1994

The effectiveness of mindfulness meditation on reducing test-taking anxiety

Jeffrey Michael Griffin

Follow this and additional works at: http://scholarworks.lib.csusb.edu/etd-project
Part of the Education Commons, and the Psychology Commons

Recommended Citation
http://scholarworks.lib.csusb.edu/etd-project/488

This Thesis is brought to you for free and open access by the John M. Pfau Library at CSUSB ScholarWorks. It has been accepted for inclusion in Theses Digitization Project by an authorized administrator of CSUSB ScholarWorks. For more information, please contact scholarworks@csusb.edu.
THE EFFECTIVENESS OF MINDFULNESS MEDITATION
ON REDUCING TEST-TAKING ANXIETY

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
in
Psychology

by
Jeffrey Michael Griffin
June 1994
THE EFFECTIVENESS OF MINDFULNESS MEDITATION ON REDUCING TEST-TAKING ANXIETY

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

by
Jeffrey Michael Griffin
June 1994

Approved by:

Lynda Warren, Chair, Psychology

Gloria Cowan

Frederick A. Newton
Abstract

This study was conducted to examine the effectiveness of mindfulness meditation on reducing test-taking anxiety. The first hypothesis was that mindfulness meditation can reduce the cognitive aspects of test-taking anxiety. The second hypotheses stated that mindfulness meditation would reduce the somatic aspects of test-taking anxiety. Fifty-four subjects from two court reporting schools were used for this experiment. A Solomon-four group design was used for this experiment. The subjects were randomly assigned to either a 5-week training of mindfulness meditation or to a no-treatment control group. Mindfulness meditation was shown to be effective in reducing the somatic symptoms of test-taking anxiety but not the cognitive symptoms of test-taking anxiety.
Acknowledgments

I would like to thank my mom, Joan Vaughan, for the love and support she gives to me, even in the ways that she will never know.

I would like to also extend my appreciation to Lynda Warren, Ph. d. for her dedication and support, not only for this project, but for me as a student and as a person. Thanks also to Gloria Cowan, Ph. d. and Frederick A. Newton, Ph. d. for also helping with this project.

Finally I would like to thank Jerry, Bob, Mickey, Bill, Phil, and Brent for always being there when I needed them. "...at least I'm enjoying the ride."
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>iii</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>iv</td>
</tr>
<tr>
<td>List of Tables</td>
<td>vi</td>
</tr>
<tr>
<td><strong>INTRODUCTION</strong></td>
<td>1</td>
</tr>
<tr>
<td>Anxiety Reduction, Cognitive Therapy, and</td>
<td>4</td>
</tr>
<tr>
<td>Transcendental Meditation</td>
<td></td>
</tr>
<tr>
<td>Mindfulness and Mindfulness Meditation</td>
<td>11</td>
</tr>
<tr>
<td><strong>SUMMARY</strong></td>
<td>17</td>
</tr>
<tr>
<td><strong>METHOD</strong></td>
<td>23</td>
</tr>
<tr>
<td>Subjects</td>
<td>23</td>
</tr>
<tr>
<td>Materials</td>
<td>23</td>
</tr>
<tr>
<td>Procedure</td>
<td>24</td>
</tr>
<tr>
<td><strong>RESULTS</strong></td>
<td>26</td>
</tr>
<tr>
<td>Effects of Mindfulness Meditation on Cognitive Test-Taking Anxiety</td>
<td>29</td>
</tr>
<tr>
<td>Effects of Mindfulness Meditation on Somatic Test-Taking Anxiety</td>
<td>30</td>
</tr>
<tr>
<td>Correlation Between Time Spent Meditating and Test-Taking Anxiety Reduction</td>
<td>32</td>
</tr>
<tr>
<td><strong>DISCUSSION</strong></td>
<td>33</td>
</tr>
<tr>
<td><strong>Appendix</strong></td>
<td></td>
</tr>
<tr>
<td>A. The Cognitive-Somatic Anxiety Questionnaire</td>
<td>41</td>
</tr>
<tr>
<td>B. The Revised Worry-Emotionality Scale</td>
<td>43</td>
</tr>
<tr>
<td>C. Treatment Condition</td>
<td>45</td>
</tr>
<tr>
<td>D. Informed Consent</td>
<td>47</td>
</tr>
<tr>
<td>E. Debriefing Statement</td>
<td>49</td>
</tr>
<tr>
<td>F. Revised Informed Consent</td>
<td>50</td>
</tr>
<tr>
<td><strong>References</strong></td>
<td>52</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table | Page
---|---
1. Means and Standard Deviations of scores on the Cognitive-Somatic Anxiety Questionnaire (CSAQ) and the Revised Worry-Emotionality Scale (RWES) | 28
INTRODUCTION

In 1977, the American Psychiatric Association made the following recommendation:

"The Association strongly recommends that research be undertaken in the form of well-controlled studies to evaluate the specific usefulness, indications, contraindications, and dangers of meditative techniques. The research should compare the various forms of meditation with one another and with psychotherapeutic and psychopharmacologic modalities." (APA, 1977, p. 134).

Meditation is one of the oldest forms of therapy (Walsh, 1992). The term "meditation" generally refers to a group of differing mental exercises which usually involve sitting quietly and/or focusing on virtually any simple external or internal stimulus (Smith, 1975).

The teachings and techniques of meditation are thousands of years old and derived from the philosophies of Zen Buddhism, Theravada Buddhism (Nyanaponika, 1972), and the Vedic tradition in India (Maharishi, 1969). Meditation does and did occur from a religious and/or spiritual framework, but Shapiro (1982) points out that the definition of meditation is noncultic and does not depend on any religious and/or spiritual framework to understand or use it.

Three different types of meditation are typically identified: a focus on the field (mindfulness meditation), a focus on a specific object within the field (concentrative meditation), and a shifting back and forth between the two (Shapiro, 1982). The techniques and process of meditation
encompass the idea that a person is not divided into two parts (mind, body), and it acknowledges that peoples' abilities are more than the sum of their parts.

Bankart (1990) has identified a major trend in psychological thinking that will have great significance for the future of psychotherapy. This is the demise of the traditional Western dichotomy between mind and body, and the adoption of the view that mind and body can no longer be conceptualized dualistically, but rather as interacting and interconnected. What this means to the future of psychotherapy is a shift away from the reductionistic values that characterize Western psychotherapeutic traditions to a more Eastern view which values concern for the whole over the systematic dissection of the individual. The increased attention and research done on meditation reflects this trend towards regarding the person holistically that is slowly gaining prominence in the therapeutic and scientific community.

In the literature, meditation has been mainly examined as an adjunctive procedure for psychotherapy (Kutz, Leserman, Dorrington, Morrison, Borysenko, & Benson, 1985; Kutz, Borysenko, & Benson, 1985). Kutz and his collaborators (1985) examined a 10-week meditation program on 20 patients who were undergoing long-term individual psychotherapy. The diagnosis of patients varied from severe narcissistic and borderline personality disorders to anxiety
and obsessive neuroses. The results of the study revealed that patients' self-ratings and their therapists' objective ratings showed a substantial improvement in most measures of psychological well-being upon conclusion of the meditation program with the largest changes in their levels of depression and anxiety. When the subjects were asked to rate the relative importance of the various components of the intervention strategy, eighty percent rated the daily experience of meditation as the most valuable factor responsible for their reported changes.

