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Mindfulness-Based Stress Reduction for Clients at a University

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MINDFULNESS-BASED STRESS REDUCTION FOR CLIENTS AT A UNIVERSITY COUNSELING CENTER: A MULTI SITE CLINICAL TRIAL

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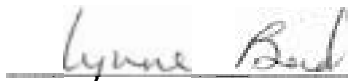

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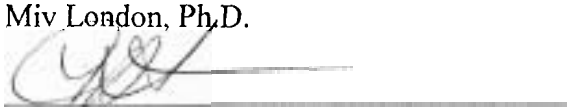

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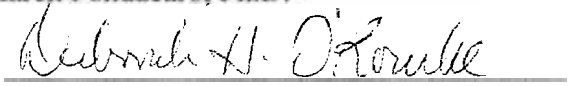

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ABSTRACT

Mindfulness-based interventions have been shown to effectively alleviate psychological suffering. The current study compares the effectiveness of a mindfulness-based intervention with an interpersonal support group and a no-treatment condition in relieving psychological distress. Participants in this study comprised 112 college students from two universities who contacted the University Counseling Center on their respective college campus to access mental health services. Clients completed written measures at 3 time points; pre- intervention, post-intervention, and at 6 months. The overall findings of this study indicate greater reductions over time in the mindfulness-based intervention on measures of anxiety, depression, academic problems, and increase in mindfulness skills compared to the interpersonal support group and no-treatment condition. Conversely, among participants in the interpersonal support group, findings reveal greater reductions in interpersonal problems. Further, results document a positive association between time spent in home mindfulness practice and change in mindfulness skills, and reductions in psychological distress. Mindfulness-based programs may prove to be a time and cost-effective intervention for addressing the needs of University Counseling Centers at a time when there is a shortage of mental health services.

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Table of Contents

Page

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

Introduction

In the last two decades mindfulness has received significant attention from the field of psychology as a promising clinical intervention. Mindfulness has been described as "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgementally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p.145). Thus, the concept of mindfulness refers both to the process of paying attention to the present moment as well as the attitude maintained while attending to one's experience. A number of programs that focus on training in mindfulness skills as a means to reduce stress, anxiety, and depression and increase emotional well-being have been developed (Hayes, Strosahl, & Wilson,1999; Kabat-Zinn, 1982, 2003; Segal, Williams, & Teasdale, 2002). These interventions offer didactic training in formal mindfulness meditation (formal practice) and discussions around how to bring a mindful attitude to many experiences in one's life (informal practice). Research demonstrates that mindfulness interventions can effectively reduce stress, anxiety, and depression (Baer, 2003; Bishop, 2002). There is also evidence that mindfulness interventions may be effective for decreasing medical symptoms and health-related distress for a range of medical conditions including chronic pain (Kabat-Zinn, 1982, Kabat-Zinn, Lipworth, & Burney, 1985), fibromyalgia (Kaplan, Goldberg, & Gavin-Nadeau, 1993), and psoriasis (Kabat-Zinn, Wheeler, Light, & Cropley, 1998). Despite the fact that research suggests mindfulness based programs may be a promising intervention for relieving distress, the many methodological flaws in investigations thus far has led several authors to be cautious in drawing conclusions about its efficacy (Baer, 2003; Bishop, 2002; Toneatto &

Nguyen, 2007). Accordingly, the present study investigates the effectiveness of a mindfulness-based intervention in increasing overall college adjustment in clients at a University Counseling Center (UCC). Specifically, the dimensions of college adjustment investigated include anxiety, depression, substance abuse, academic problems, and relationship problems. Given the dramatic increase in rates of mental illness and ensuing demand for services at University Counseling Centers (Kitzrow, 2003), such an investigation is timely. Although numerous studies have evaluated the efficacy of mindfulness based interventions for patients with a range of medical and psychological problems, there is a paucity of research on the effectiveness of such programs for treating college students at a UCC. Mindfulness based programs may prove to be a time and cost-effective intervention for addressing the needs of a UCC at a time when there is a shortage of mental health services.

The Concept of Mindfulness

The practice of mindfulness meditation is rooted in the Theravada tradition of Buddhist spiritual practices (Hanh, 1976). Also known as Vipassana, this 2500-year-old tradition has been explicitly and systematically articulated in many Buddhist texts, although, the importance of mindful living is emphasized in many spiritual traditions (Walsh & Shapiro, 2006). In the context of Buddhist practice, mindfulness meditation was taught as a means to cultivate greater awareness and insight (Hanh, 1976).

Mindfulness-based skills, as taught by Western researchers and clinicians, are typically taught independently of the religious and cultural traditions of their origins (Kabat-Zinn, 1982; Linehan, 1993). Kabat-Zinn argues that there is nothing intrinsically

Buddhist about paying attention and the Buddha's teachings are a sort of "universal generative grammar" (Kabat-Zinn, 2003, p. 145). He notes that interventions that teach mindfulness skills needed to be "free of the cultural, religious, and ideological factors associated with the Buddhist origins of mindfulness," as the programs' objectives are not to espouse Buddhism or even to teach people to become "great meditators" (Kabat-Zinn, 2003, p.148).

A group of eminent mindfulness researchers held a series of discussions to generate an operational definition of mindfulness (Bishop et al., 2004). They proposed a two-component model of mindfulness. The first component involves self-regulating attention so that it is maintained in the present and on the immediate experience. The second component involves the adoption of a particular orientation to experience, specifically, an attitude of non-judgment, curiosity and acceptance.

The first component, self-regulation of attention, involves bringing awareness to one's experience in the present moment, that is, observing and attending to the changing stream of thoughts, feelings, and sensations from moment to moment. The breath is a point of focus to anchor the awareness in the present. The client is directed to notice each object in the stream of consciousness (e.g., a thought), to discriminate between different elements of experience (a thought versus a feeling), and observe how one experience leads to another (e.g., a feeling leads to a critical thought and then the critical thought amplifies the unpleasantness of the feeling). However, rather than getting caught up in and elaborating upon the thoughts, worries, plans, feelings so forth that are entering one's

mind, mindfulness meditation practice involves a direct experience of the mind and body (Teasdale, Segal, Williams, & Mark, 1995).

The second component of mindfulness elucidated by Bishop and colleagues (2004) involves adopting and cultivating a particular orientation in mindfulness meditation practices. This involves bringing an attitude of curiosity about where the mind wanders when it drifts away from the breath. It also involves an open and inquisitive attitude about the different facets of one's experience at any moment, including thoughts, feelings, and sensations. A nonjudgmental and accepting stance towards one's experience is encouraged. This involves being open to the reality of the present moment as it is, and not trying to change how one is feeling or force a particular state such as relaxation.

Bishop and colleagues (2004) predict that adopting a stance of curiosity and acceptance may lead to reductions in the use of cognitive and behavioral strategies to avoid aspects of experience, and over time would lead to improved affect tolerance. Mindfulness teachings instruct clients to relate to their thoughts and feelings in a wider, decentered perspective, treating them as passing mental events rather than as accurate reflections of self or reality. Thus, if self-deprecating thoughts, such as 'I am worthless' or negative thoughts about the future such as 'I will always feel like this' (both frequently found in individuals experiencing depression) are recognized simply as thoughts, the student will be better able to disengage from them. It has also been suggested that mindfulness practice over time may lead to greater cognitive complexity and increased emotional awareness due to an increased ability to differentiate between discrete cognitive and affective experiences (Bishop et al., 2004).

In summary, when an individual adopts a mindful state, feelings, thoughts and sensations are observed with awareness as events in the mind, without attaching the meaning and interpretations that usually come from our mind and without reacting to these events in automatic ways. The process of observing and attending to thoughts as events without judgment is thought to allow a "space" between one's perception and one's response. This mindful space allows individuals to act with intention rather than react automatically (Bishop et al., 2004). Mindfulness has been conceptualized as a state that exists along a continuum from heightened levels of clarity to lower levels of automatic, mindless functioning (Brown & Ryan, 2003). Thus, everyone contains the inherent capability to be mindful, however, individuals differ in the regularity with which they maintain a mindful state of being.

Mindfulness Based Interventions

In the last two decades a number of programs have been developed that focus on training in mindfulness skills as a means to reduce stress and increase emotional and physical well-being. These can be grouped into: (a) interventions that are based primarily on mindfulness training including mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT), and (b) those that incorporate mindfulness training as one component of a larger intervention including acceptance and commitment therapy (Hayes, Strosahl, & Wilson, 1999), dialectical behavior therapy (Linehan, 1993), and mindfulness-based relapse prevention (Witkiewitz et al., 2005**)**. For the purpose of this paper, only interventions that are based chiefly on mindfulness-based training will be reviewed.

Mindfulness-Based Stress Reduction (MBSR). The most frequently cited mindfulness program is the mindfulness-based stress reduction program (MBSR) developed by Jon Kabat-Zinn. This program forms the basis for the current study's inquiry. Over 240 hospitals and clinics were offering MBSR programs as of 1997 (Salmon, Santorelli, & Kabat-Zinn, 1998). It was developed in a behavioral medicine setting for populations with a range of stress-related and chronic pain disorders. Its use has been investigated and supported for individuals suffering from chronic pain, fibromyalgia, psoriasis, cancer, anxiety disorders, and depression, and MBSR is now frequently used to reduce psychological morbidity associated with chronic illness and to treat emotional and behavioral disorders (Kabat-Zinn, 1998). The MBSR program is conducted as an 8-week group of between 10 and 30 participants who meet weekly for 2.5 hours, and have an all day session between week 7 and 8. Each session provides instruction and practice in particular mindfulness exercises, as well as facilitated discussions of stress, coping, and living mindfully. Instruction is offered in different forms of mindfulness meditation practice, such as sitting and walking meditation. Mindfulness of bodily sensations is taught through Hatha yoga postures and the body scan. Skills in mindful awareness during daily activities such as eating, social interactions, and stressful situations are also taught. All mindfulness training techniques share the goal of teaching participants to become more aware of thoughts, feelings, and sensations, and to change their relationship to them (Bishop, 2002).

For all mindfulness activities, group members are instructed to focus attention on the object of observation (e.g., breathing or walking or eating) and to be aware of it in

each moment. Participants are instructed that when cognitions, emotions, or sensations arise, they are observed but not evaluated as good or bad, or true or false. When the participant notices that the mind has wandered into thoughts, memories, or plans for the future, the nature or content of them is briefly noted, and then attention is returned to the present moment. Upon noticing a thought, participants may label it 'worry' or 'planning', and then return attention to the present moment. Development of mindfulness requires regular and repeated practice; thus participants are required to practice certain exercises, primarily meditation practice, mindful yoga, and applying mindfulness to situations in everyday life, outside group meetings for 45 minutes a day, six days per week.

Mindfulness can be thought of as a mode of awareness that is induced when attention is regulated in a specific manner while cultivating a nonjudgmental attitude (Bishop et al., 2004). Therefore, mindfulness is more akin to a state than a trait, because it is evoked when attention is regulated while cultivating an accepting and open orientation, and ceases when attention is no longer regulated in this manner. The capacity to evoke mindfulness is developed using various mindfulness meditation techniques, even though a state of mindfulness is not limited to when an individual is meditating. Attention can be regulated to evoke mindfulness in many situations, for example, eating a meal while attending to all of the sensations, such as taste, texture, and sound, associated with eating. In line with this a distinction has been made between formal meditation practice (e.g., sitting or walking meditation) and informal practice (e.g., being mindful when waiting in a queue at the bank).

Mindfulness-Based Cognitive Therapy (MBCT). The traditional MBSR training has been adapted to group cognitive therapy with the aim of decreasing depressive relapses in individuals who are diagnosed with major depression (Segal, Williams, & Teasdale, 2002). MBCT is a structured 8-week group intervention based largely on Kabat-Zinn's (1990) MBSR program. It deviates from the MBSR program by including elements of cognitive therapy that aim to develop a decentered view of one's thoughts. This decentered approach is also applied to emotions and bodily sensations. MBCT teaches clients to observe their depressogenic thoughts and feelings nonjudgementally, and to view them simply as mental events that come and go, rather than as aspects of themselves or as accurate reflections of reality (Teasdale et al., 1995).

Empirical Research on MBSR and MBCT

Recently Bishop and colleagues (2004) stated that the popularity of MBSR has grown in the absence of randomized controlled trials, although such trials have begun to emerge. Meta-analyses, controlled studies, and non-controlled studies that have examined the effectiveness of MBSR and MBCT in treating a number of conditions will be reviewed, followed by a discussion of the methodological limitations of research to date.

Meta-analyses. Recently, two meta-analyses of mindfulness-based interventions were conducted (Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004). Baer (2003) conducted a meta-analysis of 21 studies that clinically used the MBSR or MBCT program. The studies included in Baer's review treated conditions including anxiety, depression, binge eating, chronic pain, fibromyalgia, psoriasis, stress related to cancer, and medical and psychological functioning among non-clinical populations. Baer (2003)

found a moderate mean effect size (Cohen's *d*=.59). Half of the studies in this meta-analysis used pre-post designs with no controls while the other half used between-group designs with Treatment as Usual or waiting-list control groups. Baer noted significant methodological flaws in the current body of research, specifically, a lack of adequate control groups, small sample sizes, a lack of data concerning the integrity of the treatment, and a lack of data on the clinical significance of the interventions. Despite these limitations, she concluded that the current literature suggests mindfulness-based interventions may help to alleviate a variety of mental health problems and improve psychological functioning. She concluded that on the basis of the limited number of controlled studies, MBSR is "probably efficacious" (according to the standards of the American Psychological Association Division 12 Task Force on Promotion and Dissemination of Psychological Procedures; see Chambless et al., 1998).

Grossman and colleagues (2004) also conducted a meta-analysis of 20 studies, using somewhat different inclusion criteria, for instance, they included unpublished investigations in their analysis. Thus, only half of the studies overlapped with those in Baer's meta-analysis. Grossman et al.'s analysis examined two components of health: mental and physical. Mental health comprised constructs such as psychological well-being, depression, anxiety, sleep, and psychological components of quality of life, or affective perceptions of pain, whereas physical health was comprised of medical symptoms, physical pain, and physical impairment. Separate mean effect sizes were calculated for mental (Cohen's *d*=.54) and physical health (Cohen's *d*=.53). Grossman et al. (2004) similarly concluded that although these research findings are promising, they

must be weighed cautiously due to the small number of studies (particularly randomized studies), the diversity in participants' presenting problems, and the inclusion of unpublished investigations.

A more recent review of 15 studies (Toneatto & Nguyen, 2007) was less enthusiastic about the role of mindfulness interventions in reducing depression and anxiety. This review included published studies that examined depression and anxiety as outcome variables, and included 8 new studies that were not included in the above mentioned meta-analyses. The authors concluded that about one-half (8/15) of the studies reported a statistically significant reduction in anxiety or depression after MBSR. Of concern, they noted that none of the studies with positive findings included an active control group; positive findings were only found when waiting list or treatment-as-usual groups were used as control subjects. The authors conclude that it is difficult to attribute the reduction of symptoms of depression and anxiety to MBSR per se, given that a comparable intervention or nonspecific factors might have produced the observed benefits.

Adherence and practice effects. The importance of practicing the formal meditations outside of class has been hailed as necessary for the development of mindfulness skills (Kabat-Zinn, 2003). In her meta-analysis, Baer (2003) reviewed data on the extent to which participants engaged in home practice and whether this was linked to the benefits derived from the program. Only two studies in her review reported these data. In one study of women with binge eating disorder, participants engaged in a mean of 15.82 hours of practice over the 6 week course. Practice time was significantly related

to improvements in depression and binge eating (Kristeller & Halett, 1999). In another study, a sample of college students reported practicing meditation for an average of 30 minutes per day, 3.5 days per week (Astin, 1997). In contrast to Kristeller and Halett's (1999) study, practice time was not correlated with improvement on a measure of global psychological functioning.

At least three other studies have examined the extent to which practice was linked to outcomes. Shapiro, Schwartz, and Bonner (1998) conducted a study with medical and pre-medical students and found that practice time was positively linked to reductions in trait anxiety. In another study, the number of minutes meditated daily explained 15.5% of the variance in mood improvement as measured by the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971) (Speca, Carlson, Goodey, & Angen, 2000). The average total daily meditation time in the treatment group during the program was 32 minutes. Mixed results were reported by Ramel, Goldin, and Carmona (2004), who found that the amount of time meditating did not predict follow-up anxiety and depression symptoms, however, the amount of time meditating did significantly predict rumination, uniquely accounting for 15% of the variance in follow-up rumination. This sample reported a low level of meditation practice overall, on average one and a half hour per week. This limited amount of practice may have contributed to the mixed findings. In their review of the above studies, Toneatto and Nguyen (2007) called into question the role of mindfulness practice as the mechanism for symptomatic improvements, and called for future research designs to measure the practice of mindfulness during and between treatment sessions.

Controlled studies. A study with Spanish-speaking and English-speaking inner city samples at a community health center compared an intervention group of 68 patients (48 Spanish-speaking and 20 English-speaking) who were referred by a primary care doctor for a variety of medical and mental health problems to a control group of 18 Spanish-speaking patients who expressed interest in the program but were unable to participate and thus received no intervention (Roth & Robbins, 2004). The authors noted that most of the patients were also coping with the chronic stress associated with low socioeconomic status. Participants were assessed on health-related quality of life via the SF-36 Health Survey. Compared with the comparison group, the intervention group showed statistically significant improvement on 5 of the 8 health related dimensions of SF-36 Health Survey. Further, evidence indicated that participants used health care services less in the year following the intervention than in the year prior to intervention. These findings suggest MBSR may be a means of reducing health care costs. On the basis of this, Roth (2006) concludes that MBSR may be an effective health care intervention for low-income minority groups in the United States.

A group of cancer patients (N = 90) were randomly assigned to either an immediate MBSR treatment condition or to a wait-list control (Speca et al., 2000). The group was heterogeneous in type and stage of cancer, and participants' mean pre-intervention scores on stress and psychological symptoms were equivalent across groups, as were demographic factors. Results indicated that after the intervention participants in the treatment group had significantly lower scores on overall mood disturbance and on the subscales of depression, anxiety, anger, and confusion, and more vigor than control

participants as assessed via the POMS. The treatment group also had fewer symptoms of stress as measured by the Symptoms of Stress Inventory (Leckie & Thompson, 1979). These reductions were substantial; mood disturbances were reduced by 65% and symptoms of stress were reduced by 31%. This degree of reduction in total mood disturbance compares favorably with results of previous research using multimodal group psychosocial intervention and cognitive behavioral interventions. Further, the best predictor of improvement in total mood disturbance was average time spent doing home practice, and the best predictor of a reduction in stress level was the number of sessions attended. A six-month follow-up study indicated maintenance of post-treatment gains (Carlson, Ursuliak, Goodey, Angen, & Specca, 2001).

In another investigation 79 patients with fibromyalgia were randomly assigned to a modified mindfulness stress reduction program (Goldenberg et al., 1994). Two additional groups served as controls; one group (n =18) was enrolled in a wait-list control group, and another group (n = 24) served as a non-attention placebo control group that did not express an interest in mindfulness and received treatment as usual. Participants and controls were equivalent on fibromyalgia symptoms pre-intervention. Fibromyalgia symptoms improved in 67% of the participants in the mindfulness based intervention compared with 40% of controls. Improvement in psychological symptoms was also found, as evidenced by a 32% more decrease on the Global Severity Index of the SCL-90-R compared to controls.

A study of 27 veterans and non-veterans who completed an MBSR group were compared to a waitlist sample on depression and anxiety and rumination (RSQ; Nolen-

Hoeksema & Morrow, 1991) in a non-randomized design (Ramel et al., 2004). Participants had a high incidence of lifetime mood disorders. Results indicated the treatment group did not exhibit superior reductions in depression or anxiety, but did show significantly less tendency to ruminate following the intervention.

In another study, 39 patients diagnosed with chronic pain who participated in an MBSR were compared to eighteen patients in a waitlist comparison group (Sagula & Rice, 2004). The treatment group demonstrated significant reductions in depression and state anxiety, but no significant differences emerged when comparing groups on trait anxiety.

Non-controlled studies. The MBSR program originated out of the Stress Reduction Clinic at the University of Massachusetts Medical Center in 1979 (Kabat-Zinn, 1990) and was originally designed to treat chronic-pain patients who had not responded to traditional medical care. In 1982 Kabat-Zinn began to evaluate the effectiveness of this program on these patients with his first study involving 51 chronic-pain patients (Kabat-Zinn, 1982). Pain categories included lower back, neck and shoulder, and headaches. A pre-post test design was used, and at the end of the 10 week mindfulness meditation program, 65% of the pain patients reported a reduction of 33% in their overall pain. In addition, there was a significant reduction in negative affect, as measured by the POMS and in psychological disturbances, assessed via the Global Severity Index (GSI) of the Symptom Checklist (SCL-90; Derogatis, 1977). This study is limited by the lack of an active treatment or control group. A second study on 90 patients with mostly muscular-skeletal pain (Kabat-Zinn, Lipworth, & Burney, 1985) similarly found significant

reductions in pain from pre-intervention to post-intervention. Further, significant reductions in mood and psychological problems were noted, with the largest reductions in anxiety and depression. While the reductions in anxiety and depression were maintained through the follow-up period (2.5 to 15 months), pain returned to pre-intervention levels within 6 months in most cases. Once more, a lack of control groups limits these findings.

A subsequent study (Kabat-Zinn, Lipworth, Burney, & Sellers, 1987) of 225 chronic-pain patients, including those who participated in Kabat-Zinn's (1982; Kabat-Zinn, Lipworth, & Burney, 1985) original study was conducted. The intervention was an identical 10 week mindfulness meditation program, and participants were contacted anywhere from 2.5 to 48 months after treatment had been terminated. Overall psychological and mood disturbance were significantly improved at follow up, but similar to earlier findings, pain had returned to pre-intervention levels.

A sample of 136 heterogeneous patients with a variety of medical diagnoses, including chronic pain, hypertension, cancer, sleep disorder, anxiety, panic and depression, were enrolled in 12 different 8-week MBSR groups (Reibel, Greeson, Brainard, Rosenzweig, 2001). Results indicated that participants benefited in reports of health-related quality of life and physical and psychological symptoms. Alleviation of physical symptoms was indicated through a 28% reduction on the Medical Symptom Checklist, and psychological distress was reduced by 38% on the GSI of the SCL-90. In assessing the clinical significance of the results, the authors note that effect sizes on health related quality of life were small whereas moderate effects were found for the reduction in medical and psychological symptoms.

Mindfulness-based stress reduction also proved effective in reducing symptoms of fibromyalgia, a chronic illness characterized by pain, fatigue, and sleeplessness (Kaplan, Goldenberg, & Galvin-Nadeau, 1993). The 77 participants reported an 8.8% reduction in fatigue, and an 8% reduction in pain as measured by the visual analog scales for fatigue and pain, as well as a 37% reduction in the GSI of the SCL-90-R.

