52.2 (5.88)	51.7 (13.04)	52.2 (13.52)	0.02 (2,65) NS
Closeness to God	NA	2.2 (.71)	2.3 (0.63)	2.2 (0.77)	2.4 (0.79)	0.17(2,65) NS
Post-test						
PANAS	.81	52.9 (7.77)	54.3 (7.69)	52.4 (7.05)	51.7 (8.57)	
PPANAS	.82	34.9 (5.43)	37.3 (4.84) ^{ac}	33.8 (3.79) ^a	33.2 (6.52) ^c	
NPANAS	.87	18.1 (6.29)	17.2 (7.05)	18.6 (6.39)	18.5 (5.39)	
STAI-T	.85	37.7 (7.49)	34.4 (6.04) ^{ac}	38.5 (7.43) ^a	40.6 (7.91) ^c	
STAI-S	.90	32.4 (8.13)	29.0 (7.19) ^{ac}	34.2 (9.00) ^a	34.9 (7.13) ^c	
Adherence (days)	NA	13.6 (.89)	13.6 (1.00)	13.5 (.53)	13.8 (.69)	
SWB	.92	94.8 (15.47)	101.7 (12.08) ^{ab}	90.3 (18.05) ^a	91.0 (13.95) ^b	
RWB	.94	45.0 (10.93)	48.4 (8.65)	42.4 (13.19)	43.5 (10.33)	
EWB	.85	49.8 (7.20)	53.3 (5.67) ^{cd}	47.9 (8.17) ^c	47.5 (6.44) ^d	
DSE	.85	59.9 (9.97)	64.4 (9.19) ^{ac}	56.9 (8.53) ^c	57.8 (10.64) ^a	
Mysticism	.88	10.49 (20.28)	19.3 (19.90) ^{cd}	3.7 (19.86) ^c	4.5 (19.62) ^d	
Introvertive	.77	2.2 (5.80)	4.6 (5.73) ^{ac}	1.2 (5.07) ^a	0.27 (5.79) ^c	
Relig. Interp	.79	4.9 (8.89)	9.2 (7.46) ^{cd}	1.9 (8.68) ^c	2.9 (9.07) ^d	
Extrovertive	.81	3.4 (8.69)	7.7 (6.59) ^{cd}	0.5 (9.65) ^c	1.4 (8.26) ^d	
Close to God	N/A	2.4 (.76)	2.8 (0.66) ^{ac}	2.2 (0.77) ^a	2.2 (0.73) ^c	

*NS = Not Significant;

A letter indicates a significant difference between the two groups delineated by the superscript.

^{a/b} $p \leq .05$.

^{c/d} $p \leq .01$.

Spiritual Health

The Spiritual Well Being (SWB) scale was developed by Paloutzian and Ellison (Paloutzian and Ellison, 1982) to measure two aspects of subjective spiritual health and quality of life. Religious Well Being (RWB) assesses feelings of personal well-being with God. Existential Well Being (EWB) is designed as a measure of spiritual interactions between self and others. These subscales can be reported separately or combined into a single score (see Table II). Internal reliability coefficients ranged from .82–.94 for RWB, .78–.86 for EWB, and .89–.94 for the entire SWB scale (Boivin *et al.*, 1999).

A short scale developed for this study consisted of a self-reported closeness to God rating. Based on a 5-point scale, participants could respond “Very Close” (5) to “Not At All Close” (1).

Spiritual Experiences

Designed by Underwood and part of the 1999 Fetzer Report, the Daily Spiritual Experiences Ques-

tionnaire (DSE) is a 16-item scale that measures how individuals perceive the transcendent in their daily life (see Table II). Specifically, it assesses the frequency of spiritual experiences (ex. “I feel deep inner peace”). Internal reliability was high ($\alpha = .91$) in a national sample (Fetzer Institute, 1999).

The Mysticism Scale (Hood, 1975) assesses an individual’s “peak” or unusual experiences (see Table II). Though originally designed as a single scale in 1975, the later revision (Hood *et al.*, 1993) identified three subscales: Introvertive (experienced unity with “nothingness,” “I had an experience that was both timeless and spaceless”), Religious Interpretation (“I experienced the divine”), and Extrovertive (experienced unity with the external world, “I feel as if all things are alive”). Based on this three-factor analysis, the reliability alpha coefficients were .76 (Extrovertive), .69 (Introvertive), and .76 (Religious Interpretation). The scale and subscales are not related to psychopathology (Burriss, 1999). For this study, the questions have been modified slightly to ask whether the participant experienced any of these phenomena during the study.

Objective Measures of Stress Reactivity and Pain Tolerance

One popular laboratory stressor to measure CR is the cold pressor (CP) task. The CP task uses cold temperatures to measure psychological and physiological reactions to pain. In the present study, the CP task consists of a cold-water (2°C) bath in which participants place their hand in up to the wrist until they determine that it is too uncomfortable to remain in contact with the water. The CP task contains both physical and psychological stresses allowing the assessment of CR to both aspects of stress reactivity simultaneously. Further, this method of stress inducement, allows the individual the cognitive freedom to practice their meditation/relaxation unlike psychological stressors (ex. speech or arithmetic tasks) which would prevent the individual from practicing their technique.

CR to the painful cold-water bath is a valid objective method of assessing pain perception. Previous studies have shown that the magnitude of CR (physical response) in response to the CP test correlates with the magnitude of perceived pain (psychological response) (Peckerman *et al.*, 1994; Schneiderman *et al.*, 2000).

Physiological measurements were taken during the second session with the participants (after they had completed two weeks of daily meditation/relaxation). An IBS-SD700 heart rate monitor/recorder registered HR (Table III). The physiological measurements consist of three heart rate recordings at 10-min intervals during the 20-min meditation; one prior to beginning the meditation (baseline), one in the middle of the meditation, one post-meditation. The individuals were then asked to place their hand in a 2°C water bath. To assess pain

tolerance, the length of time that the hand was kept in the bath and the heart rate during that time was measured. Cardiac measurements were also taken after the removal of the hand from the water.