In the discussion of their results, Kutz and his collaborators (1985) reported that the major advantage of the combination of psychotherapy and meditation is the intensification of the therapeutic process. Through meditation, therapy is transformed into a daily activity. This essentially means that each individual becomes his or her own therapist. By focusing on certain areas of their own personal functioning, such as anxiety or depression, individuals come to know their own thought processes and their reactions to the environment. This is all rich therapeutic material which can then be processed immediately when coming to the therapy hour, thus making the time in the session more beneficial for client and therapist alike. Therefore, not only does the practice of meditation intensify the process of therapy, it also helps to make the
actual time spent in a therapy situation more useful and rewarding.

The more widely researched meditations are the concentrative meditations. Of the articles written on the effects of meditation, one particular type of concentrative meditation, transcendental meditation, has been the most frequently examined, especially its effects on anxiety.

Anxiety Reduction, Cognitive Therapy, and Transcendental Meditation

Anxiety can be conceptualized in terms of two modalities (cognitive and somatic) and as specific to a certain environment or situation (state anxiety), or as a pervasive or chronic feeling found across situations and environments (trait anxiety). The idea of viewing anxiety in terms of either somatic (physiological) or cognitive (thought processes) was introduced by Liebert and Morris (1967). Clinical psychologists also discuss anxiety from the standpoint of the context or focus of the anxiety. Thus one can have, for example, social anxiety, death anxiety, and/or one of the performance anxieties, such as test-taking anxiety.

Current approaches to treating anxiety can be divided into cognitive and somatic interventions that give relative importance to cognitive or somatic processes. The cognitive treatment of anxiety comprises a variety of cognitive-behavioral interventions including those proposed
by its most prominent proponents, Beck and Emery (1985) and Meichenbaum (1972). The main thesis of cognitive therapy is that when there is a disturbance in the mechanism of cognition (thinking), then there is a consequent disturbance in feeling and behavior. What cognitive therapy therefore posits is that a correction of a disturbance in thinking will relieve disturbances in feeling and behavior.

There are many strategies and techniques employed in the cognitive therapy of anxiety (Beck & Emery, 1985). Teaching a person to become aware of automatic thoughts helps the person see how thoughts produce, maintain, and intensify anxiety. Once the automatic thoughts are labeled and understood in terms of how they aid in producing anxiety, the cognitive therapist begins to help restructure the thinking process. The approach to this is threefold: analyze the faulty logic, generate alternative interpretations, and "decatastrophizing," i.e., "so what if it happens?" What comes out of the cognitive therapy intervention is a restructuring of the cognitions that have created the anxiety and a more realistic sense of how to perceive events and situations.

While the cognitive therapies focus directly on the thought processes, the somatic interventions deal more with the physiological responses of the individual. The somatic interventions include transcendental meditation (TM), systematic desensitization, biofeedback, and the many
pharmacological treatments. What is common to the somatic interventions, excluding the pharmacological treatments, is that the "relaxation response" (Benson, Beary, & Carol, 1974) is elicited. The "relaxation response" is characterized by an integrated hypothalamic response which results in generalized decreased sympathetic nervous system activity. In other words, the individual feels relaxed. Once this occurs, a more specific pattern of changes is superimposed upon the basic "relaxation response" as a function of the specific technique employed (Schwartz, Davidson, & Goleman, 1978). For example, systematic desensitization not only elicits the "relaxation response" in an individual, but it also helps systematically to reduce the anxiety felt in a certain situation, such as flying, by gradually introducing the anxiety-producing stimulus to the person while he/she is relaxed. The process continues until the individual can fully experience the situation without the anxiety usually experienced.

TM is a somatically focused intervention that has been used in the treatment of anxiety and physiological responses. TM was first introduced to the West by Maharishi Mahesh Yogi (Maharishi, 1969). TM involves sitting quietly and silently repeating a meaningless sound, known as a mantra, and concentrating on nothing, allowing the mind to drift. For example, a person will sit, with legs crossed, silently repeating the sound "ohm" over and over. This
procedure is reported to produce in its practitioner what is known as transcendental, or "pure" consciousness (Maharishi, 1969). This state is experienced as simply being aware of awareness itself.

Research on TM consistently reports its effectiveness in reducing physiological and autonomic arousal (Goleman & Schwartz, 1976; Morse, Martin, Furst, & Dubin, 1977; Orme-Johnson, 1973; Wallace & Benson, 1972; Benson et al., 1974). Morse, Martin, Furst, and Dubin (1977) examined the physiological aspects of TM. Forty-eight subjects were monitored for respiratory rate, pulse rate, blood pressure, skin resistance, EEG activity, and muscle activity. What the results suggest is that TM induces the relaxation which counteracts what Canon (1929) called the "fight or flight" state of arousal constantly stimulated today by our ever changing and complex society.

Another area of research has been focused on TM's effects on anxiety (Zuroff & Schwartz, 1978; Schwartz, Davidson, & Goleman, 1978; Eppley, Shear, & Abrams, 1989; Smith, 1975; Boswell & Murray, 1979; Throll, 1981; Goldman, Dormitor, & Murray, 1979).

Zuroff and Schwartz (1978) examined the effects of TM and muscle relaxation on trait anxiety, maladjustment, locus of control, and drug use. The researchers collected self-reported measures of trait anxiety, maladjustment, locus of control, and drug use before and after the 9-week
treatment period when subjects were either trained in TM or muscle relaxation. Assessments were made in the areas of background and personality variables, extent of arousal reduction, psychological maladjustment, and trait anxiety. Both behavioral and self-report measures on trait anxiety were used. On the self-report measures of trait anxiety, the subjects who were given the TM treatment reported steady decreases in anxiety, whereas the scores on the other two groups (muscle relaxation and control) remained unchanged. The results found that TM can reduce trait anxiety, but it has not been shown to be of value in inducing general personality change. There have been other studies as well which have cited the ineffectiveness of TM in eliciting change in people.

Smith (1976) has argued that TM is no more effective in decreasing anxiety than sitting quietly. His experiment, however, only measured state anxiety. Forty-nine subjects were randomly assigned to either the treatment group where they learned TM, or to a control group where they were instructed in an exercise that simulated meditation but involved sitting twice daily rather than meditating. In a pre-posttest design, the subjects were given the State-Trait Anxiety Inventory (STAI) A-Trait Scale and the Epstein-Fenz Manifest Anxiety Scale, among other numerous supplementary measures. The results suggested that TM and sitting quietly are equally effective in reducing state anxiety. Smith
commented that while TM may have state anxiety reducing potential, it may have little potential for reducing the enduring predisposition to behave anxiously (trait anxiety). The results of Smith's (1976) research are in conflict with Zuroff's and Schwartz's (1978) findings. Smith's study is weakened by the high dropout rates (59% for TM group, 53% for control group) of his subjects, but it does cast some doubt on claims that TM has specific treatment effects on anxiety. It is interesting, however, that the research before and after Smith's (1976) study have been consistently positive regarding TM's usefulness in treating anxiety.

