The Effects of Focus of Meditation on Pain Tolerance,
Compassion, and Anxiety Levels

BY

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Contents

Abstract

Sixty-one individuals participated in a study to examine whether practicing a meditation with a spiritual focus would demonstrate higher pain tolerance and faster pain awareness (cold-pressor task), increased implicit compassion (lexical decision task), and reduced state anxiety levels (State Anxiety Inventory) relative to control conditions. Study participants attended initial training in meditation and then were randomly assigned to either a spiritual, religious, attachment security, or neutral meditation condition. Participants then meditated for 20 minutes a day and were tested at the end of two weeks. Results show that while meditation condition differences were not found for the pain tolerance and anxiety measures, individuals in the spiritual meditation condition demonstrated higher pain awareness. Also, both spiritual and religious meditation groups reported increased implicit compassion levels relative to controls. These findings are discussed in relation to previous similar research (Wachholtz & Pargament, 2005) and the call for increased investigations of underlying psychological mechanisms of meditation and mindfulness interventions.

The Effects of focus of Meditation on Pain Tolerance,

Compassion, and Anxiety Levels

The idea that meditation leads to many positive psychological outcomes, such as reduced stress and anxiety, increased pain tolerance, and increased compassion has been the subject of numerous empirical investigations (Delmonte, 1985; Shapiro, Schwartz, & Bonner, 1998; Astin, 2004). However, it is still unclear what the underlying mechanisms of meditation-related beneficial effects might be. Modern Western psychological treatment programs employing meditation, and especially mindfulness-based interventions (e.g., Mindfulness-Based Cognitive Therapy [Segal, Williams, & Teasdale, 2002]; Mindfulness-Based Stress Reduction [Kabat-Zinn, 1982, 1990]), generally attribute meditation's success to increased awareness and acceptance of present experience following continuous practice. While this assumption is largely consistent with the traditions from which these meditation interventions were derived (e.g., Buddhism), it neglects: (1) the importance of the spiritual-cultural context in which the meditation practice is traditionally understood and experienced, and (2) the spiritual-cultural significance of the object on which the meditator is focusing. This neglect raises the question of how such context and focus are important for the obtainment of beneficial effects from meditation, and whether there are specific contexts and foci which are more likely to contribute to the success of the practice. Despite its importance, little research has been done to address these questions. Recently, however, Wachholtz and Pargament (2005) made a first attempt at filling this gap by investigating whether a spiritual object of focus is an important

component in positive meditation outcomes. While in the right direction, the Wachholtz and Pargament (2005) research is limited, due to poorly controlled and ill-defined operationalizations of meditation conditions. The study reported here is intended to overcome these limitations and improve understanding about the role of context and focus, specifically a spiritual context and focus, in successful meditation.

Meditation and Mindfulness Research

In general, meditation can be defined as a family of techniques that condition attention and awareness, usually with the aim of fostering spiritual and psychological well being and maturity (Shapiro & Walsh, 2003). A distinction recognized by most meditation traditions, as well as contemporary researchers of meditation, is between *concentration* and *mindfulness* types of meditation. In a concentration meditation, the meditator attempts to focus his or her awareness on a single object such as the breath, a mental image, or a mental word or phrase. In mindfulness meditation, meditators practice awareness and acceptance of one or more dimensions of subjective experience, such as sensory experience (e.g., body sensations, visual experience), mental experience (e.g., memories, anticipations, judgments), emotional experience (e.g., anger, sadness), and/or very subtle inner experiences, extensively cataloged by many of the meditation traditions (Murphy, Donovan, & Taylor, 1996).

Previous research offers substantial evidence that meditation in general, especially mindfulness meditation, can lead to many positive outcomes. Several meta-analyses suggest that meditation can reduce anxiety and assist coping with stress (Delmonte, 1985; Eppley, Abrams, & Shear, 1989), increase ability to tolerate pain

(Astin, 2004; Baer, 2002; Grossman, Niemann, Schmidt, and Walach, 2004), and reduce substance abuse (Gelderloos, Walton, Orme-Johnson, Alexander, 1991). Other studies suggest that meditation also increases feelings of empathy and compassion (Shapiro, Schwartz, & Boner, 1998; Terry, 1971). Other research suggests that meditation can increase positive self-concept (Haimerl & Valentine, 2001) as well as increase the beneficial effects of psychotherapy (Epstein, 1990).

Components Underlying Beneficial Meditation Outcomes

In spite of the apparent benefits of practicing meditation, the underlying psychological mechanisms which contribute to these benefits are not yet understood (Dimidjian & Linehan, 2003). In a review of recent mindfulness research, Baer (2003) suggests various components or aspects of meditation as possible contributors to its success, including exposure to avoided thoughts and emotions, adaptive cognitive changes, improved self-management, acquisition of relaxation skills and increased acceptance of experience as it is. Hayes and Wilson (2003) go on to claim that, due to the lack of scientific investigation and analyses of meditation components, no specific component has been proven to adequately account for the impact of meditation. Moreover, they claim that in the interest of simplification, communication, and progress of the field in a scientific way, evidence for the contribution of basic underlying processes and principles should be obtained. As more people use meditation and hope to enjoy its beneficial effects, the importance of understanding what underlying mechanisms contribute to meditation's success becomes crucial.

In an attempt to clarify these components, early meditation research compared meditation with other clinical strategies including guided imagery, self-hypnosis, biofeedback, progressive muscle relaxation, and autogenic training (e.g., Michenbaum & Cameron, 1974; Paul, 1969). The results of this body of research are controversial and suffer from inconsistency. For example, Shapiro concluded that meditation is equally effective as, but no more effective than, other self-regulation strategies for clinical problems (Shapiro, 1982, 1985) while Holmes, based on his meta-analyses, argued that meditation is no more effective than mere resting (1984, 1987).

Following Holmes' strong claims, researchers initiated a more careful examination on the effects of meditation, focusing on Transcendental Meditation (TM) – one of the most widespread types of meditation techniques and one that remains grounded in a spiritual-cultural context (Murphy, Donovan, & Taylor, 1996). The TM technique involves mental repetition of a mantra given to the meditator at the time of training initiation. The mantra is of spiritual and personal significance to the practitioner, and the practitioner is instructed to keep it private.