A study using mindfulness meditation for binge eating disorder showed reductions in anxiety and depression as well as a reduction in binge eating from four to 1.5 episodes per week (Kristeller & Hallett, 1999). Binge eating episodes were assessed using telephone assessments in addition to self-report measures, presumably increasing the validity of this data. Kabat-Zinn and colleagues (Kabat-Zinn et al., 1992) also conducted an evaluation of mindfulness-based stress reduction programs for 22 people who met criteria for DSM-III R for generalized anxiety disorder or panic disorder with or without agoraphobia. Thirty-five percent of the participants also had a diagnosis of a major depressive disorder. The average duration of the anxiety disorder prior to intervention was 6.5 years (range 3 months to 28 years). Results indicated that 20 out of the 22 participants showed marked improvement in their self-reports of both anxiety and depression as measured by the Hamilton Rating Scale for Anxiety (DiNardo & Barlow, 1988; Hamilton, 1959) and the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh 1961), and a significant decrease in the number of panic attacks. Clinician ratings also indicated improvement. There were no differences in outcomes between participants taking benzodiazepines (N = 3) and those who were not (N = 15), nor were there for those taking antidepressants (N = 5) versus those who were not (N =

15). These improvements were maintained at 3-month follow-up. A three-year follow up study, including 18 out of the 22 participants, indicated that gains were maintained on all indices, including, anxiety, number and severity of panic attacks, and depression (Miller, Fletcher, & Kabat-Zinn, 1995). Further, ongoing compliance was maintained with mindfulness meditation practice in the majority of the participants with 10 of the participants reporting continued formal practice, and 16 reporting informal practice, for example, awareness of breathing in daily life. However, the sample size was not large enough to allow examination of whether frequency of meditation practice was associated with reduction in anxiety symptoms. In this study, an additional group of participants (*n*= 39) who had met the screening criteria for the original study and who received identical treatment in the MBSR intervention showed reductions in anxiety on the SCL-90-R that were similar to those of the smaller group of intensively studied participants. The authors conclude these findings solidify the generalizability of the results. These results suggest that an intensive time-limited group-based mindfulness meditation program can have long-term benefits for individuals with anxiety disorders.

MBSR with college students. Several studies have examined the efficacy of MBSR in reducing stress and mood disturbance in non-clinical populations of college students. In one study, undergraduates were randomly assigned to either an 8-week mindfulness based stress reduction program or a non-intervention control group (Astin, 1997). Post-intervention, those students who participated in the program evidenced significantly greater changes in terms of reductions in overall psychological symptomatology compared to the non-intervention group. Specifically, the intervention

group evidenced a 64% reduction in the Global Severity Index of the SCL-90-R compared to a 14% reduction in the control group, and a reduction on seven of the subscales including anxiety (60% reduction compared to 10% reduction in the control group) and depression (59% reduction compared to 7% reduction in the control group). Changes were maintained during a 6-9 month follow-up period. Additional subjective benefits noted were a decrease in physical pain symptoms and an increase in sleep quality. In addition, participants in the MBSR program rated an increased sense of control in their lives and a greater capacity to accept or yield control in uncontrollable situations compared to controls. Participants' ratings of the importance and value of the program were consistently high, with a mean score of 9.3 on a 10-pt scale. Interestingly, levels of practice outside of the group were found to be unrelated to symptom measures.

Shapiro and colleagues (1998) conducted a randomized, wait-list control trial of MBSR in a group of premedical and medical students. Participants were matched for gender, race, and medical versus premedical status, and there were no significant differences between groups' pretest scores. Post-intervention the MBSR group reported significantly less depression and anxiety as measured by the SCL-90-R, and greater self reported capacity for empathy. They also found a significant effect of compliance with home practice assignments on trait anxiety, which suggests it is the mindfulness training itself that contributed to the outcome and not non-specific factors such as group support. Results of this study were replicated following the first mindfulness intervention, when the wait-list control participants were offered the same program.

Another study was conducted with medical students; however, in this study group assignment was not randomized; instead a group of medical students in a complementary class served as a control group (Rosenzweig, Reibel, Greeson, Brainard, & Hojat, 2003). As such, at pre-intervention baseline total mood disturbance as assessed via the POMS was greater in the MBSR group compared with controls. At the completion of the intervention period, the MBSR group scored significantly lower in total mood disturbance, as well as on Tension–Anxiety, Confusion–Bewilderment, Fatigue–Inertia, and Vigor–Activity subscales than the control group. The intervention concluded as students approached final examinations, which is typically a time of increased stress. The group of cohort controls demonstrated a marked increase in total mood disturbance at this time, whereas, in contrast, participants in the MBSR group demonstrated not only a significant decrease over baseline scores but also significantly lower, final total mood disturbance scores compared with controls. The authors propose this demonstrates the effectiveness of mindfulness training in helping participants maintain a stable level of anxiety over time, as opposed to escalating in response to stressors.

Together, these studies suggest that MBSR is a suitable intervention for college students. However, there is a paucity of research on the effectiveness of this intervention on students seeking mental health services and it remains to be seen if MBSR is effective among college students experiencing greater levels of psychological distress. Further, these studies are limited by the lack of an active control group. Such a control could indicate whether nonspecific factors such as therapists' attention, social support, and positive expectancy are accounting for the decreased distress.

MBSR for Non-Clinical Populations. A randomized controlled study was conducted with a nonclinical population of community volunteers to investigate if MBSR would decrease the effect of daily hassles, psychological distress, and medical symptoms (Williams, Kolar, Reger, & Pearson, 2001). Adults with self-affirmed stress were randomly assigned to an MBSR program or a control group that received educational materials and were encouraged to use community resources for stress management. Results indicated significant reductions in the impact of daily hassles in the intervention group compared to the control group, as assessed via the Daily Stress Inventory (Brantley & Jones, 1989). Overall psychological stress measured by the SCL-90-R decreased by 44% in the mindfulness treatment group whereas control group participants reported no significant change. Intervention participants also reported significantly greater reductions in medical symptomology than the psycho-education group. Results were maintained from post-test to three-month follow-up. One drawback of this study is the difference in number of therapist hours across the two treatments, with participants in the MBSR group receiving more therapist contact than the control group.

Shapiro, Astin, Bishop, & Cordova (2005) conducted a randomized controlled study of an MBSR program with health care professionals. The intervention group reported decreased perceived stress and greater self-compassion compared to the wait-list control group at the end of the intervention. Dissatisfaction with life, job burnout, and psychological distress were also reported to be diminished among the treatment group; however, changes were not significantly different from the control group. The authors conclude the non-significant findings may be attributable to the small sample size.

Meditation with substance abusing populations. Only one investigation into the role of mindfulness meditation in reducing substance abuse was located (Bowen et al, 2006; Marlatt et al., 2005). Although the intervention was not conducted in the form of a traditional MBSR program, it will be reviewed here because a variable of interest in the current study is substance abuse. The intervention consisted of a 10-day mindfulness meditation retreat. The structure of the retreat was conducted in the tradition of Vipassana practice, which includes waking up at 4 a.m and engaging in alternating periods of sitting and walking meditation until 10 p.m, with several short breaks interspersed throughout the day. Participants are in silence for the duration of the retreat. Participants included 309 inmates at a correctional facility. Eighty-eight individuals who chose to participate in the retreat were compared to 218 who did not, on multiple measures of substance abuse prior to the retreat, and three months after the retreat. Results indicated that participants in the retreat were significantly more likely to have lower weekly average drug use of marijuana, alcohol, and crack cocaine, lower drug abuse severity, as well as lower scores on impulses to use than non-participants at three months follow up.

Evaluation of MBCT. An MBSR program was used in combination with cognitive therapy, known as MBCT, in two investigations of individuals recently recovered from major depressive disorder to assess its efficacy in preventing relapse of depression (Ma & Teasdale, 2004; Teasdale et al., 2000). In two randomized clinical trials participants received either a mindfulness-based cognitive therapy intervention or treatment as usual. Results indicated that for patients who had previously experienced three or more depressive episodes, mindfulness helped to reduce relapse by half the rate

seen in the treatment as usual group. However, for individuals with two or fewer previous episodes, there was no difference in relapse between those in the mindfulness intervention and treatment as usual group (Ma & Teasdale, 2004; Teasdale et al., 2000). Although these studies were very well designed, it is impossible to draw conclusions about the effectiveness of mindfulness alone in preventing relapse of depression as its combination with cognitive therapy raises questions about which components led to change. In addition, a small trial by Kingston, Bates, Dooley, Lawlor, and Malone (2007) using a nonrandomized design was used to compare MBCT with treatment as usual for the treatment of residual depressive. They found a greater post-treatment reduction in depression scores on the Beck Depression Inventory among participants that had received the MBCT treatment.

Methodological Critiques of Mindfulness Evaluation Studies. In her review, Baer (2003) noted that despite the optimistic findings on the efficacy of MBSR in several populations, many studies have significant methodological weaknesses that prohibit strong conclusions. Kabat-Zinn also referred to research conducted to date as "first generation" exploratory studies (Kabat-Zinn, 2003). Research to date has been criticized for a lack of adequate control groups (Baer, 2003; Walsh & Shapiro, 2006) that makes it difficult to conclude that positive effects are due to mindfulness training rather than expectancy effects or contact with a therapist. Several researchers (Baer; 2003, Toneatto & Nguyen, 2007) noted that studies that used comparison groups used medical approaches or unspecified mental health approaches; this does not allow comparison of mindfulness training with other specific psychological approaches. To evaluate the

effects of any treatment requires that it be adequately administered (Kazdin, 1994). Ideally, this involves rigorous training and regular supervision of therapists and regular observation and review of their work. Baer (2003) noted that the studies evaluating MBSR do not describe the procedures used to train therapists or to evaluate their delivery of mindfulness treatment. The failure of research to evaluate the clinical significance of the effects of MBSR has also been raised (Baer, 2003). Future research should address whether participants fall within the normal range on relevant criteria after completing the program. This body of research has also been criticized for small sample sizes (Baer, 2003; Bishop, 2002; Kabat-Zinn, 2003) and there has been a call for future studies with sample sizes that will allow detection of medium to large treatment effects.

In MBSR programs the hypothesized primary active component is the ability to produce a state of mindfulness. However, to date, there is limited evidence that MBSR enhances participant's ability to evoke a state of mindfulness. Bishop (2002) noted that in the absence of research that supports MBSR as an intervention that increases mindfulness it remains possible that MBSR merely produces nonspecific benefits, such as increased self-efficacy or social support. He argues that if MBSR does not induce mindfulness then it becomes difficult to justify such a demanding program that requires almost an hour of homework everyday. Thus, research in the future should investigate whether mindfulness training produces observable increases in a state of mindfulness. Previous mindfulness research has also been hampered by the lack of reliable and valid measures of mindfulness. In the last couple of years, several such measures have been created (Brown & Ryan, 2003; Chadwick, Hember, Mead, Lilley, & Dagnan, 2005; Hayes and Feldman,

2004). Two studies have investigated if mindfulness skills training led to changes on measures of mindfulness. Using the Cognitive and Affective Mindfulness Scale (CAMS; Hayes & Feldman, 2004), one study indicated that mindfulness scores increased in a sample of individuals who completed an integrative therapy for depression that included a mindfulness component (Hayes & Harris, 2000). Similarly, using the Mindfulness Questionnaire (MQ; Chadwick, Hember, Mead, Lilley, & Dagnan, 2005), increases in mindfulness scores were found for participants following completion of an MBSR course. The major drawback with both of these studies is the questionable validity of the instruments used, as both yield only single factor scores. Recent analyses (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) into the various facets of mindfulness has indicated that a four or five factor structure best captures the experience of mindfulness, including observing, describing, acting with awareness, non-judging of inner experience, and nonreactivity to inner experience. There is some controversy around the final factor (Observe) as it has unexpected relationships with other constructs. Baer et al. recommend the use of the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004), a measure of mindfulness that comprises four factors: observing, describing, acting with awareness, and accepting without judgment.

Bishop (2002) proposes that an optimally designed study would consist of a three-arm trial, including an experimental group, an active control group that controls for therapeutic attention, social support, and positive expectancy, and a wait list or no-treatment control. In such a study, post intervention scores in favor of MBSR can then be attributed to the specifics of the intervention.

The current study addressed several of the methodological limitations identified in previous research. Specifically, the current study employed a three-arm trial comprised of an MBSR intervention, an interpersonal support group, and a no treatment control group. Further, a sample identified as large enough to detect medium effect sizes was used. Finally, this study used a four factor validated measure of mindfulness (KIMS; Baer et al., 2004) to investigate if mindfulness training increased the degree to which participants were mindful.

Mechanisms of Change: How do Mindfulness Skills Help?

Recently, there have been several discussions of the mechanisms that may play a role in leading to the benefits evidenced through mindfulness training (Baer, 2003; Walsh & Shapiro, 2006). It is important to consider mechanisms that may be particularly important in leading to change in indices of mental health relevant to a college population: anxiety, depression, substance abuse, and academic problems. These potential mechanisms include cognitive change, exposure, and arousal reduction.

Cognitive change. It has been proposed that the practice of mindfulness may lead to changes in thoughts or in attitudes about one's thoughts. Mindfulness teachings instruct clients to relate to their thoughts and feelings in a wider, decentered perspective, treating them as passing mental events rather than as necessarily valid reflections of reality or central aspects of the self. This perspective has been labeled distancing or decentering (Segal et al., 2002). Over time this is posited to lead people to change their relationship to their thoughts. The practitioner becomes less identified with his or her thoughts, simply noticing the event, as it is occurring, with acceptance. Thus, when an

anxious person begins to have a racing heart that sets off catastrophic thinking, a mindfulness based approach would encourage the patient to explore the feeling of a racing hear and related thoughts as they arise (e.g., "Heart beating… thinking I will die… always seems to beat faster when I think that… thinking about heartbeat… could be the pizza I just ate"; p. 154, Germer et al., 2005). They are to be recognized simply as thoughts, thus allowing the practitioner to be better able to disengage from them. Similar principles are believed to apply in explaining how mindfulness can help reduce depressogenic thinking (Teasdale, 1999). For instance, depressed individuals may begin to notice depressogenic thoughts and once they notice such thoughts redirect their attention to other aspects of the present moment, such as the breath or sensations in the body. This prevents depressogenic thoughts from further spiraling.

The nonjudgmental and present centered attitude encouraged in mindfulness is also purported to reduce ruminative thinking (Bishop et al., 2004). Mindfulness operates by encouraging the individual to disengage from one's train of thinking and come into the present moment, thus releasing the practitioner from ruminative thinking. Given that rumination is posited to play a central role in exacerbating negative affect and is associated with both maintaining and exacerbating anxiety and depression (Nolen-Hoeksema, 1991), this speaks to the potential for mindfulness training to be a powerful intervention for anxiety and depression. Two investigations have found that mindfulness training is associated with decreased rumination (Kingston, Dooley, Bates, Lawlor, & Malone, 2007; Ramel et al., 2004). The changes in cognitive style brought about by mindfulness training have been referred to by several authors as the development of

metacognitive awareness, that is, awareness of one's thinking processes and strategies (Bishop et al., 2004; Germer et al., 2005). Essentially, mindfulness is a process of gaining insight into the nature of one's mind.

Exposure. This mechanism is particularly important in explaining how MBSR may be helpful in reducing anxiety and substance abuse. It has been proposed that attempts to escape or avoid unpleasant feelings and internal states are involved in the maintenance of many forms of psychological distress (Hayes, Wilson, Gifford, Follette, & Strohasl, 1996). Individuals suffering with anxiety are believed to be especially fearful of internal states indicative of anxiety, such as palpitations or sweaty palms. While escaping these sensations may create immediate relief for the individual, this method of coping is not effective as a long-term strategy and, in fact, over time exacerbates symptoms of anxiety. Avoidance can also limit people's lives as they begin to avoid feared stimuli and have difficulty leaving their home or attending work. Mindfulness approaches encourage clients to give up attempts to avoid or escape unpleasant feelings (experiential avoidance strategies) and, instead, stay in contact with these unpleasant experiences, thus exposing themselves to the feared feelings. In addressing anxiety, a mindfulness approach encourages people to gradually turn their attention toward the fear, and explore it in detail, with increasing degrees of friendly acceptance (Germer et al., 2005). From this perspective, it is held that continued, nonjudgmental observation of anxiety-related sensations, without attempts to escape or avoid them, leads to reductions in the emotional reactivity elicited by anxiety symptoms (Kabat-Zinn et al. 1992), as levels of anxiety typically diminish over time.

The mindfulness practice of exposure is consistent with most of the effective psychological treatments for anxiety, including behavioral and cognitive behavioral treatments (CBT). They all aim to weaken the tendency to avoid, known as experiential avoidance, by exposing patients to feared stimuli (Germer et al., 2005). However, an advantage of mindfulness training is that traditional behavioral and CBT methods engage in techniques to elicit anxiety and panic in a treatment session, an experience that can be frightening and discouraging for many clients. In contrast, mindfulness works with anxiety that is naturally elicited. It has also been hypothesized that mindfulness training may be effective in reducing substance abuse by acting as an exposure based strategy that helps to foster acceptance of emotions and fear responses rather than avoidance (Breslin, Zack, & McMain, 2002). Thus, when the individual is exposed to negative affect and urges to use substances, and reacts to this with inaction, he or she is engaging in desensitization and the acceptance of unwanted feelings.

Arousal reduction. Kabat-Zinn and colleagues proposed that MBSR exerts its beneficial effects on a range of psychological and physical symptoms, including anxiety, depression and negative affect, through its capacity to reduce stress (Kabat-Zinn, 1990; Miller, Fletcher, & Kabat-Zinn, 1995). In conceptualizing stress, they borrow from Seyle's observation that there is a significant non-specific component to stress that he defined as the non-specific response of the body to any demand made upon it (1956). This model accounts for why MBSR may be helpful for such a heterogeneous population; it is targeting stress, which occurs in an array of diverse circumstances when a person appraises his or her environment as exceeding his or her resources and endangering his or

her well-being (Lazarus & Folkman, 1984). Specifically, Kabat-Zinn and colleagues propose that the experience of being aware in the present moment can short-circuit the flight or fight reaction characteristic of the sympathetic nervous system. Instead of engaging in a spiral of physiological and psychological hyperarousal when feeling threatened or stressed, through employing mindfulness the individual can adopt a more dispassionate, witness-like observing of the present moment. Miller et al. (1995) propose that being mindful of the present moment allows the individual to "respond" to potentially anxiety-producing situations with greater effectiveness rather than to "react" with increasing panic, which only contributes to feelings of loss of control. The importance of practicing these skills in times of low stress so that they can be transferred to in vivo situations of high stress is emphasized (Miller et al., 1995). Thus, mindfulness meditation may exert its effect through a change in physiological arousal.

The current study examined the effectiveness of mindfulness training on four dimensions of mental health adjustment in college; anxiety, depression, substance abuse, and academic problems. The purported role of mindfulness in facilitating change in each of these dimensions will now be reviewed

Anxiety. Of particular interest in this study is the ability of mindfulness training to relieve anxiety. Anxiety is currently the most commonly reported problem among college students. An analysis of change in client problems at a counseling center over 13 years indicated that whereas between 1988 and 1992 anxiety and stress were reported as a problem by only 36% of clients, this rose to 62% between 1996 and 2001, making it the single most commonly reported problem (Benton, Robertson, Tseng, Newton, & Benton,

2003). Anxiety is in many instances a healthy and adaptive emotion that keeps us out of trouble and alive. Thus, for people who develop disordered anxiety, the problem is not that they experience anxiety, for anxiety is ubiquitous and experienced by all individuals to varying degrees. Rather, the core underlying processes of disordered anxiety are: (a) a fear of experiencing negative affect, especially fear and anxiety, and (b) engaging in tremendous efforts to avoid fear and anxiety (Eifert & Forsyth, 2005). The anxious person lives a life focused on avoiding the discomfort of anxiety and fear. This manifests itself by an avoidance of people, places, activities, and situations that might lead to anxious and fearful feelings, the use of substances to minimize the occurrence of such feelings, and escape from situations during unpleasant emotional states.

Mindfulness-based approaches deal with anxiety by helping people to live satisfying lives even while experiencing anxiety and negative affect. Rather than seeking to avoid experiencing anxiety, a mindfulness perspective advocates that it may be better to learn how to cope with the anxiety that inevitably arises as we move through life. MBSR emphasizes learning to experience and live with anxiety, rather than controlling behavior and thoughts in order to reduce anxiety. Hayes and colleagues (Hayes, Stohasly, & Wilson, 1999; Hayes et al., 1996) suggest that a lot of the distress that we face comes from attempts to control or diminish our private events, such as thoughts and feelings. A mindfulness-based approach instead encourages the individual to experience the reality of the present moment and accept one's internal experiences rather than to change (Hayes et al., 1999). Mindfulness training instructs participants to step back and observe the flow of consciousness. This is posited to result in the recognition that each thought and feeling

reflects a mental event with no more inherent value or importance than what the individual awards it. Thus, there is a shift in perspective from automatically accepting the validity of any one thought to the suspension of commitment to any one thought or perspective. Similarly, affective states are not inherently "pleasant" or "unpleasant" but are merely observed as mental events. This would be expected to improve affect tolerance and decrease reactivity in the presence of emotional states.

Mindfulness training has been found to reduce anxiety in many studies with a wide range of samples (Baer, 2003). This study was designed to replicate these findings with a sample of college students at a UCC.

Depression. Mindfulness training has been posited to relieve symptoms of depression (Segal, Williams, & Teasdale, 2002). Cognitive vulnerability to depressive relapse is hypothesized to occur from the repeated associations between the depressed mood and the negative thinking patterns that accompany major depression (Segal, Williams, Teasdale, & Gemar, 1996). Thus, when an individual who has been previously depressed, but is not currently depressed, enters a mildly dysphoric mood, depressogenic thinking patterns are activated, which causes the dysphoric mood to become a moderate or severely depressed mood. If formerly depressed individuals were trained to become more aware of their negative feelings and thoughts during potentially vulnerable times, such as during a dysphoric mood, they could respond in ways that might allow them to disengage from the ruminating processing style that often accompanies depression (Nolen-Hoeksema, 1991). MBCT is designed to prevent depressive relapse by teaching formerly depressed participants to observe their thoughts, feelings and bodily sensations

non-judgmentally. Rather than viewing thoughts and feelings as true reflections of reality or true perceptions of themselves, participants are taught to view events as transitory. Such an approach is believed to mitigate the escalation of negative thoughts into patterns of rumination (Baer, 2003). Several investigators have proposed that the beneficial effects of mindfulness training on depression is mediated by a reduction in levels of rumination (Kingston, Dooley, Bates, Lawlor, & Malone, 2007; Segal et al., 2002. One study that examined this hypothesis identified a trend towards a decrease in levels of rumination following an MBCT intervention (Kingston et al., 2007).