Procedure

Recruitment

Participants were recruited through fliers, in psychology classes, and on the computer system used by the university to advertise on-going research projects to potential participants. The project was described as a study of different meditation and relaxation techniques. Atheists were not explicitly screened out of the project due to the extremely low number of atheists among the student body (3%). Further since the project uses spiritual variables rather than religious variables, it did not preclude the participation of atheist or agnostic participants. None of the participants indicated that the spiritual surveys were offensive or unreflective of their experiences.

Project

Participant contact took place in two phases. At Session 1, participants came to a large group session. They signed the informed consent, and completed the Session 1 survey packet (demographics, DSE, STAI-T, Fetzer Spirituality Measure). Then, participants were randomly assigned to one of the three groups (Relaxation, Secular Meditation, Spiritual Meditation). In the technique-specific groups, the participants learned how to use their assigned technique. All three groups were given

Table III. Means, Standard Deviations for Objective Variables

Scale	Total mean (SD)	Spiritual	Secular	Relaxation mean (SD)	F-test
		meditation mean (SD)	meditation mean (SD)		
Baseline heart rate (HR)	75.7 (13.67)	75.2 (14.78)	78.4 (9.83)	73.8 (15.59)	0.65 (2,65) NS*
Technique Time 1 HR	73.7 (12.29)	74.1 (12.68)	75.5 (11.39)	71.4 (12.85)	0.63 (2,65) NS
Technique Time 2 HR	71.7 (12.26)	71.7 (13.11)	74.5 (10.11)	68.9 (13.30)	1.14 (2,65) NS
Cold Pressor (CP) Time 1 HR	82.5 (16.30)	80.9 (16.63)	80.9 (13.08)	85.7 (18.78)	0.62 (2,65) NS
Time 1 Post-CP (HR)	72.1 (12.38)	72.3 (12.78)	73.0 (10.02)	71.1 (14.32)	0.12 (2,65) NS
Duration of CP task in seconds	63.9 (67.84)	91.9 (87.23) ^{ab}	45.9 (24.44) ^b	49.4 (62.76) ^a	

*NS = Not significant;

A letter indicates a significant difference between the two groups delineated by the superscript.

^{a/b}*p* ≤ .05,

^{c/d}*p* ≤ .01.

identical instructions about how to relax physically and create a physically relaxing atmosphere. All participants were asked to practice their technique for 20 min per day for 2 weeks. They were instructed to relax by isolating themselves without any external stimuli (i.e. no TV, radio, etc.).

There was no difference in the content or teaching style between the meditation groups. The statements were introduced as a focus of their attention during their meditation time. The meditation groups were told to focus on their chosen phrase for the duration of the time. Participants were instructed that, if they found themselves mentally drifting, they should not become upset with themselves. Instead, they should simply refocus their thoughts on the phrase and continue with their meditation.

The two groups of meditative phrases (spiritual and secular) were balanced previously for perceived positiveness in a pilot test. In the Spiritual Meditation group, the participants were allowed to choose one of four spiritual meditative phrases in an attempt to allow the participants to use the phrase that best fits their spiritual system: "God is peace," "God is joy," "God is good," and "God is love." If participants in the spiritual meditation group did not feel that "God" was the center of their spirituality, they were offered the option to change the term "God" to a term that best describes the focus of their spirituality. One participant chose to substitute "Mother Earth." This participant did not differ from others in the Spiritual Meditation group. Participants from the Secular Meditation group were offered a choice from four secular phrases as well: "I am content," "I am joyful," "I am good," "I am happy."

The Relaxation control group was given the same instructions as the meditation groups regarding physically comfortable positions and isolation. Unlike the meditation groups, the Relaxation group was not given explicit instructions regarding how to mentally occupy themselves during that time. However, they were told not to sleep or to think about stressful things.³

As the participants left the education sessions, instructors gave them an adherence diary and scheduled an individual appointment two weeks later. The adherence diary recorded completion of the daily assigned practice and whether they found the practice to be a positive experience. No participants reported negative experiences.

At Session 2, two weeks later, participants had individual appointments. They rested for 5 min, then baseline HR was taken. Participants practiced their technique for 20 min, while HR was taken in ten-minute intervals, and then placed their hand in the cold-water bath (CP task) up to the wrist as they continued their meditation or relaxation. HR was taken following initial contact with the water. The length of time participants kept their hand in the water was recorded. After participants chose to remove their hand from the water bath, they continued their technique; HR was taken at two-minute intervals until the recovery of the pre-CP exposure HR.

To ensure consistency of the CP task across participants, the water temperature was kept below 2°C (36°F) with cold water, ice packs and ice. Temperature readings were taken with a digital thermometer prior to and after the completion of each participant trial. A standard aquarium pump circulated the water to maintain a consistent temperature in the five-gallon container.

After completing the individual session, participants filled out the Session 2 Questionnaire packet (PANAS, STAI-S, STAI-T, SWB, DSE, Mysticism Scale, Manipulation Check Questions regarding their experiences with their assigned technique).

RESULTS

1 × 3 (variable × group) ANOVAs were conducted to test for differences between the three groups on most of the variables. Repeated measure 2 × 3 (time period × group) ANOVAs were also conducted to assess whether the three groups changed in different ways over time. For clarity, the results are presented in four major categories: manipulation check analyses (objective and subjective), objective variable analyses, psychological variable analyses, spiritual variable analyses, and repeated measure (time × group) analyses.