Dillbeck and Orme-Johnson (1987), and Eppley, Abrams, and Shear (1989) found in their meta-analyses that TM has a significantly larger effect on reduction of trait anxiety than other meditation and relaxation strategies. Similarly, Alexander, Rainforth, and Gelderloos (1994), when comparing various methods of relaxation and other non-spiritual meditation techniques to TM, found practitioners of TM to

show significantly more improvement on measures of trait anxiety, drug use/abuse, self-actualization, and health factors.

The Importance of Spiritual Focus in Beneficial Meditation Outcomes

Findings that TM is more effective at reducing anxiety than non-spiritual meditation types is consistent with the idea that a spiritual focus or context might facilitate meditation's positive outcomes. Other non-TM research also supports this notion. For example, Carlson, Bacaseta, and Simanton, (1988) compared a form of Christian devotional practice to progressive muscle relaxation. They divided 36 Christian participants into three conditions: devotional meditation (DM) condition, progressive muscle relaxation (PMR) condition, and control condition. Each participant practiced his or her technique for 20 min a day for two weeks. At the end of the program, the DM condition reported less anxiety and anger than those who underwent the two-week PMR program. In addition the DM condition had less muscle tension (reduced EMG activity) than the other conditions. Their findings indicated that a quiet religious reflection was associated with more beneficial effects than progressive muscle relaxation.

These results fit with the broader empirical literature on the relationship between a variety of spiritual/religious constructs and beneficial psychological outcomes. For instance, *perceived closeness to God* has been found to be associated with less depression and higher self-esteem (Maton, 1989), less loneliness (Kirkpatrick, Kellas, & Shillito, 1993), greater relational maturity (Hall & Edwards, 1996, 2002), and greater psychosocial competence (Pargament, et al. 1988). *Intrinsic*

religious orientation has been associated with increased self-esteem, meaning in life, family relations, sense of well-being, and lower levels of alcohol use (Donahue, 1985; Payne, Bergin, Bielema, & Jenkins, 1991). *Spiritual experiences*, defined as "an individual's perception of the transcendent (God, the divine) in daily life and his or her perception of his or her interaction with or involvement of the transcendent in life," has been found to positively correlate with quality of life, optimism and perceived social support, and to negatively correlate with alcohol consumption, anxiety, depression, anger, perceived stress, and hostility (Underwood et al., 2002, Keefe et al., 2001). *Attendance at religious services* was found to be associated with physical health, mental health and mortality in community based samples (Koenig, George, Cohen, et al., 1998; Koenig et al, 1999). Finally, *religious coping* has been found to be highly associated with recovery and survival from disease and illness (Oxman, Freeman, & Manheimer, 1995; Pargament, 1997). Overall these findings are consistent with the notion that spiritual context or focus plays a role in the beneficial outcomes of meditation.

A study by Wachholtz and Pargament (2005) is a recent attempt to directly and experimentally investigate this relationship. The researchers tested whether participants who practiced meditation with a what they labeled a 'spiritual' focus would demonstrate increased pain tolerance and lowered trait anxiety relative to those practicing non-spiritual meditation. During the first phase of the study participants were randomly assigned to one of three conditions: spiritual meditation, secular meditation, or relaxation control. In the spiritual meditation condition, participants

chose one of four phrases ("God is peace," "God is joy," "God is good," or "God is love"), which served as the object of their meditation. Participants also were told that, if the word 'God' was not consistent with how they experience spirituality, they could choose another word that better described their connection with spirituality. In the secular meditation condition, participants also chose one of four phrases: "I am good," "I am joyful," "I am content," or "I am happy." The relaxation control condition was not given explicit instructions regarding how to mentally occupy themselves. Participants practiced their respective techniques once a day for 20 minutes and recorded their practice in an adherence diary. In a second session 2 weeks later, after practicing their technique for 20 minutes, participants' pain tolerance and trait anxiety were measured. Results indicated that those in the spiritual meditation condition experienced significantly less anxiety and were able to endure the pain of the cold-pressor task twice as long as participants in the two other conditions.

The Wachholtz and Pargament (2005) study, while providing preliminary evidence for the facilitating role of a spiritual-cultural dimension in meditation, suffers from major limitations. First, the adjectives in the 'spiritual' and 'secular' meditation conditions were different, applying a different meaning for God and for oneself (God is love vs. I am happy). Second, within each meditation condition different people might have had a different experience based on the specific phrase they chose (e.g., peace, love, joy), and thus it is unclear what the crucial component or context responsible for the beneficial effects was. Third, in the 'secular' meditation

condition, participants focused on a self-referential statement (e.g., "I am content," "I am joyful"). There is a substantial literature on the aversive affects of self-focus (Duval & Wicklund, 1972), raising questions about the adequacy of this condition as a comparison condition. Fourth, the relaxation condition could not serve as an adequate control condition because participants might have engaged in different things while supposedly relaxing (no systematic instructions were administered for the condition). Fifth, the number of participants that did not use the word 'God' in the spiritual condition was not reported and was not controlled for in the analysis. Sixth, whereas meditation (especially one within a spiritual context) is expected to affect coping and emotion-regulation (i.e., reduce anxiety and increase pain tolerance) it is also expected to affect people's approach to other beings and the world (Murphy, Donovan, & Taylor, 1996). Specifically that means that meditation should increase compassion tendencies, consistent with previous research (Shapiro, Schwartz, & Boner, 1998; Terry, 1971). This claim was not evaluated in Wachholtz and Pargament study. Seventh, because the participants in the study practiced their meditation immediately prior to completion of the dependent measures, the contribution of practice time was not assessed. Because meditation involves development across time, through practice, most theoreticians would agree that the enduring effects, rather than the immediate effects, are of most interest in clarifying meditation's positive outcomes. Eighth, the researchers did not measure pre- post-test anxiety, but just post-test anxiety. In order to best assess whether meditation practice

has affected anxiety, differences between pre and post meditation need to be demonstrated.

Lastly, the object of focus that defined the 'spiritual' meditation condition in the Wachholtz and Pargament (2005) was very specific to one religion. Thus, whether group differences were due to focusing on the Judeo-Christian conceptualization of a higher power or to the pan-religious dimension of spirituality that weaves through all religions is impossible to determine. Further, the 'spiritual' meditation condition in this study might be better described as is a 'religious' meditation condition. Contemporary use of the adjective 'spiritual' is more associated more with the 'transcendent,' and 'relatedness' qualities. 'Spirituality' has come to represent whatever people do to attain meaning in life, wholeness, interconnection with others, truth, and one's own inner potential (Zinnbauer, 1999). 'Religious' is more associated with the organized, social, and traditional dogma and practices of a particular religion. And so while it is possible that spirituality in this sense was manipulated in the Wachholtz and Pargament study, it is impossible to tease it apart from the Judeo-Christian religious framework it implied.