It has been repeatedly established that mindfulness training is associated with subsequent lower levels of depression. Investigations conducted with a range of populations from cancer patients to college students found that people who participated in an MBSR program were less depressed afterwards (Astin, 1997; Kabat-Zinn et al., 1992; Miller et al., Kabat-Zinn, 1995; Shapiro et al, 1998; Speca, et al., 2000). Further, an intervention (MBCT) modeled very closely on the MBSR program has also proved to be effective in reducing depressive relapses in people who have had a history of three or more depressive episodes.

Substance abuse. Several researchers have offered convincing arguments regarding the potential effectiveness of mindfulness training in reducing substance abuse (Marlatt et al. 2004; Witkiewitz, Marlatt & Walker, 2005). The development of mindfulness skills can help prevent against relapse by increasing individual's conscious awareness of urges to use (Breslin et al., 2002). Marlatt and colleagues (2004) have proposed that through mindfulness techniques practitioners can learn that arising thoughts

and cravings are just that; they are mental events that come and go. They can learn to recognize these thoughts and cravings, and accept them and let them pass, without necessarily reacting to them. Because mindfulness skills encourage individuals to slow down and pause prior to reacting in the usual habitual manner, they can choose to engage in an alternative response rather than using substances. "In the context of addictions, mindfulness might mean becoming aware of triggers for craving…. and choosing to do something else which might ameliorate or prevent craving, so weakening the habitual response." (p. 189, Groves & Farmer, 1994). Ultimately, this heightened level of awareness of urges can stop substance abusers from engaging in the automatic drug action plans that are posited to lead often to a relapse. Further, over time this can lead to relearning the association between triggers such as negative affect and substance use. Repeated exposure to being mindful in high-risk situations without giving into the temptation to engage in substance use in the presence of substance related cues will lead to increased counterconditioning of the reinforcement previously associated with the effects of an addictive substance (Witkiewitz et al., 2005). In addition, mindfulness training may exert its effects through a reduction in thought suppression. Several studies have demonstrated that attempts to suppress thoughts about using substances may actually lead to increases in substance use, including alcohol and tobacco use (Palfai, Monti, Colby, & Rohsenow, 1997; Toll, Sobell, Wagner, & Sobell, 2001). Bowen et al. (2007) proposed that a reduction in thought suppression is one mechanism that accounts for the therapeutic effect of mindfulness training on decreased substance abuse. In their study of a 10 day Vipassana retreat with an incarcerated population, the treatment group

reported significant decreases in avoidance of thoughts when compared to controls. The decrease in avoidance of thought partially mediated the effects of the intervention on post-release alcohol use.

Overall, however, there has been limited research to substantiate these claims. As mentioned above, one study was conducted with an incarcerated population; however, this intervention was a 10-day silent Vipassana retreat, differing substantially from traditional MBSR programs. Several studies have incorporated mindfulness techniques as one component of a larger treatment package for the treatment of substance use, with promising results. For instance, patients who received dialectical behavior therapy exhibited reduced drug dependence a year following treatment compared to those receiving treatment as usual (Linehan, et al., 1999). Also, an acceptance-based treatment intervention for smoking cessation had better long-term smoking outcomes at 1-year follow-up than nicotine replacement treatment, and outcomes were mediated by improvements in acceptance-related skills (Gifford et al., 2004). However, given that mindfulness was only one component of these comprehensive treatment packages, it is impossible to determine the extent to which the mindfulness component was contributing to change.

Another study that examined the association between mindfulness and frequent binge drinking behavior found that individuals who reported higher levels of mindfulness were more likely to engage in binge drinking (Leigh, Bowen, & Marlatt, 2005). This relationship was unexpected, and the authors concluded it could be the result of increased sensitivity to body sensations among those who frequently binge drink. Although, there

exists a clear rationale for why mindfulness training should be effective in providing strategies to resist the urge to abuse substances, research to date is contradictory. The present study addresses this important question.

Academic Problems. As measured in this study academic problems refers to poor study skills, inefficient use of time, poor concentration, and test anxiety. There are several reasons to believe why mindfulness meditation may be helpful for reducing academic problems. First, several researchers have pointed out that mindfulness meditation may cultivate several cognitive abilities, including attentional control, switching, and cognitive inhibition (Bishop et al., 2004). Two investigations, in particular, have supported the role of mindfulness training in improving attentional control (Jha, Krompinger, & Baime, 2007; Wenk-Sormaz, 2005). For instance, Wenk-Sormaz (2005) found less Stroop interference and more flexible word production in participants who had completed a mindfulness intervention relative to controls. These abilities are likely to lead to increased concentration, cognitive flexibility, and ability to work in a time efficient manner, skills that would no doubt confer benefits onto academic performance. Second, it has been established that anxiety, especially test anxiety, and depression have adverse consequences on academic performance (Brackney & Karabenick, 1995). Thus, mindfulness may lead to increased academic performance through reductions in emotional distress. There is a paucity of research in this area. Two studies were located that lend tentative support to the notion that mindfulness meditation may be helpful in reducing academic problems. One group of students assigned to a meditation task for a semester was compared to a no treatment control group on their

GPA's (Hall, 1999). At the end of the semester, the meditation group showed a significant increase in GPA compared to the no treatment group. Unfortunately, this study did not provide enough information to determine if the form of meditation used is analogous to mindfulness meditation, describing it simply as a "meditation process that consisted of natural breathing techniques, relaxation, and attention-focusing techniques" (p. 411). Another study conducted a mindfulness-based intervention with five clinically anxious children aged 7 to 8 years of age (Semple, Reid, & Miller, 2005). Teacher ratings on the CBCL showed improvements in academic functioning. Drawbacks to this study include the very small sample size and the fact that the CBCL is not considered a rigorous measure of academic performance, and therefore results may reflect only minor variations in reporting. Although clearly no strong conclusions can be drawn from the above research, it does encourage the examination of this question in a better-designed study.

Mental Health Among College Students

In recent years, there has been a dramatic increase in the use of services at UCCs. The role of UCCs has evolved in response to the changing demographic profile of today's college student population and its mental health needs. More specifically, the last couple of decades have seen a change from students seeking counseling services regarding developmental and occupational needs to those seeking help with more severe psychological problems (Gallgher, Sysko, & Zhang, 2001; Landow, 2006). A survey of initial assessment data from students seeking service at a UCC found that "the level of severity of these concerns is much greater than the traditional presenting problems of

adjustment and individuation that were seen for college students in counseling center research from the 1950's through the 1980's" (Pledge, Lapan, Heppner, & Roehlke, 1998, p. 387). The National Survey of Counseling Center Directors at 274 institutions reported that 85% of UCC directors reported an increase in "severe" psychological problems over the last 5 years, including self-injury incidents (51%), eating disorders (38%), alcohol problems (45%), sexual assault concerns on campus (33%), and childhood sexual abuse (34%) (Gallgher et al., 2001). This trend is supported by other data sources, such as student affairs administrators who reported that they were spending more time dealing with troubled students and had seen marked increases in serious mental health problems on campus, including eating disorders, alcohol and drug abuse, gambling, classroom disruption, and suicide attempts (Levine & Cureton, 1998). A study that reviewed clients' problems at a counseling center over the previous 13 years lead the authors to conclude that students who were seen in counseling services in more recent time periods frequently had more complex problems that included both the normal college student problems, such as difficulties in relationships and developmental issues, as well as the more severe problems, such as anxiety, depression, suicidal ideation, sexual assault, and personality disorders (Benton et al., 2003). Several of the more dramatic increases in problems in this study included double the number of students with depression and triple the number of suicidal students.

Kitzrow (2003) explained the increase in students psychological disorders as attributable to the effectiveness of newer psychotropic medications that have made it more possible than in the past for many students with serious psychological disabilities to

attend college, as well as changing social and cultural factors such as divorce, family dysfunction, instability, poor parenting skills, poor frustration tolerance, violence, early experimentations with drugs, alcohol and sex (Gallgher, Gill, & Sysko, 2000). Students who are coming to college are "overwhelmed and more damaged than those of previous years" (Levine & Cureton, 1998, p. 95).

In line with the rise in mental health problems experienced by college students, UCCs have been experiencing a sharp increase in demand for services. In a survey of senior student affairs officers 60% reported that a record number of their students are using campus counseling services for longer periods of time than ever before (Levine & Cureton, 1998). For instance, Columbia University reported a 40% increase in the use of counseling services since 1995; MIT experienced a 50% increase in the use of counseling services between 1995 and 2000, and the University of Cincinnati reported a 55% increase in the last 6 years (Berger, 2002). The increase in demand for services has not been matched by increased resources, and in one survey 63% of counseling centers reported that a lack of resources is a major challenge (Gallagher, Gill, & Sysko, 2000).

Mental health problems of students take their toll on many elements of the college experience including academic performance, retention, and graduation rates (Brackney & Karabenick, 1995). Higher levels of psychological distress among college students have been significantly related to academic performance, specifically, lower academic self-efficacy, less effective time management, and higher test anxiety (Brackney & Karabenick, 1995). Five percent of college students prematurely end their education due to psychiatric disorders; specifically, anxiety, mood disorders, substance abuse, and

conduct disorders were all predictors of failure (Kessler, Foster, Saunders, & Stang, 1995). A longitudinal study found that emotional and personal adjustment predicted retention as well or better than academic adjustment (Gerdes & Mallinckrodt, 1994). Conversely, students who receive help for their psychological problems are more likely to succeed academically and stay in school, and a positive relationship between the number of counseling sessions attended and retention rate has been established (Wilson, Mason, & Ewing, 1997).

Problematic alcohol consumption is also becoming a more frequent problem on college campuses throughout America. The rates of frequent binge drinking on college campuses (2 or more instances of 5 drinks in a row for men, or 4 drinks in a row for women) on college campuses is increasing, with one study reporting an increase of 14.3% from 1993 to 1999 (Wechsler, Lee, Kuo, & Lee, 2000). It is estimated that annually approximately 1400 college students (between the ages of 18 and 24) die from alcohol related injuries, 500,000 students are unintentionally injured while under the influence of alcohol, 600, 000 students are assaulted by another student who has been drinking, and over 70,000 students are the victims of alcohol related sexual assault or rape (National Institute on Alcohol Abuse and Alcoholism, 2002).

University counseling centers have responded to this challenge by implementing a number of strategies including a decrease in the mean number of sessions and limiting individual therapy in favor of group therapy (Benton et al., 2003). Given this state of affairs mindfulness-based interventions may be an effective and time-efficient and cost-efficient means of meeting the growing demand on UCCs. Mindfulness-based

interventions may also be useful for preventing the escalation of milder mental health difficulties into more severe ones.

In conclusion, mindfulness-based interventions have been shown promise in effectively treating stress, anxiety, and depression through teaching clients to become more aware of thoughts and feelings and to change their relationship to them (Kabat-Zinn, 1992; Miller et al., 1995). Mindfulness practices are used to create a viewpoint on thoughts and feelings so that they are recognized as mental events rather than as accurate reflections of the self or reality; in times of stress, the individual will be able to step back from thoughts and feelings, instead of engaging in ruminative thinking patterns that can escalate anxiety and depression. This intervention has been developed at a time when the changing demographic profile of the college population has lead to increased need for services (Kitzrow, 2003). Effective time-limited group interventions are being sought as a cost reducing complementary role to more traditional, time-consuming, and expensive forms of therapy. Although MBSR holds promise to be such an intervention many questions remain about the applicability of MBSR to a student population presenting with psychological distress. Given the crisis in college mental health, this is a timely and important research question. Further, it has been suggested that the skills taught during the program affect global lifestyle changes and a new pattern of perceiving that is readily applicable to most of life situations (Kabat-Zinn et al. 1986; Miller et al., 1995). Thus, in addition to addressing clinical problems, MBSR may lead to overall improvements in college adjustment.

Rationale for Current Study and Research Questions

The central goal of this study is to investigate the effectiveness of mindfulness training in improving well-being on several dimensions of college adjustment, including: anxiety, depression, substance abuse, and academic problems. The effectiveness of mindfulness training in reducing anxiety and depression among clinical populations has been established by a number of studies (e.g., Baer, 2003). The current investigation examines whether these findings are replicated among students seeking mental health services at a UCC. Further, this study adds to the field by investigating if the beneficial effects of mindfulness training extend to two additional indices of college adjustment: substance abuse and academic problems. Although little research to date has investigated the latter two variables, there exists a solid theoretical rationale for why mindfulness training should be helpful in reducing problems with substance abuse and academic problems. Breslin and colleagues (2002) have argued that mindfulness training will offer individuals strategies for dealing with triggers of relapse (e.g., negative affect) and urges to use substances. Similarly, although there is a lack of research on the role of mindfulness skills in increasing academic performance, it is easy to imagine several ways in which it might be helpful. First, mindfulness interventions have been linked with increased attentional control skills (Jha, Krompinger, & Baime, 2007; Wenk-Sormaz, 2005). It is likely that an increased ability to concentrate will lead to benefits in study habits and academic performance. Second, anxiety, stress, and depression have adverse consequences on academic performance (Brackney & Karabenick, 1995), thus,

mindfulness training may confer benefits onto academic performance through reduced emotional distress. The following specific hypotheses were tested in this study:

First, it is expected that mindfulness training will lead to greater reductions in anxiety, depression, substance abuse, and academic problems compared to an interpersonal support group and no-treatment control group. Furthermore, it is expected that participants in the interpersonal support group will exhibit greater reductions in interpersonal problems compared to the mindfulness and no treatment group from pre-intervention to post-intervention and follow up.

Second, this study investigated if mindfulness training leads to increased mindfulness. The lack of a reliable and valid measure to assess mindfulness has hampered the ability of previous research to investigate this relationship directly (Bishop, 2002), however, the development of the KIMS (Baer et al.,2004) has paved the way for improved methodology. *Accordingly, mindfulness participants are expected to exhibit increased mindfulness compared to the no-treatment group and interpersonal support group from pre-intervention to post-intervention and follow up.*

Finally, this investigation examined the extent to which home practice of mindfulness meditation is linked to the outcomes of increased mindfulness and college adjustment. Ambiguous findings to date have left the field unclear regarding the extent to which home practice is a necessary and vital ingredient of the program. The *amount of mindfulness practice time is expected to predict degree of change in mindfulness and improvement on the college adjustment scales.*

Method

Design

This study used a cohort-controlled, quasi-experimental design. Data were colleted from two university counseling centers located at different universities (UVM and UNC) in different states (Vermont and Colorado). Students who sought treatment for a range of difficulties including, anxiety, depression, substance abuse, academic problems, and interpersonal problems, at the University Counseling Centers were given the choice of participating in one of two different groups: a mindfulness-based stress reduction group or an interpersonal support group. Participants who enrolled in a group, but attended only one or no meetings served as the no-treatment control group. Using a pre-post-follow-up between group design, the effectiveness of the mindfulness based group was compared to the interpersonal support group and no-treatment control group in improving college adjustment and increasing mindfulness.

A drawback of using a cohort controlled design rather then a randomized controlled trial is that the treatment and control groups may differ in characteristics that affect the treatment outcome and therefore differ in outcomes that are unrelated to the interventions being assessed, an effect known as confounding. This study limited the effects of possible baseline differences between the groups by using a propensity score analysis (Rosenbaum & Rubin, 1983). A propensity score is the conditional probability that a participant will be assigned to a particular treatment given a group of pretreatment covariates. It represents the 'propensity' for an observation to be in one group or the other. In the current study, first, a logistic regression that included all covariates was used to model the initial group differences, and second, based on the group differences the

propensity score was calculated as the predicted probability of group membership. Thus, the propensity score replaces a collection of confounding covariates with one function of these covariates. The propensity score itself, is then used to control for confounding in subsequent analyses. Successful adjustment on the propensity score theoretically leads to a balanced design where group assignment into a treatment and control condition does not differ with respect to any of the variables included in the creation of the propensity score (Rosenbaum & Rubin, 1984). For instance, in the current study, there can be a concern with using drop-outs as the no-treatment comparison group because these students may have lower baseline levels of distress or be less motivated to change. By controlling for differences on a host of covariates, including demographic variables, pre-treatment levels of distress, and motivation to change, between the treatment and no-treatment groups, we are balancing these confounding covariates and, therefore, reducing selection bias.

There are also distinct advantages to the currently proposed design. Controlled research often excludes clients who most resemble those who typically receive treatments in clinic settings. There have been calls recently for research to move away from evaluating treatments in laboratory settings and begin investigations of treatments as they happen in the real world (Kettlewell, 2004). Although effectiveness studies are less tightly controlled, findings are more generalizable to real world settings. In addition, the use of two sites increases the generalizability of our findings further. In line with this, the current study compares the effectiveness of a mindfulness-based program with an interpersonal support group, across two sites, as they are typically delivered at a UCC.

Participants

Participants in this study included a total of 112 students, including 85 students attending the University of Vermont and 27 students attending the University of Northern Colorado. The mindfulness condition included 46 clients, comprised of participants from 9 mindfulness groups at UVM and 3 mindfulness groups at UNC. The interpersonal support condition included 28 clients, comprised of participants from 3 interpersonal support groups at UVM and 2 interpersonal support groups at UNC. Thirty-eight clients who did not attend any meeting or attended one meeting only served as the no-treatment group, including 31 clients from UVM and 7 clients from UNC. Groups were conducted over three semesters, including two fall semesters (2006 & 2007) and one spring semester (2007). Data were collected on a total of 17 groups.

There were no significant differences across sites (UVM versus UNC) on demographic variables, thus, data on both sites are combined for the purpose of describing demographic data.

Seventy-nine percent of the sample was female. Participants ranged in age from 18 to 33 years of age, with a mean age of 21, and standard deviation of 2.4. Four percent of participants were first year, 34% were sophomores, 29 % were juniors, 10% were seniors, and 14% were graduate students. Twenty-five percent of the sample reported taking psychiatric medication. Ninety-four percent of the sample self-identified as White or Caucasian, 3 (%) as Black or African American, and 2 (%) as Hispanic or Latino, and one as Asian.

Measures

College Adjustment Scale. The College Adjustment Scale (CAS) was designed as an inventory for use by professionals who provide counseling services to college students (Anton & Reed, 1991, Appendix A). It contains 108 statements, and for each statement the student is asked to circle the letter on the answer sheet that best represents their opinion: F for false or not true at all, S for slightly true, M for mainly true, and V for very true. The CAS requires 15-20 minutes to complete and provides a rapid method of screening students for common developmental and psychological problems. The CAS assesses nine areas of adjustment difficulties: Anxiety, Depression, Suicidal Ideation, Substance Abuse, Interpersonal Problems, Academic Problems, and Career Problems. The current study did not administer the Suicidal Ideation, Career Problems, Self-Esteem Problems, or Family Problems sub scale as these indices were not relevant to the focus of this investigation.

The CAS has been normed on responses from 1,146 students enrolled in colleges and universities throughout the U.S.A (Anton & Reed, 1991). Available research and normative data indicate that the CAS is unbiased with respect to gender and ethnic group membership. Although the normative sample included students ages 17-65, the CAS is intended primarily for students ages 17-30. Five studies examined the convergent and discriminant validity of the CAS and its ability to distinguish students in counseling from those not in counseling (Anton & Reed, 1991). Results support the validity of the CAS as a measure of college adjustment problems (Nafziger, Couillard, Smith, & Wiswell, 1998). Internal consistency reliability coefficients for the nine scales range from .80-.92

with a mean of .86. In the current study, overall Cronbach's alphas for pre-treatment scores were calculated at .83 for the academic problem scale, .84 for the anxiety scale, .84 for the interpersonal problem scale, .86 for the depression problem scale, and .92 for the substance abuse problem scale.

The Kentucky Inventory of Mindfulness Skills. The Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004) is a 39-item instrument designed to measure four elements of mindfulness: observing, describing, acting with awareness, and accepting without judgment. It measures a general tendency to be mindful in daily life and does not require experience with meditation. Sample items include, "I notice when my moods begin to change" (observe); "I'm good at finding words to describe my feelings" (describe); "When I do things, my mind wanders off and I'm easily distracted" (act with awareness); and "I tell myself that I shouldn't be feeling the way I'm feeling" (accept without judgment). Items are rated on a 5-point Likert-type scale (never or very rarely true to always or almost always true).

Exploratory and confirmatory factor analyses clearly support the proposed four-factor structure. The four-factor structure was demonstrated in an initial student sample and confirmed in a second sample, and this four factor structure was found to be a much better fit to the data than an alternative single-factor structure (Baer et al., 2004).

Test-retest reliability was assessed for each scale with a student population. Test-retest correlations for the Observe, Describe, Act With Awareness, and Accept Without Judgment scores were .65, .81, .86, and .83, respectively, indicating adequate to good

test-retest reliability. Paired samples *t* tests showed no significant differences between scores at Time 1 and Time 2 (Baer et al., 2004).

The KIMS was found to have good internal consistency, with alpha coefficients for Observe, Describe, Act With Awareness, and Accept Without Judgment at .91, .84, .83, and .87, respectively (Baer et al., 2004). In the present study, overall Cronbach's alpha was calculated at .81.

Mindfulness is widely discussed as a correlate, if not a predictor, of well-being (Baer, 2003; Kabat-Zinn, 2003;Williamson, 2003); thus, other instruments purporting to measure well-being are expected to relate to the KIMS. Expected correlations with a variety of constructs were obtained. The KIMS showed moderate positive correlations with emotional intelligence (Observe scale; $r = .34$, $p < .001$, Describe scale; $r = .54$, $p < .001$) and with life satisfaction. (Describe scale; $r = .28$, $p < .001$, Act With Awareness; $r = .22$, $p = .015$). Similarly, measures of negative mental health are expected to be inversely related to mindfulness scores. Three of the KIMS scales (all but Observe) were found to be moderately inversely related to neuroticism, as measured via the NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992) (Describe scale; $r = -.41$, $p < .001$, Act/Aware scale; $r = -.31$, $p < .001$ Accept scale; $r = -.42$, $p < .001$) and with GSI scores (Describe scale; $r = -.33$, $p < .001$, Act/Aware scale; $r = -.38$, $p < .001$ Accept scale; $r = -.29$, $p < .001$), suggesting an inverse relationship between mindfulness skills and the experience of negative affect. Experiential avoidance was significantly negatively correlated with mindfulness scores (Describe scale; $r = -.35$, $p < .001$, Act/Aware scale; $r = -.30$, $p < .001$ Accept scale; $r = -.26$, $p < .001$), with the exception of the Observe scale.

A comparison of mindfulness scores between a student sample and a small clinical sample (largely individuals diagnosed with borderline personality disorder) showed significantly lower scores for three of the four mindfulness scales for the clinical sample, providing additional support for the relationship between mindfulness and mental health (Baer et al., 2004).