Schwartz and his colleagues (1978) studied the effects of meditation and exercise on reducing anxiety. The meditation practice used by some of the subjects was what the researchers called "a form" of transcendental meditation where the subjects were to attend to and count their breathing. The experiment consisted of seventy-seven subjects either practicing physical exercise or the meditation techniques. Anxiety was assessed by administering the Cognitive-Somatic Anxiety Questionnaire (CSAQ) to the subjects. The CSAQ items reflect both the cognitive (I imagine terrifying scenes) and somatic (My heart beats faster) aspects of anxiety. Unfortunately, there were differences on both measures of anxiety between the two groups before the intervention which renders interpretation of their findings difficult.
As expected, the data showed that subjects practicing physical exercise reported relatively less somatic and more cognitive anxiety than meditators. Meditators reported less cognitive and more somatic anxiety than exercisers. The meditation group and the physical exercise group, however, did report decreases on both the cognitive and somatic aspects of anxiety. The reason why this research did not find that somatic anxiety was significantly reduced by the meditation may be because the meditation technique used by some subjects was not TM, but rather a form of TM. These data do suggest, however, that specific components of anxiety may be differentially affected by different relaxation interventions. It is therefore concluded that different types of anxiety (cognitive, somatic) may be better treated by different intervention strategies which directly address the specific symptom of anxiety experienced.

Focusing treatment of anxiety on different aspects of anxiety is the way that many interventions have been developed so far. This approach, however, does not address the problem that individuals suffering from anxiety tend to experience both cognitive and somatic symptoms. It seems that an individual who suffers from both cognitive and somatic anxiety would best be treated by an intervention that addresses both types of symptoms.
Is there one intervention that can effectively deal with both forms of anxiety? To answer this question, this proposal re-examines the recommendation made by the APA (1977) in which it posits that all forms of meditation need to be researched. The more widely researched meditation is TM, while mindfulness meditation has, until recently, been overlooked.

**Mindfulness and Mindfulness Meditation**

Before discussing mindfulness meditation, a distinction must be made between the concept as used in mindfulness meditation and the construct of mindfulness developed by Langer (1989). Working within a social psychology paradigm, Langer defines mindfulness as the ability to create multiple perspectives and be aware of context. The mindful state of being implies the ability to create new categories, be open to new information, and be aware of more than one perspective.

Although Langer has not assessed the view of mindfulness in terms of self-reported experiences of anxiety, she and her colleagues have studied the relative benefits of mindfulness in some creative ways. Alexander and his colleagues (1989) examined the relationship between TM, mindfulness, and longevity in an experimental study with the elderly. Seventy-three subjects (mean age = 81 years) were randomly selected to be trained in TM, mindfulness in active decision making, or relaxation (low mindfulness
Mindfulness was taught in two ways. A guided attention technique was used where subjects were required to think of a word, take its last letter and find a new word beginning with that letter. The other way mindfulness was developed in the subjects was by asking them to think about any topic in new and creative ways. For example, subjects were asked to think about new and creative uses for common objects. This study was assessing whether a direct change in state of consciousness through specific mental techniques can extend life and reverse age-related declines. What the results showed was that the mindfulness group improved most in the variables of perceived control and work fluency, followed by improvements made by the TM group. The relaxation group reported feeling relaxed during the program, but some subjects stated that it was "peaceful but boring," while some in the mindfulness group stated that they felt "mentally stimulated." The results also showed that after 3 years following the experiment the survival rate for the subjects was 100% for the TM group and 87.5% for the mindfulness group followed by a lower rate (65%) for the relaxation group.

Langer (1989) states that our perceptions and interpretations influence the way our bodies respond. When the "mind" is in context, the "body" is necessarily in that context. To achieve a different physiological state, sometimes what we need to do is place the mind in another
context. This is the closest Langer comes to stating that
cognitive components of personality can have an effect on
the physiological responses of the body. She also states
that her work on mindfulness has been conducted almost
entirely within the Western scientific perspective and that
the Eastern teachings on mindfulness and mindfulness
meditation are beyond the scope of her research.

In contrast to Langer's definition of mindfulness is
the idea of mindfulness as it is encouraged in the practice
of mindfulness meditation. In this context mindfulness
refers to the ability to pay attention to the present
moment. Mindfulness meditation comes from the Theravada
Buddhism tradition, where it is known as satipattana
vipassana (insight meditation) (Nyanaponika, 1962). The
word satipatthana combines "sati" meaning "attention," and
patthana meaning "keeping present" (Nyanaponika, 1973).
Mindfulness meditation has three objectives: (1) to come to
know one's own mental processes, (2) to begin to have the
power to shape or control the mental processes, and (3) to
gain freedom from the condition where the mental processes
are unknown and uncontrolled, with the individual at the
mercy of the unbridled mind (Deatherage, 1975).

Mindfulness is developed in an individual through a
structured form of meditation. Practicing mindfulness
meditation begins with instructions to simply focus
attention on breathing and see what happens as the attempt
is made to keep it there (Kabat-Zinn, 1990). What usually occurs is the mind shifts attention away from the breathing and centers attention on other experiences such as thinking, feeling, hearing, or other sensory experiences. When this occurs, the individual is instructed, according to Kabat-Zinn, to acknowledge the shift and gently turn the focus of attention back on to breathing.

A core aspect of mindfulness, in the Eastern paradigm, is what Nyanaponika (1972) calls "bare attention." Bare attention is a non-value sensing of the events taking place in the mind and senses. No attempt is made to judge ideas, feelings, or thoughts. Instead the individual is taught to note the interruption in the observation of breathing and label each interruption with a neutral term such as "remembering," "hearing," "thinking," etc. Bare attention is a careful, systematic observation of all mental and physical activity with the purpose of coming to know one's own mental processes as thoroughly as possible.

By developing the sense of bare attention and continued non-judgmental acknowledgment of the senses, the "watcher self" is said to develop inside the individual (Deatherage, 1975). The watcher self is a neutral, objective observer of all that comes into the individual's awareness. Through the practice of formal mindfulness meditation, the watcher self, or the observing self as Deikman (1982) has termed it, is said to become stronger, thereby leaving the individual no
longer at the mercy of the unbridled mind (Deatherage, 1975).

The practice of mindfulness meditation has been recently introduced as a therapeutic technique by Kabat-Zinn (1990) who has reframed the practice into concepts and language that mainstream Americans can understand. For example, Kabat-Zinn states that the word "meditation" tends to be viewed as mystical hocus-pocus because of its association with strange cultures and languages unknown to Americans. He defines mindfulness meditation simply as a particular way to pay attention to the experiences of the present moment. He has also identified seven basic attitudes that serve to cultivate and maintain mindfulness in everyday living: non-judging, patience, beginner's mind, trust, non-striving, acceptance, and letting go.

To teach mindfulness meditation to patients at a stress reduction clinic at the University of Massachusetts Medical Center, Kabat-Zinn (1990) developed a 10-week intervention in which people are taught the formal and informal practice of mindfulness meditation and mindfulness when used with yoga. The program begins with having people simply trying to focus attention on breathing, and includes training in the formal practice of mindfulness meditation. Participants practice mindfulness meditation techniques for forty-five minutes a day, six days a week, for the 10-week period. The program has been studied for its effectiveness in the
reduction of anxiety and depression with encouraging results.