Manipulation Check Analyses

The objective manipulation checks determined if the techniques were relaxing cardiovascularly, and if the CP task was cardiovascularly stressful. Participants' mean heart rate was significantly lower after practicing their assigned technique for twenty minutes compared to Baseline ($t(67) = 3.45$, $p < .01$). Thus, the techniques created significant

³For a script of the education sessions, please contact the first author.

cardiovascular relaxation. Cardiac reactivity following initial contact with the cold water was an objective measurement of stress and pain induced by the CP task. The mean participants' heart rate after initial contact with the water was significantly higher than both the Technique Time 2 mean heart rate ($t(67) = -5.35, p < .01$) and the Baseline mean heart rate ($t(67) = -3.08, p < .01$). This indicates that the participants experienced cardiac stress as a result of the CP task.

The effects of the techniques and CP manipulations were also assessed through subjective measurements in the form of self-report data from the participants. The participants indicated that the CP task was "Moderately" stressful ($M = 3.3, SD = 1.17$). They also reported the techniques were "Moderately" relaxing ($M = 3.7, SD = .98$).

A series of 1×3 ANOVAs assessed differences between the groups on the manipulation check variables. There was no subjective difference between the groups on the stressfulness of the CP task ($F(2,65) = 1.00, NS$). Nor did the participants differ on their ratings of how relaxing each technique was ($F(2,65) = 3.00, NS$). However, a significant difference occurred between the groups in how they rated the spiritual experience of their technique ($F(2,65) = 12.3, p < .01$). As expected, according to a post-hoc LSD test, the Spiritual Meditation group reported that their assigned technique was a more spiritual experience than the Secular Meditation group ($p < .01$) and the Relaxation group ($p < .01$).

Post-Intervention Psychological Measures

A series of 1×3 between subjects ANOVAs (post intervention \times treatment group) examined differences between the three groups on anxiety and mood as assessed by the post-intervention psychological measures STAI-T, STAI-S, and PANAS (see Table II).

Anxiety

The STAI-T was given at both pre and post-intervention times. Although, the three groups displayed no differences in trait anxiety at the pre-test, they differed significantly at post-test ($F(2,65) = 4.62, p < .01$). An LSD post-hoc test indicated that the trait Spiritual Meditation group reported significantly less

trait anxiety (defined as "in the past two weeks") than the Relaxation group ($p < .01$) and the Secular Meditation group ($p < .05$).

The STAI-S was given only post-intervention. The three groups differed significantly on the levels of reported state anxiety ($F(2,65) = 4.05, p < .05$). An LSD post-hoc test showed that the Spiritual Meditation group endorsed significantly fewer state anxiety statements than the Relaxation group ($p < .01$) and the Secular Meditation group ($p < .05$).

Mood

The PANAS was only given post-intervention. The NPANAS did not show a significant difference between the groups at post-intervention ($F(2,65) = .36, NS$). However the PPANAS did show significant differences ($F(2,65) = 4.32, p < .01$). A post-hoc LSD test indicated that the Spiritual Meditation group reported significantly more positive mood than the Secular Meditation group ($p < .05$) and the Relaxation group ($p < .01$).

Post-Intervention Spiritual Measures

A series of 1×3 between subjects ANOVA (post-intervention scores \times treatment group) assessed differences between the three groups on the spiritual measures at post-intervention (see Table II). All of the post hoc tests to compare the groups used Least Significant Differences (LSD) methodology. It had been hypothesized that those in the spiritual meditation group would have higher scores on the SWB, DSE, and Mysticism scales than the other two treatment groups when tested at post-intervention.

Spiritual Health

The SWB scale was given only at post-test. No significant differences were found between the groups on the RWB subscale ($F(2,65) = 2.08, NS$). However, the three groups differed in their scores on the EWB subscale ($F(2,65) = 5.4, p < .01$). Participants in the Spiritual Meditation group reported significantly greater EWB than those in the Secular Meditation group ($p < .01$) and the Relaxation group ($p < .01$).

While there was no difference between the groups on their reported closeness to God at pre-test

($F(2,65)=1.17$, NS), at post-test, the three groups reported significant differences on how close they felt to God ($F(2,65)=4.67$, $p < .01$). According to the post-hoc test, the Spiritual group felt significantly closer to God than the Secular Meditation group ($p < .05$) and the Relaxation group ($p < .01$).

Spiritual Experiences

While there were no differences on the DSE at the pre-test between the groups, the three groups differed significantly at post-test ($F(2,65)=4.43$, $p < .05$). The Spiritual Meditation group reported significantly more daily experiences of a spiritual nature than the Secular Meditation group ($p < .01$) or the Relaxation group ($p < .05$).

The three subscales of the Mysticism scale and the total score were analyzed. Significant differences were found between the groups on their total scores of the Mysticism scale ($F(2,65)=6.77$, $p < .01$). Post-hoc analysis showed that individuals in the Spiritual Meditation group endorsed significantly more mystical experiences statements than those in the Secular Meditation group ($p < .01$) or the Relaxation group ($p < .01$).

The groups also reported significant differences on all of the mysticism subscales. As seen in Table II, very large mean differences emerged between the three groups on this scale and its corresponding subscales. The mean differences between the three groups are striking, as members of the Spiritual Meditation group consistently reported many more mystical experiences during the course of this study than the members of the other two groups. The groups displayed significant differences on the Introverted subscale ($F(2,65)=4.01$, $p < .05$); the Spiritual Meditation group endorsed significantly more introverted mystical experiences than the Secular Meditation group ($p < .05$) and the Relaxation group ($p < .01$). Differences also emerged on the Religious Interpretation subscale ($F(2,65)=5.14$, $p < .01$). Participants in the Spiritual Meditation group identified a greater number of mystical experiences with religious connotations than both the Secular Meditation group ($p < .01$), and the Relaxation group ($p < .01$). Finally, the groups differed in their scores on the Extroverted subscale ($F(2,65)=5.41$, $p < .01$). The Spiritual Meditation group reported more extrovertively oriented mystical experiences than the Secular Meditation ($p < .01$) and Relaxation ($p < .01$) groups.