University of Rhode Island Change Assessment-short form (URICA – short form). The URICA-short form (McConnaughy, Prochaska & Velicer, 1983) consists of 24 items representing the four primary stages of change in DiClemente and Prochaska's (1982) Trans Theoretical Model of Change. The scale includes 6 items for each of the Precontemplation, Contemplation, Action, and Maintenance subscales. Items are rated by respondents on a five-point scale from 'strongly disagree' (score 1) to 'strongly agree' (score 5). A number of studies, across diverse samples, have suggested that a four-factor structure most parsimoniously accounts for participants' responses on the URICA (Carney & Kivlahan, 1995; DiClemente & Hughes, 1990; McConnaughy et al., 1983). These factors can be understood as Precontemplation (no current intention to take action to deal with a problem), Contemplation (actively considering taking action on a problem, but ambivalent), Action (decided to make change and actively applying change strategies toward this end), and Maintenance (have changed and working on preventing relapse). Readiness to Change is a sum of Contemplation, Action and Maintenance scores, with Precontemplation subtracted ([C + A + M] - PC; Amodei and Lamb, 2004). The internal consistency of the URICA is good with the following Cronbach alpha coefficients; Precontemplation = .88, Contemplation = .88, Action = .89, and Maintenance = 0.88

(McConnaughy et al., 1983). Construct validity of the URICA has been supported through factor analysis (McConnaughy et al., 1983), and cluster analyses indicating that the stages are associated with different behavioral profiles (e.g., El-Bassel et al., 1998; McConnaughy et al., 1983). In this study, overall Cronbach's alphas were calculated as follows; Precontemplation = .79, Action = .86, and Maintenance = .81. Cronbach's alpha for the Contemplation subscale was initially calculated with the 6 relevant items at .26. One item, 13 ('I wish I had more ideas on how to solve my problem') largely accounted for the extremely low coefficient. Accordingly, this item was removed, and the alpha coefficient with the 5 remaining items was calculated at .76.

Demographic and additional data. Participants were asked to provide information on personal characteristics, including age, gender, ethnicity/race, year in college, and use of psychiatric medication.

Practice log. Participants were asked to maintain a practice log (Appendix B) throughout the 7 weeks of the intervention and submit it at each weekly meeting. This recorded the frequency and total amount of time spent practicing formal and informal mindfulness exercises each day during the previous week. In addition, on the post-intervention and 6 month follow-up questionnaire, participants were asked to estimate how much time they spent practicing formal and informal mindfulness techniques per week (Appendix C).

Procedure

Recruitment. Recruitment of participants was identical at both sites. Students who contacted the UCC were scheduled for an intake appointment with one of the UCC

clinical staff. Counseling center staff members conducted the intake assessment and determined if the client was a better candidate for group or individual therapy. Factors that determine a client's suitability for group therapy versus individual therapy include; a) the severity of the client's presenting problem; clients characterized as higher risk (e.g., self-harm behaviors) are referred to individual counseling, b) the student's preference for group or individual therapy; often students themselves will have a preference for participating in a group or individual therapy, and c) previous therapy at the counseling center; the counseling centers operate on a short-term model and students are typically limited to one semester of individual therapy, and subsequently referred to a group. If the client was deemed suitable for group therapy, the counselor described the mindfulness group and interpersonal support group and asked them to choose the group that they thought would better meet their current need. Typically, students who present with a wide variety of complaints, including anxiety, stress, depression, academic difficulties, and relationship problems, will be referred to the mindfulness group or interpersonal support group. In actuality, students often chose a group based on what fits with their time schedule. If the student was interested in participating in a group he or she was referred to one of the group leaders for a further screening. The UVM and UNC counseling centers also run several issue specific groups every semester, for example, an eating disorder group and grief and loss group. Thus, if a student presented with a specific complaint that would be better addressed in another group, he or she was not referred to the mindfulness or interpersonal support group. All of the above procedures are part of standard therapy procedures at the counseling centers, and were not adapted for the study. Students

referred to mindfulness or interpersonal support group were asked to arrive 20 minutes prior to the group screening scheduled time to fill out paperwork. This is an adaptation from standard therapy procedures at the counseling centers.

Group screening. When a client arrived at the counseling center for a group screening he or she first checked in at the front desk. The front office staff handed the client a packet that contained the usual group screening form (given to all clients at the counseling center who attend a group screening), a letter of invitation to participate in the study (See Appendix D), an informed consent form (See Appendix E) and the pre-intervention questionnaire (See Appendix A). The informed consent form described the option for optional, confidential participation in a program evaluation of the Counseling Center's group counseling services. It explained this would involve completing a pre-group questionnaire, another questionnaire upon completion of the group, and a 6-month follow up questionnaire. In addition, the student was informed that he or she could drop out of the study at any time point, and would be reimbursed $15 for both the post-treatment and follow up questionnaire. The student was asked to sign an Informed Consent Form if he or she agreed to participate in the study.

During the group screening interview the nature of the group was described in more detail, and the student was given an opportunity to ask any questions about the group. Participants for the mindfulness group were informed that the group required home practice of the exercises on an almost daily basis. Group screenings typically lasted 20 minutes. Students were enrolled for a group if they were deemed a suitable candidate and the day and time fit their schedule. Students who were experiencing acute

mania or post-traumatic stress disorder, or reported high levels of suicidal ideation or intent were not deemed an appropriate fit for either the mindfulness or interpersonal support group. In this study, no group candidates were denied admission to the group after a group screening. This is typical, as the initial intake counselor screens for group eligibility and will usually not refer unsuitable candidates. If the student was not available at the scheduled group time, he or she was put on a waiting list for the next round of groups. Group screenings occurred in the 2-week period before the groups began.

Data collection. Once the client had checked in and was handed the materials, he or she was directed to the waiting room to complete the written materials. The questionnaire requires 15-20 minutes to complete. Students were asked to provide his or her email or mailing address (depending on the student's preference) so that questionnaires could be mailed for follow-up data collection. Several times a student did not arrive with sufficient time to complete the pre-intervention measures. In such cases, the student was asked to complete the questionnaire at the end of the group screening. For post-intervention data collection, questionnaires were distributed to students at the end of the last mindfulness or interpersonal support group meeting. For those students that did not attend the final session of the group, an email with an attached questionnaire was sent or a letter with a questionnaire was mailed (depending on their preferred method of contact). Most students provided permission to contact them by email and mail. Thus, typically the initial contact with the post-intervention questionnaire was emailed. If students did not respond to this in one week, a second email was sent out. For those students who did not respond to either of the emails within two weeks, a third attempt

was made by mail. The 6 month follow-up questionnaires were emailed or mailed (depending on their preferred method of contact) to all participants 6 months after completion of the intervention or 8 weeks after the pre-intervention questionnaires had been completed for drop-outs. Typically, the first attempt with the 6 month follow-up questionnaire was emailed. If students did not respond to this in one week, a second email was sent out. For those students that did not respond to either of the emails within two weeks, a third attempt was made by mail.

Mindfulness group. The mindfulness intervention was based on the MBSR program developed by Jon Kabat-Zinn at the University of Massachusetts Medical Center (Kabat-Zinn, 1990, see Appendix F for intervention protocol). The groups ran for 7 weeks and consisted of a weekly meeting that lasted one hour and forty-five minutes. The program involved training in several formal meditation techniques, including sitting meditation, walking meditation, body scan, hatha yoga and loving-kindness meditation. In addition to the formal practice introduced through training in class each week, the group encouraged informal practice of mindfulness in everyday life. Participants were encouraged to bring a mindful attitude to their daily activities and interactions, including eating, driving, and talking. This was encouraged through homework exercises; for example, one exercise required participants to choose a daily activity, such as brushing their teeth or taking a shower to perform mindfully for the week. At the first session participants received a binder with readings and instructions for a variety of meditations. They were also given access to audio recordings of guided meditations in the form of a CD or a link to a website (based on their preference). Our group is adapted somewhat

from the MBSR curriculum to meet the specific developmental needs of the college population. For instance, the MBSR curriculum involves sitting meditations that last 40 minutes. In our mindfulness group, we replaced this with a 30 minute sitting meditation, and extended the time of the body awareness practice by an extra 10 minutes. This modification was based on feedback from students that they found the body awareness exercises (e.g., body scan, yoga, and restorative yoga) extremely helpful. Because our intervention was modified slightly from the original MBSR protocol, we will refer to it as a mindfulness-based intervention or mindfulness group, rather than MBSR.

Interpersonal support group. The interpersonal support groups ran for 8 weeks, with each weekly meeting lasting one and a half hours. Interpersonal support groups at the UVM and UNC counseling centers are based on the group therapy model espoused by Irvin Yalom (Yalom, 1994). Clients were encouraged to discuss the issues that brought them into therapy openly and honestly with other group members. The interaction among group members is considered to be an integral part of the therapeutic interpersonal support and is believed to help facilitate change and growth and lead to heightened self awareness. Thus, group leaders encouraged members to addresses the dynamics that occur during the sessions. Typically, the leaders let members set their own agenda but also provided direction when the group got off track.

No-treatment control group. The no-treatment control group was comprised of clients who attended a group screening and were enrolled to participate in the mindfulness group or the interpersonal support group but did not attend any session or attended only one session. Approximately 10 (range 7-12) clients were screened and

enrolled for each group. Average attrition was 3 people for both the mindfulness and interpersonal support group. There was no difference between attrition rates at UVM and UNC. The attrition figures in our study are slightly higher (33%) than those reported by Kabat-Zinn & Chapman-Waldrop (1988) at University of Massachusetts Medical Center (24%).

Therapist qualifications for the Mindful Living Group. Fifty-five percent (5) of the groups at UVM were co-led by two senior group leaders. The remaining 45% (4) were led by one of the senior leaders and one intern. All interns were graduate students in the Master's in Counseling program at UVM. All interns had previously attended an 8 week mindfulness training course and observed a group for at least one semester before acting as co-leader.

The first senior group leader was the Mindfulness Practices Coordinator at the UVM Counseling Center, is a clinical psychologist, and director of training at the UVM Counseling Center. She had practiced mindfulness meditation for 15 years. Prior to the beginning of this study she had led five mindfulness groups and conducted two training programs in leading mindfulness groups for interns at the UVM Counseling Center. The second senior leader was an advanced doctoral candidate in clinical psychology at UVM. She had practiced mindfulness meditation for 9 years, and has attended several intensive meditation retreats. She attended an 8-week training in leading mindfulness groups at the UVM Counseling Center, and prior to the beginning of this study had led four mindfulness groups. She is also author of this study.

Mindfulness groups at UNC were co-led by two senior staff members. The first group leader was a doctoral level clinical psychologist. She attended an 8 week training course for running mindfulness groups at UVM (conducted by the first group leader at UVM). She had practiced mindfulness meditation for 6 years, and prior to the beginning of this study had led four mindfulness groups with college students. The second leader was a Master's level psychologist and had practiced mindfulness meditation for 8 years.

Therapist qualifications for the Interpersonal Support Group. Interpersonal Support Groups at UVM were led by two senior staff members at the UVM counseling center who were Masters level psychologists and had each led a minimum of ten previous interpersonal support groups. At UNC, interpersonal support groups were led by two senior staff members. One staff member was a doctorate level clinical psychologist and the second was a Masters level psychologist. The group leaders at UNC had each led a minimum of 8 previous interpersonal support groups.

Evaluation of Treatment Integrity. Treatment integrity for the mindfulness group at each site was maintained by adherence to a detailed curriculum that outlined the activities for every session as well as the amount of time to be spent on each activity. Weekly supervision meetings were held between mindfulness group leaders. Phone supervision and email contact between the primary group leaders at UVM and UNC was conducted on a monthly basis, and more frequently when needed.

RESULTS

Propensity Score Analysis

There are a number of ways the estimated propensity scores can be used to create a comparison group that is comparable to the treatment group across the set of pretreatment covariates. One option is to stratify and/or match cases using the estimated propensity scores. Another option is to use the propensity score as a covariate in an ANCOVA model to estimate causal treatment effects (D'Agostino, 1998; Shadish, Campbell, & Cook, 2002). Shadish and colleagues state that when the usual ANCOVA assumptions are met, covariance adjustment is more efficient than matching or stratifying. Similarly, Pasta (2000) recommends using the propensity score as a variable in a prediction model when possible. Given that the current data meets the assumptions for ANCOVA, the propensity score was included as a covariate. After calculating the propensity score, D'Agostino's (1998) guidelines were followed with regard to testing that the propensity score has adequately balanced the treatment versus no-treatment group.

The first step was to investigate pre-treatment differences in the outcome variables across treatment groups. Given our concern about non-randomization was with those students who had dropped out of treatment (the no-treatment group), rather than between the mindfulness and interpersonal support group, we chose to distinguish between those who had participated in either the mindfulness or interpersonal support group, and those who had dropped out of treatment and were consequently the no-treatment group. Independent sample t-test indicated the no-treatment group reported

significantly lower levels of readiness to change (URICA), however, there were no other significant differences between the treatment and no-treatment group on any of the CAS scales or mindfulness. Nevertheless, the no-treatment group did show slightly lower levels of distress on every CAS scale and on mindfulness skills (although these did not reach the level of statistical significance). Thus, we decided to include readiness to change, all the CAS scales, mindfulness, and gender. It has been recommended that even covariates that do not differ significantly between treatment groups but are deemed theoretically important in distinguishing between conditions, be included in the computation of a propensity score (Christina, 2005; Love, 2004). Table 1 shows mean pre-treatment scores and standard deviations for the treatment and no-treatment conditions.

Next, a propensity score for each student was estimated using a logistic regression. The outcome of the logistic regression was the probability that a subject received the treatment, with the variable coded as 1 for treatment completers and 0 for those who did not complete treatment, and the independent variables were the pretreatment covariates. As mentioned above, the logit model included all of the variables that could have influenced the likelihood of being in an active treatment group versus no-treatment, including gender and pre-treatment scores for every scale of CAS and mindfulness. In this study, the propensity score is the probability that a student is a member of an active treatment group (mindfulness or interpersonal support) versus a member of the no-treatment group.

Rubin (2001) sets criteria that help distinguish whether the set of covariates in the two observational groups overlap enough for a regression adjustment to be trustworthy. Rubin's (2001) three criteria were used to evaluate the trustworthiness of the larger set of covariates to successfully balance the treatment and no-treatment group. The first assumption holds that the difference in means of the propensity scores between groups be less than half of the pooled standard deviation (i.e., less than half a standard deviation apart). In the current study mean difference in propensity score between groups is .134, which is smaller than .25 (half of the pooled standard deviation). The second assumption states that the ratio of the propensity score variance between groups be close to 1. In this study the ratio of the propensity score variance between groups is .89 which is deemed sufficiently close. The third assumption holds that the ratio of the residual variances of each covariate, after adjusting for the propensity score, must be close to 1.0. Residual variance is defined operationally as the original covariate regressed on the linear combination of the covariates that defines the estimated propensity score. The residual of this regression was examined for the variance ratios of these residuals between the two groups. Rubin (2001) suggested that a ratio of less than 0.5 or greater than 2.0 is considered extreme. A range of odds ratios between 0.8 and 1.2 represent equivalent variances. In the current study, the ratios of the residual variances of the covariates after adjusting for the propensity score were all considered equivalent ratios using the acceptable range (0.9-1.1). Table 2 shows ratios of the residual variances after adjusting for the propensity score for each covariate. By meeting these assumptions, we can assume that the propensity score covariate adjustment is not "over- or under-adjusting"

for pretreatment differences and is providing an unbiased estimate of pretreatment differences.

To ensure that balance was achieved based on the propensity score, we calculated an ANOVA to compare the *F*-statistic for readiness to change after adjustment for propensity score with the *F*-statistic, F (1, 112) = 13.29, *p*=.00, for readiness to change prior to adjustment for propensity score, F (1, 112) = .01, *p*=.91. These results indicate balance was achieved based on adjusting for the propensity score. Furthermore, when the interaction term between propensity score and time was entered into each of the ANCOVAs investigating treatment effects, results indicated no significant interaction terms [hypotheses 1(a) – 1(e)].

Table 1.

Mean Pre-Treatment Scores by Treatment

	Treatment (Mindfulness and IS) M (SD) n = 74	No Treatment M (SD) n = 38	*t*-value
Readiness to Change	62.6 (10.4)	54.4 (12.2)	3.65*
Mindfulness	120.5 (14.4)	123.2 (14.6)	1.34
Anxiety	31.2 (6.6)	30.1 (6.4)	0.49
Depression	25.3 (7.1)	24.6 (6.6)	0.13
Interpersonal Problems	25.8 (7.0)	25.9 (6.5)	0.70
Academic Problems	25.4 (6.8)	23.7 (6.4)	0.94
Substance Abuse	18.5 (6.5)	17.8 (6.5)	0.83
Gender (% female)	72%	82%	1.73 (χ^2)

*p<.05

Table 2.

Ratios of the Residual Variances of the Covariances after Adjusting for Propensity Score

Covariate	Ratio of Residual Variances
Readiness to Change	1.1
Mindfulness	1.1
Anxiety	1.0
Depression	0.9
Interpersonal Problems	1.1
Academic Problems	0.9
Substance Abuse	1.1
Gender	1.0

Data Screening

Prior to statistical analyses, data were examined for missing values, distribution characteristics, and univariate and multivariate outliers using the procedures outlined by Allison (2001), McKnight, McKnight, Sidani, and Figueredo (2007), and Tabachnick and Fidell (1996). On several of the demographic variables (i.e., age, year in college, and psychiatric medication use) there were missing data for more than 5% of the cases. Further examination indicated that missing data were not systematically distributed in any one treatment group. This informed the decision to retain all cases with missing demographic data without estimating missing values. On the outcome measures (CAS,

KIMS, & URICA) there were missing data for less than 5% of the cases. Similarly, missing data on the questionnaires were not over-represented in any one treatment group. Missing data were imputed using a substitution of the linear regression trend value for that data point in SPSS. Essentially, a regression is used to impute the data by using non-missing data to predict the values of missing data.

The dependent variables were tested for violations of the assumptions of multivariate statistics. Data were found to meet requirements for normal distribution in terms of kurtosis and skewness. No violations of homogeneity of variance or sphericity were observed. Assumptions were also tested and satisfied prior to conducting regression analyses. Concerns about multicolinearity were negated as none of the correlations were above .70.

Univariate outliers were investigated by converting dependent variables to *z* scores and searching for extreme outliers of 3 standard deviations above or below the mean. Two cases were identified with extreme *z* scores on readiness to change (URICA) ($z = -3.07$ and $z = 3.70$). Given that these scores fell within the range of possible scores for the continuous variable and that the identified participants did not vary on any demographic variables from other participants, the scores were assumed to reflect an accurate measure of the clients' readiness for change. A search for multivariate outliers was also conducted for each of the treatment groups by examining the Mahalanobis distance of each case and the ensuing probability of such a score. There were no multivariate outliers, so all cases were retained.

Drop-out and Attrition

Overall, 157 participants attended an initial group screening and were accepted into a treatment group. Thirty-nine percent of clients who attended a screening and/or began a treatment group (mindfulness or interpersonal support) dropped out (n = 62). Eighty-seven percent of those drop-outs (n = 54) occurred either before session 1 (after screening) or before session 2. A subsequent 12% (n = 6) dropped out after session 2 or 3, and the remaining 4% (n = 2) between sessions 4 and 6. Participants who completed a minimum of 85% of sessions (6 out of 7 sessions for the mindfulness intervention and 7 out of 8 for the interpersonal support group) were categorized as treatment completers. Thus, the 8 participants who dropped out between session 2 and 5 were not included in analyses as they did not fit criteria for either treatment completers or drop-outs. Participants who dropped out either before session 1 or 2 served as the no-treatment group. A chi-square analysis indicated no difference between treatment groups or between sites in likelihood of dropping out. Eight participants who participated in a group intervention declined to participate in completing study questionnaires. Of the 141 participants who completed pre-treatment questionnaires and met criteria for completion of a treatment group or the no treatment condition, 129 completed post-intervention questionnaires, and 112 completed follow-up questionnaires. Table 3 shows data on attrition by treatment group for each assessment period.

Missing Data

The first step in deciding how to deal with missing data is to determine the mechanism of missing data. Rubin (1976) identified three different mechanisms of

missing data, including Missing Completely at Random (MCAR), Missing at Random (MAR), and Missing Not at Random. By diagnosing the mechanism of missing data, one can then select the most appropriate missing data handling technique. To investigate if missing data were MCAR, we followed procedures outlined by Hardy and Bryman (2004). The first step involved splitting the sample into three groups, a) participants who completed questionnaires at all three time points (completers), b) participants who completed questionnaires at two time points; pre and post-intervention (partial drop-outs), and c) participants who completed questionnaires at only one time point; pre-intervention (drop-outs). The second step outlined by Hardy and Bryman (2004) required comparing the means of the observed values for each variable between the completers and the two drop-out groups using univariate ANOVAs. A significant mean difference between completers and either group of drop-outs would provide evidence the data are not MCAR. Thus, a series of ANOVAs were performed to compare mean pre-treatment values on the following variables: subscales of the CAS, mindfulness, and readiness to change. None of the ANOVAs were significant; thus, it can inferred that the data are MCAR. Table 4 shows mean pre- treatment scores for dropouts and completers.

Several statisticians have noted that listwise deletion is an appropriate method for handling missing data when data are MCAR (Allison, 2002; Little & Rubin, 1987; Schafer & Graham, 2002). Further, Allison (2002) noted that listwise deletion is an especially favorable option due to its simplicity and because of its attractive statistical properties. For instance, if the data are MCAR then the reduced sample acquired after using listwise deletion will be a random subsample of the original sample. If data are

MCAR it indicates that those who remained in the study and provided complete data are similar to those who dropped out. This implies that for any parameter of interest, if the estimates would be unbiased for the full data set (with no missing data), they will also be unbiased for the listwise deleted set. The procedure for listwise deletion involves deleting from the sample any cases that have missing data on any variables. This action results in a data set that has no missing data and can then be analyzed by conventional methods of analysis. For the current study this procedure involved removing the 14 cases for which there were only pre-intervention data, and the 17 cases for which there were only pre and post-intervention data.

Table 3.

Attrition by Treatment Group and Assessment Period

	Completed Questionnaires by Treatment Group		
Assessment Period	Mindfulness	Interpersonal Support	No-Treatment
Pre-intervention	57	32	52
Pre & Post-intervention	54	30	45
Pre, Post-intervention, & Follow-up	46	28	38
% of Pre-Post Data Lost	9% (n=5)	6% (n=2)	13% (n=7)
% of Post-Follow-up Data Lost	15% (n=8)	7% (n=2)	16% (n=7)

Table 4.

Pre- Treatment Scores of Dropouts and Completers

Mean Pre-Treatment Score	Completers (n = 112)	Post Dropouts (n = 14)	Follow-up Dropouts (n = 17)	*f*-value
Readiness to Change	58.3	57.9	58.6	0.64
Mindfulness	120.1	121.4	122.0	0.71
Anxiety	30.2	29.8	31.0	0.84
Depression	24.9	25.2	25.1	1.01
Interpersonal Problems	25.6	24.6	25.2	0.78
Academic Problems	24.6	25.2	24.9	0.93
Substance Abuse	18.3	19.0	19.1	0.96

Preliminary Analysis

Initial Differences Across Site, Semester and Individual Group

The total sample consisted of 112 students, including 85 participants from University of Vermont (UVM) and 27 participants from University of Northern Colorado (UNC). At UVM, nine mindfulness groups (mean number of participants = 6), and 3 interpersonal support groups (mean number of participants = 8) were conducted. At UNC 3 mindfulness groups (mean number of participants = 5), and 2 interpersonal support groups (mean number of participants = 6) were conducted. Groups were carried out over

3 semesters, one spring semester (2007) and two fall semesters (2006 & 2007). Data were collected on a total of 17 groups.