Kabat-Zinn, Massion, Kristeller, Peterson, Fletcher, Pbert, Lenderking, and Santorelli (1992) studied the effectiveness of the meditation-based program, developed by Kabat-Zinn, in the treatment of anxiety disorders. Twenty-two subjects were screened with a structured clinical interview and found to meet the DSM-III-R criteria for generalized anxiety disorder or panic disorder with or without agoraphobia. Assessments, including self-ratings and therapists' ratings, were obtained weekly before and during the meditation program and monthly during the three month follow-up period. Among the measures used to assess the subjects were the Beck Anxiety Inventory and the Hamilton Rating Scale for Anxiety. The results showed highly significant reductions in anxiety after treatment for twenty of the subjects. These changes were maintained during the period of training and at follow-up as well. The authors reported in a footnote to this article that a three year follow-up conducted with 18 of the 22 subjects in the study found that the low levels of anxiety reported shortly after treatment had been maintained.

Since the practice of mindfulness meditation has only been recently introduced in this country, there is as yet only limited research on its effectiveness in treating anxiety, but it has proven useful in the treatment of
chronic pain and as an adjunct to psychotherapy as previously discussed (Kabat-Zinn, Lipworth, & Burney, 1985; Kutz, Borysenko, & Benson, 1985; Kutz et al., 1985). More research is needed on mindfulness meditation's effectiveness in reducing anxiety to determine whether it will be effective with different types of anxiety and also to explore its effectiveness relative to that of transcendental meditation.

SUMMARY

What transcendental meditation and mindfulness meditation appear to share in common is the elicitation of the "relaxation response" (Benson et al., 1974; Kutz et al., 1985). They may have different effects on different components of anxiety, however, as a function of the different approaches they take to meditation. As previously discussed, research has shown the effectiveness of transcendental meditation on somatic and state anxiety (Goleman et al., 1976; Schwartz et al., 1978; Smith, 1976). Mindfulness meditation, in contrast, seems to address both the somatic and cognitive aspects of anxiety. While the "meditation" aspect of mindfulness meditation would elicit the "relaxation response" and lower somatic arousal, the "mindfulness" component is more directly concerned with becoming mindful of one's cognitions and observing the effect on one's body and mind. Therefore, mindfulness meditation is not just concerned with the
cognitive aspects or the somatic aspects of arousal (anxiety), but rather that both exist and are interconnected. This acknowledgment of the somatic-cognitive interconnectedness is what gives mindfulness meditation a potential advantage over other interventions that only acknowledge one aspect of arousal (cognitive or somatic) (Kabat-Zinn, 1985).

With regard to mindfulness meditation, there is only a small amount of research on this concept. However, the available research suggests that mindfulness meditation is effective in anxiety reduction. A comparison between transcendental meditation and mindfulness meditation suggests that mindfulness meditation may address more aspects of anxiety than transcendental meditation. Mindfulness meditation provides a promising intervention for use with people suffering from a variety of problems of anxiety. One such problem of anxiety that many students face is the problem of test-taking anxiety.

Students suffering from test-taking anxiety would seem to offer an excellent clientele to study the efficacy of mindfulness meditation in anxiety reduction. The educational system has become increasingly competitive, and the pressure to perform well on tests and examination creates a sense of fear and anxiety in many students (Hurwitz, Kahane, & Mathieson, 1986). This fear can be debilitating, making it nearly impossible for some students
to take tests effectively. Overcoming test-taking anxiety could mean for some students the difference in completing or dropping out of college with related implications for employability.

In the literature on the treatment of test-taking anxiety (Liebert & Morris, 1967; Morris, Davis, & Hutchings, 1981), anxiety has been broken down into two components: emotionality and worry. Worry is the cognitive expression of concern about one's own performance on a test. Emotionality refers to one's perception of the physiological-affective arousal of the anxiety experience. It includes feelings of apprehension, tension, rapid heartbeat, and general autonomic arousal.

Various approaches to reducing test-taking anxiety can be found in the literature. Allen (1971) examined the effectiveness of study counseling and desensitization in alleviating test-taking anxiety in college students. Seventy-five subjects were randomly assigned to one of two therapists, who provided training in a desensitization alone program, study counseling, a combination of study counseling and desensitization, or a placebo procedure. The results indicated that a combination of desensitization and study counseling was more effective in reducing physiologically measured anxiety and improving academic and examination performance than either technique alone.
Study skills training can be seen as a cognitive approach to the treatment of test-taking anxiety. Other cognitive approaches have been used to help the individual learn to focus on the test rather than to attend to interfering self-oriented responses (anxiety). Wine (1971) argued that "worry" cognitions distract the student from task requirements. This attention on negative consequences rather than on the test at hand results in poor performance.

Meichenbaum (1972) conducted a study on the cognitive modification of test anxious college students. The subjects in the treatment group were instructed in cognitive modification combined with an insight-oriented therapy designed to make test-anxious subjects aware of their anxiety-engendering thoughts. A modified desensitization procedure was used which employed coping imagery on how to handle anxiety and self-instructional training to attend to the task and not ruminate about oneself which can produce anxiety. The results showed that the cognitive modification procedure was effective in significantly reducing test-taking anxiety as assessed by test performance, self-reports, and grade-point average. Meichenbaum (1972) suggested that a multi-modal treatment that influences the individual's meaning system, internal dialogue, behavioral acts, and interpretations or behavioral outcomes would be most effective in treating test-taking anxiety.
Hurwitz, Kahane, and Mathieson (1986) examined the effects of biofeedback and progressive muscle relaxation on the reduction of test-taking anxiety. Thirty randomly assigned subjects were selected for the control group or one of two treatment groups where they were instructed on progressive relaxation and biofeedback training. The results indicated that the biofeedback and progressive muscle relaxation groups were effective in significantly reducing the emotionality component of test-taking anxiety. There were no significant reductions, however, in the worry component. This would follow since the interventions used are ones that focus only on the physical manifestations of anxiety.

Other general findings support the statement that behavioral interventions such as systematic desensitization, implosion, and even relaxation alone are effective in reducing the emotionality component of test-taking anxiety rather than the worry component (Allen 1971). Wine (1971) suggests that perhaps if these interventions had involved a more cognitive orientation, the worry component would have been significantly influenced as well.

To summarize the research on test-taking anxiety, it appears that current intervention procedures are effective in either reducing worry or emotionality anxiety, but not both. Therefore, some of the interventions for test-taking anxiety will work for people who are cognitively anxious,
while others will only work for people who are somatically anxious.

It appears that the logical next step in the development of interventions for test-taking anxiety is to find a strategy that deals with both the worry and emotionality aspects of anxiety simultaneously. Mindfulness meditation is one such intervention that acknowledges both the cognitive and somatic components of anxiety.

