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# A Randomized Controlled Trial of Mindfulness Versus Yoga: Effects on Depression and/or Anxiety in College Students

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**Abstract**

**BACKGROUND:** Depression and anxiety disorders are two of the most common mental disorders in the United States. These disorders are prevalent among college students. **OBJECTIVE:** The main objective of this study is to compare the effectiveness of two different types of intervention practices (mindfulness vs. yoga) and a noninterventional control group in mitigating the effects of depression and/or anxiety in college students. **METHOD:** A sample of 90 students (both genders) over age 18 who had a diagnosis of anxiety and/or depression was recruited from 11,500 undergraduate college students in a mid-size university. The study's design included stratified-randomized controlled repeated measures with three groups: a mindfulness intervention group, a yoga-only intervention group, and a noninterventional group. Participants were randomly assigned to the aforementioned three groups. Participants in the intervention groups received an 8-week training either in mindfulness or yoga. Depressive, anxiety, stress symptoms, self-compassion, and mindfulness were measured at baseline, Week 4, Week 8, and Week 12. **RESULTS:** Depressive, anxiety, and stress symptoms decreased significantly ($p < .01$) from baseline to follow-up conditions in both the mindfulness and yoga intervention groups. The changes in mindfulness scores were also significant in both groups. However, the changes in self-compassion scores were significant only in the mindfulness intervention group. No significant changes in the control group were demonstrated. **CONCLUSIONS:** The findings from this study can provide useful information to nurses and other health care providers. This study may have implications for a cost-effective treatment for depression and anxiety.

**Keywords**

mindfulness, yoga, depression, anxiety, college students

## Background

Depression and anxiety are two of the most prevalent mental disorders in the United States (Anxiety and Depression Association of America, 2016), especially among college students (Deroma, Leach, & Leverett, 2009; Farabaugh et al., 2012; Tartakovsky, 2008). The comorbidity of these disorders is also common (Lai, Cleary, Sitharthan, & Hunt, 2015; Lamers et al., 2011). Based on a 2014 National College Health Assessment Survey (American College Health Assessment [ACHA], 2015), 15.7 million U.S. adults over the age of 18 had one major episode of depression. The prevalence of anxiety disorders for all U.S. adults over the age of 18 was even higher at approximately 40 million. According to the 2014 National College Health Assessment Survey, 14.3% of students have been either diagnosed or treated for anxiety disorders (ACHA, 2015). Reports of increases in suicide rates among college students are also alarming (Eisenberg, Gollust, Golberstein, & Hefner, 2007; Lunau, 2012).

College students have to cope with multiple stressors as they transition from high school to college. This transition involves many new experiences, including limited support from parents, exposures to new cultures, making new friends, and making adjustments to different ways of thinking and life styles. They are also exposed to new risks such as excessive drinking and using drugs, and the need to make decisions about these situations (Robb, 2011). Students who cannot manage such demands may

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feel inadequate and prone to more stress, depression, and/or anxiety. Academic pressure and expectations from parents and/or self can add more challenges to the life of a student. Academic stressors can also add to feelings of inadequacy, which can fuel symptoms of depression and/or anxiety. According to the emerging adulthood theory, the period from late teens to mid-20s is a time of life when many different directions remain possible (Arnett, 2004). This period of life is associated with a lot of uncertainty. What happens during these critical years has a big impact on the path to successful adulthood. Unfortunately, the stigma associated with a diagnosis of a mental health condition may prevent a student from seeking help. Some students may turn to alcohol or drugs to self-medicate. Concerns regarding confidentiality and finances, and the fear that their mental health struggles may affect their future, can also reinforce this stigma. According to an American College Health Association survey of depression in college students, only 33% of students felt comfortable to disclose to a friend that they were receiving help for an emotional issue (Heiligenstein & Guenther, 2006). There is a great need to explore other treatment interventions and adjunctive therapies for patients with anxiety and/or depression including college students.

Mindfulness practices including self-compassion and yoga can help individuals calm their body and mind (Emerson & Hopper, 2011; Germer, 2009; Siegel, 2010). Recent studies indicate that the use of such practices is promising in helping college students cope with stress, anxiety, and depression (Burns, Lee, & Brown, 2011; Hall, Row, Wuensch, & Godley, 2013; Jain et al., 2007; Preddy, McIndoo, & Hopko, 2013; Simard & Henry, 2009; Terry, Leary, & Mehta, 2013). Adding such complementary modalities to current treatments for depression and/or anxiety has the potential to decrease the use of psychotherapy and/or medications (Hofmann, Sawyer, Witt, & Oh, 2010). These nonpharmaceutical practices may be more acceptable to students who may avoid obtaining help for their depression and/or anxiety due to the stigma associated with a diagnosis of a mental illness. Such modalities have demonstrated effectiveness in as little as 8 weeks (Falsafi & Leopard, 2015,; Eastman-Mueller, Wilson, Jung, Kilmura, & Tarrant, 2013; Neff & Germer, 2013). Also, these modalities do not have the side effects associated with the use of antianxiety and antidepressant medications (Townsend, 2015). Furthermore, it is easy to learn these practices, and after students learn the basics of these modalities, they can continue to practice them on their own. While each of these practices has shown potential to mitigate symptoms of depression and anxiety (Emerson & Hopper, 2011; Neff, 2011; Siegel, 2010), a comparison of these two interventions with a control group has not been explored. Knowing which modality may be more beneficial in helping students to cope with symptoms of depression and/or anxiety will guide health care professionals in recommending a more suitable practice (mindfulness vs. yoga) to individuals. In this case, choosing the right practice, without going through trial and error, should not only save time and money, but it may also promote a faster recovery.

## Objective

The main objective of this study is to compare the effectiveness of two different types of intervention practices (mindfulness including self-compassion vs. yoga) and a noninterventional control group in coping with depression and/or anxiety in college students.

## Method

### *Design, Setting, and Sample*

A repeated-measures design with random assignments to three groups (two intervention groups and a control group) was used for this study. The random assignment was stratified for gender. There were two intervention groups: a mindfulness group and a yoga group. Both intervention groups received 8 weeks of training (75 minutes per week). The mindfulness group learned various mindfulness practices including self-compassion. The yoga group received a gentle Hatha yoga training. The control group did not receive any training.