To investigate differences across sites (UVM versus UNC) in demographic variables and pre-treatment scores, chi-square analyses and independent samples *t*-tests were conducted. There were no significant differences found across the sites, thus, the groups were aggregated for data analysis. Table 5 shows mean pre-treatment scores across sites.

To investigate differences in pre-treatment scores across the three semesters that data collection took place a series of univariate ANOVA's were conducted. There was a significant difference in readiness to change. Follow up t-tests indicated that participants in Fall 07 exhibited significantly lower readiness to change ($M = 54.2$, $SD = 8.3$) than participants in Spring 07 ($M = 61.4$, $SD = 8.9$). Given this variable was not an outcome variable, but rather a covariate, the difference was not deemed a significant problem. There were no other differences found across semesters, thus, data for each semester were combined. Table 6 shows mean pre-treatment scores across semesters.

To investigate differences in pre-treatment scores and change scores across individual mindfulness groups (12 groups) and individual interpersonal support groups (5 groups) two series of univariate ANOVA's were conducted. There were no significant differences found between individual mindfulness groups or individual interpersonal support groups, thus, data for each groups were aggregated.

Initial Differences on Demographic and Dependent Variables Across Treatment Conditions

Chi-square analyses and univariate ANOVAs were conducted to investigate differences in demographic variables (gender, age, year in college, and psychiatric medication use) across the three treatment conditions. Tables 7 presents the distribution of demographic variables across treatment conditions. There were significant differences across treatment conditions for gender, Pearson X^2 (2, N = 112) = 8.97, p<.05: 36% and 28% of participants in the interpersonal support and no-treatment group, respectively, were males, whereas only 9% of participants in the mindfulness intervention were males. Therefore, gender was included as a covariate in all subsequent analyses related to comparison of treatment conditions. No other demographic variable differed significantly across treatment conditions. A series of univariate ANOVAs was also conducted to investigate differences in dependent variables across treatment conditions. There were no pre-treatment mean differences in any dependent variable across treatment condition. Tables 8 & 9 present mean pre-treatment scores on the CAS, KIMS, & URICA across treatment conditions.

Table 5.

Mean Pre-treatment Scores by Intervention Site

Intervention Group Measure	UVM	UNC	*t*-value
Mindfulness Intervention	n = 35	n = 11	
Readiness to Change	60.1	61.3	0.48
Mindfulness	119.3	120.4	1.13
Anxiety	31.5	30.1	1.70
Depression	26.6	28.6	0.97
Interpersonal Problems	25.2	25.7	1.40
Academic Problems	26.4	27.8	0.68
Substance Abuse	21.3	20.2	1.15
Interpersonal Support	n = 19	n = 9	
Readiness to Change	62.8	62.2	0.77
Mindfulness	121.2	119.4	0.96
Anxiety	30.7	31.5	0.97
Depression	26.3	27.3	0.87
Interpersonal Problems	27.4	28.1	1.21
Academic Problems	24.7	22.3	1.06

Substance Abuse	21.8	22.4	1.25
No-Treatment	n = 31	n = 7	
Readiness to Change	54.3	52.3	0.59
Mindfulness	123.4	121.4	1.11
Anxiety	30.1	29.5	1.14
Depression	24.4	23.7	0.60
Interpersonal Problems	24.3	25.8	1.05
Academic Problems	23.1	22.9	1.07
Substance Abuse	17.2	18.3	0.99

Table 6.

Mean Pre-treatment Scores by Semesters

	Semester			*F* value
	Fall 06	Spring 07	Fall 07	
	M (SD)	M (SD)	M (SD)	
Pre-Treatment Measure	n = 28	n = 48	n = 36	
Readiness to Change	58.3(9.1)	61.4(8.9)	54.2(8.3)	3.46*
Mindfulness	120.4 (12.1)	121.4 (13.1)	122.5 (12.5)	0.89
Anxiety	31.3(7.2)	30.5(7.1)	30.2(7.2)	0.13
Depression	24.5(7.3)	26.6(7.2)	24.6(6.7)	1.71
Interpersonal Problems	24.8(6.8)	27.3(7.0)	23.8(6.9)	1.84
Academic Problems	23.9(6.9)	25.4(6.7)	22.9(6.8)	3.01
Substance Abuse	18.3(7.3)	18.2(7.1)	17.2(6.9)	0.78

*p<.05

Table 7.

Distribution of Demographic Variables by Treatment Conditions

Demographic Variables	Treatment Group			Chi-square
	Mindfulness	IS	No-treatment	/*F* value
	n = 46	n = 28	n = 38	
Gender (% female)	91%	64%	72%	8.97 (χ^2)
Age (M)	21.6	20.3	20.9	2.70
Year in College (M)	3.2	2.7	2.9	1.77
Psychiatric Medication (% using)	26%	33%	21%	0.81 (χ^2)

Hypothesis Testing

Hypothesis 1

Five repeated measures ANOVAs were conducted. Treatment group (mindfulness, interpersonal support/IS, and no-treatment) served as the between-subjects factor, and time (pre-treatment, post-treatment, and 6 month follow-up) served as the within-subjects factor. The five dependent variables were: a) Anxiety; b) Depression; c) Interpersonal Problems; d) Academic Problems; and e) Substance Abuse. Follow-up paired samples *t*-tests were conducted using Bonferroni's correction to control for familywise error rate. Because nine comparisons were made, alpha was set at .05/9 = .005.

Hypothesis 1(a): Anxiety

The hypothesis that a mindfulness-based intervention is more effective in reducing anxiety than the IS group and no-treatment group across three time points (pre-treatment, post-treatment, and 6 month follow-up/FU6) was tested using a 3X3 repeated measures ANCOVA with "time" as the within-subjects factor and "group" as the between-subjects factor, and the propensity score included as a covariate. The results for the ANCOVA indicated no significant main effect for time. Results did indicate a significant interaction between time and treatment group, indicating the means changed differentially across groups over time, Wilks' Λ=.80, $F(2, 110) = 6.18$, $p < .001$. Follow-up pairwise comparisons indicated a significant difference between mean anxiety scores at pre-treatment and post-treatment for the mindfulness intervention, $t(45) = 9.29$, $p<.001$, and IS group, $t(27) = 4.53$, $p<.001$. The no-treatment group showed no significant differences in anxiety over time. Between pre-intervention and 6 month follow-up, the mindfulness intervention maintained a significant decrease in anxiety scores $t(45) = 8.75$, $p<.001$; however, the IS group and no-treatment group showed no significant differences. There were no significant differences in anxiety scores for any treatment group between post and follow-up. The means and standard deviations of pre-treatment, post-treatment and 6 month follow-up anxiety scores are presented in Table 8, and means are displayed in Figure 1.

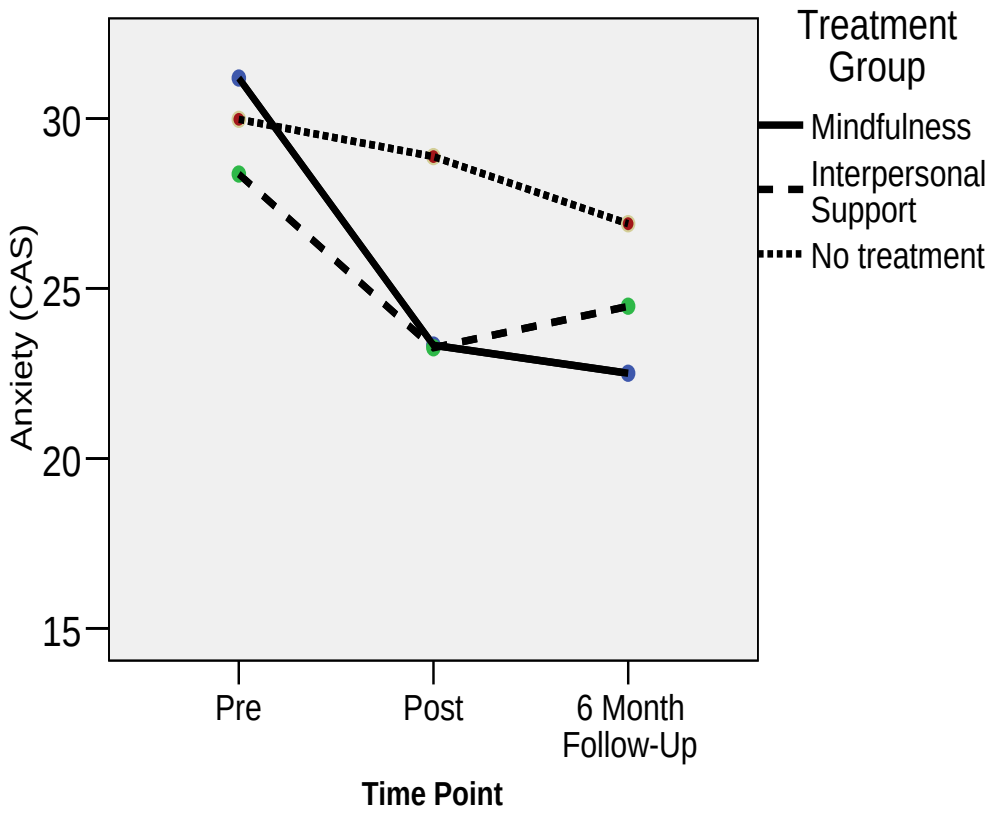

Figure 1: Anxiety Scores for Mindfulness, Interpersonal Support and No-Treatment conditions across Pre, Post and 6 Month Follow-up.

Hypothesis 1(b): Depression

The hypothesis that a mindfulness-based intervention is more effective in reducing depression than the IS group and no-treatment group across three time points was tested using a 3X3 repeated measures ANCOVA with "time" as the within-subjects factor and "group" as the between-subjects factor, and the propensity score included as a covariate. The results indicated no significant main effect for time. Results, however, did show a significant interaction between time and treatment group, indicating the means changed differentially across groups over time; Wilks' Λ=.89, F (2, 110) = 4.27, $p < .002$. Follow-up paired samples *t*-tests indicated a significant effect between mean depression scores at pre-treatment and post-treatment for the mindfulness intervention, t (45= 6.92, $p<.001$ and IS group, t (27) = 5.88, $p<.001$. The no-treatment group showed no significant differences in depression over time. Between pre-intervention and 6 month follow-up, the mindfulness intervention maintained a significant decrease in depression scores t (45) = 7.00, $p<.001$, however, the IS group and no-treatment group showed no significant differences. There were no significant differences in depression scores for any treatment group between post and follow-up. The means and standard deviations of pre-treatment, post-treatment and 6 month follow-up depression scores are presented in Table 8, and means are displayed in Figure 2.

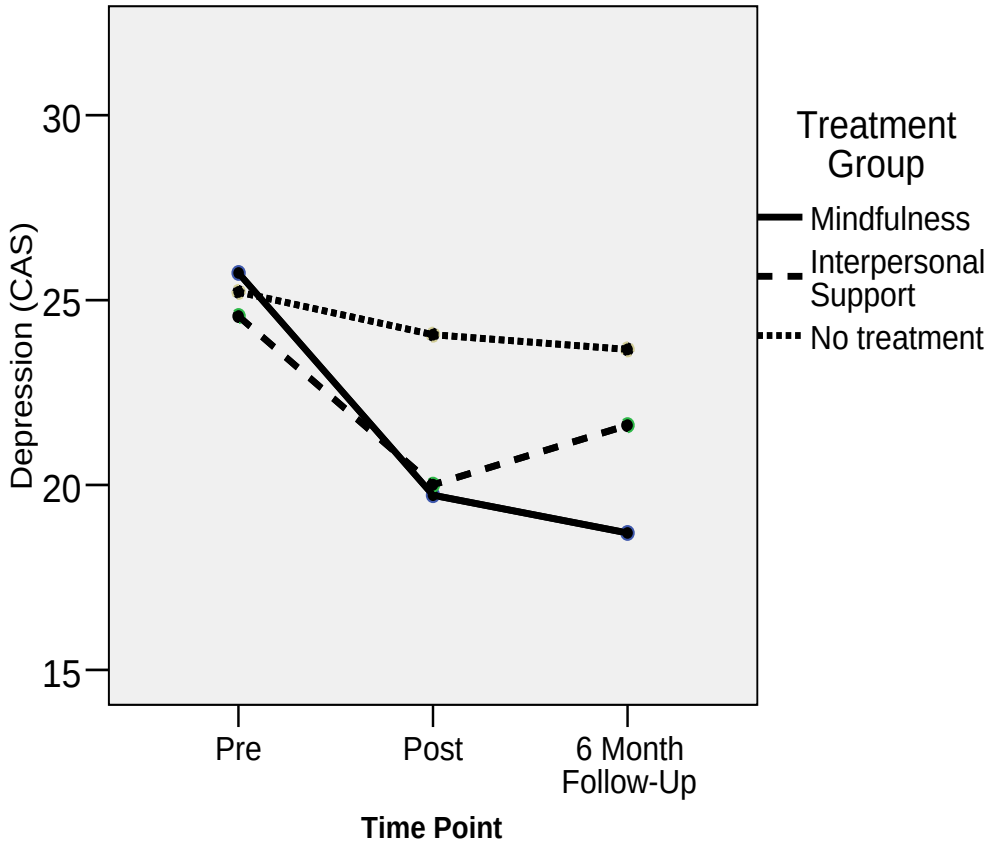

Figure 2: Depression Scores for Mindfulness, Interpersonal Support and No-Treatment conditions across Pre, Post and 6 Month Follow-up.

Hypothesis 1(c): Interpersonal Problems

The hypothesis that an IS group would be more effective in reducing interpersonal problems than a mindfulness-based intervention and no-treatment group across three time points was tested using a 3X3 repeated measures ANCOVA with "time" as the within-subjects factor and "group" as the between-subjects factor, and the propensity score included as a covariate. The results for the ANCOVA showed no significant main effect for time. Results indicated a significant interaction between time and treatment group, indicating the means changed differentially across groups over time, Wilks' Λ=.85, F (2, 110) = 4.46, $p < .002$. Follow-up paired samples *t*-tests indicated a significant difference between mean interpersonal problems scores at pre-treatment and post-treatment for the mindfulness intervention, t (45) = 4.74, $p<.001$ and IS group, t (27) = 4.39, $p<.001$. The no-treatment group showed no significant changes in interpersonal problems over time. Between pre-intervention and 6 month follow-up, the IS group maintained a significant decrease in interpersonal problems scores, t (27) = 3.69, $p<.001$, however, the mindfulness intervention and no-treatment group showed no significant differences. There were no significant differences in interpersonal problems for any treatment group between post and follow-up. The means and standard deviations of pre-treatment, post-treatment, and 6 month follow-up interpersonal problem scores are presented in Table 8, and means are displayed in Figure 3.

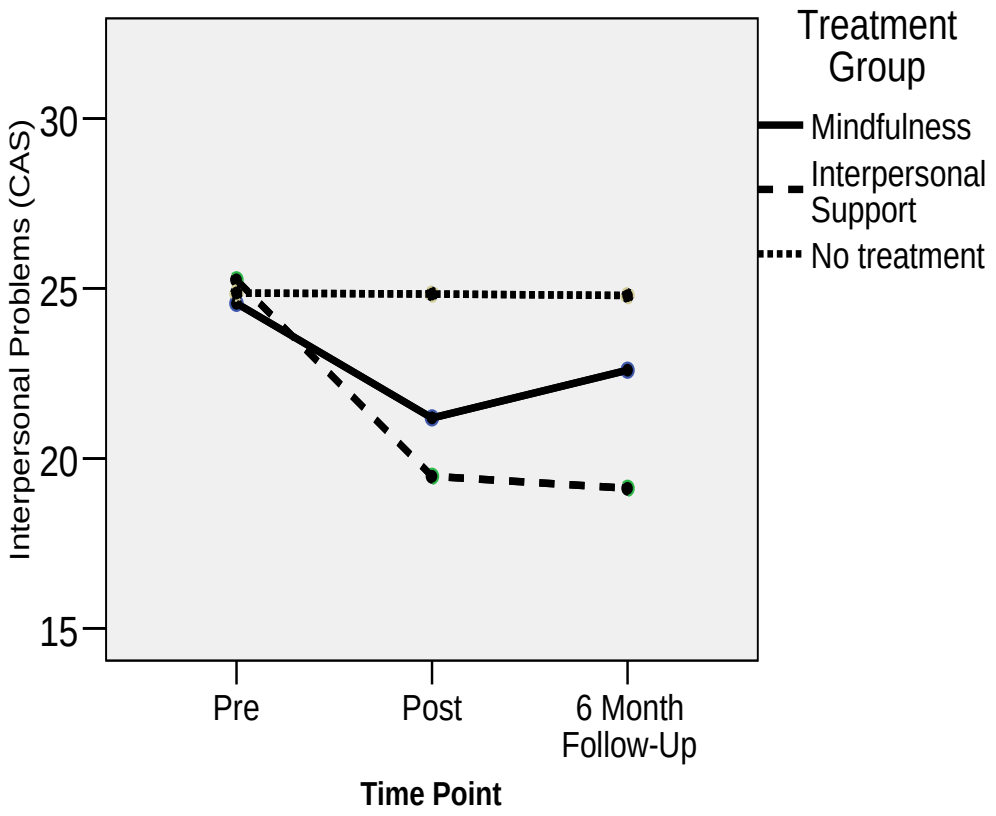

Figure 3: Interpersonal Problem Scores for Mindfulness, Interpersonal Support and No-Treatment conditions across Pre, Post and 6 Month Follow-up.

Hypothesis 1(d): Academic Problems

The hypothesis that a mindfulness-based intervention is more effective in reducing academic problems than the IS group and no-treatment group across three time points was tested using a 3X3 repeated measures ANCOVA with "time" as the within-subjects factor and "group" as the between-subjects factor, and the propensity score included as a covariate. There was no significant main effect for time. The results for the ANCOVA indicated a significant interaction between time and treatment group, indicating the means changed differentially across groups over time; Wilks' Λ=.80, F (2, 110) = 6.07, $p < .001$. Follow-up paired samples *t*-tests indicated a significant change between mean academic problems scores at pre-treatment and post-treatment for the mindfulness intervention, t (45) = 5.49, $p<.001$**.** Between pre-intervention and 6 month follow-up, the mindfulness intervention maintained a significant decrease in academic problems scores, t (45) = 6.13, $p<.001$. The IS and no-treatment groups showed no significant differences in academic problems over time (pre, post and follow-up). There were no significant differences in academic problems for any treatment group between post and follow-up. The means and standard deviations of pre-treatment, post-treatment and 6 month follow-up academic problem scores are presented in Table 8, and means are displayed in Figure 4.

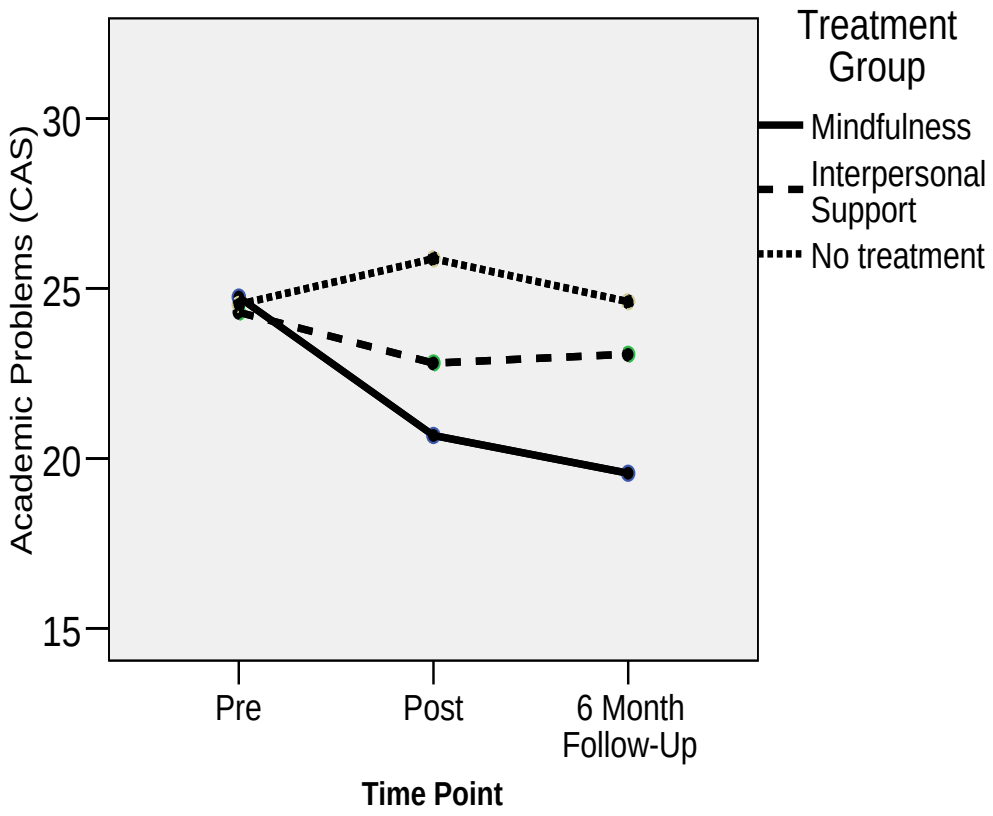

Figure 4: Academic Problem Scores for Mindfulness, Interpersonal Support and No-Treatment conditions across Pre, Post and 6 Month Follow-up.

Hypothesis 1(e): Substance Abuse

The hypothesis that a mindfulness-based intervention is more effective in reducing substance abuse than the IS group and no-treatment group across three time points was tested using a 3X3 repeated measure ANCOVA with "time" as the within-subjects factor and "group" as the between-subjects factor, and the propensity score included as a covariate. The results for the ANCOVA indicated no significant main effect for time. Results showed a significant interaction between time and treatment group, indicating the means changed differentially across groups over time; Wilks' Λ=.89, F (2, 110) = 3.37, $p < .01$. Follow-up paired samples t-tests indicated a significant effect between mean substance abuse scores at pre-treatment and post-treatment for the mindfulness intervention, t (45) = 2.97, p<.005. The IS group and no-treatment group showed no significant differences in substance abuse over time. Between pre-intervention and 6 month follow-up, the mindfulness intervention no longer showed a significant decrease in substance abuse scores. There were no significant differences in substance abuse scores for any treatment group between post and follow-up. The means and standard deviations of pre-treatment, post-treatment and 6 month follow-up substance abuse scores are presented in Table 8, and means are displayed in Figure 5.