Since there is no literature that examines the relationship between meditation and test-taking anxiety, the current study was proposed to examine this relationship. The purpose of this study was to provide students who report they suffer from test-taking anxiety with a brief, highly structured intervention based on the program developed by Kabat-Zinn (1990). It appears that this program, which utilizes mindfulness meditation, would be able to address both the worry and emotionality aspects of anxiety simultaneously and more efficiently than any intervention currently in use. It was hypothesized that students receiving mindfulness meditation training would show a significant decrease in cognitive anxiety in a pre-posttest Solomon four-group design intervention as compared to students who would not receive mindfulness meditation training. It was also hypothesized that students receiving mindfulness meditation training would show a significant decrease in somatic anxiety in a pre-posttest Solomon
four-group design intervention as compared to students who would not receive mindfulness meditation training. Moreover, it was hypothesized that there is a significant correlation between minutes spent practicing mindfulness meditation per day and anxiety reduction.

METHOD

Subjects

Fifty-four subjects (49 Anglo-American women, 2 Hispanic-American women, 1 Asian-American woman, and 1 Anglo-American man), aged 26-47, who reported that they suffered from test-taking anxiety were used for this experiment. The subjects were enrolled as students at two court reporting schools in Southern California and had no previous meditation experience.

Materials

Two measures were used in this experiment. A modified version of the Cognitive-Somatic Anxiety Questionnaire (CSAQ) (Schwartz et al., 1978) was used to identify the cognitive and somatic aspects of test-taking anxiety (see Appendix A). The measure consists of 14 questions which the respondent rates on a scale from 1 ("This statement does not describe my condition at all") to 5 ("This statement describes my condition well"). The correlation between the cognitive and somatic scales of the CSAQ is $r = 0.42$. Schwartz et al. (1978) computed the correlations between the CSAQ and the Speilberger State-Trait Anxiety Inventory.
(STAI) (Speilberger, Gorsuch, & Lushene 1970), and it was observed that separate correlations between the cognitive and somatic scales of the CSAQ and the STAI were both highly significant ($r = 0.67$, and 0.40, respectively, for both $p < .001$).

A modified version of the Revised Worry-Emotionality Scale (RWES) (Morris et al., 1981) was used to identify worry (cognitive) and emotionality (somatic) components of test-taking anxiety (see Appendix B). This scale was developed and revised by the researchers and consists of 10 questions that the respondent rates on a scale from 1 ("This statement does not describe my condition at all") to 5 ("This statement describes my condition very well"). The internal consistencies (alpha coefficients) of the worry and emotionality scales are .81 and .86, respectively.

A few demographic questions, developed by the researcher, were included with the questionnaire. The questions include: sex, culture/ethnicity, minutes spent meditating per day, and a section for comments.

**Procedure**

Twenty-seven subjects were randomly assigned to the experimental groups and twenty-seven subjects were randomly assigned to the control groups. Subjects were obtained through solicitation from classes and a sign-up sheet which gave a brief description of the experiment and requirements to participate.
The researcher held short (5-10 minute) individual interviews with all interested subjects before the experiment began to ascertain if they were able to commit to treatment, if they were in good psychological health, and if they had previous meditation experience. The subjects who qualified were then randomly assigned to either the treatment groups or one of the two control groups. All subjects were treated in accordance with "Ethical Principles of Psychologists" (American Psychological Association, 1981).

The treatment condition was a highly structured 5-week training based on the program developed by Kabat-Zinn (1990) (see Appendix C). The meetings lasted approximately 1 1/2 hours per week. Subjects were administered the two scales assessing test-taking anxiety at specific times designated by the Solomon four-group design to which they were assigned. An informed consent sheet (see form D) was attached to the questionnaires and the subjects were asked to read and sign it then detach it from the questionnaires and give it to the researchers to ensure their confidentiality. A debriefing statement (see Appendix E) was also affixed to the posttest measures and given to all subjects when the posttest measures were administered. The subjects in the control conditions met two times corresponding to the first and last meetings of the experimental groups. One control group was asked to fill
out the pretest measures and the other was not, according to the Solomon four-group design. Both groups were then instructed to return in five weeks on a set date and time to fill out the two measures. The subjects were contacted by phone to remind them to come to the second meeting. Subjects in the control conditions did not receive the mindfulness meditation training but were debriefed about the procedure used in the treatment condition upon conclusion of the experiment. Subjects in the control conditions were given the option to receive the mindfulness meditation training upon conclusion of the experiment. Twenty-two of the control subjects were interested in and received the mindfulness meditation training upon conclusion of the experiment.

RESULTS

An experimental randomized between-subjects Solomon four-group design was used. Two groups received the mindfulness meditation training (simultaneously) and two groups did not receive the mindfulness meditation training (control groups). Two groups were pretested and two were not. The dependent variables were the subjects' posttest scores on two measures of cognitive test-taking anxiety and two measures of somatic test-taking anxiety.

Upon analysis of the data recorded from the two court reporting schools, similar results were obtained on the effectiveness of mindfulness meditation on the somatic
aspects of test-taking anxiety. Only small differences were obtained, however, between the schools on the analysis of the effectiveness of mindfulness meditation on the cognitive aspects of test-taking anxiety. Because of the similarity of results across locations and because the number of subjects from each location was only 27, subjects' scores were combined across locations, and all subsequent analyses were based on data obtained from the two locations.

The data were analyzed first in an analysis of variance (ANOVA). Table 1 shows the means and standard deviations for the cognitive and somatic scores on the CSAQ and RWES.

The lowest mean found was for the CSAQ cognitive test-taking anxiety scores of the posttested only subjects who received the mindfulness meditation training (X = 10.80). The highest mean was for the RWES somatic anxiety scores of the posttested only subjects who did not receive the mindfulness meditation training. As can be seen in Table 1, the means for all groups were relatively low, with a possible score range of 6 to 35, indicating that no respondents were reporting high levels of either cognitive or somatic symptoms of test-taking anxiety at posttest. More importantly, low means were obtained on both measures for the pretest scores. Means for pretest scores on the CSAQ for subjects receiving the training were: \( \bar{X} = 16.83 \) for the cognitive questions, and \( \bar{X} = 19.00 \) for the somatic questions. On the RWES, pretest means for the subjects
### TABLE 1

Means and Standard Deviations of Scores on the Cognitive-Somatic Anxiety Questionnaire (CSAQ) and the Revised Worry-Emotionality Scale (RWES)

<table>
<thead>
<tr>
<th></th>
<th>Pre and Post Test</th>
<th></th>
<th>Post Test Only</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Meditation</td>
<td>No Meditation</td>
<td>Meditation</td>
<td>No Meditation</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td><strong>SD</strong></td>
<td><strong>M</strong></td>
<td><strong>SD</strong></td>
<td><strong>M</strong></td>
</tr>
<tr>
<td>CSAQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Somatic</strong></td>
<td>14.17</td>
<td>4.84</td>
<td>13.58</td>
<td>4.12</td>
</tr>
<tr>
<td><strong>Cognitive</strong></td>
<td>13.42</td>
<td>4.58</td>
<td>13.83</td>
<td>5.27</td>
</tr>
<tr>
<td>RWES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Somatic</strong></td>
<td>12.50</td>
<td>5.44</td>
<td>12.58</td>
<td>3.73</td>
</tr>
<tr>
<td><strong>Cognitive</strong></td>
<td>12.17</td>
<td>4.28</td>
<td>12.42</td>
<td>3.58</td>
</tr>
</tbody>
</table>

Note: Means are for post-test only for all measures.