The present study was designed to overcome the limitations listed above while further investigating the importance of spiritual context in the attainment of beneficial meditation outcomes. To address these issues, we examined the effects of different focuses of meditation on pain tolerance, pain awareness, compassion and anxiety levels. Two meditation conditions were included to clarify whether previous findings were due to focusing on objects associated with more universal, pan-

religious aspects of spirituality (spiritual condition) or the more narrowly-defined aspects of a particular religion (religious condition). As in the Wachholtz and Pargament study (2005), a 'secular' meditation was included to control for positive affect. Instead of a self-referential object of focus for this condition, however, an other-focused attachment security meditation was used (attachment security condition). Participants focused on a neutral object in the last condition (control condition).

The first hypothesis was that those in the spiritual focus meditation condition would demonstrate higher tolerance for pain relative to those in the religious, attachment security and control meditation conditions. This was measured by how long participants could keep their hands in cold water during a cold-pressor task.

Previous research suggests that mindfulness meditation increases non-sectarian spiritual experiences (Astin, 1997; Shauna, Shwartz, & Bonner, 1998), and that spirituality increases the success of mindfulness (although very few studies have actually manipulated spiritual experience). Thus, our second hypothesis was that those in the spiritual meditation condition would demonstrate greater overall mindfulness as measured by shorter time to report first sensation of pain and scores on a mindfulness self-report measure.

Third, it was hypothesized that those in the spiritual meditation condition would demonstrate higher levels of compassion as measured by an implicit measure of compassion – a lexical decision task (which is less affected by social desirability and other biases of explicit measures of compassion). Specifically, people in the

spiritual condition would exhibit quicker recognition of compassion words and slower recognition of disgust words after being exposed to sad faces and disfigured faces.

Lastly, we hypothesized that those in the spiritual meditation condition would demonstrate a greater reduction in anxiety relative to the other conditions measured by pre- and post-manipulation measures of anxiety.

Method

Participants

A total of 50 individuals participated in the study (Mean age = 22.7, 25 males and 36 females). Participants were either undergraduate students from a large Midwestern university participating for course credit ($n = 39$) or community volunteers ($n = 11$).

Materials and Procedure

The experiment included three sections: pretest battery, two-week meditation training, and post-test battery. The pre-test packet consisted of the following measures:

Demographics Questionnaire. This questionnaire assessed age, gender and other demographic variables.

Mindfulness Attention Awareness Scale (MAAS). The MAAS (Brown & Ryan, 2003) is a 15-item scale assessing the extent to which a person is both aware and accepting of internal and external experiences. The measure includes items such as "I tend not to notice feelings of physical tension or discomfort until they really grab my

attention" and "I rush through activities without being really attentive to them." Chronbach's alpha in the present study was found to be .86.

Positive and Negative Affect Scale. The Positive and Negative Affect Scale (PANAS; Watson et al, 1988) consists of two 10-item subscales: positive affect and negative affect. Participants are asked to rate 20 feeling and emotion words such as "excited," "scared," "proud," and "ashamed." Both positive and negative scales showed high internal consistency in the present study: .87 for positive affect, and .84 for negative affect.

Daily Spiritual Experiences Questionnaire. Designed by Underwood and Teresi (2002), the Daily Spiritual Experiences Questionnaire (DSE) is a 16-item scale that measures how individuals perceive the transcendent in their daily life. Specifically, it assesses the frequency of spiritual experiences (e.g., "I feel deep inner peace"). Internal reliability was high ($\alpha = .90$) in this study.

Mysticism Scale. The Mysticism Scale (Hood, 1975) assesses an individual's "peak" or unusual experiences. The measure consists of 32 true/false items, and includes such items as "I have had an experience in which I had no sense of time and space" and "I have had an experience which left me with a feeling of awe." In the present study, Chronbach's alpha was .86.

Satisfaction With Life Scale. The Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffen, 1985) consists of five self-report statements that measure subjective well-being. The scale is said to evaluate the quality of one's life satisfaction in comparison to an internally-imposed, subjective standard rather than an

externally-imposed, pre-defined notion of life satisfaction. Items include "I am satisfied with my life" and "in most ways my life is close to my ideal." Reliability in the present study was = .85

State-Trait Anxiety Inventory. The State-Trait Anxiety Inventory (STAI; Spielberger, 1983) is a frequently used measure of anxiety. It is a self-report survey that assesses transient and stable mood states, and includes such items as "I feel calm" and "I am jittery." Only the state version of the scale was used in this study. Chronbach's alpha for the current study was .93.

Experiences in Close Relationships Scale (ECR). This is a 36-item self-report instrument designed to measure attachment-related anxiety and avoidance. Participants were asked to think about their close relationships without focusing on a specific partner, and to rate the extent to which each item accurately described their feelings in close relationships, using a 7-point scale ranging from "not at all" (1) to "very much" (7). Eighteen items tap attachment anxiety and 18 items tap attachment avoidance. The reliability and construct validity of the two subscales have been demonstrated in a wide variety of samples and in different languages (e.g., Brennan et al., 1998; Mikulincer & Florian, 2000). Alpha was found to be .88 in this study.

Religious Coping Scale of the Brief Multidimensional Measure of Religiousness/Spirituality. The Religious Coping Scale of the Brief Multidimensional Measure of Religiousness/Spirituality (Fetzer Institute, 1999) was used to assess participants' tendency to rely on religious practices when distressed. The scales includes such items as "To what extent is your religion involved in understanding or

dealing with stressful situations in any way?" and "I look to God for strength, support, and guidance". Chronbach's alpha in the present study was .68

Mental Health Inventory. The 30-item version of the Mental Health Inventory (MHI) assesses mental health status "during the past month." (Hays, Sherbourne, & Mazel, 1995). Items are rated on a frequency or intensity scale. The test produces a summary score of overall mental wellness, called the Mental Health Index. Among other items, the questionnaire asks "How often, during the past month, have you felt so down in the dumps that nothing could cheer you up?" and "How much time, during the past month, have you been a very nervous person?" Alpha for the present study was found to be .93.