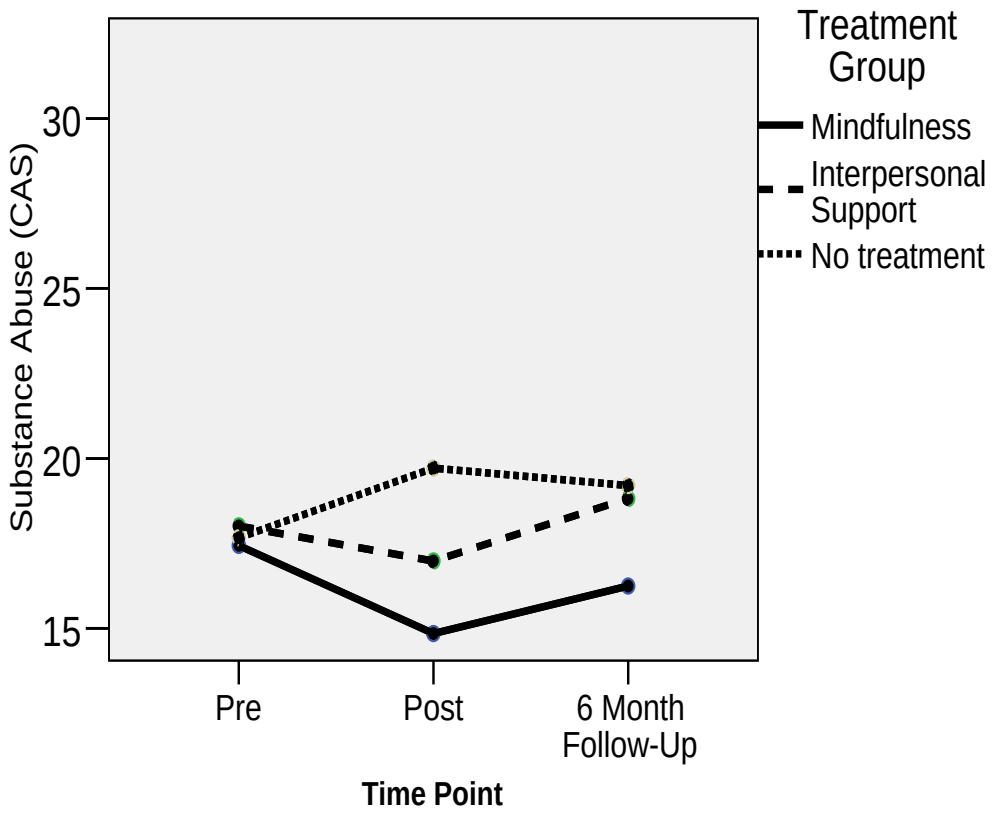

Figure 5: Substance Abuse Scores for Mindfulness, Interpersonal Support and No-Treatment conditions across Pre, Post and 6 Month Follow-up.

Table 8.

Mean CAS Scores (and Standard Deviations) by Treatment Condition at Pre-treatment, Post-treatment, and 6 Month Follow-up

	Assessment Time		
	Pre-Treatment	Post-Treatment	6 Month Follow-Up
CAS Subscales Treatment Group	M (SD) N = 112	M (SD) N=112	M (SD) N=112
Anxiety			
Mindfulness	31.0 (6.6)	23.2 (5.6)**	22.2 (5.9)**
IS	28.4 (7.1)	23.3 (8.1)**	24.5(7.2)
No-Treatment	30.3 (6.9)	29.1 (8.1)	27.3 (8.2)
Depression			
Mindfulness	25.9 (7.7)	19.5 (6.2)**	18.5 (5.5)**
IS	24.6 (6.8)	20.0 (5.5)**	21.6 (6.0)
No-Treatment	25.1 (6.6)	24.3 (7.3)	24.0 (6.8)
Interpersonal Problems			
Mindfulness	24.5 (6.8)	20.9 (6.0)**	22.2 (7.0)
IS	25.3 (7.8)	19.5 (6.0)**	19.1 (5.2)*
No-Treatment	24.0 (6.4)	25.2 (7.3)	25.3 (7.6)
Academic Problems			
Mindfulness	25.3 (6.4)	21.0 (5.6)**	19.7 (5.4)**
IS	24.3 (6.5)	22.8 (5.9)	23.0 (6.0)
No-Treatment	23.9 (6.4)	25.4 (7.2)	24.4 (7.5)
Substance Abuse			
Mindfulness	18.0 (7.6)	15.2 (6.9)*	16.3 (5.0)
IS	18.0 (6.8)	17.0 (6.5)	18.8 (7.0)
No-Treatment	17.0 (6.9)	19.2 (7.4)	19.2 (7.2)

Note. Significant change in scores from pre-treatment, *p<.05, **p<.001

Hypothesis 2

The hypothesis that a mindfulness-based intervention is more effective in increasing mindfulness skills than the IS group and no-treatment group across three time points (pre-treatment, post-treatment, and FU6) was tested using a 3X3 repeated measures ANCOVA with "time" as the within-subjects factor and "group" as the between-subjects factor, and the propensity score included as a covariate. The results for the ANCOVA indicated no significant main effect for time, however it did show a significant interaction between time and treatment group, Wilks' Λ=.76, F (2, 110) = 7. 91, p < .001. Follow-up paired samples t-tests indicated a significant effect between mean mindfulness scores at pre-treatment and post-treatment for the mindfulness intervention t (45) = 5.21, p<.001. Between pre-intervention and 6 month follow-up, the mindfulness intervention maintained a significant increase in mindfulness scores t (45) = 3.01, p<.003. The IS and no-treatment groups showed no significant differences in mindfulness over the three time points (pre-treatment, post-treatment, and FU6). There were no significant differences in mindfulness scores for any treatment group between post and 6 month follow-up. The means and standard deviations of pre-treatment, post-treatment, and 6 month follow-up mindfulness skill scores are presented in Table 9, and means are displayed in Figure 6.

Figure 6: Mindfulness Skills Scores for Mindfulness, Interpersonal Support and No-Treatment conditions across Pre, Post and 6 Month Follow-up.

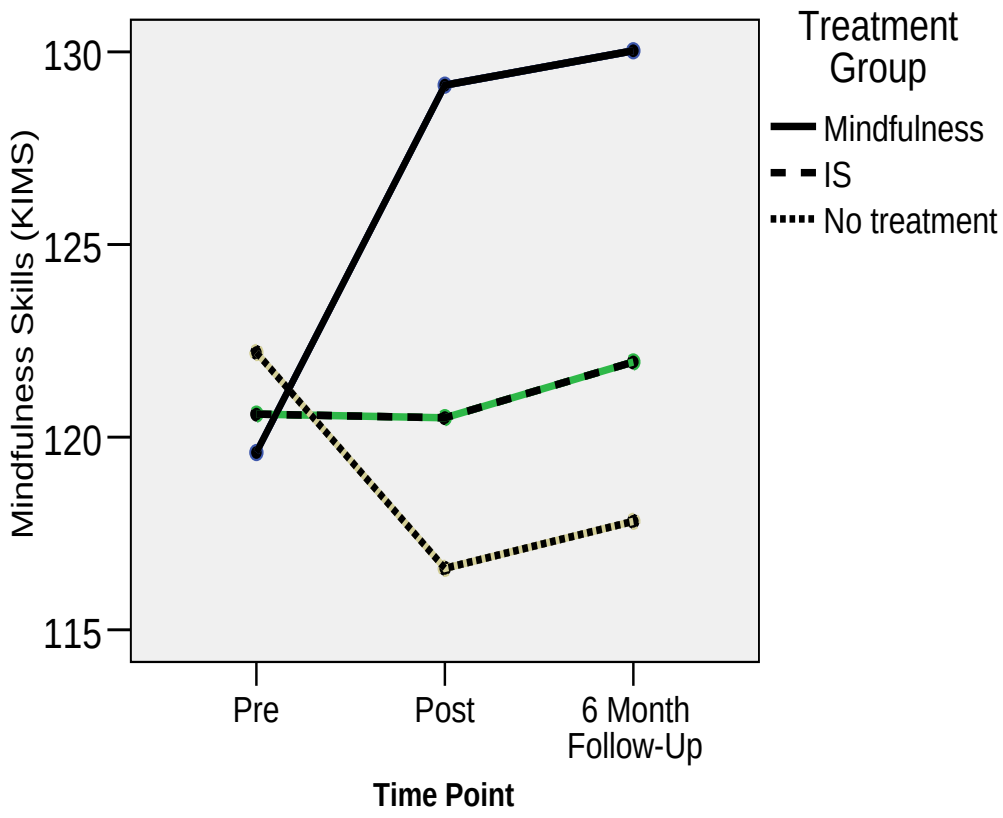

Table 9.

Mean Mindfulness (KIMS) and Readiness to Change (URCIA) by Treatment Condition at Pre-treatment, Post-treatment, and Follow-up

Measure	Pre-Treatment	Post-Treatment	6 Month Follow-Up
Intervention	M (SD)	M (SD)	M (SD)
	n = 95	n = 95	n = 95
Mindfulness (KIMS)			
Mindfulness	119.0 (15.4)	129.0 (15.0)**	129.5 (16.7)**
IS[a]	120.6 (13.4)	120.5 (14.2)	121.9 (14.9)
No-Treatment	123.0 (15.5)	116.8 (15.0)	118.5 (14.4)
Readiness to Change			
Mindfulness	61.1 (11.8)	-	-
IS	62.3 (10.9)	-	-
No-Treatment	54.4 (12.2)	-	-

Note. Significant increase in scores from pre-treatment, **p<.001
[a] Interpersonal Support

Hypothesis 3

A series of linear regression analyses were used to investigate the relationship between mindfulness practice time and change in mindfulness skills from pre-intervention to post-intervention, and post-intervention to follow-up. These analyses were conducted exclusively with participants in the mindfulness intervention because these effects were hypothesized only for people participating in mindfulness training. Pre-post

change scores were calculated by subtracting pre-intervention scores from post-intervention scores. Post to follow-up change scores were calculated by subtracting post-intervention scores from follow-up scores.

Hypothesis 3(a)

The hypothesis that mindfulness practice time will be positively associated with degree of change in mindfulness skills from pre-intervention to post-intervention was investigated using linear regression. To examine this relationship, change in mindfulness from pre-intervention to post-intervention was entered as a criterion variable (dependent variable), and mindfulness practice time was entered as a predictor variable. The amount of mindfulness practice time refers to the number of minutes spent engaging in formal or informal mindfulness practices per week over the course of the intervention (M = 112, SD = 78). Mean number of minutes spent practicing mindfulness practice time was significantly related to change in mindfulness scores, $F(2, 45) = 6.3$, $p < .004$, and approximately 24% of the variance in change in mindfulness from pre-intervention to post-intervention was accounted for by its linear relationship with mindfulness practice time. An examination of the standardized beta coefficients indicated that mindfulness practice time beta = .49, indicating that with every 1 standard deviation increase in mindfulness practice time, there was a .49 standard deviation increase in mindfulness skills. Table 10 presents the correlation coefficients between change scores in mindfulness skills from pre-intervention to post-intervention and practice time.

Hypothesis 3(b)

The hypothesis that mindfulness practice time will be associated with degree of change in mindfulness from post-intervention to follow-up was investigated using linear regression. Change in mindfulness from post-intervention to 6 month follow-up was entered as the criterion variable, and mindfulness practice time was entered as the predictor variable. The amount of mindfulness practice time refers to the number of minutes spent engaging in formal or informal mindfulness practices per week from the end of the intervention to 6 month follow-up ($M = 54$, $SD = 44$). Mindfulness practice time was significantly related to change in mindfulness scores, $F(1, 45) = 28.4$, $p < .001$, and approximately 53% of the variance in change in mindfulness from post-intervention to 6 month follow-up was accounted for by its linear relationship with mindfulness practice time. An examination of the standardized beta coefficients indicated that mindfulness practice time beta = .73, indicating that with every 1 standard deviation increase in mindfulness practice time, there was a .73 standard deviation increase in mindfulness skills.

Hypothesis 4

A series of linear regressions was conducted to investigate the relationship between mindfulness practice time and change in the five dimensions of college adjustment from pre-intervention to post-intervention, and post-intervention to follow-up. Again, these analyses were conducted only with participants in the mindfulness intervention because these effects were hypothesized only for people participating in mindfulness training.

Hypothesis 4(a)

The hypothesis that mindfulness practice time will be associated with degree of change on the five dimensions of the CAS from pre-intervention to post-intervention was investigated. To examine this relationship a series of five regressions were conducted with change in anxiety, depression, interpersonal problems, academic problems, and substance abuse from pre to post-intervention entered as the criterion variables and mindfulness practice time entered as a predictor variable. Table 10 presents the correlation coefficients between change scores in CAS scales from pre-intervention to post-intervention and mindfulness variables.

Hypothesis 4(a)(i): *Anxiety*. Mindfulness practice time was significantly related to a decrease in anxiety scores, $F(2, 45) = 6.4$, $p < .004$, with an adjusted R^2 of .21, indicating approximately 21% of the variance in change in anxiety from pre-intervention to post-intervention was accounted for by its linear relationship with mindfulness practice time. Gender did not significantly predict change in anxiety scores from pre-intervention to post-intervention. An examination of the standardized beta coefficients indicated that mindfulness practice time beta = -.5, indicating that with every 1 standard deviation increase in mindfulness practice time, there is a .5 standard deviation decrease in anxiety.

Hypothesis 4(a)(ii): *Depression.* Mindfulness practice time was significantly related to a decrease in depression scores, $F(2, 45) = 3.3$, $p < .05$, with an adjusted R^2 of .09, indicating approximately 9% of the variance in change in depression from pre-intervention to post-intervention was accounted for by its linear relationship with mindfulness practice time. Gender did not significantly predict change in depression

scores from pre to post-intervention. An examination of the standardized beta coefficients indicated that mindfulness practice time beta = -.38, indicating that with every 1 standard deviation increase in mindfulness practice time, there is a .38 standard deviation decrease in depression.

Hypothesis 4(a)(iii)): *Interpersonal Problems.* There was no significant relationship between mindfulness practice time and change in interpersonal problems.

Hypothesis 4(a)(iv): *Academic Problems.* Mindfulness practice time was significantly related to a decrease in academic problems scores, $F(2, 45) = 5.8$, $p < .006$, with an adjusted R^2 of .19, indicating approximately 19% of the variance of change in academic problems from pre to post-intervention was accounted for by its linear relationship with mindfulness practice time. An examination of the standardized beta coefficients indicated that mindfulness practice time beta = -.47, indicating that with every 1 standard deviation increase in mindfulness practice time, there is a .47 standard deviation decrease in academic problems.

Hypothesis 4(a)(v): *Substance Abuse.* There was no significant relationship between mindfulness practice time and change in substance abuse.

Hypothesis 4(b)

The hypothesis that mindfulness practice time will be associated with degree of change on the five dimensions of the CAS from post-intervention to follow-up was investigated using linear regression. The amount of mindfulness practice time refers to the number of minutes spent engaging in formal or informal mindfulness practices per week from the end of the intervention to 6 month follow-up. To examine this relationship

change in anxiety, depression, interpersonal problems, academic problems, and substance abuse from pre to post-intervention was entered as the criterion variable and mindfulness practice time was entered as a predictor variable. Regression analyses indicated that mindfulness practice time across the follow-up period was not related significantly to any dimension of the CAS.

Table 10.

Pearson correlations between Mindfulness Variables and CAS Change Scores from Pre to Post Intervention (n=46)

Change Score Pre-Intervention to Post-Intervention	Mindfulness Practice Time	Mindfulness Skills Change Scores
Anxiety	-.49**	-.27**
Depression	-.38*	-.36**
Interpersonal Problems	-.16	-.17
Academic Problems	-.47**	-.38**
Substance Abuse	-.24	-.36**
Mindfulness Skills Change Scores	.50**	-

Pearson Correlation Coefficients, *p<.05, **p<.001

Hypothesis 5

The hypothesis that change in mindfulness will be linked with change on the five dimensions of the CAS from pre-intervention to post-intervention was investigated. To examine this relationship a series of five linear regressions were conducted with change in anxiety, depression, interpersonal problems, academic problems, and substance abuse

from pre to post-intervention entered as the criterion variables and change in mindfulness from pre-intervention to post-intervention as the predictor variable. See Table 10 for Correlation Coefficients between CAS Change Scores from Pre to Post Intervention and Mindfulness Variables.

Hypothesis 5(a): *Anxiety*

The linear regression between change in mindfulness and change in anxiety scores was significant, $F(1, 112) = 4.25$, $p < .05$. The adjusted R^2 was .06, indicating approximately 6% of the variance of change in anxiety from pre-intervention to post-intervention was accounted for by its linear relationship with change in mindfulness. An examination of the standardized beta coefficients indicated that mindfulness beta = -.28, indicating that with every 1 standard deviation increase in mindfulness, there was a .28 standard deviation decrease in anxiety.

Hypothesis 5(b): *Depression*

The linear regression between change in mindfulness and change in depression scores was marginally significant, $F(1, 112) = 3.3$, $p < .08$. The adjusted R^2 was .04, indicating approximately 4% of the variance of change in depression from pre-intervention to post-intervention was accounted for by its linear relationship with change in mindfulness. An examination of the standardized beta coefficients indicated that mindfulness beta = -.24, indicating that with every 1 standard deviation increase in mindfulness, there was a .24 standard deviation decrease in depression.

Hypothesis 5(c): *Academic problems*

The linear regression between change in mindfulness and change in academic problems scores was significant, $F(1, 112) = 7.4$, $p < .009$. The adjusted R^2 was .11, indicating approximately 11% of the variance of change in academic problems from pre-intervention to post-intervention was accounted for by its linear relationship with change in mindfulness. An examination of the standardized beta coefficients indicated that mindfulness beta = -.36, indicating that with every 1 standard deviation increase in mindfulness, there was a .36 standard deviation decrease in academic problems.

Hypothesis 5(d): *Interpersonal Problems*

There was no significant relationship between change in mindfulness and change in interpersonal problems.

Hypothesis 5(e): *Substance abuse*

The linear regression between change in mindfulness and change in substance abuse scores was marginally significant, $F(1, 112) = 2.87$, $p < .10$. The adjusted R^2 was .04, indicating approximately 4% of the variance of change in substance abuse from pre-intervention to post-intervention was accounted for by its linear relationship with change in mindfulness. An examination of the standardized beta coefficients indicated that mindfulness beta = -.23, indicating that with every 1 standard deviation increase in mindfulness, there was a .23 standard deviation decrease in substance abuse.

Effect Sizes

Effect sizes were computed for all CAS scales to compare the practical significance of differences among the mindfulness group, the interpersonal support group, and the no-treatment group. Effect sizes were computed by dividing the change score (pre-intervention to 6 month follow-up) for a given subscale by the standard deviation of the combined group scores on that index (Cohen, 1988). Practical significance was evaluated using Cohen's (1988) standards for effect sizes, in which values around or below .20 are considered small, values around .50 are considered moderate, and values around or above .80 are considered large. Among participants in the mindfulness intervention, large effect sizes were observed for anxiety (d = 1.06) and depression (d =.87), whereas moderate effect sizes were observed for academic problems (d =.58) and interpersonal problems (d =.54), and small effect sizes were found for substance abuse (d =.34). Among participants in the interpersonal support group large effect sizes were observed for interpersonal problems (d=.*84*).

Clinical Significance

One way of investigating the clinical significance of the changes produced by therapeutic interventions is to compare the performance of treated participants to normative comparisons (Kazdin, 2008; Kendall, Marrs-Garcia, Nath, & Sheldrick, 1999). Accordingly, we ran a series of one sample *t*-tests to compare both the pre-treatment and 6 month follow-up scores of the current sample with the non-clinical standardization sample (Anton & Reed, 1991). We used Bonferroni's correction to control for family-

wise error rate. Because five comparisons were made, alpha was set at .05/5 = .01. At their pre-intervention assessment, study participants demonstrated significantly higher rates of anxiety, $t(112) = 14.83$, $p<.001$, depression, $t(112) = 12.35$, $p<.001$, and interpersonal problems, $t(112) = 8.57$, $p<.001$, than the normative sample, but did not report higher rates of academic problems or substance abuse. At 6 month follow-up participants in the mindfulness intervention did not differ significantly from the normative sample on any dimensions of the CAS. Among participants in the interpersonal support group, mean scores at 6 month follow-up no longer differed significantly from the normative sample on dimensions of anxiety or interpersonal problems; however, they were still higher (indicating more distress) than the normative sample on depression scores, $t(28) = 3.53$, $p<.001$. For the no-treatment group, mean scores at 6 month follow-up remained significantly higher (indicating greater difficulty) than those of the normative population on dimensions of anxiety, depression, and interpersonal problems.

Discussion

This study provided consisten evidence that a mindfulness-based intervention is more effective over the long-term in decreasing psychological distress than either an interpersonal support group or no-treatment at all. As expected, the interpersonal support group was found to be more effective in alleviating interpersonal problems.

In fact, the results of this study demonstrate relatively similar short-term effects for the mindfulness and interpersonal support interventions. Both, the mindfulness and interpersonal support groups were effective in reducing anxiety, depression, and interpersonal problems from pre-intervention to post-intervention compared to the no-treatment control group. Two notable differences in the short-term results related to academic problems and substance abuse; only the mindfulness intervention was effective in reducing academic problems and substance abuse from pre-intervention to post-intervention. However, at 6 months follow-up, there was evidence of a difference in the interventions' effectiveness. Six-months following the end of the intervention, participants in the mindfulness intervention maintained reductions in anxiety, depression, and academic problems (from pre-intervention). In contrast, participants in the interpersonal support group did not maintain initial declines they had made in anxiety, depression, and academic problems by the 6 month follow-up. Conversely, participants in the interpersonal support group did maintain the decrease in interpersonal problems at 6 months follow-up, whereas participants in the mindfulness intervention did not. Neither intervention exhibited 6 month follow-up reductions compared with pre-intervention

status in substance abuse. Thus, the short-term benefits in substance abuse problems exhibited by participants in the mindfulness intervention were lost at 6 months follow-up. Overall, participants in the no-treatment group showed no significant change in scores on any dimension across time points. There was no change in any dimension of psychological functioning from post-intervention to 6 months follow-up for any treatment condition.

Our findings are in line with previous research that supports the effectiveness of a mindfulness-based intervention in treating anxiety and depression (Baer, 2003; Grossman et al., 2004). The current study also built on previous research in several important ways. First, few prior studies included an evaluation of intervention effects at a follow-up period. Second, very few studies compared the effect of a mindfulness intervention to an active control group; instead most used a waitlist control or an unspecified treatment-as- usual control. Of the few studies that have examined effects at a follow-up period, all found that gains of the mindfulness intervention were maintained at the follow-up period (3 months to 3 years; Astin, 1997; Carlson, et al., 2001; Kabat-Zinn, Lipworth, & Burney, 1985; Kabat-Zinn, Lipworth, Burney, & Sellers, 1987; Miller, Fletcher, & Kabat-Zinn, 1995). Thus, our findings are consistent with those demonstrating longer-term benefits of a mindfulness-based intervention for reducing symptoms of anxiety and depression.