* Somatic scores had a possible range from 7 to 35.
* Cognitive scores had a possible range from 6 to 30.
receiving the training were: $X = 16.75$ for the cognitive questions, and $X = 18.25$ for the somatic questions. Subjects who did not receive the mindfulness meditation training reported pretest means on the CSAQ of: $X = 11.91$ for the cognitive questions, and $X = 13.83$ for the somatic questions. The pretest means of the scores of the control subjects for the RWES were: $X = 12.41$ for the cognitive questions, and $X = 13.41$ for the somatic questions.

**Effects of Mindfulness Meditation on Cognitive Test-Taking Anxiety**

The first hypothesis predicted that subjects receiving mindfulness meditation would score lower at posttest on two measures of cognitive anxiety than subjects not receiving the mindfulness meditation training. When analyzing the data from the CSAQ, there was no significant effect, $F(1) = 1.37$, $p = n. s.$, for the mindfulness meditation training on reducing cognitive test-taking anxiety. A second main effect also showed no significant differences between the subjects who were pretested or not, $F(1) = 2.04$, $p = n. s.$ The data obtained from the RWES showed similar results. There was no significant effect of mindfulness meditation on cognitive test-taking anxiety reduction, $F(1) = .705$, $p = n. s.$ Also, there were no significant differences as a function of whether the subjects were pretested or not, $F(1) = 335$, $p = n. s.$ For both measures of cognitive test-taking anxiety, there were also no significant
interaction effects, $F(1) = .545, p = n. s.$, for the CSAQ and, $F(1) = .301, p = n. s.$ for the RWES.

Although significant results were not obtained for the effectiveness of mindfulness meditation on reducing the symptoms of cognitive test-taking anxiety, comments from several subjects indicated that mindfulness meditation did have at least some positive effect on cognitions associated with test-taking. One subject reported that she was able to "remain focused for longer periods of time," and when she loses her focus, she was able to "refocus and bring the concentration back." Another subject reported that she was able to "concentrate for longer periods of time," and that she found the practice of mindfulness meditation a "very calming experience." Many subjects also reported that they expected to continue the formal practice of mindfulness meditation after the experiment was concluded.

Effects of Mindfulness Meditation on Somatic Test-Taking Anxiety

Support was obtained for the second hypothesis predicting that subjects receiving mindfulness meditation training would score lower at posttest on somatic test-taking anxiety than subjects who did not receive the training. Subjects receiving the mindfulness meditation training scored significantly lower on the RWES measure of somatic test-taking anxiety than subjects not receiving the meditation training, $F(1) = 5.57, p < .05$. A second main
effect of whether the subjects received the pretest measure or not was not significant, \( F(1) = 0.842, p = n.s. \)

Results obtained for the CSAQ measure of somatic test-taking anxiety were marginally significant for the effect of mindfulness meditation training, with meditation subjects scoring lower than subjects who did not receive the training, \( F(1) = 3.26, p < .08 \). A second main effect of whether the subject was pretested or not was not significant, \( F(1) = 0.664, p = n.s. \)

A significant interaction between meditation training (or not) and whether the subjects were pretested or not was found on both the RWES, \( F(1) = 4.18, p < .05 \), and the CSAQ, \( F(1) = 4.32, p < .05 \), measures of somatic test-taking anxiety. There were no posttest differences between meditation subjects and non-meditation subjects if they had been pretested. However, if they received only the posttest, then subjects receiving the meditation training were significantly lower on somatic test-taking anxiety at posttest than subjects not receiving the meditation training.

Because of the significant differences between meditation and control groups at pretesting on both measures, an analysis of covariance was completed in which the subjects' scores on the dependent variables were controlled for the effects of pretesting. In this analysis, a significant difference between meditators and control
subjects was found on the CSAQ measure of somatic test-taking anxiety, $F(1) = 11.35, p. < .05$, indicating that mindfulness meditation was successful in reducing subjects' levels on this measure of somatic test-taking anxiety.

Several subjects commented on the changes that occurred for them in relation to their somatic experiences of test-taking anxiety. Among the students that commented, one subject reported that before learning mindfulness meditation, she would "start shaking... my heart would pound..., and I would have a knot in my stomach," before taking a test. After learning the practice of mindfulness meditation, the subject reported that she "felt a lot calmer," and that the mindfulness meditation was "very relaxing." Another subject commented that "my body doesn't tense up as much and I am able to breathe and relax my body."

**Correlation Between Time Spent Meditating and Test-Taking Anxiety Reduction**

A third hypothesis examined the relationship between minutes spent meditating and test-taking anxiety reduction. It was expected that subjects who spent a greater amount of time practicing mindfulness meditation would experience the greatest test-taking anxiety reduction. A correlation analysis, however, provided support for this hypothesis only for the CSAQ measure of somatic test-taking anxiety, $r. = .30, p. = .06$. Other correlations obtained between
meditation time and the measures were: (CSAQ - cognitive): \( r = .058, p = \text{n. s.} \); (RWES - somatic): \( r = .216, p = \text{n. s.} \); and (RWES - cognitive): \( r = .183, p = \text{n. s.} \).

**DISCUSSION**

It was hypothesized that mindfulness meditation would be successful in reducing cognitive and somatic symptoms of test-taking anxiety. It was also hypothesized that there would be a correlation between time spent meditating and test-taking anxiety reduction. The data obtained in this experiment produced support for the effectiveness of mindfulness meditation in reducing the symptoms of somatic test-taking anxiety but not the symptoms of cognitive test-taking anxiety.

In this research, mindfulness meditation was shown to significantly reduce symptoms of somatic test-taking anxiety on both the CSAQ and the RWES. The reduction in somatic test-taking anxiety cannot be attributed to any effects of pretesting since an analysis of covariance controlling for this effect still yielded a significant reduction in somatic test-taking anxiety on the CSAQ for those subjects receiving the mindfulness meditation training. This finding supports the interpretation that mindfulness meditation is similar to transcendental meditation in its ability to elicit the "relaxation response" (Benson et al., 1974). The design of mindfulness meditation itself may be a reason for this finding. The subjects were asked to listen to and follow
along with a cassette recording developed by Kabat-Zinn (1990) which focused primarily on somatic anxiety. The structure of following along with the tape as well as the relative ease of being able to practice the meditation by following the tape may have helped subjects' abilities to decrease their levels of somatic test-taking anxiety. In the somatic area, the trainer's inexperience in teaching mindfulness meditation may have been balanced by the subjects' abilities to practice meditation by themselves with the use of the tape.

In this experiment, mindfulness meditation was not found to be successful in reducing the cognitive aspects of test-taking anxiety as measured by the CSAQ and RWES. A possible reason for this finding may have to do with the short period of time involved with the training of mindfulness meditation (5 weeks). This may not have been enough time to elicit changes in cognitions associated with test-taking anxiety. For example, the idea of acceptance of anxiety was discussed in the training. Acceptance of anxiety is the ability to accept the fact that taking a test can produce anxiety. Once acceptance of anxiety occurs, some subjects report a "lessening" of the crippling effects of anxiety and they are able to stay concentrated and more focused while taking a test. Acceptance of anything such as fear, loss, and/or anxiety is a process that requires time and patience. A person's ability to accept the fact
that anxiety can occur while taking a test may take more than five weeks to fully understand and integrate into one's cognitive schemas before it can change actual test-taking behavior. Therefore, even though mindfulness meditation directly addresses the cognitive aspects of test-taking anxiety, a short program of only five weeks may not be enough for people to fully benefit from its teaching.