All three groups continued their regular treatments (medication and/or psychotherapy). Figure 1 demonstrates the study design. A sample of 90 students of both genders over the age of 18, who had a diagnosis of depression and/or anxiety, was recruited from about 11,500 undergraduate college students in a mid-size public university in the southeastern United States. The university is located in a small city and serves both urban and rural communities. Mass e-mails and flyers were used to recruit the participants after the study was approved by the university's institutional review board. The initial mass e-mail included a short screening questionnaire that enquired whether the prospective participant currently experienced symptoms of depression and/or anxiety, and if so, whether the individual had been assessed by a health care professional for those symptoms, and whether he/she was receiving any type of treatment for depression and/or anxiety. All undergraduate students with a diagnosis of depression and/or anxiety were eligible for the study except for the following: those with a diagnosis of thought disorder, bipolar disorder, or borderline personality disorder; those engaged in active substance abuse and/or dependence; and those practicing yoga, mindfulness meditation, or those who had attended four classes in such practices within the past year. Also excluded were

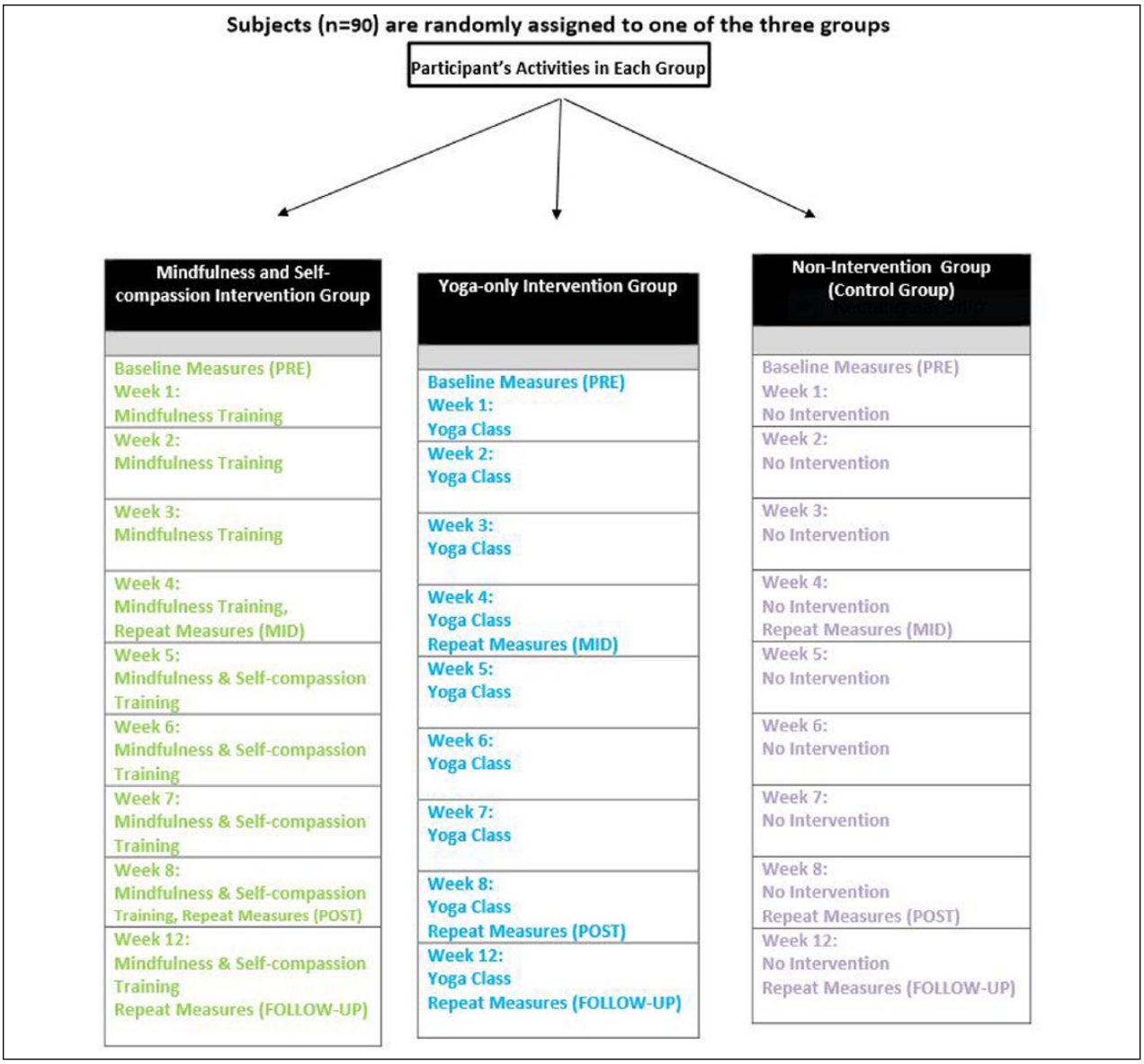


**Figure 1.** Study design.

those with severe physical disabilities that prevented them from doing gentle yoga poses, those pending legal dispositions, and those unable to hear, read, visualize, and/or comprehend the assessment questions. The Select Survey program was used for the initial online screening. To determine whether a prospective participant met the inclusion/exclusion criteria, the investigator, who is a psychiatric clinical nurse specialist, met individually with the students who appeared to be qualified based on their responses to the initial online screening. During this meeting the investigator assessed each prospective participant for depression and/or anxiety and other psychiatric diagnoses. During the interview, each prospective participant was also asked about his/her general state of well-being, and whether he/she was suffering from any physical problems. Nine students from the first round of screening were not qualified to partake in the study for not meeting the inclusion criteria after they were interviewed by the investigator.