To our knowledge, no previous research has directly compared the efficacy of a mindfulness-based intervention with an interpersonal support group. There are several reasons why the mindfulness-intervention may have maintained positive gains for

depression and anxiety at 6 month follow-up in contrast to the interpersonal support group. First, it has been suggested that a reduction in rumination may be one of the mechanisms that accounts for the beneficial effects of mindfulness-based interventions (Bishop et al., 2004). Given that rumination is associated with exacerbating both anxiety and depression (Nolen-Hoeksema, 1991), such reduction would explain the positive effect of the mindfulness intervention on both dimensions. Mindfulness teachings instruct clients to treat thoughts and feelings as passing mental events rather than as necessarily valid reflections of reality or central aspects of the self. Over time this practice is posited to lead people to change their relationship to their thoughts. The practitioner becomes less identified with his or her thoughts; simply noticing the event, as it is occurring, and letting it go. Thus, the use of mindfulness techniques can prevent depressogenic and anxiogenic thinking from spiraling by encouraging clients to notice unhelpful thoughts and, once they notice such thoughts, redirect attention to other aspects of the present moment, such as the breath or sensations in the body. Mindfulness practice essentially allows individuals to disengage from their train of ruminative thinking and come into the present moment. Indeed, two investigations have found that mindfulness training is associated with decreased rumination (Kingston, Dooley, Bates, Lawlor, & Malone, 2007; Ramel et al., 2004).

Second, mindfulness training may exert its effects through a reduction in thought suppression. Mindfulness techniques encourage individuals to change their relationship to aversive mental content from avoidance to acceptance. A large body of research supports the role of thought suppression in increasing the accessibility of thoughts (e.g., Wegner,

1997). Thus, mindfulness skills should lead to reductions in the accessibility of depressogenic and anxiogenic thoughts. The reduction of both ruminative thinking patterns and thought suppression may be significant mechanisms that account for why mindfulness practices reduce anxiety and depression over the longer term in contrast to an interpersonal support group.

Third, one aim of the mindfulness intervention is to encourage clients to develop an ongoing home practice. Thus, to the degree to which clients in the mindfulness intervention practice at home, they continued to receive a dose of treatment following the end of the intervention, whereas presumably those in the interpersonal support condition did not. This hypothesis is further supported by the relationship between practice-time and increased mindfulness skills discussed below.

Finally, participants in the mindfulness intervention also may have developed effective strategies for managing stress and concomitant symptoms of arousal. Kabat-Zinn and colleagues proposed that mindfulness training exerts its beneficial effects on a range of psychological and physical symptoms, including anxiety and depression, through its capacity to reduce stress (Kabat-Zinn, 1990; Miller, Fletcher, & Kabat-Zinn, 1995). Specifically, they propose that the experience of being aware in the present moment can short-circuit the flight or fight reaction characteristic of the sympathetic nervous system. Instead of engaging in a spiral of physiological and psychological hyperarousal when feeling threatened or stressed, through employing mindfulness the individual can adopt a more dispassionate attitude to the present moment. There is no

reason to believe that participation in an interpersonal support group would contribute to the development of such arousal reduction techniques.

In summary, the short-term reductions in anxiety and depression witnessed in participants in the interpersonal support group may have been due to non-specific effects present during treatment, such as social support, therapeutic attention, and expectancy of change. In contrast, participants in the mindfulness-based intervention were provided with a set of skills for changing their relationship to unhelpful thinking patterns, and for reducing escalating levels of stress and arousal. Further, the mindfulness intervention encouraged them to develop a daily mindfulness practice that continually reinforces these skills.

The finding that participants in the mindfulness-based intervention reported short-term reductions in interpersonal problems was unexpected. More recent research suggests that such findings may not be so surprising. Several studies have linked relationship satisfaction in romantic relationships with mindfulness skills. For instance, Wachs and Cordova (2007) found that mindfulness is related to marital adjustment. Similarly, another investigation found that trait mindfulness predicted relationship satisfaction and an increased capacity to respond constructively to relationship stress in romantic relationships (Barnes, Brown, Krusemark, Campbell, Rogge, 2007). Further, an investigation into a mindfulness-based relationship enhancement program with nondistressed couples found that the intervention positively influenced couples' relationship satisfaction, closeness, acceptance of the partner, and relationship distress (Carson, Carson, Gil, & Baucom, 2004). In the current study, the interpersonal problems

measure is not exclusive to romantic relationships, but rather refers to relationships in general (for example, 'I have close and satisfying relationships'). Our work builds on previous findings by suggesting that mindfulness may not only be linked with romantic relationship satisfaction but also with general interpersonal satisfaction, such as reduced conflict and increased sense of intimacy.

Wachs and Cordova (2007) have proposed several processes that might explain the link between mindfulness and relationship satisfaction. Firstly, they theorize that greater attentiveness to interpersonal interactions in the present moment may enable partners to engage in more adaptive emotional responding. This hypothesis is supported by their research that found more mindful partners were superior at both identifying their own emotions and communicating their emotions to others, and more skilled at empathic responding. Secondly, links between mindfulness and anger-related emotion skills have been established. Specifically, higher levels of mindfulness were not linked with a decrease in the internal experience of anger, however, a more mindful orientation was linked with how an individual choose to respond to anger; for example, such individuals were less likely to do or say things they might later regret (Wachs & Cordova, 2007).

The positive effects on interpersonal problems did not hold up at 6 months follow-up for participants in the mindfulness-based intervention. This finding is surprising given that self-reported use of mindfulness skills remained the same from post-intervention to 6 months follow-up. It is possible that the novelty of mindfulness techniques along with the group support for using such techniques in daily life encouraged participants to bring a mindful way of relating to their relationships during

the intervention. However, once the intervention ended, old patterns of communicating and relating may have resumed.

As expected participants in the interpersonal support group exhibited short (at post intervention) and long-term (at 6 months follow-up) reductions in interpersonal problems. This finding is not surprising given the aim in this group is interpersonal learning. Research supports the role of short-term interpersonal group therapy in reducing interpersonal problems during treatment and at a follow-up period up to two years after treatment (Svartberg, Stiles, & Seltzer, 2004).

The investigation into the effect of mindfulness training on academic performance is a novel contribution of the current study. Participants in the mindfulness intervention exhibited short and long-term reductions in academic problems compared to the interpersonal support group and no-treatment group, neither of which showed any change over time. There is some very tentative evidence, including one study with children (Semple, Reid, & Miller, 2005) and another study with an unspecified mindfulness intervention (Hall, 1999) that found links between mindfulness training and academic performance. In addition, there is sound theoretical rationale for why mindfulness training should have positive effects on academic performance. First, several researchers have pointed out that mindfulness meditation may cultivate cognitive abilities such as attentional control, switching, and cognitive inhibition (Bishop et al., 2004). These abilities are likely to lead to increased concentration, cognitive flexibility, and ability to work in a time efficient manner, skills that would no doubt confer benefits onto academic performance. The role of mindfulness training in improving one of these abilities,

attentional control, has been supported in two investigations (Jha et al, 2007; Wenk-Sormaz, 2005). Moreover, it has been established that anxiety, especially test anxiety, and depression have adverse consequences on academic performance (Brackney & Karabenick, 1995). Thus, participants in the mindfulness intervention may have experienced increased academic performance due to the reductions in anxiety and depression.

Another unique contribution of this study is its examination of the effect of mindfulness training on substance abuse. Among participants in the mindfulness group, substance abuse decreased from pre-intervention to post-intervention. However, these changes were not retained at 6 month follow-up. In contrast, participants in the interpersonal support group showed no significant change in substance abuse levels over time. Although one previous study investigated the effect of mindfulness training on substance abuse, results are difficult to compare as the intervention was a 10-day silent Vipassana retreat; hence, it differed substantially from an MBSR intervention, and it was conducted with inmates incarcerated in a minimum security jail (Bowen et al., 2006). Results from Bowen et al.'s (2006) study similarly showed significant reductions in substance use among the mindfulness intervention as compared to a treatment-as-usual control condition, and such effects were maintained at 3 months follow-up. The findings of the current study, however, must be interpreted with some caution. The base rates of substance abuse were low compared to other indices of psychological distress; the average substance abuse score was 18, compared to a mean score of 31, 25, 24, and 25 for anxiety, depression, interpersonal problems, and academic problems, respectively. It

is also important to note that participants in this study were not specifically seeking treatment for substance abuse problems. Thus, it is impossible to know how effective this intervention would be with clients motivated to change substance abuse behavior. The small effects found in the present study should not be used to infer that students presenting with substance abuse problems should be referred to a mindfulness-based intervention.

To investigate the effectiveness of a mindfulness intervention in increasing mindfulness skills, participants also completed a measure at each time point of the extent to which they practice mindfulness skills in their daily life. As expected, participants in the mindfulness intervention increased in daily use of mindfulness skills from pre-intervention to post-intervention, and maintained these gains at 6 month follow-up. In contrast, there was no change in use of mindfulness skills over any time point for either the interpersonal support or no-treatment group. Participants in the mindfulness intervention exhibited no change in use of mindfulness skills from post-intervention to 6 month follow-up.

Our findings are in line with the one other study that examined this link. Carmody and Baer (2008) similarly found participation in a mindfulness based intervention led to an increase in mindfulness skills; however, they only examined this increase over the duration of the intervention and did not include a follow-up period. Several authors have noted with concern that in the absence of research that documents the role of mindfulness-based interventions in increasing mindfulness skills, it remains possible that such interventions merely produce nonspecific benefits, such as increased self-efficacy

(Bishop, 2002; Grossman, 2004). Thus, the evidence of increased mindfulness in the current mindfulness intervention is a significant contribution.

The current study also investigated the role of home practice in leading to changes in mindfulness skills and in psychological symptoms. Results documented a positive association between time spent in home mindfulness practice and change in mindfulness skills across time was supported. In fact, 24% of the variance in mindfulness skill from pre-intervention to post-intervention was accounted for by home practice, and 53% of the variance in mindfulness skill from post intervention to follow-up was accounted for by home practice. Further, home practice time was linked with changes in anxiety, depression, and academic problems from pre to post intervention. However, home practice time was not associated with changes in interpersonal problems or substance abuse.

Our findings are in line with the one previous study that investigated this link. Carmody and Baer (2008) found the extent of home practice of formal meditation exercises was significantly correlated with degree of change in mindfulness skills. Our findings also provide evidence for a strong and positive linear relationship between the amount of time that is spent doing home practice and change in mindfulness skills. To our knowledge, no previous research has examined this link at a follow-up time period after the end of the intervention. Thus, it is encouraging that we found such a strong link continues after the end of the intervention, when participants no longer have a formal opportunity (i.e., at weekly meeting) to discuss integrating mindfulness skills into their daily lives.

Previous research into the role of home practice on changes in psychological functioning has been conflicting. Several studies have found positive links between time spent doing home practice and improvement in mood disturbance (Carlson et al., 2001; Kristeller & Halett, 1999; Shapiro et al. 1998; Specca et al., 2000). However, other research has been more ambiguous. For example, Astin (1997) and Ramel and colleagues (2004) found no correlation between practice time and improvements in psychological functioning. It is interesting that in the current study home practice was linked with changes in anxiety, depression, and academic problems but not with changes in interpersonal problems or substance abuse. The later two are also the dimensions for which mindfulness participants only made short-term gains. It is possible that the reduction in interpersonal problems and substance abuse were due to non-specific effects of the group, such as social support and therapeutic attention, rather than due to the acquisition of mindfulness skills, per se.

The average amount of time spent practicing both formal and informal mindfulness practices over the course of the intervention was 1 hour and 56 minutes per week. Twenty-one percent reported not engaging in any practice at 6 month follow-up. Almost 50% reported spending between 2 and 2½ hours practicing per week, 20% reported between 1 and 1 ½ hours of practice, and the remaining 30% of the sample practiced between 10-60 minutes per week. In general, the current sample reported slightly lower amounts of time engaging in home practice compared to other samples described in the literature. Kristeller & Halett (1999) reported an average weekly practice amount of 2¼ hours in an eating disordered population, Specca et al. (2000) reported an

average weekly practice amount of 3 hours and 43 minutes per week with a group of cancer patients, and Ramel et al. (2004) reported a slightly lower amount of weekly practice time with Vietnam veterans, 1½ hours.

Data on amount of time spent practicing at 6 months follow-up were also collected. Twenty one percent of participants reported not engaging in any practice at 6 month follow-up. Almost 30% reported engaging in 1½ hours of practice a week, 20% reported between 1 and 1¼ hours of practice, and the remaining 30% of the sample practiced between 10-60 minutes per week. The mean amount of practice time was 55 minutes per week. Thus, although mean practice time halved from the intervention period to 6 month follow-up, the majority of the sample were still practicing, and half of the sample was practicing at least an hour a week. There is very little previous research on the extent to which participants continue to practice once the intervention has ended. Only one study was located that gathered such data (Kabat-Zinn, Lipworth, & Burney, 1985). These authors found that 70% of the sample continued practice up to 15 months after the intervention had ended, and of this group, 47% of participants were classified as engaging in a regular practice (over 3 times a week), 33% infrequently (less than once a week), and the remainder sporadically (between 1 and 3 times a week). The above study did not report data on the total amount of minutes spent practicing, thus, it is difficult to directly compare our findings. However, for the most part it seems our findings are similar.

Contrary to our expectation, home practice time was not linked with change in any dimension of psychological functioning from post-intervention to 6 month follow-up.

We could not locate any prior research that examined this question with which to compare our results. There are several possible explanations for the null findings. Although participants in the mindfulness intervention continued to show a decrease on all dimensions of the CAS except substance abuse from post-intervention to 6 month follow-up, such changes were very small and none were statistically significant. Thus, the lack of variance in this variable may in part have contributed to our findings. It is also possible that data on practice time may not be very accurate. Initially, we hoped to collect information on practice time through a practice log that participants were asked to complete on a daily basis. However, a very low percentage (8%) of participants completed this log or were willing to hand it in at the end of the group. Thus, we altered our strategy and gathered data on practice time by asking people at the end of the 7 week intervention and then again at 6 months follow-up to estimate how much time they spent doing formal or informal mindfulness practices every week. It is easy to imagine that asking people to reflect back over such long periods of time may lead to biased estimates.

It was also hypothesized that change in mindfulness skills would be linked with changes in psychological functioning. As expected, results indicated that from pre-intervention to-post intervention increases in mindfulness skills were linked with decreases in anxiety, depression, academic problems, and substance abuse, but not interpersonal problems.

One previous study similarly found that an increase in mindfulness over the course of a 7 week MBSR intervention was a significant predictor of decrease in symptoms on the Brief Symptom Inventory (Carmody & Baer, 2008). Unfortunately,

Carmody and Baer (2008) only examined the link with a global measure of psychological distress and did not investigate the link with the interpersonal sensitivity subscale separately. Thus, we have no comparison for our null findings between changes in mindfulness skills and interpersonal problems. Nonetheless, our findings are in line with the earlier proposal that reductions in interpersonal problems are due to non-specific effects of the mindfulness group rather than due to changes in mindfulness practice per se. On the other hand, reductions in other dimensions of psychological functioning, especially anxiety and depression, are more likely to be due to the development of strategies for responding to negative thought patterns in a less distressing way. The link between changes in mindfulness skills and substance abuse makes it difficult to understand the lack of a link between changes in substance abuse and practice time. The limitations of assessing substance abuse problems in a non-treatment seeking population have been noted above.

Recently, Kazdin (2008) has delineated the limitations of relying solely on statistical significance as a marker of a treatment's effectiveness. Specifically, Kazdin highlighted that the difference required for statistical significance in an outcome may not reflect a real difference in the everyday quality of life in the client. Accordingly, we chose two additional measures to gauge the impact of treatment; effect size and clinical significance. Effect sizes are a helpful method for assessing the practical significance of relationships and group differences (Borg & Gall, 1989; Shaver, 1993). The effect sizes among participants in the mindfulness intervention indicated the magnitude of the treatment effect was large for anxiety and depression, and moderate for academic

problems. Among participants in the interpersonal support group, the effect size was large for interpersonal problems. The effect sizes in the current study were slightly larger overall than those found in Baer's (2003) and Grossman's (2004) meta analyses (d = .59 and d = .54, respectively), although a direct comparison is difficult because these studies combined a broad range of psychological and medical outcomes. Several researchers have noted that a meaningful way of examining the clinical significance of a treatment is to investigate if high scores at pre-treatment fall within the normative range of nonclinical samples by the end of treatment (Kazdin; 2008; Kendall, 1999). Our findings support that students differed significantly from the normative range before treatment on dimensions of depression, anxiety and interpersonal problems. Moreover, 6 months following treatment, for both intervention groups, participants' scores fell within the normative range for these dimensions of distress, except that participants in the interpersonal support group remained more depressed than the nonclinical sample. In contrast, students who did not receive treatment continued to report more anxiety, depression, and interpersonal problems than the normative sample 6 months following treatment. Thus, using proximity to norms as a measure of clinically significant improvement, following treatment the participants in the mindfulness intervention were similar to a non-clinical population.

Strengths and Limitations of This Study

The current study has made several noteworthy contributions to the literature on mindfulness-based interventions by addressing several unanswered questions in the field. Research prior to this had been criticized for a lack of adequate control groups (Baer,

2003; Walsh & Shapiro, 2006) that made it difficult to conclude that the positive effects were due to mindfulness training rather than expectancy effects, social support, or contact with a therapist. The use of an active control condition in our design strengthens the argument that it is mindfulness training itself that contributes to the beneficial effects of this intervention. Further evidence for this premise comes from the fact that we found a different pattern of results across the two active interventions. Specifically, the mindfulness intervention was not more effective across the board, rather, it was more effective at targeting specific areas of psychological functioning that are theoretically linked to mindfulness: anxiety, depression, academic problems, and substance abuse. Reductions in rumination, thought suppression, arousal reduction, and increased attentional control include some of the likely mechanisms that account for these changes. In the same vein there is no theoretical rationale for why a mindfulness intervention would contribute to long-term changes in interpersonal functioning, and our study did not document such changes.

Another novel contribution of the current study was the finding that a mindfulness-based intervention did enhance participants' ability to evoke a state of mindfulness, and that such changes were maintained 6 months following the end of the intervention. To our knowledge, this is the first study to examine if such changes in mindfulness skills are maintained at a follow-up period after the intervention.

Another addition to the literature made by this investigation is clarification regarding the role of home practice. Research on the importance of home practice in contributing to changes in psychological well-being has been conflicting (Astin, 1997;

Carlson et al., 2001; Kristeller & Halett, 1999; Shapiro et al. 1998; Speca et al., 2000). It is important to clarify the necessity of home practice as the steep practice requirements of MBSR and MBCT (45 minutes a day) may preclude some individuals from participating in these forms of intervention. On the other hand, it is important to note that our data were correlational in nature and, as such, do not necessarily indicate a causal connection between home mindfulness practice and psychological well-being and mindfulness skills. It is important to use an experimental design to identify whether participants who are instructed to and actually conduct home practice show greater psychological well-being and mindfulness skills than a mindfulness intervention that does not include home practice.

The current study also had several methodological strengths. Although we could not conduct a randomized trial, we took measures to minimize the effects of non-randomization. Specifically, the design included a propensity score analysis to limit the effects of possible baseline differences between the groups (Rosenbaum & Rubin, 1983). In addition, our findings were duplicated across two sites and across 6 combinations of group leaders. This increases the confidence with which we can say these effects generalize across settings. Finally, the current study compared the effectiveness of two interventions as they are typically delivered at a UCC which adds to its ecological validity. Although effectiveness studies are less tightly controlled than randomized controlled trials, there have been calls for research to move away from evaluating treatments in laboratory settings and begin investigations of treatments as they happen in

the real world, as such findings are more generalizable to how clinical practice is actually conducted (Kettlewell, 2004).

The central drawback of the current study is that participants were not randomized to treatment conditions. Such a design was not possible in the context of a university counseling center, whose central aim is to provide services to students. Randomized clinical trials (RCT) are generally deemed the best way to compare the effects of treatment on outcomes. RCT's have the advantage of randomly distributing participant characteristics, both observable and unobservable ones, across treatment conditions. In the absence of a randomized design it is difficult to attribute the outcome directly to the treatment effect with complete confidence as it is always possible the results may be biased if some variables that are related with the outcomes are distributed unevenly across treatment conditions. We attempted to address this drawback by gathering and comparing data on participant characteristics, including demographic variables, pre-treatment levels of distress, and motivation to change across treatment groups. This allowed us to draw conclusions about the extent to which our treatment groups were similar or dissimilar. Overall, treatment groups were very similar. The only dimension on which treatment groups differed was motivation to change; the no-treatment condition exhibited significantly less motivation to change than either active treatment condition. Also, as mentioned above, we employed a propensity score analysis to balance differences across groups in our analyses, thus reducing the effects of non-randomization in our results. Clearly, one drawback of the propensity score analysis is that unlike randomization, the method cannot balance the distributions of unobserved group

differences. Thus, any unobserved yet potentially influential variables on group assignment are not included and, therefore, they remain a potential source of bias (Rubin, 1997).

A second limitation pertains to the assessment of home practice. In the current study we did not differentiate between the amount of time spent in informal and formal practices; thus, it is not possible to know the relative importance of each of these forms of practice. In light of recent research that found differences in the effects of formal versus informal practice on well-being (Carmody & Baer, 2008) this is clearly an important distinction to make in gathering such data. There are also questions about the reliability of the home practice data. As mentioned above, we had to change our strategy for collecting data on practice time. Because of the very low return rate of the daily practice log, we instead asked students to estimate such data at the end of the 7 week intervention, and then again at 6 months follow-up to estimate how much time they spent doing formal or informal mindfulness practices every week. Thus, it is possible that such a method led to biased estimates. In the future, it is suggested that incentives or a weekly "auditing" process be used to encourage students to submit information about practice time. Alternatively, students could be asked to complete their practice log at the beginning or end of each weekly group meeting.

Further, this study would ideally have conducted a mediation analysis to investigate if the changes in mindfulness skills mediated the positive benefits, such as decreased anxiety, depression, and academic problems, of participating in the mindfulness intervention. However, the current study would have necessitated a sample

of at least 300 participants to conduct a mediation analysis (Fritz & MacKinnon, 2007). Future inquiries should include sample sizes large enough to conduct such analyses.

Now that the effectiveness of mindfulness training has been strongly supported, it would be beneficial to investigate the mechanisms that account for these benefits. There has been much theorizing and a small amount of empirical research to suggest that reductions in rumination, thought suppression, and self-regulation may account for the benefits witnessed in such programs (Kabat-Zinn, 1990; Kingston et al.; 2007; Ramel et al., 2004; Wegner, 1997). A novel finding in the current study that also deserves further investigation is the role of mindfulness in improving academic performance. Unfortunately, the current study did not collect data on any objective measure of academic performance. In the future it would be advantageous to also include more objective measures of academic performance, such as GPA and study habits.