Another possible reason for the ineffectiveness of mindfulness meditation on reducing the cognitive symptoms of test-taking anxiety may have to do with the pretest scores. The pretest measures showed that the subjects' were not reporting high levels of cognitive test-taking anxiety before they received the training. Perhaps the subjects were not sufficiently cognitively anxious for mindfulness meditation to be shown effective in reducing cognitive test-taking anxiety.

The CSAQ and RWES measures themselves may be another reason for finding no significant cognitive test-taking anxiety reduction. The questions on the measures may not accurately reflect the cognitive test-taking anxiety experienced by court reporters. Questions such as "I feel like I am losing out on things because I can't make up my mind soon enough," (CSAQ) and "I feel regretful before/while taking a test," (RWES) may not have a substantial impact on court reporters cognitive test-taking anxiety before they enter a testing situation. A possible solution for this
problem is to create a measure of cognitive and somatic test-taking anxiety developed specifically for the court reporter population. A questionnaire developed particularly for this population may be able to more accurately reflect court reporters levels of cognitive and somatic test-taking anxiety.

The inexperience of the trainer may have to do with the results showing the ineffectiveness of mindfulness meditation on reducing the cognitive symptoms of test-taking anxiety. The trainer had practiced mindfulness meditation for one year prior to the experiment and had not run a mindfulness meditation training class in the past. The data obtained showing the ineffectiveness of mindfulness meditation in reducing the symptoms of cognitive test-taking anxiety may be due to the inexperience of the trainer in teaching the concepts associated with the cognitive aspects of the practice of mindfulness meditation.

Partial support was found for the third hypothesis which predicted that subjects who spent more time meditating would experience greater test-taking anxiety reduction. Because all subjects who received meditation training reported that they either spent the full required minutes meditating (45 minutes daily) or came close to fulfilling the time requirements of meditation practice (35 minutes daily) for this experiment, there was a restricted range in time spent meditating (35 minutes to 45 minutes daily).
This could limit the discovery of finding any correlation between time spent meditating and test-taking anxiety reduction. This finding may also be explained by the fact that it is not the amount of time spent meditating but rather the quality or amount of effort that the subjects put into the meditation practice. Commenting on their experiences, some subjects reported that their levels of somatic test-taking anxiety had been reduced, but at times they were only able to stay awake during the cassette recording of the meditation for a few minutes due to its calming and relaxing nature. This may indicate that it may be the amount of willingness to practice meditation that is useful for somatic test-taking anxiety reduction instead of the amount of time meditating.

There was, however, a significant correlation between meditation practice and the CSAQ measure of somatic test-taking anxiety. This finding may be due to the fact that by the very practice of just sitting or lying down and resting while listening to the tape helped the subjects to calm down and relax. Perhaps the time the subjects spent meditating was the only time of the day which they could take a "time out" for themselves and relax which could have aided in reducing their levels of somatic test-taking anxiety because they were more rested.

The focus of this experiment was the reduction of test-taking anxiety and its associated negative symptoms,
but an interesting phenomenon was reported by two subjects which seem to indicate that the opposite (increase of negative symptoms) occurred for them. One subject reported that she was able to recall a past traumatic experience that had been repressed and out of the field of her awareness before she began the practice of mindfulness meditation. Another subject reported that she became "evenly more severely depressed," after she practiced meditation. Not much research has been done on the relationship between meditation and the remembering of past traumatic experiences or emotions. In a recent article, Miller (1993) presented three case studies which detail the unveiling of traumatic memories and emotions through the practice of meditation. He reported that, in some instances, it appears that unresolved or repressed material from the past surfaces with its original intensity during the practice of mindfulness meditation. Hypotheses about the relationship of mindfulness meditation and the remembering of past traumatic experiences and emotions need to be researched and examined. One such hypothesis may be that the ability of mindfulness meditation to elicit the "relaxation response" lowers a person's defense mechanisms and coping responses, thereby enabling past traumatic episodes to come into conscious awareness. The possibility of a person remembering past traumatic experiences or emotions raises the issue of how critical informed consent is to naive persons considering
mindfulness meditation. As a result of the experiences reported by two subjects in the first group receiving training, the informed consent used in this experiment was changed to inform the subjects that the process of mindfulness meditation can bring up unpleasant feelings, memories, and/or thoughts (see Appendix F). Full informed consent is essential to meet the ethical standards that a person understand fully the possible dangers associated with the practice of mindfulness meditation.

There are several important implications for the practice of mindfulness meditation that emerge from this study. One implication is the effectiveness of mindfulness meditation in reducing somatic symptoms of test-taking anxiety in a relatively short amount of time. The highly-structured, short intervention could be implemented in the curriculum of court reporting schools to help the students deal with their somatic test-taking anxiety. The results obtained in this experiment may also generalize to a wider population of students and be shown to be effective in helping with their somatic test-taking anxiety as well. Programs and instructional classes on mindfulness meditation could be implemented in colleges and universities in order to help students deal with their symptoms of somatic test-taking anxiety. Another implication concerns the use of mindfulness meditation for addressing cognitive symptoms. While it may be that this type of meditation does not have
an effect on the cognitive aspects of anxiety, it may also be that a longer period of training would demonstrate that mindfulness meditation can reduce cognitive symptoms of test-taking anxiety.

An area for future research may be to lengthen the time of the mindfulness meditation intervention equivalent to the length of Kabat-Zinn's, Massion's, Kristeller's, Peterson's, Fletcher's, Pbert's, Lenderking's, and Santorelli's (1992) training and reinvestigate the relationship between cognitive test-taking anxiety and the mindfulness meditation practice. Their research was able to show significant anxiety reduction with a program of mindfulness meditation which was 10-weeks long and that used subjects who met full DSM-III-R criteria for one of the anxiety disorders. It is possible that mindfulness meditation is effective in reducing cognitive symptoms of test-taking anxiety when practiced over a longer time period with more anxious subjects than employed in the present research. Another fertile area of exploration may be to examine the relationship between mindfulness meditation and the recollection of past traumatic experiences and emotions. As yet, this area is relatively unexplored but of potential significance to all treatment interventions employing some form of meditation.
Appendix A

The Cognitive-Somatic Anxiety Questionnaire

Directions: Please rate the degree to which you generally or typically experience these symptoms when you are feeling anxious before/while taking a test. Please use the following numerical scale:

1. This statement does not describe my condition at all before/while taking a test.
2. The condition is barely noticeable before/while taking a test.
3. The condition is moderate before/while taking a test.
4. The condition is very strong; the statement describes my condition very well before/while taking a test.