## Variables and Their Measurements

Using paper and pencil, the participants in all three groups completed five short questionnaires about symptoms of depression and anxiety, levels of stress, mindfulness, and self-compassion. The participants were asked to complete the Beck Depression Inventory, the Hamilton Anxiety Scale, the Student-Life Stress Inventory, the Self-compassion Scale, and the Cognitive and Affective

Mindfulness Scale–Revised. The copyright permissions to use these instruments were obtained where required. The questionnaires were completed four times: pre (Week 1), mid (Week 4), post (Week 8), and follow-up (Week 12). The estimated time to complete all study instruments was about 30 to 35 minutes per data collection session.

The Beck Depression Inventory is a 21-question multiple-choice self-report inventory that measures the intensity, severity, and depth of depressive symptoms (Beck, Steer, & Garbin, 1988). The questions are designed to assess specific symptoms common among individuals with depression. The scale has been found to be internally consistent (Cronbach's $\alpha = .86$). The scale has been widely used with various populations including college students (Hall et al., 2013; Rogehr, Glancy, & Pitts, 2013; Tashakkori, Barefoot, & Mehryar, 1989).

The Hamilton Anxiety Scale is a 14-item questionnaire measuring the severity of anxiety symptoms (Hamilton, 1959). It is based on a 5-point scale duplicate. Seven items address psychic anxiety and the remainder focus on somatic symptoms. The scale has good internal consistency (Cronbach's $\alpha = .89$). The scale has been widely used in clinical diagnosis of general anxiety disorders and has been used with college students (Ashor, 2012; Gupta et al., 2014).

The Student-Life Stress Inventory is a 51-item questionnaire designed to study college students' stressors and their reaction to stressors. The instrument is a self-report, paper and pencil tool with nine categories (Gazella, 1994; Gazella & Baloglu, 2001; Zascavage, Winterman, Buot, Wies, & Lyzinski, 2012). The internal consistency for this measure was adequate (Cronbach's $\alpha = .76$), and the correlations for the total inventory were .78.

The Self-compassion Scale (Neff, 2003) is a 26-item assessment of six different aspects of self-compassion (self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification). The internal consistency for this measure is high (Cronbach's $\alpha = .92$). The short version of this scale, which is a 12-item tool, was used in this study. The internal consistency for the short form is adequate (Cronbach's $\alpha = .86$), and a near-perfect correlation with the long version of the Self-compassion Scale ($r \geq .97$ all samples) is reported (Raes, Pommier, Neff, & Van Gucht, 2011). The scale has been used with college students (Bergen-Cico, Possemato, & Cheon, 2013; Hall et al., 2013; Lockard, Hayes, Neff, & Locke, 2014; Neff & Pommier, 2013).

The 12-item Cognitive and Affective Mindfulness Scale–Revised (CAMS-R) is a brief self-report measure of mindfulness that assesses the four domains of mindfulness (attention, present-focus, awareness, acceptance/nonjudgment). The scale has been used with college students and demonstrates internal consistency alphas ranging from .76 to .85 (Feldman, Greeson, Renna, & Robbins-Monteith, 2011; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007; Whitaker et al., 2015). The study participants also completed a demographic data form developed by the investigator that asked for basic information such as name, age, marital status, diagnoses, treatments for their depression and/or anxiety, and contact information.

## Procedures

All students provided written consent to participate prior to the start of the study. The participants were informed that they could withdraw from the study without any consequences. The students were assigned to one of three groups—the mindfulness group ($n = 30$), the yoga group ($n = 30$), or the control group ($n = 30$)—using a computer number random generator. Because of the students' schedules, randomization occurred within the feasible time frame of their schedule. Stratified randomization was used to ensure that male students were in all three groups.

Participants in intervention groups (mindfulness and yoga groups) were asked to practice the learned modalities outside of class for 20 minutes each day. They were instructed to practice what they learned in the training sessions and felt comfortable doing. The importance of regular practice (Falsafi & Leopard, 2015) was explained to the participants. Also, at the beginning of each training session, the investigator asked the participants about their home practice, and if they had any questions or difficulties. At each session, the participants were also asked to complete a short form about their home practice indicating the type of practice, number of days and duration of each session.

The study was conducted over two semesters (fall 2014 and spring 2015). Measures were used to ensure that all training was completed a few weeks before the final exams. Data were collected at baseline (pre), 4 weeks (mid), 8 weeks (post), and 12 weeks (follow-up) for all participants in each group (mindfulness, yoga, and control group). Each participant received a $20.00 voucher following completion of each of the four data collection sessions. All participants were given a journal to document their daily home practice or any important event related to their treatments, depression and/or anxiety, or any unexpected events.

The participants in the control group did not receive any intervention. However, they completed the five study questionnaires like the members of the intervention groups. They were also given a journal book to document any changes in their treatments or any significant event that occurred in their lives during the study period. To ensure that students in the control group also benefited from participation in the study, they were offered the

opportunity to participate in the training received by members of the intervention group that provided the best outcome after the completion of the study.

## Interventions

The participants in the intervention groups received 8 weeks (75 minutes per week) of assigned interventions, and a follow-up session after the completion of the trainings. A doctoral-level psychiatric clinical nurse specialist, who is also board certified as an advanced holistic nurse and a certified yoga teacher, provided training to both intervention groups. The same group leader conducted the sessions for all groups to ensure consistency in procedures and information receipt. Two research assistants (RAs) helped with the study (a psychology graduate student and a nursing student). A RA attended all training sessions and ensured that all data collection tools were completed adequately by the study participants. The RAs completed the Protection of Human Research Participants training module.

### *Mindfulness Group*

Mindfulness is a state of being aware in the present moment. Mindfulness is also about observing every moment without judgment and attachment. While mindfulness is a relatively new concept in the West, its origins in Buddhism is thousands of years old. But mindfulness is not restricted to Buddhism. It is also being practiced by the nonsectarian general population.

A typical mindfulness meditation consists of focusing full attention on the breath as it flows in and out of the body. Focusing on each breath in this way allows one to observe his/her thoughts as they arise in the mind, without dwelling on them. Kabat-Zinn (2012), the molecular biologist who is accredited with bringing mindfulness to mainstream medicine, asserts that there are certain qualities that are essential to be successful in practicing mindfulness. These qualities include being patient, trusting the process, having the mind of a beginner, and letting go.