Following completion of the pretest assessment questionnaires, participants were asked if they were willing to take part in the second stage – a two week meditation study. The length of 2 weeks was chosen to allow comparison to the Wachholtz and Pargment (2005) study. If they said yes, they were trained by the experimenter in the meditation practice. This included giving information about how to create a physical environment conducive to meditation, appropriate meditation posture using a chair (or other postures with which they were already familiar and comfortable), and common times to meditate. During training of the meditation technique, the following instructions were reviewed:

> "Once you have settled into your posture, you can begin the meditation practice and start timing. You will begin by simply counting your breaths up to 10. Mentally count each of your breaths on the exhale. Don't try to speed up or slow down your breathing, just let it occur naturally. If your mind wanders for ten seconds or more before you get to 10, start over at 1.

After counting 10 exhales, bring to mind the object of your meditation, the word you were given on the slip of paper. From this point on, mentally "say" the word in your mind on each *inhale* as you continue to count to 10 on each *exhale*. So in your mind, it would sound like this:

[Inhale]   "word"

[Exhale]   "1"

[Inhale]   "word"

[Exhale]   "2"

[Inhale]   "word"

[Exhale]   "3"

   …and so on.

After you reach 10, start back over with 1. Just as before, if you find your mind has been wandering for 10 seconds or more, start your counting over beginning with '1'."

Following the training, participants were randomly assigned to one of four experimental conditions: spiritual (meditating using the word "oneness"), religious ("almighty"), secure attachment ("affectionate"), or a control condition ("option"). They were each given a sealed envelope which contained a slip of paper with their word written on it. There were 15 participants in the spiritual meditation condition, 16 participants in the religious meditation condition, 15 participants in the attachment meditation condition, and 15 participants in the control meditation condition. These four conditions were not significantly different on any of the demographic variables.

The words for the different meditation conditions were chosen based on a pilot study conducted prior to the beginning of the actual study. Twenty-two participants, who did not take part in the actual study, were presented with 29 words, which were chosen in advance as potentially representing the various constructs (spirituality, religiosity, secure attachment). Among these candidate words, 6 were

potential spiritual words, 10 were potential traditional Christian religiosity, and 10 were potential secure attachment words. The participants were asked to rate the extent to which each word was related to each of three descriptions (i.e., spiritual, religious, attachment), using a scale from 1 (*not at all related*) to 7 (*completely related*).

Words with the highest fit scores in each category, which were also not highly rated in any other category, were selected (See Table 1 for means and standard deviations). Word selection was further filtered by ensuring that word frequency was constant across all meditation condition words. This was done by referring to the 1-million-word Brown corpus. Lastly, ANOVAs were conducted for each of the final words, ensuring that each was rated significantly higher in its respective content category than in the other content categories. 'Oneness' was chosen for the spiritual meditation condition, $F(2,19) = 6.39$, $p < .01$. 'Oneness' implies connection, unity, and transcendence or movement into a higher state of consciousness, consistent with lay and scientific meanings of the word 'spirituality' (Underwood et al., 2002; Zinnbauer, 1999). 'Almighty' was chosen for the religious meditation condition, $F(2,19) = 69.14$, $p < .01$. This word has an obvious tie to the Judeo-Christian religious framework. 'Affection' was chosen for the attachment condition, $F(2,19) = 60.92$, $p < .01$. Finally, because no potential control words used in our pilot study were as frequent used as the three experimental words, the word 'option' was chosen for the control condition. The word was face valid as a control word, had the same word frequency as the other words, and also started with a vowel.

Lastly, participants were given meditation manuals which included the instructions reviewed during the training and a diary to be completed at the end of each meditation session. For each diary entry, participants indicated their overall ability to focus while meditating, briefly described their subjective experience of the meditation session, and completed two filler questionnaires.

Within the first 2 days following the training session each participant was called to ensure comprehension of the meditation instructions and to encourage adherence. Participants were called a second time approximately one week later for the same purposes. Two weeks after the training session, participants attended a second and final appointment at the lab, during which the post-test battery was administered. This battery included: a compassion-related Lexical Decision Task, a cold-pressor task, and a battery of self-report questionnaires

Implicit-compassion was measured using a Lexical Decision Task. The measure of implicit compassion was administered using a lexical decision task modified specifically for the current study, based on previous similar tasks (e.g., Mikulincer, Gillath, & Shaver, 2002). The task was run on a Pentium IBM-PC, with an SVGA monitor, and was programmed using Superlab software (Christopher, 2001).

Participants were asked to identify whether a string of letters was a word or nonword as quickly as possible. Prior to each word being presented, one of three image primes was flashed for approximately 30 ms. The primes were chosen in a pilot study (Kemeny et al., in preparation) to elicit the sense of compassion,

compassion and disgust, or neither. For the compassion eliciting stimulus a face of a woman in tears was chosen. For the compassion and disgust eliciting stimulus a child's face with a tumor on his eye was chosen. Finally, for the neutral stimulus (neither compassion nor disgust), a women's face with a neutral expression was chosen. The presentation of the prime was preceded and followed by a 500 ms mask (a scrambled picture) to prevent the possibility of an afterimage remaining temporarily active in the peripheral parts of the visual system. This was followed, in turn, by the target letter string. Participants were asked to indicate as fast and accurately as possible whether they thought the letter string was a word by pressing either "1" (word) on the keyboard number pad or "3" (nonword). There were 80 target strings: 10 were compassion-related words, 10 were disgust-related, 20 were neutral words, and 40 were non-words. The words, like the primes, were chosen in a pilot study.

Reaction times (RTs) served as a measure of the accessibility of thoughts related to the target words- the quicker the RT, the higher the accessibility (e.g., Fischer & Bloom, 1979). Implicit compassion was specifically measured by assessing how quickly each participant could identify compassion-related words after seeing either the sad face or the disfigured face, and how long it took participants to identify disgust-related words after seeing these faces. If a compassion response was elicited by either of these stimuli, then compassion-related words should be relatively accessible and quickly identified as actual words. On the other hand, if compassion

was elicited by either of these stimuli, then disgust-related words should be relatively inaccessible and more slowly identified as actual words.