Objective Variable Analyses

Statistical tests of differences between the three groups, as measured by the objective assessments of heart rate for reactivity and recovery were conducted using a series of 1×3 ANOVAs (cardiac measurement \times treatment group) (see Table III). There were no significant differences between the groups on heart rate at Baseline ($F(2,65)=.65$, NS), Technique Time 1 ($F(2,65)=.63$, NS), Technique Time 2 ($F(2,65)=1.14$, NS), Cold Pressor Time 1 ($F(2,65)=.62$, NS), or Time 1 Post-CP ($F(2,65)=.12$, NS).

On the 3×5 (group \times time) repeated measures analyses of variance, no significant main effects were found between the groups ($F(2,65)=.25$, NS) (see Table III). However, main effects occurred between the time periods ($F(4,63)=16.4$, $p < .01$). LSD post hoc tests indicated that when collapsed across groups, participants' heart rates varied significantly across time points. Participants' baseline HR was higher than at Technique Time 2 ($p < .001$) and post-CP ($p < .01$), but were lower than during CP ($p < .001$). HR at Technique Time 1 was higher than at Technique Time 2 ($p < .01$) and lower compared to CP HR ($p < .001$). HR at Technique Time 2 was lower than during CP ($p < .001$). HR at post-CP was lower than during CP ($p < .001$). No time \times group significant interaction occurred ($F(8,260)=1.32$, NS).

A 1×3 ANOVA was used to assess for length of CP task between the groups. There was a significant difference between the groups on the mean duration a participant's hand was in contact with the water ($F(2,65)=3.63$, $p < .05$). The post-hoc analysis revealed that, on average, individuals performing Spiritual Meditation remained in contact with the water significantly longer than individuals in the Secular Meditation group ($p < .05$) and the Relaxation group ($p < .05$). Participants in the Spiritual Meditation group remained in contact with the water for over a minute and a half ($M=91.9$, $SD=87.23$). This was almost twice as long as individuals in the Secular Meditation group ($M=45.9$, $SD=24.44$), and the Relaxation group ($M=49.4$, $SD=62.76$).

Pre-Post Test Analyses

A series of 2×3 (pre-post \times treatment group) ANOVAs were performed to check for an interaction effect that would reveal differences in changes from pre to post for the three groups.

On the DSE, no significant main effect for group ($F(2,65)=1.35$, NS) appeared. There was a significant main effect for time on the DSE ($F(1,66)=37.02$, $p < .001$) and a significant interaction occurred between group and time ($F(2,65)=3.41$, $p < .05$). An analysis of the resulting plot shows that the Spiritual Meditation group had a greater increase in the number of reported daily spiritual experiences than the other two groups.

The scores on the STAI-T displayed a similar pattern of results that supported the hypotheses. There was no significant main effect for group ($F(2,65)=1.96$, NS), but there was a significant main effect for time ($F(1,66)=30.63$, $p < .001$). The interaction between time and group also emerged as significant ($F(2,65)=3.99$, $p < .05$), and a plot of the means shows that the Spiritual Meditation group had a greater decline in trait anxiety over the course of the study than the other two groups.

The self-reported closeness to God scores also displayed a pattern of results that supports the hypothesis. There were significant main effects for time ($F(1,66)=16.48$, $p < .001$) and group ($F(2,65)=3.47$, $p < .05$). Additionally, the interaction between time and group for self-reported closeness to God was significant ($F(2,65)=4.45$, $p < .05$). The plot means indicated that participants in the Spiritual Meditation group reported a greater increase in their closeness to God over the course of the study than individuals in the other two groups.

Post Hoc Analyses: Pathways

Following the supportive results of the planned analyses, post-hoc analyses explored potential explanations for the observed pain tolerance effects among members of the spiritual meditation group. Correlations were conducted to examine the relationships among pain tolerance, mood, and spiritual variables within the spiritual meditation group (see Table IV).

Spirituality and Mood

Significant correlations emerged between spirituality and mood. Spiritual well-being was correlated with better psychological health including reduced post-test trait anxiety ($r = -.53$, $p < .01$), and less negative mood ($r = -.54$, $p < .01$). Daily spiritual experiences were positively related to

level of positive mood ($r = .42$, $p < .01$). Existential well-being inversely correlated with negative mood state ($r = -.67$, $p < .001$), current levels of anxiety ($r = -.49$, $p < .01$), and general levels of anxiety ($r = -.73$, $p < .001$).

Psychological Factors and Pain Tolerance

An inverse correlation appeared between positive mood and trait anxiety ($r = -.53$, $p < .001$). Both positive mood ($r = .73$, $p < .001$) and trait anxiety ($r = -.60$, $p < .001$) were related to pain tolerance. Thus, a connection appears between psychological factors and ability to tolerate pain.

Spirituality and Pain Tolerance

Participants in the spiritual meditation group who displayed greater pain tolerance also reported richer spiritual lives. Existential spiritual well-being was positively correlated with greater pain tolerance ($r = .35$, $p < .05$). As reported previously, participants who reported more existential well-being reported less negative mood, and less anxiety.

DISCUSSION

This study attempted to determine whether spirituality is a critical component of meditation. Specifically, we asked whether adding a spiritual component to meditation alters the technique's impact on affect, spirituality, pain perception and tolerance, and cardiac reactivity to pain. We hypothesized that spiritual meditation creates greater physical, psychological, and spiritual benefits than secular forms of meditation or relaxation.

Three major criteria of interest were explored in the course of this study. Participants' subjective responses to the techniques were assessed by psychological and spiritual variables. Physiological variables provided an objective source of information regarding participants' ability to withstand pain, and cardiac reactivity in response to the stress and pain of a cold-water bath. Combining these domains of subjective responses and objective measures yielded a comprehensive picture of the efficacy of the techniques.