While the most basic form of mindfulness is observing the breath, there are various types of mindfulness practices including body awareness, walking meditation, mindful eating, meditation in action (Yoga, Tai' Chi), and mindful living. Some of the benefits of mindfulness include slowing the pace of thoughts, enjoying the richness of the moment, seeing and accepting things as they are, and becoming more compassionate toward self and others (Roberts & Danoff-Burg, 2010; Siegel, 2010). Greeson (2009) reviewed multiple research articles on mindfulness that were published between the years 2003 and 2008 in various journals. He concluded that the benefits of mindfulness go beyond relaxation. He suggested that mindfulness leads to "important shifts in cognition, emotion, biology, and behavior that may work synergistically to improve health" (Greeson, 2009, p. 15). Also, the effects of mindfulness in the physical and psychological health of college students are documented in several studies (Oman, Shapiro, Thoresen, Plante, & Flinders, 2008; Roberts & Danoff-Burg, 2010).

Mindfulness is one of the components of self-compassion that involves extending compassion to one's self in instances of perceived inadequacy, failure, or general suffering (Neff, 2011). Recent studies on self-compassion suggest that self-compassionate individuals experience greater psychological health than those who lack self-compassion (Neff, Rude, & Kirkpatrick, 2007). Additional self-compassion studies indicate the positive effects of self-compassion (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Neff et al., 2007; Neff & Germer, 2013; Terry et al., 2013).

Participants in the mindfulness group received 8 weeks (75 minutes per week) of mindfulness training, including self-compassion. They completed five short questionnaires on depressive and anxiety symptoms, stress, self-compassion, and mindfulness. The questionnaires were completed before training (pre), at the end of the fourth session (mid), at the end of the eighth week or last training session (post), and 4 weeks after the completion of the training (follow-up). The participants received a $20 gift certificate in those sessions after they completed the questionnaires.

In the mindfulness intervention group, various types of mindfulness practices were introduced to the participants, starting with simple ones, and then progressing to the more complex mindfulness practices. For example, during the first session, meditation on breath was introduced and practiced. Meditations on senses, such as sound and taste, and meditation on walking were introduced in subsequent sessions. One of the components of self-compassion is mindfulness, so Loving Kindness Meditation, gratitude, and forgiveness meditations were offered later in the training. A variety of mindfulness practices were introduced to the participants so that they could explore what worked best for each of them. For example, individuals who are very anxious may have difficulty practicing sitting meditation, so they may find it easier to do a walking meditation. Each training session included a review of the materials from the previous week. The participants received a book on mindfulness and a thumb drive with soft music and audio guided meditations on mindfulness and self-compassion practices. All participants were given a journal to document their daily home practice and/or any important event related to their depression and/or anxiety.

### Yoga Group

The yoga intervention that was used in this study was based on a gentle version of the Hatha yoga tradition. Hatha yoga is the most widely practiced yoga tradition that is being used in the West. It is referred to as physical yoga. However, it also has some meditative qualities. It uses breath to connect the mind and body. A typical yoga class includes a short meditation, a series of stretches to prepare the body, poses and postures, and a period of relaxation at the end of the session. Yoga has been used successfully with various populations and with multiple disorders (Chen et al., 2010; Falsafi & Leopard, 2015; Libby, Reddy, Pilver, & Desai, 2012; Manafort & Libby, 2013; Nurries-Stearns & Nurries-Stearns, 2010), including depression and anxiety (Simard & Henry, 2009; Streeter et al., 2010).

The participants in the yoga group received 8 weeks (75 minutes per week) of yoga training and completed the same five questionnaires that members of the mindfulness and control groups completed. The participants in the yoga group also received all necessary materials that could assist them to practice at home. They received a yoga mat, a yoga strap, and a journal book to document their home practice. A thumb drive, which included video and verbal instructions of both regular and chair yoga conducted by the instructor, were also given to the participants for practice at home. This ensured that participants did not use advanced instruction in poses and/or postures that could have hurt them. The thumb drive also included soft yoga music that a participant could use if he/she decided to do their home practice based on memory.

In the early sessions of the yoga training, simple poses and postures were taught and practiced with the students. As the group progressed, the moderate versions of the poses and postures were introduced to the participants. This strategy allowed the students to practice yoga according to their ability. For safety reasons, the strenuous versions of poses and postures were not taught or practiced.

## Data Analysis

Descriptive statistics were used to assess the sociodemographic characteristics of participants and to examine the distribution and frequency of scores on the instruments. Multivariate analysis of variance (with appropriate follow-up comparisons) was used to compare mean scores on repeated measures in each group. *P* values less than .05 (2-sided) were defined as statically significant. The Bonferroni correction was used to reduce the possibility of obtaining "significant" results that may have occurred by chance alone.

Out of the 90 students who were qualified, 6 students were unable to partake in the study due to schedule conflicts, heavy load of school work, or other personal reasons. Due to time limitations, the investigator was unable to postpone the training to recruit additional students and had to start the training with 84 participants. During the course of the study, 17 (20.24%) students left the study for various reasons. Four students left after the first session. Three students started working after the study started, and the working hours interfered with the training schedules. Two students felt too overwhelmed with school work, two students left the university, and one student had a car accident. Five students did not complete the follow-up session. The entire data package of any student who did not complete all 4 data collection sessions was excluded from consideration for data analyses. Out of 84 students who participated in the study, 67 (79.76%) students completed the entire study. The mindfulness group consisted of $n = 21$, the yoga group $n = 23$, and the control group $n = 23$. The statistical power for the test was 0.42, with 67 subjects and a medium effect size.

## Results

Participants (67 students) were predominantly White (89.5%) and female (86.4%). The mean age of the participants was 22.1 years, with a range of 18 to 50 years. The majority of participants were juniors (25 or 37.3%) and sophomores (20 or 29.85%). There were 14 (20.8%) seniors and 8 (11.9%) freshmen. There were 25 categories of majors. The most common fields of study were biology (10 students), psychology (9 students), nursing (6 students), and education (6 students). More than 50% of the students did not work, 15 students worked under 20 hours per week, and 15 students worked between 20 and 30 hours per week.