Cold-Pressor Task. A common stressor used to measure pain tolerance in the laboratory is the cold pressor (CP) task. The CP task uses cold temperatures to measure psychological and physiological reactions to pain. In this study, the CP apparatus consisted of cold-water kept at 2º C (36º F), ice, a screen separating ice from the area in which participants placed their hands, and a water circulation pump.

Participants were first screened for any exclusionary blood circulation difficulties. Participants were then asked to hold their non-dominant hand in the water, up to their wrist, for as long as they could tolerate. They were asked to report when they were about to put their hand in the water, when they first felt sensations of pain, and when they were ready to remove their hand. Pain awareness was measured by how long it took participants to report the experience of pain. The pain tolerance score consisted of the total time participants held their hand in the water.

After completing the cold-pressor task, participants completed the Session 2 questionnaire packet, which contained the questionnaires included in the first session packet (MAAS, PANAS, DSES, Mysticism Scale, SWLS, ECR, Religiosity Measure, and MHI), and then fully debriefed and thanked for their participation.

<p align="center">Results</p>

Preliminary Analyses

Prior to running the primary analyses, adherence to the 2-week meditation schedule was assessed for each participant. Participants who were identified as having

meditated for less than 10 of the 14 days were removed from the analyses. A total of 3 participants were removed for these reasons.

Next, using a Chi-Square analyses we tested whether age (younger, older) or gender (male, female) affected the distribution of participants in the different meditation conditions. To evaluate age, a median split was performed on participant age (younger group < 19, older group >= 19). No such differences were found either due to age, χ^2 (3) = .39, *ns;* or due to gender, χ^2 (3) = 5.90, *ns*.

Finally, to examine for possible effects of the various trait measures on the dependent variables we computed the correlations between the trait measures on time 1 and the dependent variables. As can be seen in Table 2, despite some nonsystematic findings, no pattern emerged from these correlations. Therefore, we decided not to include these variables in the rest of the analyses.

Pain Tolerance

A one-way Analysis of Variance (ANOVA) with meditation condition as the independent variable and time hand was kept under water during the cold-pressor task as the dependent variable was used to test the hypothesis that individuals in the spiritual meditation condition would demonstrate higher pain tolerance. This analysis did not reveal a significant main effect, F (3, 43) = .07, *ns*, suggesting that the different focuses of meditation did not affect people's pain tolerance (for Means and SDs see Table 3).

Mindfulness

A one-way ANOVA with meditation condition as the independent variable and time to first pain sensation as the dependent variable was used to test the hypothesis that individuals in the spiritual meditation condition would demonstrate higher pain sensation awareness. This analysis revealed a significant main effect for meditation condition, $F(3, 43) = 3.24$, $p < .05$.

A post-hoc analysis using Tukey's Honestly Significant Differences test revealed that individuals in the spiritual meditation condition reported pain significantly more quickly than those in the control condition, $Q = -8.62$. No other contrasts were significant. This suggests that these people experienced greater mindfulness (See Table 4 and Figure 1).

A repeated measure ANOVA with meditation condition as the independent variable, pre- and post-MAAS score (Brown & Ryan, 2003) as the within-subjects variable to test the hypothesis that individuals in the spiritual meditation condition would demonstrate higher overall mindfulness. This analysis did not reveal a significant interaction, $F(3, 41) = 1.37$, *ns* or a significant main effect, $F(1, 41) = .051$, *ns* (See Table 5).

Implicit Compassion

Only reaction times for trials consisting of a correct response were included in the analyses. Reaction times for each word-group (compassion, disgust, neutral, non-words), after each prime type (compassion, compassion+disgust, neutral) were averaged. A mixed design, 3-way ANOVA with meditation condition as the between-subjects variable, and word type, and prime type as the within-subjects variables was

used to test the hypothesis that those in the spiritual meditation condition would demonstrate higher relative implicit compassion as measured by quicker reactions times to compassion words and slower reaction times to disgust words after being exposed to the compassion eliciting and the compassion+disgust eliciting pictures. RTs were obtained for only a subsample of the participants.

The analysis revealed a significant main effect for word type, $F(3, 29) = 12.55$, $p < .001$. An examination of means reveals that it took participants longer to identify non-words as non-words relative to other word-types. The analysis also revealed a significant 2-way interaction between prime type and word type, $F(6, 26) = 3.61$, $p < .05$, which was qualified by a significant 3-way interaction among prime type, word type, and meditation condition, $F(18, 84) = 1.81$, $p < .05$.

With an alpha level of .05, a Tukey's Honestly Significant Differences test appropriate for this design was run to further examine the interaction ($q = 3.63$, $HSD = 18.03$). The four ways in which implicit compassion would reveal itself were assessed. For recognition time of compassion words following the sad face, analysis revealed that those in the religious condition recognized words faster than those in the spiritual and control conditions. For recognition time of compassion words following a disfigured face, those in the religious condition took significantly less time to recognize words than did both the attachment and control conditions. For recognition of disgust words following the sad face, participants in the spiritual condition and the attachment condition both took longer to identify disgust words following a sad face than those in the religious condition. Lastly, no significant group differences were

found for recognition time of disgust words following a disfigured face (See Table 6 and Figure 2)

State Anxiety

A repeated measure ANOVA with meditation condition as the independent variable and state anxiety scores before and after the two-week meditation practice as the within-subject variable, was used to test the hypothesis that individuals in the spiritual meditation condition would experience a greater decrease in anxiety than would those in the other meditation conditions. ANOVA results revealed no significant interaction, F (3, 41) = 1.44, *ns* (See Table 7).

Discussion

The hypothesis that individuals in the spiritual meditation condition would demonstrate the highest pain tolerance was not supported. Further, no differences between meditation conditions were found. This is in contrast to the findings of Wachholtz and Pargament (2005) who found that their 'spiritual' meditation led to increased pain tolerance. The present study went to lengths to account for the limitations of the Wachholtz and Pargament research, including not administering the DV immediately after meditation practice, including a secular control that was not self-focused, and including a neutral control in which participants meditated rather than simply relaxed. Thus the absence of this finding calls into question this finding reported by Wachholtz and Pargament. Nevertheless, the fact that none of the meditation conditions differed from the others suggests that the spiritual and religious

meditation manipulations used in this study may not have been as powerful as those used in the Wachholtz and Pargament research. This possibility is discussed below.