In general, the Spiritual Meditation group reported lower anxiety, more positive mood, and

Table IV. Pearson *r* Correlation Matrix for the Primary Spiritual, Psychological, and Pain Tolerance Variables in the Spiritual Meditation Group

	Time in water	NPANAS	PPANAS	STAI Trait-Post	STAI State	Religious well being	Existential well being	SWB total	DSE-post	Introvertive mystical experience	Religious interpret	Extrovertive mystical experience
Negative PANAS												
Positive PANAS	.73 ^a											
STAI-Trait Post test	-.60 ^a	.72 ^a										
STAI state	.55 ^b	.53 ^a	.67 ^a									
Religious Well being						.40 ^c						
Existential well being	.35 ^c	-.67 ^a		-.73 ^a	-.49 ^b	.90 ^a	.75 ^a					
Spiritual well being		-.54 ^b	.42 ^c	-.53 ^b		.51 ^b	.36 ^c	.53 ^b				
Post DSE												
Introvertive						.40 ^c		.38 ^c	.49 ^b	.57 ^a		
Religious interpretation										.70 ^a	.52 ^b	
Extrovertive										.87 ^a	.84 ^a	
Mystical experience total									.35 ^c			.86 ^a

^a*p* ≤ .001.

^b*p* ≤ .01.

^c*p* ≤ .05.

greater spirituality. Furthermore, this group displayed an ability to withstand pain for longer periods of time than the other two groups. On most of the variables examined, the Secular Meditation and Relaxation groups were not significantly different from each other.

Meditation and Mental Health: Psychological Variables

Participants' subjective experiences of anxiety, stress, and mood were assessed following the use of their assigned technique. There were no differences between the groups at pre-test on the examined psychological criteria, but significant differences did emerge at post-test.

Following two weeks of technique use, the Spiritual Meditation group reported more positive outcomes than the other two groups on most of the psychological criteria. Members of this group reported more positive mood and less anxiety than the other groups. These findings are consistent with several studies that have found that the use of spiritual techniques can improve psychological health (Alexander *et al.*, 1991; Carlson *et al.*, 1988; Ferguson, 1980). The addition of the spiritual focus to a meditation task not only resulted in better mental health, but it was more beneficial than the secular meditation and relaxation techniques.

Meditation and Spirituality: Spiritual Variables

Spiritual meditation was associated with more positive spiritual outcomes, including a greater number and variety of spiritual experiences. On the post-test measures, the Spiritual Meditation group reported significantly more spiritual experiences and a stronger spiritual life on 7 of the 8 spiritual measures and subtests than the other two groups. Similar to the findings on the psychological variables at post-test, there were few differences between the Secular Meditation and Relaxation groups. Thus, the spiritual component of the meditation appeared to create the conditions that allowed individuals to experience more spirituality in their lives both within and outside of the meditation experience.

Of the three treatments, only the Spiritual Meditation condition imposed a focused time on the participants to consider their spirituality. This could lead to two conclusions. First, individuals may be more

likely to interpret everyday occurrences through a spiritual lens when they participate in spiritual meditation. Second, when individuals set aside time to focus on their spirituality, they may be more open to subjective spiritual experiences. Further, perhaps people are generally looking to improve their spiritual lives, yet in their rushed lifestyles, they are unable to find the time to expand their spirituality. The quiet time mandated by this study may have provided some outlet for that spiritual desire, diverting attention from the external "noise" of daily life to the inner spiritual life.

Meditation, Pain and Cardiac Reactivity: Objective Variables

The most noteworthy finding with respect to the objective variables involved the measure of pain tolerance. Interestingly, pain perception did not appear to be altered by the use of a spiritual meditation technique; on the manipulation check, all three groups reported that they experienced the same subjective level of pain. However, pain tolerance was affected. The Spiritual Meditation group was able to endure that pain level almost twice as long as the other two groups. Thus, the spiritual focus of meditation appears to be able to affect, not how much pain the practitioner feels, but how well the practitioner copes with that pain.

Though differences in pain tolerance appeared between the groups, the expected corresponding cardiac reactions to pain did not emerge. Only when collapsed across groups did significant differences appear in the expected pattern: HR decreased while participants used their respective techniques, then increased during the CP, and again decreased during the post-CP period.

Meditation Across Time: Pre-Post Analyses

Three self-report measures were given both prior to the beginning of the study and at the completion of the study. These results also supported the study hypotheses. Participants using Spiritual Meditation reported a greater reduction of anxiety from pre- to post test than those using the Secular Meditation and Relaxation techniques. Similarly, the Spiritual Meditation group reported a greater increase in spiritual experiences and more closeness to God over

the course of the study than did the members of the other two groups.

Role of Spirituality in Pain Tolerance

Those in the Spiritual Meditation group reported significantly stronger spiritual lives following the intervention than the other groups' members and they displayed an increased tolerance of pain. **These findings suggest that there may be something unique about spiritual meditation that is not experienced in the course of practicing secular techniques. How can we explain these effects?** The current study provided some preliminary information about how spirituality may uniquely impact the individual through psychological and spiritual means.

Potential Pathways for Pain Tolerance

Spiritual meditation may support an increased tolerance of pain through pathways that include both psychological variables (decreased anxiety, improved mood), and spiritual variables (spiritual experiences, relationship with God, feelings of spiritual support) (Bush *et al.*, 1999; Keefe *et al.*, 2001; Lecci and Wirth, 2000; Low, 1997; Yates *et al.*, 1991). Previous research suggests improved mood and stronger spiritual lives result, not in a difference in the subjective experience of pain, but rather in how well an individual endures that pain.

Mood Pathway. Spiritual meditation may affect pain tolerance through an improvement in mood. In previous studies, religious beliefs and the use of spiritual techniques have been linked to better mood (Bush *et al.*, 1999; Yates *et al.*, 1991). The current study furthered these findings by suggesting that the use of positive, spiritual statements during meditation results in more positive mood than the use of positive secular phrases. These improvements in mood may relate, in turn, to greater pain tolerance. In this vein, Heiligman *et al.* (1983) found that anxiety often reduces individuals' ability to cope effectively with pain. This is consistent with the current study that showed more positive mood and lower anxiety correlated with greater ability to endure pain among the Spiritual Meditation group.