Out of 67 participants who completed the entire study, 39 (58.20%) suffered from both depression and anxiety, 21 (31.34%) suffered from anxiety only, and 7 (10.44%) had only depression. The majority of participants (56.6%) were taking psychiatric medications. During the initial interview two participants stated that their physician had recommended medication for them, but they did not want to take medications. Three participants had tried medications in the past, but they preferred not to take them due to their side effects. There were minor changes in medication during the course of the study. For example, one person's antidepressant medication was discontinued and replaced with another antidepressant. The dose of another participant's antidepressant was adjusted.

A total of 15 (22.38%) students stated that they were receiving therapy during the course of study. Four students received therapy once a week, some every other week, and some attended therapy sessions when they went home to visit their parents because their therapist was in their home town. One student started seeing a therapist half way through the study due to suicidal ideation.

Compared with the control group, anxiety, depressive, and stress symptoms scores in the mindfulness group decreased significantly ($p < .01$) from pre to follow-up measurements. Self-compassion scores increased significantly ($p < .01$), from pre to follow-up measurements, and mindfulness scores increased significantly ($p < .05$), from pre to mid measurements; however, the changes in scores became more significant ($p < .01$) from mid to follow-up measurements.

Compared with the control group, depressive, anxiety, and stress symptoms scores in the yoga group decreased significantly ($p < .01$) from pre to follow-up measurements, and mindfulness scores increased significantly ($p < .01$) from mid to follow-up measurements. However, self-compassion scores did not significantly increase in the yoga intervention group. Also, it was noted that while the change in scores continued to be significant through the follow-up measures for the Beck Depression Inventory and the Hamilton Anxiety Scale, the scores for these scales stayed the same from post to follow-up measurements in the yoga group. The same situation occurred in the scores of the self-compassion scale for both intervention groups.

Table 1 provides means and standard deviations for each time period, for each measure (pre, mid, post, and follow-up) and for each group (mindfulness, yoga, and control group).

Figures 2 through 7 demonstrate improvements in depressive and anxiety symptoms, decrease in stress levels, and increases in mindfulness both in the mindfulness and yoga groups. The figures also demonstrate increases in self-compassion scores in the mindfulness intervention group. Figures 2 through 7 also demonstrate the nonsignificant changes in the scores in the control group in all five measured variables. Participants reported in writing that they had practiced at home. The average time of practice for the mindfulness group was 6.1 times per week for a total of 141.7 minutes per week. The average time of practice for the yoga group was 3.8 times per week for a total of 127 minutes per week.

### *Qualitative Data*

The participants were asked to write a summary of any important events they documented in their journals on a form that was provided to them on the last day of study. A break-up with a boyfriend or girlfriend was reported by three students. Another participant reported a few cases of cancer in her family as stressful. During the course of study, three participants reported feeling suicidal without a plan to do so. They agreed to see a therapist. One participant had to spend a week in the hospital due to losing a friend to suicide. Seeking employment, exams, and assignments were also noted by participants as sources of stress. The participants were also asked to report any changes in their regular treatments (medications and/or therapy). Four participants from the intervention groups indicated that they decreased the amount of as needed antianxiety medication, and one person stopped taking her antianxiety medication because she felt she was able to manage her anxiety better. Two students who were in therapy reported that they decreased the number of their therapy visits.

Based on information provided by participants during the follow-up session, three participants indicated the positive changes were so obvious that their parents and/or friends made comments about those changes. One student who had a difficult relationship with her father reported that she reacted gentler toward him in a situation that normally would involve 2 to 3 weeks of hard feelings. One other student surprised her mother by reacting calmly when her car broke down in the highway and needed to be towed. Four students mentioned that they felt less rushed and did everything more mindfully including eating, walking, and taking a shower. Another student mentioned that she felt more grateful for what she has including being able to attend college and learning new things. Two students indicated they were able to concentrate better while in the class. Two students indicated that they slept better.

The following are the statements that were noted by the members of the mindfulness intervention group: “I enjoy life more,” “I want to live,”” I am happier,” “I enjoy nature more,” “I am more self-compassionate,” “I walk and exercise mindfully,” and “I respond to situations rather than react to them.” One person wrote, “When I started this training, I was hating life, then I learned tolerating life, now I am on my way to loving life.”

The following are the statements that were noted by the members of the yoga intervention group: “I am more accepting of my situation,” “I am calmer and happier,” “I feel more flexible,” “I am more relaxed,” “I learned to love my body as it is,” “I sleep better,” “I have become more productive,” “I am more positive about life,” “My self-image has improved,” “I am less depressed and anxious,” “I have less acne on my face,” “I enjoy being alone,” and “I am more fulfilled with everyday life.” The members of control group were also encouraged to offer information from the journals that were given to them at the start of the study. Two individuals had adjustments in their medications; however, they did not provide any written information about any other changes.

## Discussion

As discussed in the Results section, in the mindfulness intervention group, self-compassion scores increased significantly from pre to follow-up measurements ($p < .01$). However, self-compassion scores did not significantly increase in the yoga

**Table 1.** Means and Standard Deviations for Mindfulness, Yoga, and Control Groups at Pre, Mid, Post, and Follow-Up Assessments.