The hypothesis that individuals in the spiritual meditation condition would demonstrate stronger mindfulness as measured by pain awareness was supported. This is consistent with the interpretation that overall awareness increases as a result of the manipulated spiritual component. However, change in overall scores on a self-report measure of mindfulness did not parallel these results. This may be due to the fact that self-awareness of changes in attentive patterns necessarily comes later than the changes themselves. In spite of this discrepancy, the present study is the first to demonstrate that a spiritually-focused meditation may increase awareness of experience. This is an important first step in understanding the relationship between these two constructs.

The hypothesis that individuals in the spiritual meditation condition would demonstrate higher implicit compassion was also supported in one of the four implicit compassion measures.
Compared to other conditions, it took participants in the spiritual and attachment conditions longer to identify disgust words following a sad face than it did for those in the religious condition. While it is self-evident that meditating on a word associated with interpersonal attachment would reduce a disgust response to such a face, this is the first study of which the author is aware of to demonstrate that a spiritually-oriented meditation leads to such a compassion-consistent response. However, when it came to identifying compassion related words after a sad or

disfigured face, those in the religious meditation condition showed a compassionate response higher than most other groups. It is unclear what accounts for these findings. This effect may be due to the fact that most study participants had preexisting associations between the Christian-Judeo religious framework and compassion-related words. This is consistent with previous findings that meditation increases empathy and compassion (Shapiro, Schwartz, & Boner, 1998; Terry, 1971), but further suggests that meditation in a spiritual and religious context can facilitate an even larger positive impact on compassion.

The hypothesis that individuals in the spiritual meditation condition would report a greater reduction in anxiety was not supported. As with the results for pain tolerance, this finding is inconsistent with those of Wachholtz and Pargament (2005), and suggests that the potency of the manipulations was different in this study.

The lack of results as compared with the Wachholtz and Pargament (2005) study and the absence of a coherent pattern for several of the other self-report measures (e.g., neither the spiritual or religious meditation conditions reported higher scores on the DSES or the Mysticism Scale; those in the attachment security condition did not report higher scores on the ECR) may be due to several reasons. In our study, in the attempt to precisely control the manipulated content of the meditation conditions, single words were used. It may be the case that the objects of the meditations used by Wachholtz and Pargament led to bigger effect sizes because they used phrases (e.g., "God is Peace"). These phrases likely evoked more meaning and thus had more of an impact. Perhaps the most powerful distinction between the

two studies, however, is the fact that meditators in the Wachholtz and Pargament

(2005) research meditated immediately prior to the administration of the DVs. The

several null findings of the present study may mean that while a spiritual meditation

may have an immediate after-effect on pain tolerance and anxiety, changes that

endure beyond this time period have to come as a result of more than just two weeks

of meditating for 20 minutes a day.

Overall, two of our hypotheses were supported, suggesting that spiritual

factors such as context and object of focus are important in understanding beneficial

meditation outcomes. Although further research needs to confirm these findings, the

possibility that mindfulness is facilitated by a spiritual meditation has important

implications. Meditating with a spiritual focus is a different means of enhancing

awareness than has been used in most mindfulness research, in which participants

intentionally focus on one or more aspects of awareness. Practicing within a spiritual

context, or focusing on an object of spiritual significance, may indeed be a more

efficient route to increase mindfulness. It may also be the case that spirituality, as

manipulated in this study, and mindfulness are two aspects of a larger construct that

has yet to be identified in psychological research. Future research will need to clarify

these issues.

The possibility that a spiritual and religious meditation enhances compassion

has implications for those wishing to enhance this trait in themselves or others. In

addition to being appreciated as a virtue in itself, compassion has been correlated with

well-being, health, and longevity (Post, 2005). When appropriate, those in the helping

professions may wish to prescribe such an intervention for those with relevant interpersonal difficulties. In addition to other means to nuture this important trait, a spiritually- or religiously-oriented meditation may prove to be a useful supplemental treatment.

In spite of important findings, some drawbacks to the study are noted. Because of pragmatic constraints, participants began participation in the study within a 3 month time period in one semester. Because stress levels likely fluctuate as mid-terms and finals are given, the ability to find a significant effect on the anxiety measure was likely impacted. Future research along these lines should attempt to restrict the period in which measurements are made to control for this error variance.

Also, the sample used in this study was relatively heterogeneous. While most of the participants were university students, others were community volunteers. While this diversity may allow for increased generalizability to a broader population, the increased variability likely made it more difficult to detect the effect of the manipulation.

Despite these limitations, the current study is one of only a few that provides an analysis of the role of a spiritual context and object of focus on meditation. Meditation practices employed in many of the contemporary mindfulness-based treatment programs (e.g., Mindfulness-Based Cognitive Therapy [Segal, Williams, & Teasdale, 2002]; Mindfulness-Based Stress Reduction [Kabat-Zinn, 1982, 1990]), have removed many of these aspects for a variety of reasons. Some researchers

(Shapiro, 1994), however, have claimed that the time has come to introduce these components in the interest of scientific understanding and public health.

Further research is needed to answer the call to investigate the underlying mechanisms of meditation (Dimidjian & Linehan, 2003; Hayes and Wilson, 2003) and, more specifically, to clarify the role of spiritual context and object of focus. Although the current study provides preliminary support to the potential role of spiritual focus or context as a facilitator of meditation's positive outcomes, many other potentially influential components remain unexamined. The role of exposure, adaptive cognitive change, and increased acceptance of present experience are all potential powerful meditating mechanisms accounting for the beneficial outcomes of meditation. Also unexamined are environmental factors such as the effect of group practice, instructor characteristics, and personality differences in meditators themselves.