Spiritual Pathway. Previous correlational research suggests that those who report strong spiritual and religious beliefs tend to be psychologically and physically healthier (George *et al.*, 2000). In this study, correlational analyses of the Spiritu-

al Meditation group indicated that those who reported more active spiritual lives at the post-test displayed a higher tolerance for pain. There may be a unique connection between participants' spirituality and pain tolerance.

Spiritual Meditation as a Form of Spiritual Coping

Pargament (1997) and his research colleagues have attempted to show that some forms of positive religious coping can help individuals deal with psychological and physical pain. His research indicated that those individuals who use positive religious coping in response to a psychological stressor report better physical and psychological outcomes.

Keefe *et al.* (2001) found that individuals who used positive spiritual coping techniques were more likely to describe their pain as tolerable on the days they used those techniques. In the present study, the Spiritual Meditation group practiced their technique during the painful cold pressor task. In this sense, spiritual meditation may be a form of spiritual coping, and the increased tolerance of pain may be an indication of the efficacy of this spiritual coping method. Similarly, Keefe *et al.* (2001) reported that high efficacy of participants' spiritual coping techniques was correlated with a greater tolerance for pain. These findings suggest that people who spend time performing spiritually based tasks, whether to cope with a particular life stressor (such as pain), or in the course of daily life (Alexander *et al.*, 1991), may improve their ability to withstand pain.

The tone of the spiritually based task may determine how the coping method influences an individual's physical and mental health. The meditative phrases in this study focused on positive aspects of spirituality (ex. God is joy, God is peace). The positive meditative phrases may have created feelings of closeness to God that were used as ways of coping religiously with the pain presented in the course of the study. Had the phrases emphasized negative forms of spirituality (ex. God is domineering), different results may have emerged in this study including, perhaps, more depressed mood and reduced pain tolerance.

Spiritual Meditation in Secular Clothing?

The current results raise intriguing questions as to whether the beneficial effects of meditation that

have been reported in the literature are at least partly due to the implicitly spiritual nature of meditation. The meditation process directs individuals to focus their concentration on a phrase or object. A number of authors have suggested that the use of this technique within a secular context creates positive effects for practitioners and suggest that practitioners may even experience an increased level of spirituality (Astin, 1997; Carrington, 1998; Titlebaum, 1998). Thus, the participants may be experiencing spiritual phenomena in this ostensibly secular context. This aspect of secular meditation has yet to be empirically tested.

Since secular meditation grew out of spiritual traditions, it is not surprising that at least some of the beneficial effects of secular meditation may still be rooted in spirituality. Thus, a presumably secular technique may continue to have threads of spirituality embedded within it. For example, in the current study, members of the Spiritual Meditation group perceived their task as more spiritual than those in the other two groups. Nevertheless, even though other participants in this study meditated on secular phrases (I am good, I am happy, etc.), they still reported increases in their number of daily spiritual experiences. If secular meditation was truly devoid of spirituality, then the number of spiritual experiences should not have been affected by this ostensibly secular meditation technique. Thus it would appear from the current study that secular meditation tasks represent *less-spiritually oriented, rather than non-spiritually oriented, meditation tasks*.

It is not uncommon to find strains of spirituality in seemingly secular interventions. Rye and Pargament (2002) compared the efficacy of secular and spiritual forgiveness interventions. Even within the secular forgiveness intervention context, they found that many of the students utilized religious or spiritual strategies to assist them in the process of forgiveness (ex. prayer). This suggests that some processes, like meditation and forgiveness, have an inherent spirituality that can arise even within secular contexts.

Limitations

There were some limitations in the present study. The sample was limited to healthy, undergraduate volunteers, which restricted the amount of variance in the cardiac measure. The restricted variance may have limited the ability to detect significant al-

terations in heart rates. Studies of a general community sample or a sample involving mildly hypertensive individuals or other cardiac patients may provide more information about the long-term cardiac effects of the different forms of meditation and relaxation. Additionally, individuals may need a greater length of time to practice the meditation technique before heart rate is impacted. Most of the research on meditation uses a time frame of a month or more between initial exposure to the meditation technique and the final testing session (Alexander *et al.*, 1991; Khare and Nigam, 2000; Wenneberg *et al.*, 1997). Thus, a longer time frame for meditation practice may lead to more information regarding the efficacy of different types of meditation on the cardiovascular system.

Second, one of the individuals that taught the meditation/relaxation protocols was not blind to the hypothesis. This may have altered how the intervention techniques were presented by this individual. However, to counteract this possibility, the experimenters and research assistants utilized scripts and intentionally refrained from wearing religious or spiritual accessories of any kind during the experiment to reduce any bias across the intervention conditions. Additionally, in Session 2, participants did not identify their ID number, or assigned technique until after the completion of data collection.

Third, the study design prevented the collection of pre-test data on all of the surveys used in the study. This introduces the possibility that on these particular domains the groups may not have been equal prior to the intervention. However, this decision was made intentionally to prevent the participants from becoming sensitized to the study hypotheses. Further, it is important to note that participants did not differ on the three psychological and spiritual variables that were measured at pre-test or on demographic data.

Fourth, the possible value of spiritual meditation may be tied to the non-self-centered focus of the task. The secular group's phrases were targeted toward the internal self, while the spiritual group's phrases were targeted toward an external source. It is important to recall that the groups of phrases were pilot tested and balanced for positivity, but it does raise the intriguing question: Would meditation directed toward another external object (e.g. People love me, or Sand is soft) have similar effects as the externally directed spiritually focused phrases? In order to answer this question, a third contrast group, perhaps allowing meditators to focus on positive social support experiences could be included in a future study.