| | Mindfulness group ($n$ = 21), $M \pm SD$ | | | | Yoga group ($n$ = 23), $M \pm SD$ | | | | Control group ($n$ = 23), $M \pm SD$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | Pre | Mid | Post | Follow-up | Pre | Mid | Post | Follow-up | Pre | Mid | Post | Follow-up |
| Beck Depression Inventory | 21.1 ± 7.9 | 15.8 ± 7.9** | 12.8 ± 10.3** | 8.9 ± 6.7** | 20.0 ± 10.6 | 13.2 ± 6.8** | 9.1 ± 5.0** | 8.7 ± 5.8** | 20.2 ± 9.1 | 20.8 ± 0.7 | 21.1 ± 10.9 | 19.3 ± 10.3 |
| Hamilton Anxiety Scale | 22.2 ± 7.1 | 17.8 ± 8.3** | 13.8 ± 9.1** | 11.8 ± 9.5** | 21.2 ± 8.0 | 14.2 ± 6.2** | 14.5 ± 8.3** | 13.3 ± 9.7** | 21.1 ± 8.6 | 21.8 ± 10.1 | 20.3 ± 8.4 | 21.3 ± 11.7 |
| Student-Life Stress Inventory | 166.4 ± 24.2 | 149.4 ± 25.0** | 139.4 ± 28.8** | 133.3 ± 29.3** | 160.0 ± 19.9 | 146.3 ± 26.9** | 136.0 ± 27.2** | 131.3 ± 31.7** | 161.7 ± 20.6 | 154.8 ± 23.6* | 155.5 ± 27.8 | 156.4 ± 29.2 |
| Student-Life Stress Inventory (overall) | 2.4 ± 0.6 | 1.9 ± 0.6** | 1.5 ± 0.6** | 1.4 ± 0.7** | 2.3 ± 0.5 | 2.1 ± 0.6 | 1.7 ± 0.6** | 1.6 ± 0.5** | 2.3 ± 0.5 | 2.3 ± 0.6 | 2.2 ± 0.7 | 2.1 ± 0.6 |
| Self-compassion Scale | 2.1 ± 0.7 | 2.5 ± 0.5** | 3.0 ± 0.7** | 3.52 ± 0.5** | 2.7 ± 1.5 | 2.7 ± 0.7 | 3.0 ± 0.6 | 3.0 ± 0.6 | 2.3 ± 0.7 | 2.4 ± 0.8 | 2.4 ± 0.8 | 2.5 ± 0.7* |
| Cognitive and Affective Mindfulness Scale–Revised | 20.5 ± 3.6 | 22.4 ± 5.1* | 25.3 ± 5.8** | 26.5 ± 5.1** | 21.7 ± 5.9 | 22.9 ± 5.9 | 25.4 ± 6.0** | 25.5 ± 6.2** | 20.6 ± 4.9 | 21.5 ± 6.3 | 21.9 ± 5.2 | 22.4 ± 5.5 |

*$p < .05$. **$p < .01$.

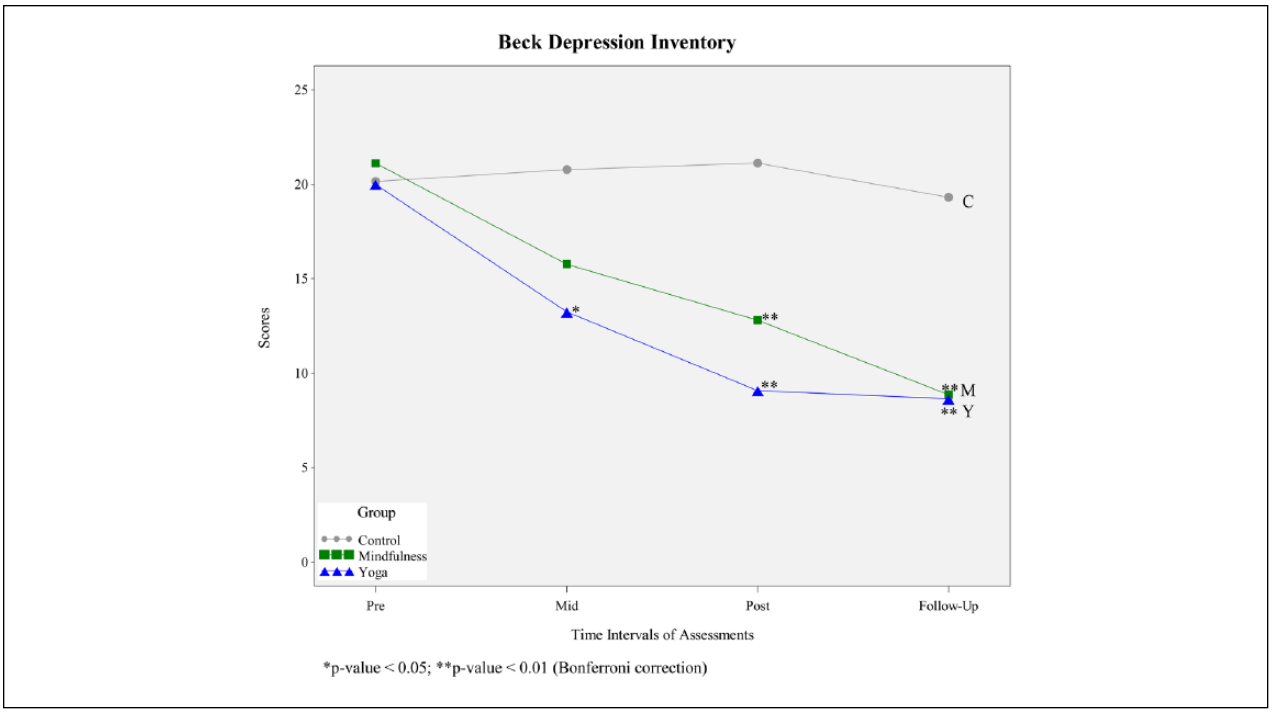


**Figure 2.** Improvements in depressive symptoms in intervention groups.
*$p < .05$. **$p < .01$ (Bonferroni correction).