Implications

This study's results have implications for the distribution of resources at University Counseling Centers. Our findings speak to the differential effectiveness of distinct treatment approaches for specific problems. Accordingly, students should be carefully assessed at initial intake interviews and then triaged into the treatment group that most effectively targets their highest priority presenting problem. The efficient use of resources based on empirical evidence is especially pertinent given the steep rise in identified mental health problems on college campuses and the scarce resources to meet the demand. Second, these results also have implications for those students who drop-out of treatment. Although the drop-out group showed no significant changes over time on

any indices of psychological distress, we found a trend towards problems increasing from pre-intervention to post-intervention intervention for academic problems and substance abuse, and then a flattening off. Overall college adjustment was not significantly better at 6 month follow-up compared to pre-intervention for those students not receiving treatment. This finding suggests that if students who are seeking treatment do not receive treatment, their psychological distress does not subside over time. The implementation of outreach efforts to students who drop out of treatment might encourage some of these students to remain in treatment. Also because the drop-out students had significantly less motivation to change prior to beginning treatment, a motivational interviewing framework may be a better place to start treatment with these students.

These findings also have implications for how mindfulness-based interventions are implemented, specifically in terms of the importance of encouraging home practice. Clearly, home practice is linked with benefits in psychological well-being and increased mindfulness skills. Thus, the notion that more practice is associated with more benefit should be shared with clients. It is of note that 20% of students said they did not practice at all following the intervention. UCC's that are using mindfulness-based interventions should develop strategies to encourage students to continue practicing after the end of the group, for example, holding booster sessions and half-day retreats.

Overall, this study adds to the existing literature that supports the effectiveness of a mindfulness-based intervention for reducing anxiety and depression and for maintaining such gains over a 6 month period of time. Our results also contribute a novel finding to the field with the discovery that academic performance benefits through mindfulness

training. Moreover, the design of the current study allowed us to disentangle some of the common shared factors (e.g., social support, expectancy of change, and therapeutic attention) across interventions and conclude with more certainty that mindfulness training contributes to many of the benefits associated with mindfulness-based interventions rather than non-specific treatment benefits contributing to these changes.

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Appendix A

Please read each statement carefully and decide whether or not it is an accurate statement about you. Underline or put an X beside the number that best fits for you.

1	2	3	4
Not at all True	Slightly True	Mainly True	Very True

I have poor study skills.	1 2 3 4
I feel tense much of the time.	1 2 3 4
A lot of people irritate me.	1 2 3 4
I haven't felt much like eating lately.	1 2 3 4
I party too much.	1 2 3 4
I have difficulty concentrating while studying.	1 2 3 4
When I get upset, I have trouble catching my breath.	1 2 3 4
The people around me care about very different things than I do.	1 2 3 4
The smallest tasks seem to tire me out.	1 2 3 4
I spend too much money on drugs or alcohol.	1 2 3 4
I never find the time to study.	1 2 3 4
I seem to be worried constantly about something.	1 2 3 4
I have close and satisfying relationships.	1 2 3 4
Lately, I feel sad or blue most of the time.	1 2 3 4
I've missed classes or work because I partied the night before.	1 2 3 4
I seldom feel prepared for my exams.	1 2 3 4
I have a lot of aches and pains.	1 2 3 4
I seem to disagree with others more than I agree with them.	1 2 3 4
I've lost interest in the things I've always enjoyed.	1 2 3 4
I've done things while drinking that I'm ashamed of or embarrassed about.	1 2 3 4
I organize my time poorly.	1 2 3 4
Lately, I've had trouble concentrating.	1 2 3 4
I always get hurt when I let others get close to me.	1 2 3 4
Most mornings I wake up calm and rested.	1 2 3 4
I've gotten into trouble as a result of my drinking.	1 2 3 4
I'm satisfied with my academic performance.	1 2 3 4
Lately, it doesn't take much to get me upset.	1 2 3 4
People around me don't understand what I'm really like.	1 2 3 4
Things have gone from bad to worse.	1 2 3 4
I use drugs or alcohol as a way to cope with my problems.	1 2 3 4
As much as I try, I'm always behind in my schoolwork.	1 2 3 4
Often I get so nervous I feel my heart pounding.	1 2 3 4
My temper often gets me into arguments.	1 2 3 4
Lately, it's a chore for me just to get through the day.	1 2 3 4
My use of drugs or alcohol has hurt my grades.	1 2 3 4
I think about dropping classes.	1 2 3 4
I worry about things that don't bother most other people.	1 2 3 4

1	2	3	4
Not at all True	Slightly True	Mainly True	Very True

I need others more than they seem to need me.	1	2	3	4
Sad thoughts keep me awake at nights.	1	2	3	4
Other people believe that I have a problem with drugs or alcohol.	1	2	3	4
Other students seem to study more than I do.	1	2	3	4
I think I'm showing the signs of a lot of stress.	1	2	3	4
I don't get along with those in authority.	1	2	3	4
I don't get the same pleasure that I used to from my activities.	1	2	3	4
People have taken advantage of me while I was drunk or high.	1	2	3	4
I seem to forget what I know when I take a test.	1	2	3	4
Lately, my worries have made it hard for me to get to sleep.	1	2	3	4
I'm tired of the way people treat me.	1	2	3	4
I believe that no matter what I do things will not improve.	1	2	3	4
I've felt guilty over my drinking or use of drugs.	1	2	3	4
I'm inconsistent in my class work.	1	2	3	4
I often feel afraid but don't know why.	1	2	3	4
I've made mistakes in choosing my friends.	1	2	3	4
I can't seem to get rid of my feelings of sadness.	1	2	3	4
I've had arguments with my friends about my drinking or use of drugs.	1	2	3	4
No matter how much I study, I can't seem to make good grades.	1	2	3	4
I'm bothered by thoughts that I can't seem to get rid of.	1	2	3	4
I don't trust most of the people around me.	1	2	3	4
Recently I've lost some of my interest in sex.	1	2	3	4
I've been in some pretty dangerous situations because of my drinking or use of drugs.	1	2	3	4

Underline or put an X beside the number that best describes your own opinion of what is generally true for you.

Never or Very Rarely True	Rarely True	Sometime True	Often True	Very Often or Always True
1	2	3	4	5

I notice changes in my body, such as whether my breathing slows down or speeds up.	1	2	3	4	5
I'm good at finding the words to describe my feelings.	1	2	3	4	5
When I do things, my mind wanders off and I'm easily distracted.	1	2	3	4	5
I criticize myself for having irrational or inappropriate emotions.	1	2	3	4	5
I pay attention to whether my muscles are tense or relaxed.	1	2	3	4	5
When I'm doing something, I'm only focused on what I'm doing.	1	2	3	4	5
I can easily put my beliefs, opinions, and expectations into words.	1	2	3	4	5
I tend to evaluate whether my perceptions are right or wrong.	1	2	3	4	5
When I'm walking, I deliberately notice the sensations of my					

body moving.	1	2	3	4	5
I'm good at thinking of words to express my perceptions, such as how things taste, smell, or sound.	1	2	3	4	5
I disapprove of myself when I have irrational ideas.	1	2	3	4	5
I pay attention to how my emotions affect my thoughts and behavior.	1	2	3	4	5
I notice when my moods begin to change.	1	2	3	4	5
I get completely absorbed in what I'm doing, so that all my attention is focused on it and nothing else.	1	2	3	4	5
I drive on automatic pilot without paying attention to what I'm doing.	1	2	3	4	5
I tell myself that I shouldn't be feeling the way I'm feeling.	1	2	3	4	5
When I take a shower or bath, I stay alert to the sensations of water on my body.	1	2	3	4	5
It's hard for me to find the words to describe what I'm thinking.	1	2	3	4	5
When I'm reading, I focus all my attention on what I'm reading.	1	2	3	4	5
I believe some of my thoughts are abnormal or bad and I shouldn't think that way .	1	2	3	4	5
I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.	1	2	3	4	5
I have trouble thinking of the right words to express how I feel about things.	1	2	3	4	5
When I do things, I get totally wrapped up in them and don't think about anything else.	1	2	3	4	5
I make judgments about whether my thoughts are good or bad.	1	2	3	4	5
I pay attention to sensations, such as the wind in my hair or sun on my face.	1	2	3	4	5
When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.	1	2	3	4	5
I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.	1	2	3	4	5

Never or Very Rarely True	Rarely True	Sometime True	Often True	Very Often or Always True
1	2	3	4	5

I tend to make judgments about how worthwhile or worthless my experiences are.	1	2	3	4	5
I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.	1	2	3	4	5
Even when I'm feeling terribly upset, I can find a way to put it into words.	1	2	3	4	5
When I'm doing chores, such as cleaning or laundry, I tend to daydream or think of other things.	1	2	3	4	5
I tell myself that I shouldn't be thinking the way I'm thinking.	1	2	3	4	5
I notice the smells and aromas of things.	1	2	3	4	5
I intentionally stay aware of my feelings.	1	2	3	4	5
I tend to do several things at once rather than focusing on one thing at a time.	1	2	3	4	5
I think some of my emotions are bad or inappropriate and I shouldn't feel them.	1	2	3	4	5
I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.	1	2	3	4	5
My natural tendency is to put my experiences into words.	1	2	3	4	5

When I'm working on something, part of my mind is occupied with other things, such as what I'll be doing later, or things I'd rather be doing. 1 2 3 4 5

Each statement describes how a person might feel when starting therapy or approaching problems in their lives. Please indicate the extent to which you tend to agree or disagree with each statement. In each case, make your choice in terms of how you feel right now, not what you have felt in the past or would like to feel. For all the statements that refer to your "problem", answer in terms of the "problem' that you are currently seeking counseling for. If you are not engaged in counseling at the moment, consider a "problem" that you would like to change in your life.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1	2	3	4	5

1)	I'm not the problem one. It doesn't make much sense for me to consider changing.	1	2	3	4	5
2)	I am finally doing some work on my problem.	1	2	3	4	5
3)	I've been thinking that I might want to change something about myself.	1	2	3	4	5
4)	At times my problem is difficult, but I'm working on it.	1	2	3	4	5
5)	Trying to change is pretty much a waste of time for me because the problem doesn't have to do with me.	1	2	3	4	5
6)	I'm hoping that I will be able to understand myself better.	1	2	3	4	5
7)	I guess I have faults, but there's nothing that I really need to change.	1	2	3	4	5
8)	I am really working hard to change.	1	2	3	4	5

9) I have a problem and I really think I should work on it.	1	2	3	4	5
10) I'm not following through with what I had already changed as well as I had hoped, and I want to prevent a relapse of the problem.	1	2	3	4	5

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
	1	2	3	4	5
11) Even though I'm not always successful in changing, I am at least working on my problem.					
12) I thought once I had resolved the problem I would be free of it, but sometimes I still find myself struggling with it.	1	2	3	4	5
13) I wish I had more ideas on how to solve my problem.	1	2	3	4	5
14) Maybe someone or something will be able to help me.	1	2	3	4	5
15) I may need a boost right now to help me maintain the changes I've already made.	1	2	3	4	5
16) I may be part of the problem, but I don't really think I am.	1	2	3	4	5
17) I hope that someone will have some good advice for me.	1	2	3	4	5
18) Anyone can talk about changing; I'm actually doing something about it.	1	2	3	4	5
19) All this talk about psychology is boring. Why can't people just forget about their problems?	1	2	3	4	5

20) I'm struggling to prevent myself from having a relapse of my problem.	1	2	3	4	5
21) It is frustrating, but I feel I might be having a recurrence of a problem I thought I had resolved.	1	2	3	4	5
22) I have worries but so does the next guy. Why spend time thinking about them?	1	2	3	4	5
23) I am actively working on my problem.	1	2	3	4	5
24) After all I had done to try and change my problem, every now and then it comes back to haunt me.	1	2	3	4	5

Appendix B

Practice Journal

Please record each time you engage in a mindful activity or sitting meditation.

Day/Date	**Type of Practice** (e.g., sitting mediation, or mindfully eating breakfast)	**Amount of time practiced**	**Comments**

Appendix C

Have you been practicing any formal or informal mindfulness practices?_____
If so, please list what type of practices_____
And how often: __5+ times a week __3-5 times a week __less than 3 times a week
On average for what length of time (in minutes)_____

Total number of minutes spent in formal or informal mindfulness practices per week (on average)_____

Appendix D

Dear Student,

You are being invited to participate in a research study that aims to evaluate therapy groups at the Counseling Center at the University of Vermont. The purpose of this evaluation is to assess the effectiveness of therapy groups offered at the Counseling Center. Your participation will entail filling out a questionnaire before you begin the group, at the end of the group, and 6 months after the end of group. The information you provide is completely confidential. You will be compensated $15 for filling out the questionnaire at the end of the group, and $15 for the follow-up questionnaire 6 months after the group.
Participation is voluntary, and you may refuse to participate or withdraw at any time.

This will in no way affect the services offered to you at the Counseling Center.

If you would like to learn more about participating in this study, please sign here, and read the informed consent form (attached).

_____

(Signature) (Date)

If you would like to learn more about this study by talking to a clinical staff member about it, please sign here and return this letter to the front office staff.

_____

(Signature) (Date)

If you are not interested in learning more about this study and do not want to participate, please return this packet to the front office.

Signature of Principal Investigator Date

_____

Name of Principal Investigator: Ciara Byrne
Address: 146 South Williams St.
Burlington, VT, 05401
Telephone Number: 656 3340
You may contact Ciara Byrne the Investigator in charge of this study, at 656 3340 for more information about this study. If you have any questions about your rights as a participant in a research project or for more information on how to proceed should you believe that you have been injured as a result of your participation in this study you should contact Nancy Stalnaker, the Institutional Review Board Administrator at the University of Vermont at 802-656-5040.

Appendix E

Informed Consent

Title of Research Project: Mindfulness-Based Stress Reduction for Clients at a University Counseling Center

Principal Investigator: Ciara Byrne

Why is This Research Study Being Conducted?

The purpose of this evaluation is to assess the effectiveness of therapy groups offered at the Counseling Center. This research will provide information that will add to our knowledge about the effectiveness of services at the Counseling Center and will potentially improve the quality of services offered.

What Is Involved In The Study?

Our goal is that 130 UVM students who have contacted the counseling center will participate in this study. If you agree to participate, you will be asked to complete 3 questionnaires; one now or before you begin group therapy, a second questionnaire in 7-9 weeks, and a final questionnaire in 6 months. Each questionnaire will take approximately 20 minutes to complete. The questionnaire is designed to gather information about your current emotional functioning. All of the questions will ask you to 'rate' how much a statement applies to your experience on a scale (for example, from "not all true" to "very true").

Your name will not be reported with any of your answers. Instead, your answers will be combined with the answers of other students, and our analyses will identify average responses.

The goal of this study is to investigate the effectiveness of a 7-week Mindfulness-Based Stress Reduction group in reducing anxiety, and other emotional difficulties. Groups will meet once a week for an hour and 45 minutes. Group times and dates include Monday and Tuesday from 2-3.45, and Thursday from 5-6.45.

What Are The Risks and Discomforts Of The Study?

This questionnaire has been used with college students previously. However, it is always possible that you may feel uncomfortable, stressed, or confused by a question. We will respect your reactions and take them seriously. You may choose not to answer any question in the questionnaire by simply leaving it blank. You also are free to discontinue participation in this study at any time.

If you feel unsafe or significantly distressed as a result of your participation in this study, the researcher will work with you to resolve such issues and will aid in facilitating a referral to an individual counselor if desired.

Questionnaires will be kept confidential and stored in a locked file cabinet at the counseling center.

What Are The Benefits of Participating In The Study?
The information gathered in this research will be used to improve the quality of group therapy services at the counseling center.

What Other Options Are There?
Participation in this study is completely voluntary, and in no way affects the services offered to you at the Counseling Center. You may choose not to participate in this study and still access all services (including group therapy) at the counseling center.

Are There Any Costs?
The time you spend filling out the questionnaire may be considered a cost to you. Your participation in this study will not result in any fees or charges.

What Is the Compensation?
Compensation for your time participating in this study will be up to thirty dollars ($30). Fifteen dollars ($15) compensation will be provided for completion of the 2nd questionnaire, and another $15 will be provided for the 3rd questionnaire.

Can You Withdraw or Be Withdrawn From This Study?
You are free to withdraw from this study at any time. Your decision will not affect your right to participate in the group or access to any services at the counseling center. If you choose to withdraw, you will need to communicate this to the researcher so that you may be removed from the participant list. You will not be asked to provide reasoning for this decision. If you decide you no longer want to participate in the group, but would like to continue to participate in the study, you will be welcome to do so, and will be compensated in an identical manner ($30 for the completion of 3 questionnaires).

What About Confidentiality?
Your interview will be stored in a locked file cabinet in a locked office at the Counseling Center, and your name will not be recorded on the questionnaire. A separate record of your contact information and consent will be kept in a confidential form in a separate locked file cabinet at the Counseling Center so that your name will not be linked with your interview. The results of this study may eventually be shared and/or published but the names of participants will remain confidential and never shared. Agents of the Institutional Review Board and/or regulatory authorities will be granted access to your records for verification of procedures and/or data.

Contact Information

You may contact Ciara Byrne, the Investigator in charge of this study, at (802)656 3340 for more information about this study. If you have any questions about your rights as a participant in a research project or for more information on how to proceed should you believe that you have been injured as a result of your participation in this study you should contact Nancy Stalnaker, the Institutional Review Board Administrator at the University of Vermont at 802-656-5040.

Statement of Consent

You have been given and have read or have had read to you a summary of this research study. Should you have any further questions about the research, you may contact the person conducting the study at the address and telephone number given below. Your participation is voluntary and you may refuse to participate or withdraw at any time without penalty.

You agree to participate in this study and you understand that you will receive a signed copy of this form.

_____ _____

Signature of Subject
Date

This form is valid only if the Committees on Human Research's current stamp of approval is shown below.

_____

Name of Subject Printed

_____

Signature of Principal Investigator or Designee Date

_____

Name of Principal Investigator: Ciara Byrne, Address: 146 South William St., Burlington VT 05405, Ph: 656 3340

Appendix F

Mindful Living Protocol

Session 1

- Introductions. Ask members to introduce themselves (name, year, major) and state reason for participating in the group.
- Brief introduction to the program by group leader, including a discussion about confidentiality and ground rules for group, including punctuality, attendance, and respect.
- Talk: Mindfulness as a Way of Life.
- Guided raisin eating exercise
- Feedback and discussion of the raisin eating exercise.
- Body scan
- Feedback and discussion of the guided body scan.
- Identify one personal goal for what they would like to get out of group (framed as one observable difference b/w now and the end of the group) and share this with group.
- Collect pre-group questionnaires for anybody who did not fill it out at group screening.

Homework:
Formal Practice: Body Scan at least 3 times during the week (provide info on accessing web exercises).
Informal Practice: Choose a routine activity in which to be mindful each day, e.g. preparing meal, brushing teeth. Can have members go around and share their activity.

Session 2

- Mindful yoga.
- Check-in. Discuss reactions to mindful activity homework exercise and body scan.
- Discuss 'mindful attitudes': Non-striving, beginner's mind, and non-attachment.
- Introduce sitting meditation.
- Guided sitting meditation (10 minutes).
- Feedback and discussion of the sitting meditation

Homework:

1) Practice 10-15 minutes' mindfulness of breathing for 6 days.

2) Practice 15 minutes of ***body practice*** everyday.

3) Choose a new routine activity to be especially mindful of (e.g. brushing your teeth, taking a shower, driving, eating, etc.).

Session 3

- Mindful yoga
- 15 minute sitting meditation
- Five minute "seeing" or "hearing" exercise.
- Discuss 'mindful attitudes': Non-judging and patience.
- Mindful sharing: introduce mindful dialogue as a practice.
- Guided walking meditation
- 3-minute breathing space

Homework:

1) Practice 15 minutes of ***body practice*** everyday.

2) Practice 10 minutes' ***mindfulness of breathing*** everyday.

3) Practice using the ***3-Minute Breathing Space*** three times a day, at set times that you have decided in advance, and record each time by circling an R on the Practice Journal.

Session 4

- Mindful yoga
- Sitting meditation: awareness of breath, body, sounds, and thoughts.
- Mindful Sharing
- Discuss 'mindful attitudes': acceptance and letting go
- Loving-Kindness meditation.
- Feedback and discussion of Loving-Kindness meditation.
- Introduce Sacred Pause

Homework:

1) Practice ***Sitting Mediation*** daily using the recorded meditation.

2) Practice using the ***3-Minute Breathing Space Practice*** 3 times a day at times that you have decided in advance. Record each time by circling an R on the Practice Journal.

3) Practice the ***Loving kindness meditation*** three times throughout the week.

4) Practice 15 minutes of ***body practice*** everyday.

Session 5

- Mindful yoga
- Sitting meditation: awareness of breath, body, sounds and thoughts. Introduce difficult thought/memory.
- Mindful Sharing: Mid-point of group – discuss how it's going, any changes people want to make to get the most out of remaining weeks of group.
- Cognitive exercise: 'Alex goes to the Party' or 'Walking Down the Street' Exercise.
- Discussion around 'Thoughts are not facts'.
- 3-minute breathing space – coping.

Homework:

1. Practice ***Sitting Mediation*** daily using the recorded meditation.

2. Practice using the ***3-Minute Breathing Space:*** Practice 3 times a day at times that you have decided in advance. Record each time by circling an R on the Practice Journal.

3. Practice using the ***3-Minute Breathing Space – Coping:*** Practice whenever you notice unpleasant feelings. Record each time by circling an X on the Practice Journal.

4. Practice 15 minutes of ***body practice*** everyday.

Session 6

- Mindful yoga
- Sitting meditation; mindfulness of thoughts
- Mindful Sharing.
- Introduction to schemas – "Top 10 tunes".
- Schema exercise: sitting with difficult emotions.
- Breathing techniques for anxiety reduction; 4-7-8 breath and 3 part diaphragmatic breathing.

Homework:

5. Practice ***Sitting Mediation*** daily using the recorded meditation.

6. Practice using the ***3-Minute Breathing Space Practice*** 3 times a day at times that you have decided in advance. Record each time by circling an R on the Practice Journal.

7. Practice using the ***3-Minute Breathing Space – Coping: Practice*** whenever you notice unpleasant feelings. Record each time by circling an X on the Practice Journal.

8. Practice 15 minutes of ***body practice*** everyday.

Session 7

- Mindful yoga
- Sitting meditation: awareness of breath, body, sounds and thoughts.
- Mindful Sharing.
- Anxiety Reduction technique; 54321.
- Discuss 'How can I best take care of myself'
- Do exercise: 'Activities that give or take away energy'.
- Discussion about progress (in terms of specific goal they named in 1st session, and more generally what they have gained)
- Discussion about how they will integrate their practice into their lives.

Resources: discuss resources in the community and on campus
Complete and collect evaluation forms.