____ I find it difficult to concentrate on a test because of uncontrollable thoughts.
____ My heart beats faster before/while taking a test.
____ I worry too much over something that doesn't really matter before/while taking a test.
____ I feel jittery in my body before/while taking a test.
____ I imagine terrifying scenes before/while taking a test.
____ I get diarrhea before/while taking a test.
____ I can't keep anxiety-provoking pictures out of my mind before/while taking a test.
____ I feel tense in my stomach before/while taking a test.
____ Some unimportant thought runs through my mind and bothers me before/while taking a test.
____ I nervously pace before taking a test.
____ I feel like I am losing out on things because I can't make up my mind soon enough.
____ I become immobilized before/while taking a test.
I can't keep anxiety-provoking thoughts out of my mind before/while taking a test.

I perspire before/while taking a test.
Appendix B

The Revised Worry-Emotionality Scale

Directions: To the left of each of the following statements, please indicate your feelings, attitudes, or thoughts as they are before/while taking a test. Please use the following numerical scale:

1. The statement does not describe my condition before/while taking a test.
2. The condition is barely noticeable before/while taking a test.
3. The condition is moderate before/while taking a test.
4. The condition is strong before/while taking a test.
5. The condition is very strong; the statement describes my condition very well before/while taking a test.

____ I feel my heart beat fast before/while taking a test.
____ I feel regretful before/while taking a test.
____ I am so tense that my stomach is upset before/while taking a test.
____ I am afraid that I should have studied more for the test.
____ I have an uneasy, upset feeling before/while taking a test.
____ I feel that others will be disappointed in me.
____ I am nervous before/while taking a test.
____ I feel I may not do as well on the test as I could.
____ I feel panicky before/while taking a test.
____ I do not feel very confident about my performance before/while taking a test.
Please indicate the following:

Age:____  Sex:___

Educational level - Freshman___  Sophomore___
Junior___  Senior___  Graduate___

Culture - African-American___  White___
Hispanic-American___  Asian-American___
Other___

Minutes spent meditating (per day) - ____________
Appendix C

Treatment Condition

The treatment condition was a highly structured 5-week training of mindfulness meditation based on the program of Kabat-Zinn (1990). In the training, the subjects were instructed on how to practice mindfulness meditation. They were taught the seven attitudes that help to cultivate mindfulness: non-judging, patience, beginner's mind, trust, non-striving, acceptance, and letting go.

The formal practice of mindfulness meditation begins with simply trying to focus attention on the breath and breathing. Kabat-Zinn (1990) suggests that one of the best places to focus on while breathing is the belly. When we focus on our breathing down in the belly, we are tuning into a region of the body that is below the agitations of our thinking mind and is intrinsically calmer. The subjects were instructed on how to breathe from the diaphragm and to pay attention to their breathing. They were instructed that when the mind interjects thoughts and feelings and/or the senses become heightened as they attempt to ascertain attention, to simply acknowledge the thought or sense, let it go, and gently shift their attention back to their breathing. The subjects were to practice this technique for increasingly longer amounts of time in the meetings (5 minutes the first session, 10 minutes the second session, etc.). They were also instructed to practice mindfulness
meditation individually for 45-minutes per day, six days a week using a mindfulness meditation tape that was distributed to them at the first meeting.

Subjects were also instructed on how to informally practice mindfulness meditation by simply being mindful of their breathing from time to time during the day, at any time, at any place.

The meeting time was spent engaging in the formal practice of mindfulness meditation for increasingly longer amounts of time as well as talking about personal experiences while practicing mindfulness meditation. The subjects in the mindfulness meditation group were asked to keep all instructions concerning the mindfulness meditation training strictly confidential so as not to contaminate the control groups.
Appendix D

INFORMED CONSENT

The experiment in which you are about to participate is designed to investigate the relationship between mindfulness meditation and test-taking anxiety. It is being conducted by Jeff Griffin, a graduate student in the M. S. Clinical/Counseling Psychology program, Lynda Warren Ph. d., Gloria Cowan Ph. d., and Fred Newton Ph. d. This experiment has been approved by the Institutional Review Board within Psychology of California State University, San Bernardino.

In this experiment, you will learn the practice of mindfulness meditation during a five-week period. The training sessions will be held once per week and last approximately 1 1/2 hours each. Please be assured that the practice is in no way harmful. There is no evidence that the practice of mindfulness meditation has any undesirable side effects or harmful consequences. Jeff Griffin will be the instructor/researcher for the mindfulness meditation sessions.

You will be asked to fill out two short questionnaires, once at the beginning of the first training session and once at the end of the last training session. Only questions pertaining to test-taking anxiety will be asked.

Please be assured that any information that you provide will be held in strict confidence by the researchers. At no
time will your name be reported along with your responses. All data will be reported in group form only. At the conclusion of this study, you will be able to receive a report of the results.

Please understand that your participation in this research is totally voluntary and you are free to withdraw at any time during the study without penalty, and to remove any data that you may have contributed.

I acknowledge that I have been informed of, and understand, the nature and purpose of this study, and I freely consent to participate. I acknowledge that I am at least 18 years of age.

Signed__________________________

Date_________________________
Appendix E
Debriefing Statement

This experiment was designed to investigate the relationship between mindfulness meditation and test-taking anxiety. There was no deception used in this study. The hypothesis being tested in the research was that the practice of mindfulness meditation would reduce symptoms of test-taking anxiety. Currently there is no literature on the relationship between mindfulness meditation and test-taking anxiety. Mindfulness meditation, however, has been shown to be effective in reducing anxiety in general as well as helping individuals who suffer from chronic and constant pain.

If you wish to receive the results obtained in this study, please contact the Psychology Department (phone # 909-880-5570) after May 1, 1994. If you have any questions regarding this study, please contact Lynda Warren, Ph. d. through the Department of Psychology, California State University, San Bernardino (phone # 909-880-5580).

Thank you for participating in this study.
Appendix F

Revised Informed Consent

The experiment in which you are about to participate is designed to investigate the relationship between mindfulness mediation and test-taking anxiety. It is being conducted by Jeff Griffin, a graduate student in the M. S. Clinical/Counseling Psychology program, Lynda Warren, Ph. d., Gloria Cowan Ph. d., and Fred Newton, Ph. d. This experiment has been approved by the Institutional Review Board within Psychology of California State University, San Bernardino.

In this experiment, you will learn the practice of mindfulness meditation during a five-week period. The training sessions will be held once per week and last approximately 1 1/2 hours each. There is no evidence that the practice of mindfulness meditation has any undesirable side effects or harmful consequences. For some people, however, the practice of mindfulness meditation can bring up unpleasant feelings, memories, and/or thoughts. If this occurs for you, please inform the researcher (Jeff Griffin) immediately and appropriate recommendations will be made. Jeff Griffin will be the instructor/researcher for the mindfulness meditation sessions.

You will be asked to fill out two short questionnaires, once at the beginning of the first training session and once at the end of the last training session. Only questions pertaining to test-taking anxiety will be asked.
Please be assured that any information that you provide will be held in strict confidence by the researchers. At no time will your name be reported along with your responses. All data will be reported in group form only. At the conclusion of this study, you will be able to receive a report of the results.

Please understand that your participation in this research is totally voluntary and you are free to withdraw at any time during the study without penalty, and to remove any data that you may have contributed.

I acknowledge that I have been informed of, and understand, the nature and purpose of this study, and I freely consent to participate. I acknowledge that I am at least 18 years of age.

Signed________________________________________
Date________________________________________
References