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Table 1. Means and Standard Deviations of Pilot-tested Words for the Meditation Conditions

	Religious Mean (SD)	Spiritual Mean (SD)	Attachment Mean (SD)
Descriptions	Having to do with the church (or synagogue or temple, etc.), religious doctrine, practices	Having to do with the spiritual, the psyche, the transcendent, the universe, divine	Having to do with affectionate close relationships, warm attachment, significant others
Potential Religious Words			
Bible	8.95 (.22)	5.29 (3.02)	3.10 (3.05)
God	8.71 (.64)	6.81 (2.54)	4.24 (3.65)
Almighty	8.29 (1.01)	5.91 (2.64)	2.00 (2.66)
Lord	8.52 (1.12)	4.67 (3.55)	1.86 (2.71)
Sacred	7.76 (2.26)	6.29 (2.65)	4.08 (3.31)
Heaven	8.67 (.66)	5.67 (3.09)	2.19 (3.01)
Worship	8.91 (.30)	4.43 (3.25)	2.71 (3.30)
Holy	8.48 (.93)	6.43 (2.46)	2.52 (3.27)
Sacred	8.00 (2.19)	6.29 (2.47)	3.91 (3.06)
Prayer	8.91 (.30)	6.19 (2.71)	2.33 (3.18)
Potential Spiritual Words			
Oneness	5.43 (2.52)	7.81 (1.69)	5.95 (3.11)
Being	5.29 (3.08)	7.48 (1.57)	5.10 (3.35)
Infinite	5.81 (3.36)	7.71 (1.76)	4.19 (2.99)
Spirit	7.38 (2.11)	8.48 (1.21)	4.91 (2.90)
Soul	7.91 (1.92)	8.33 (1.32)	5.62 (3.02)
One	4.67 (2.85)	6.67 (2.63)	4.19 (3.59)
Potential Attachment Words			
Romantic	1.76 (2.11)	3.29 (2.67)	8.62 (.92)
Loved	6.67 (2.56)	5.43 (3.22)	8.71 (.96)
Compassion	6.76 (2.05)	5.86 (2.78)	7.95 (2.06)
Intimate	4.24 (2.70)	5.67 (2.65)	8.24 (2.00)
Love	7.10 (2.34)	6.67 (2.63)	8.91 (.30)
Caring	6.81 (2.38)	5.48 (2.99)	8.33 (1.15)
Cuddle	.667 (1.32)	1.29 (1.90)	7.95 (1.75)
Secure	5.71 (3.07)	4.57 (3.22)	7.57 (1.60)
Affection	3.62 (2.22)	4.19 (2.96)	8.67 (.66)
Loving	6.76 (2.62)	4.76 (3.39)	8.29 (1.95)
Control Words			
Paper	2.05 (2.22)	.43 (.87)	1.00 (1.52)
Money	5.38 (2.97)	.76 (2.00)	1.62 (2.04)
Carpet	1.05 (1.86)	.67 (1.74)	.81 (1.75)

Table 2. Correlations between Dependent Measures and Personality Factors

	Overall Cold-Pressor Time	First Pain Sensation Time	Change in Anxiety	Sad Face/ Compassion Word	Sad Face/ Disgust Word	Neutral Face/ Compassion Word	Neutral Face/ Disgust Word	Disfigured Face/ Compassion Word	Disfigured Face/ Disgust Word
Mindfulness Scale	.016	.376*	-.152	-.018	-.026	.172	-.057	.073	.160
PANAS Positive	-.114	-.017	-.225	-.251	-.053	-.276	-.169	-.111	-.044
PANAS Negative	.097	-.086	.025	-.261	-.196	-.277	-.033	.029	-.214
Daily Spiritual Experiences	-.303*	-.234	.101	.416*	.360*	.377*	.398*	.111	.402*
Mystical Experiences	-.212	-.263	.002	.458**	.232	.422*	.419*	.127	.343
Satisfaction with Life	-.190	-.158	-.044	-.021	.122	-.057	.065	.196	.163
State Anxiety Inventory	.081	-.195	.559**	-.250	-.101	-.240	-.213	-.076	-.284
Attachment- Avoidant	.017	-.307*	.024	.316	.357*	.204	.157	.159	.201
Attachment- Anxious	.194	-.238	.050	.003	.016	-.006	.208	.016	.028
Religious and Spiritual Coping	-.157	.102	.002	.335	.479**	.217	.205	.168	.358*
Mental Health Index	-.175	.186	-.218	.354*	.299	.325	.234	.241	.386*

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 3. Means and Standard Deviations for Pain Tolerance Time

Total Mean (SD)	Spiritual Meditation Mean (SD)	Religious Meditation Mean (SD)	Attachment Meditation Mean (SD)	Control Meditation Mean (SD)
52.57 (45.26)	46.5 (31.0)	54.92 (27.25)	53.38 (74.39)	54.42 (30.78)

Table 4. Means and Standard Deviations for Pain Awareness Time

Total Mean (SD)	Spiritual Meditation Mean (SD)	Religious Meditation Mean (SD)	Attachment Meditation Mean (SD)	Control Meditation Mean (SD)
26.09 (16.68)	14.5 (6.5)	30.08 (21.29)	23.92 (8.25)	34.08 (19.79)

Table 5. Means and Standard Deviations for Mindfulness Attention Awareness Scale

Time of Testing	Total Mean (SD)	Spiritual Meditation Mean (SD)	Religious Meditation Mean (SD)	Attachment Meditation Mean (SD)	Control Meditation Mean (SD)
Time 1	3.76 (.66)	3.27 (.28)	4.00 (.67)	3.93 (.66)	3.81 (.66)
Time 2	3.78 (.70)	3.43 (.56)	4.10 (.66)	3.90 (.77)	3.60 (.66)

Table 6. Means and Standard Deviations for Implicit Compassion Task

Word Type	Prime Type	Total Mean (SD)	Spiritual Meditation Mean (SD)	Religious Meditation Mean (SD)	Attachment Security Meditation Mean (SD)	Control Meditation Mean (SD)
Compassion Word	Sad Face	241.28 (23.35)	252.55 (27.08)	226.9 (11.62)	239.91 (24.05)	247.9 (23.51)
	Neutral Face	242.14 (18.53)	249.18 (19.31)	238.41 (21.52)	242.64 (21.85)	238.68 (7.95)
	Disfigured Face	250.65 (22.19)	251.67 (11.72)	235.1 (15.19)	255.49 (28.680)	261.07 (21.51)
Disgust Word	Sad Face	256.25 (31.33)	268.45 (45.49)	240.44 (14.28)	264.38 (36.81)	251.66 (10.67)
	Neutral Face	254.65 (24.17)	261.38 (23.76)	244.19 (27.05)	253.97 (25.38)	260.56 (19.36)
	Disfigured Face	254.66 (22.9)	258.82 (22.19)	246.3 (23.5)	256.61 (28.97)	257.48 (14.86)
Neutral Word	Sad Face	247.3 (20.18)	266.71 (19.69)	232.49 (15.98)	245.02 (18.31)	247.41 (12.12)
	Neutral Face	245.14 (17.19)	256.99 (12.02)	231.95 (13.0)	246.85 (20.11)	246 (13.74)
	Disfigured Face	240.69 (15.46)	249.23 (13.38)	232.89 (13.93)	241.29 (20.11)	240.17 (8.79)
Nonword	Sad Face	276.51 (93.7)	288.39 (55.61)	240.06 (19.39)	309.24 (165.89)	264.71 (13.54)
	Neutral Face	278.56 (95.76)	291.09 (58.39)	242.84 (21.87)	312.76 (168.95)	263.45 (11.57)
	Disfigured Face	276.52 (92.24)	296.34 (76.33)	240.08 (19.89)	304.29 (156.3)	262.98 (13.08)