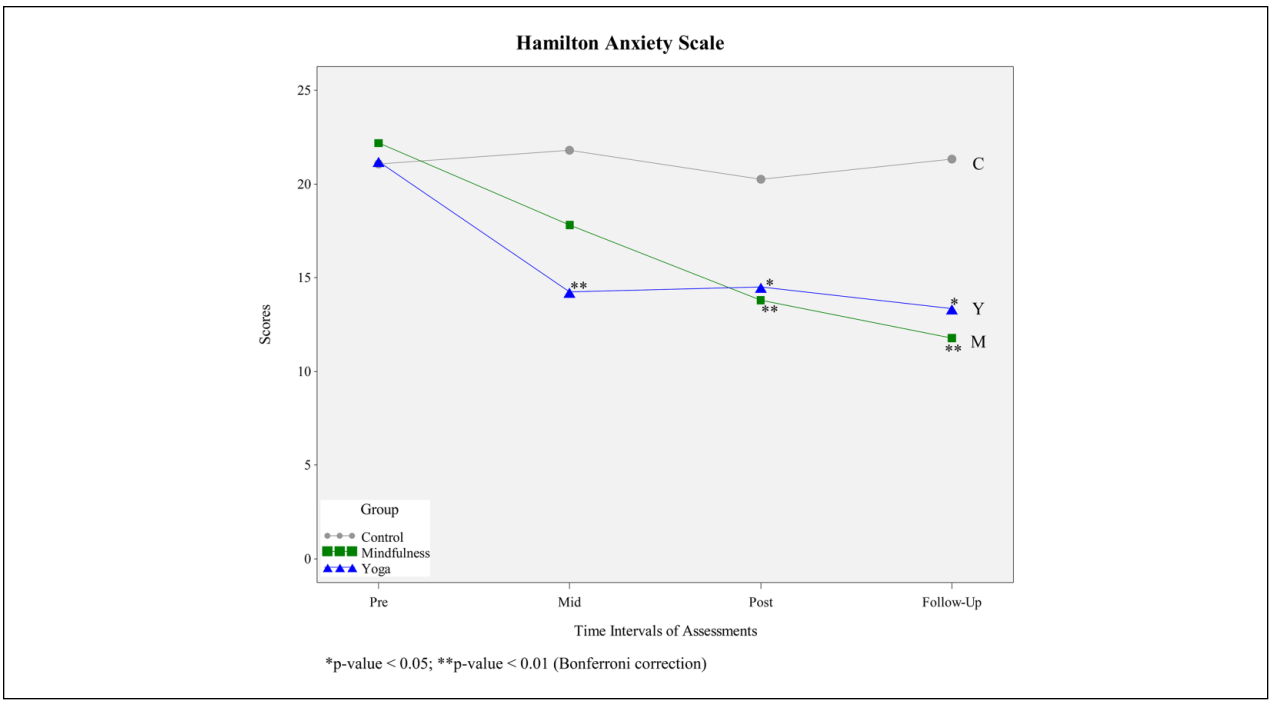


**Figure 3.** Improvements in anxiety symptoms in intervention groups.
*$p < .05$. **$p < .01$ (Bonferroni correction).

intervention group. This can be explained by the fact that self-compassion exercises were practiced in the mindfulness intervention group, and they were not included in the yoga intervention group. Also in the yoga intervention group, while the changes in scores continued to be significant from pre through the follow-up measures for the Beck Depression