Implications

The current study suggested that spiritual therapeutic techniques may be more effective than secular techniques. Further, the correlational data suggest that individuals with stronger spiritual lives may have greater positive affect, less anxiety, and may further benefit from use of the spiritual techniques. However, despite the more limited benefits of secular meditation and relaxation, these techniques remain viable therapeutic resources. Since few qualitative or quantitative differences arose between the two non-spiritual groups, the choice of which of these two techniques to use in practice may be more based on the discretion of the therapist than on any empirical grounds derived from the current study. Additionally, all three meditation/relaxation techniques could be easily adapted for use in a standard medical or mental health setting without prohibitively extensive and expensive training by either the clinician or the client. At this point though we are unsure of whether these results generalize to other forms of meditation or meditation practiced in explicitly religious environments.

Therapeutic Impact

The current research project indirectly suggested that an individual's spirituality may have a significant impact on a patient's endurance of a painful disease. One's spirituality does not appear to alter the level of pain experienced (Keefe *et al.*, 2001) though it may alter how well that pain can be endured. If accessing spiritual resources help individuals better tolerate pain, they may require fewer pain reducing pharmaceuticals while recovering from injury or during the progression of a disease. Since the majority of the most effective painkillers used by the medical profession are addictive opiate derivatives, and/or have a sedative effect (Julien, 1995), the introduction of spiritual meditation may reduce both the financial burden and negative side effects of these medications. This may result in an improvement in a patient's quality of life, even in the midst of chronic pain, terminal illness, or life threatening disease.

The present study also suggests that spiritual meditation techniques may decrease clients' levels of anxiety and improve their mood, though further research is needed to determine whether spiritual meditation can also affect depression. Since both anxiolytics and anti-depressants may create a number of

negative side effects, reducing or eradicating clients' need for these medications may improve their quality of life while teaching lifetime skills that may empower them in the treatment of their mood disorder.

REFERENCES

- Alexander, C. N., Rainforth, M. V., and Gelderloos, P. (1991). Transcendental meditation, self-actualization, and psychological health: A conceptual overview and statistical meta-analysis. *J. Soc. Behav. Pers.* 6: 189-248.
- Alexander, C. N., Robinson, D. W., Orme-Johnson, R. H., Schneider, R. H., and Walton, K. G. (1994). The effects of transcendental meditation compared to other methods of relaxation and meditation reducing risk factors, morbidity, and mortality. *Homeostasis* 35: 243-264.
- Astin, J. (1997). Stress reduction through mindfulness meditation: Effects on psychological symptomatology, sense of control, and spiritual experiences. *Psychother. Psychosom.* 66: 97-106.
- Boivin, M. J., Kirby, A. L., Underwood, L. K., and Silva, H. (1999). Spiritual well-being scale (a review). In Hill, P., and Hood, R. (eds.), *Measures of Religiosity*. Birmingham: Religious Education Press, pp. 382-385.
- Burris, C. T. (1999). The mysticism scale: Research form D (a review). In Hill, P. C., and Hood, R. W. (eds.), *Measures of Religiosity*. Birmingham: Religious Education Press, pp. 363-367.
- Bush, E. G., Rye, M. S., Brant, C. R., Emery, E., Pargament, K. I., and Riessinger, C. A. (1999). Religious coping with chronic pain. *Appl. Psychophysiol. Bio.* 24: 249-260.
- Carlson, C. A., Bacaseta, P. E., and Simanton, D. A. (1988). A controlled evaluation of devotional meditation and progressive relaxation. *J. Psychol. Theol.* 16: 362-368.
- Carrington, P. (1998). *The Book of Meditation*. Element, Boston.
- Carroll, D., Smith, G. D., Shipley, M. J., Steptoe, A., Brunner, E. J., and Marmot, M. G. (2001). Blood pressure relations to acute psychological stress and future blood pressure status: A 10-year follow-up of men in the Whitehall II study. *Psychosom. Med.* 63: 737-743.
- Dillbeck, M. C., and Orme-Johnson, D. W. (1987). Physiological differences between transcendental meditation and rest. *Am. Psychol.* 42: 880-881.
- Elias, A. N., Guich, S., and Wilson, A. F. (2000). Ketosis with enhanced GABAergic tone promotes physiological changes in transcendental meditation. *Med. Hypo.* 54: 660-662.
- Elkins, D., Anchor, K. N., and Sandler, H. M. (1979). Relaxation training and prayer behavior as tension reduction techniques. *Behav. Eng.* 5: 81-87.
- Ferguson, P. C. (1980). An integrative meta-analysis of psychological studies investigating the treatment outcomes of meditation techniques. Unpublished doctoral dissertation, University of Colorado, Boulder, CO.
- Fetzer Institute (1999). *Multidimensional Measurement of Religiosity/Spirituality for Use in Health Research*. John E. Fetzer Institute, Kalamazoo.
- George, L. K., Larson, D. B., Koenig, H. G., and McCullough, M. E. (2000). Spirituality and health: What we know, what we need to know. *J. Soc. Clin. Psychol.* 19: 102-116.
- Harris, A. H. S., Thorensen, C. E., McCullough, M. E., and Larson, D. B. (1999). Spiritually and religiously oriented health interventions. *J. Health Psychol.* 4: 413-433.
- Heiligman, R. M., LaMont, R., and Kramer, D. (1983). Pain relief associated with a religious visitation: A case report. *J. Family Prac.* 16: 299-302.
- Hixon, K. A., Gruchow, H. W., and Morgan, D. W. (1998). The relation between religiosity, selected health behaviors, and