Table 7. Means and Standard Deviations for State Anxiety Inventory

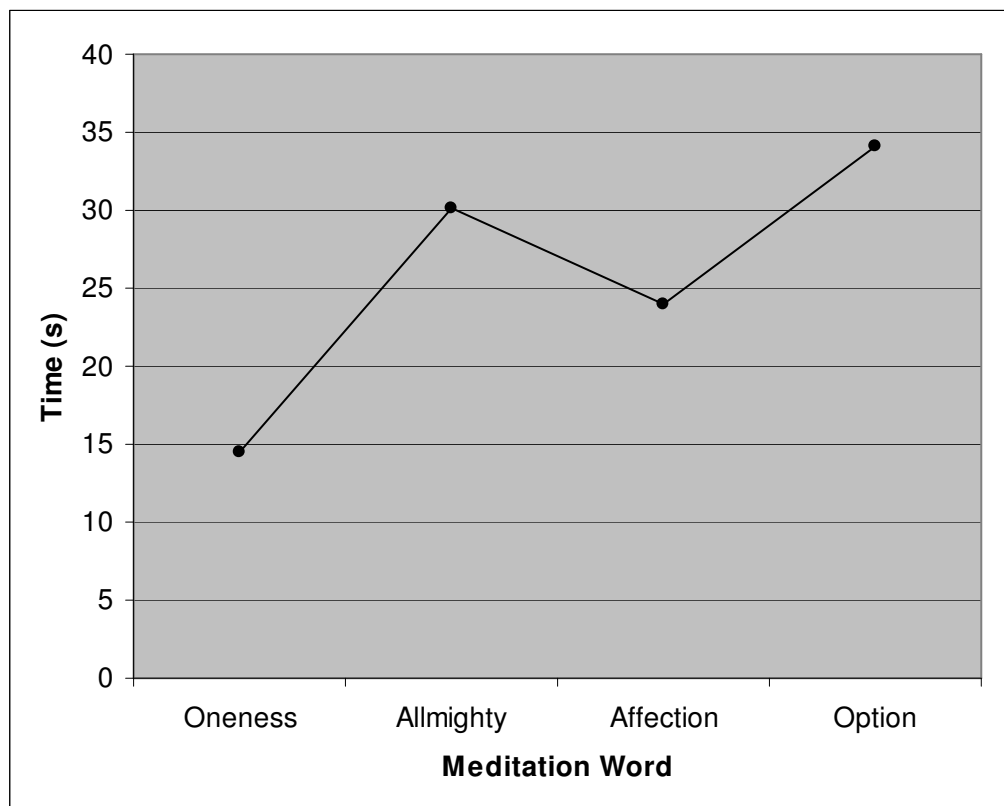| Time of Testing	Total Mean (SD)	Spiritual Meditation Mean (SD)	Religious Meditation Mean (SD)	Attachment Meditation Mean (SD)	Control Meditation Mean (SD)
Time 1	41.00 (9.05)	39.40 (5.19)	45.27 (12.77)	41.92 (7.91)	37.09 (7.56)
Time 2	41.11 (8.35)	42.80 (8.69)	43.45 (10.71)	39.15 (7.97)	41.11 (8.35)

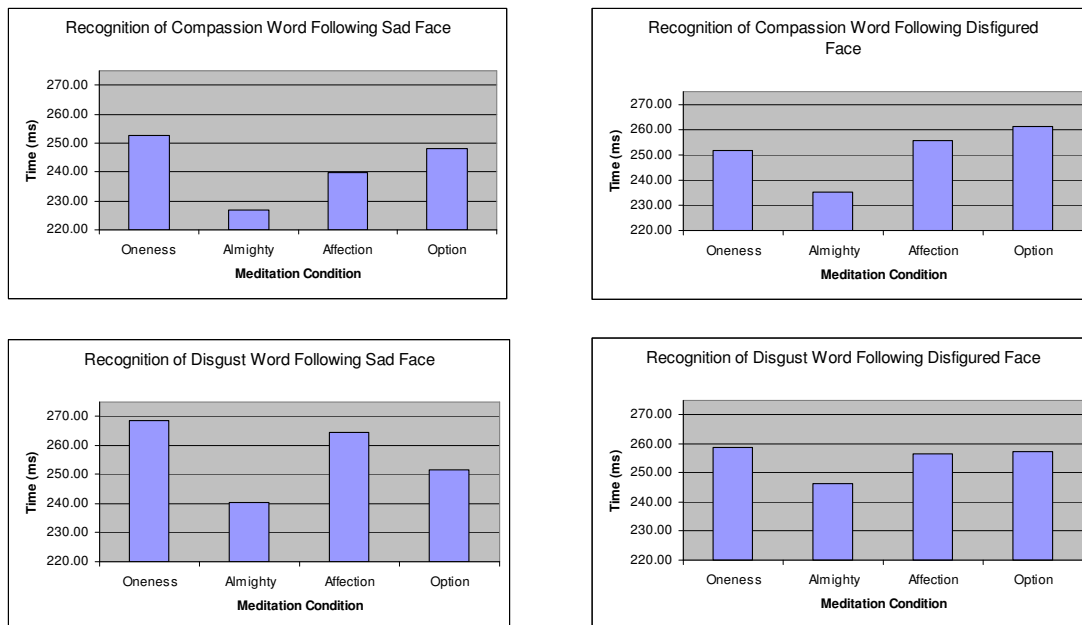Figure 1. Mean Times Until Pain First Reported During Cold-Pressor Task

Figure 2. Mean Word Recognition Times by Prime Type, Word Type, and Meditation

Word Condition