- blood pressure among adult females. *Prev. Med.* 27: 545–552.
- Hood, R. W. (1975). The construction and preliminary validation of a measure of reported mystical experiences. *J. Sci. Study Relig.* 22: 353–365.
- Hood, R. W., Morris, B., and Watson, P. J. (1993). Further factor analysis of Hood's Mysticism Scale. *Psychol. Rep.* 73: 1176–1178.
- Infante, J. R., Peran, F., Martinez, M., Rodan, A., Poyatos, R., Ruiz, C., Samaniego, F., and Garrido, F. (1998). ACTH and B-Endorphin in transcendental meditation. *Physiol. Behav.* 64: 311–315.
- Julien, R. M. (1995). *A Primer of Drug Action* (7th Edn). W. H. Freeman, New York.
- Kasagi, F., Masazumi, A., and Simaoka, K. (1995). Relationship between cold pressor test and development of hypertension based on 28-year follow-up. *Hypertension* 25: 71–76.
- Keefe, F. J., Affleck, G., Lefebvre, J., Underwood, L., Caldwell, D. S., Drew, J., Egert, J., Gibson, J., and Pargament, K. (2001). Living with rheumatoid arthritis: The role of daily religious and spiritual coping. *J. Pain* 2: 101–110.
- Khare, K. C., and Nigam, S. K. (2000). A study of electroencephalogram in meditators. *Indian J. Physiol. Pharmacol.* 44: 173–178.
- Koenig, H. G., McCullough, M. E., and Larson, D. B. (2001). *Handbook of Religion and Health*. Oxford University Press, New York.
- Lecci, L., and Wirth, R. J. (2000). Investigating the effects of physical discomfort on laboratory-induced mood states. *J. Behav. Ther. Exp. Psychiat.* 31: 231–247.
- Levin, J. S., and Vanderpool, H. Y. (1989). Is religion therapeutically significant for hypertension? *Soc. Sci. Med.* 29: 69–78.
- Low, J. F. (1997). Religious orientation and pain management. *Am. J. Occup. Ther.* 51: 215–219.
- McCullough, M. E. (1999). Research on religion-accommodative counseling: Review and meta-analysis. *J. Couns. Psychol.* 46: 92–98.
- McKinney, J. P., and McKinney, K. G. (1999). Prayer in the lives of late adolescents. *J. Adol.* 22: 279–290.
- Moore, N. (1996). Spirituality in medicine. *Alt. Ther. Health Med.* 2: 24–26, 103–105.
- O'Halloran, J. P., Jevning, R., Wilson, A. F., Skowsky, R., Walsh, R. N., and Alexander, C. (1985). Hormonal control in a state of decreased activation: Potentiation of arginine vasopressin secretion. *Physiol. Behav.* 35: 591–595.
- Paloutzian, R. F., and Ellison, C. W. (1982). Loneliness, spiritual well-being and quality of life. In Peplau L. A. and Perlman D. (eds.), *Loneliness: A Sourcebook of Current Theory, Research, and Therapy*. New York: Wiley Interscience, pp. 224–237.
- Pargament, K. I. (1997). *The Psychology of Religion and Coping: Theory, Research, and Practice*, New York: Guilford Press.
- Payne, R., Bergin, A. E., Bielema, K. A., and Jenkins, P. H. (1992). Review of religion and mental health: Prevention and the enhancement of psychosocial functioning. In Pargament, K. I., Maton, K., and Hess, R. (eds.), *Religion and Prevention: Research, Vision, and Action*. New York: Haworth Press, pp. 57–82.
- Peckerman, A., Hurwitz, B. E., Saab, P. G., Llabre, M. M., McCabe, P. M., and Schneiderman, N. (1994). Stimulus dimensions of the cold pressor test and the associated patterns of cardiovascular response. *Psychophysiology* 31: 282–290.
- Rabin, B. S. (1999). *Stress, Immune Functioning, and Health: The Connection*. Wiley-Liss, New York.
- Rye, M. S., and Pargament, K. I. (2002). Forgiveness and romantic relationships in college: Can it heal the wounded heart? *J. Clin. Psychol.* 58: 419–441.
- Schneiderman, N., Gellman, M., Peckerman, A., Hurwitz, B., Saab, P., Llabre, M., Ironson, G., Durel, L., Skyler, J., and McCabe, P. M. (2000). Cardiovascular reactivity as an indicator of risk for future hypertension. In McCabe, P. M., Schneiderman, N., Field, T. and Wellens A. R. (Eds.), *Stress, Coping, and Cardiovascular Disease*. Mahwah, NJ: Erlbaum, pp. 181–202.
- Scott, B., and Melin, L. (1998). Psychometric properties and standardized data for questionnaires measuring negative affect, dispositional style and daily hassles. A nation-wide sample. *Scandinavian J. Psychol.* 39: 301–307.
- Spielberger, C. (1983). *Manual for the State-Trait Anxiety Inventory STAI*. Mind Garden, Palo Alto.
- Tice, D. M., and Bratslavsky, E. (2000). Giving in to feel good: The place of emotion regulation in the context of general self-control. *Psychol. Inquiry* 11: 149–159.
- Titlebaum, H. (1998). Relaxation. *Alternative Health Practitioner* 4: 123–146.
- Watson, D., Clark, L. A., and Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *J. Pers. Soc. Psychol.* 54: 1063–1070.
- Weidner, G. and Messina, C. R. (1998). Cardiovascular reactivity to mental stress. In Orth-Gomer, K. and Chesney, M. (eds.) *Women, stress, and heart disease*. Lawrence-Erlbaum: Mahwah, NJ.
- Wenneberg, S., Schneider, R., Walton, K., Maclean, C., Levitsky, D., Salerno, J., Wallace, R., Mandarino, J., Rainforth, M., and Waziri, R. (1997). A controlled study of the effects of the Transcendental Meditation program on cardiovascular reactivity and ambulatory blood pressure. *Int. J. Neuro.* 89: 15–28.
- Worthington, E. L., Kurusu, T. A., McCullough, M. E., and Sandage, S. J. (1996). Empirical research on religion and psychotherapeutic processes and outcomes: A 10-year review and research prospectus. *Psychol. Bull.* 119: 448–487.
- Yates, J. W., Chalmer, B. J., St. James, P., Follansbee, M., and McKegney, F. P. (1981). Religion in patients with advanced cancer. *Med. Ped. Oncol.* 9: 121–128.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.