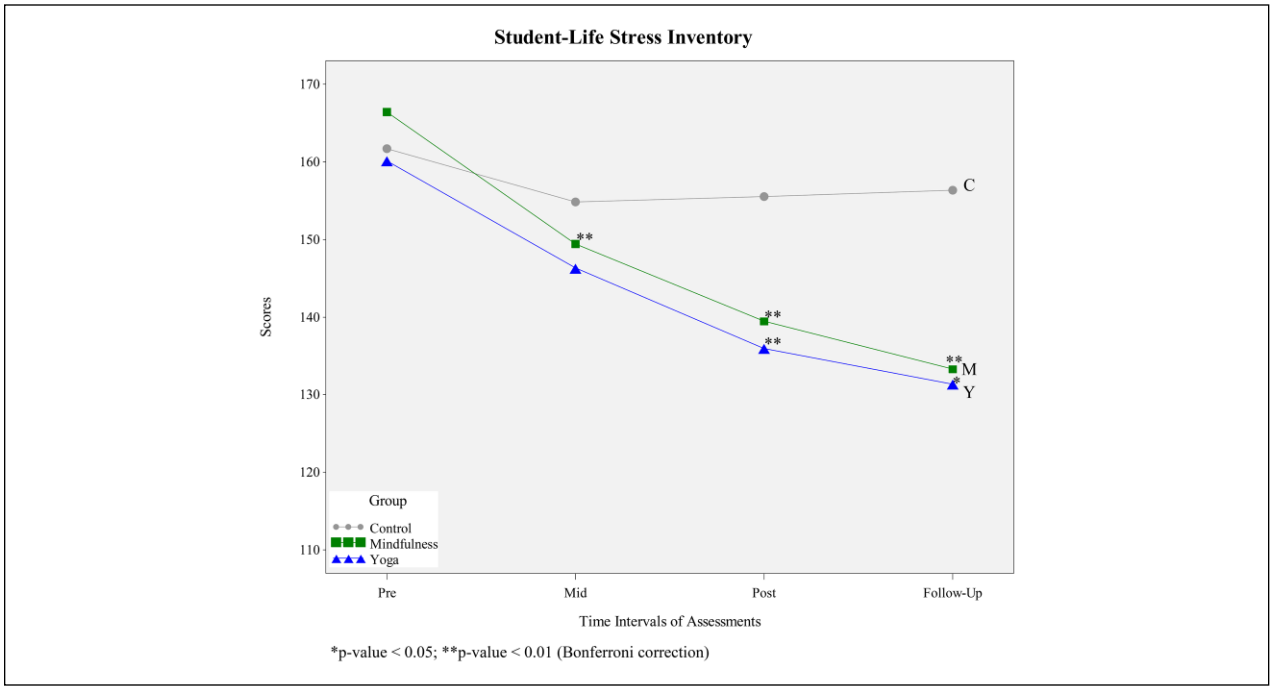


**Figure 4.** Improvements in stress symptoms in intervention groups.
*$p$ < .05. **$p$ < .01 (Bonferroni correction).

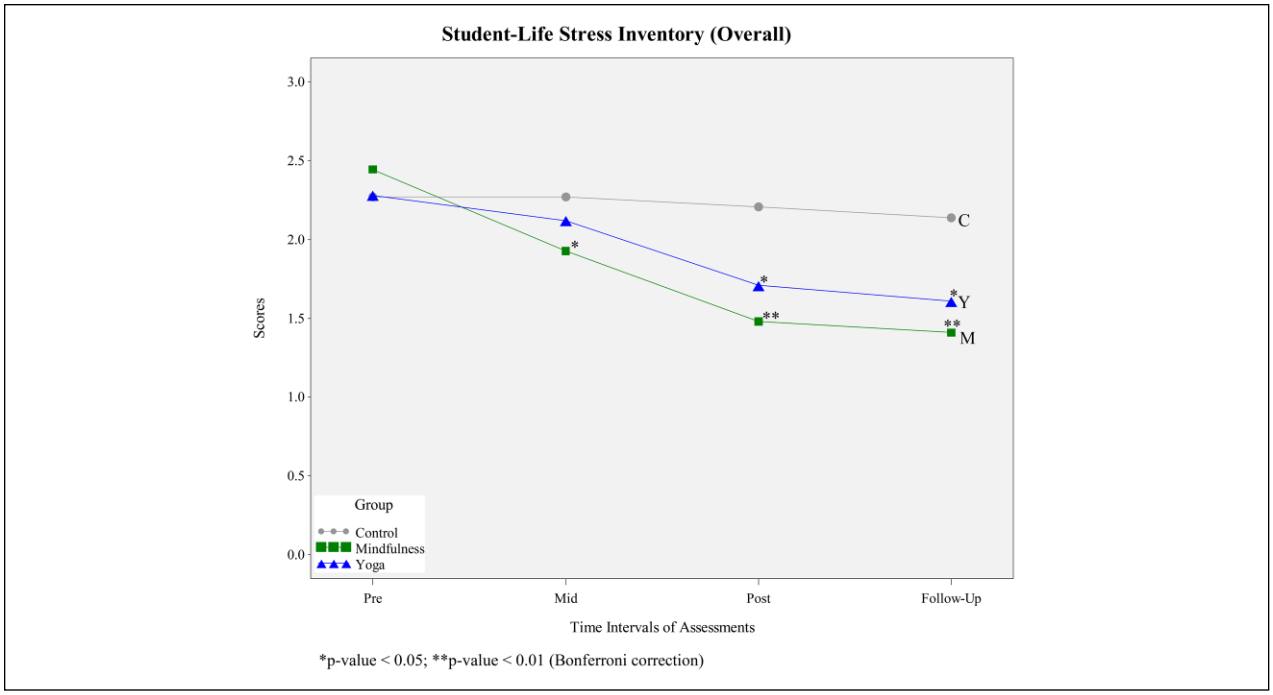


**Figure 5.** Improvements in overall stress level in intervention groups.
*$p$ < .05. **$p$ < .01 (Bonferroni correction).

Inventory and the Hamilton Anxiety Scales, the scores for these scales stayed the same from post to follow-up measurements. It is not clear whether the remissions in the depression and anxiety scales reached a plateau, or if the results reflected a lack of weekly training between the 8th week and the 12th week (follow-up session).

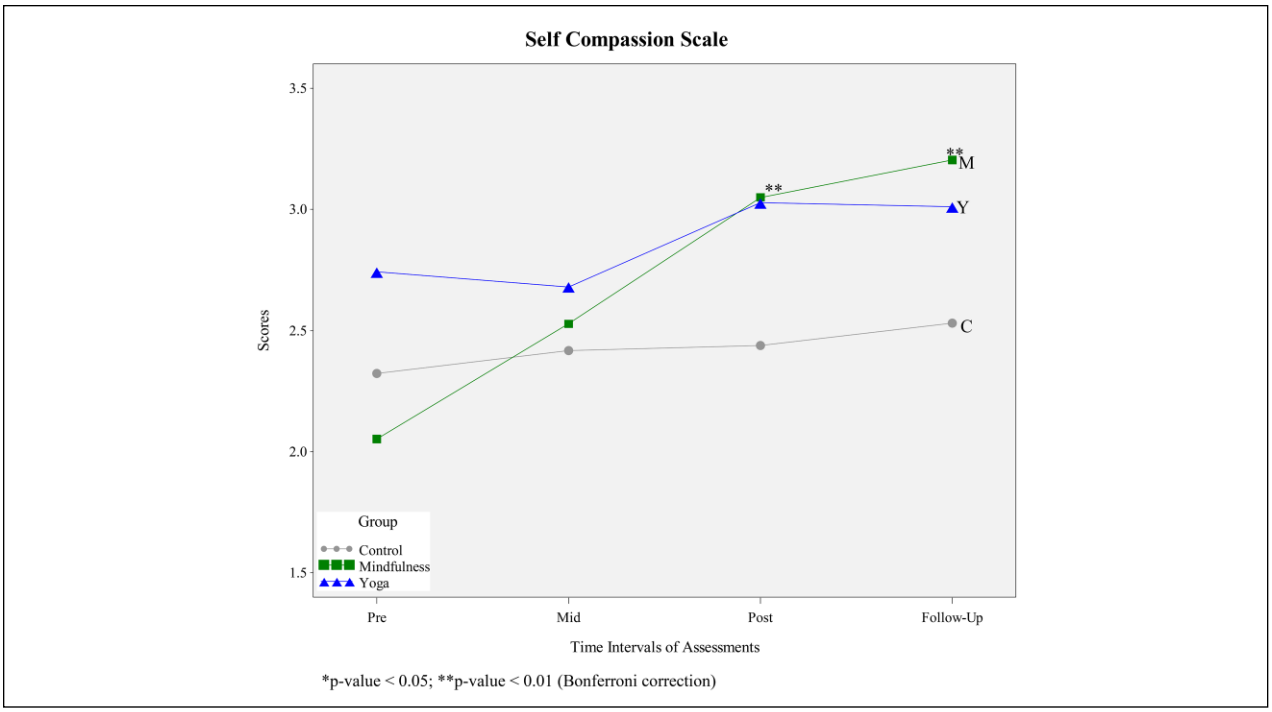


**Figure 6.** Changes in self-compassion scores in intervention groups.
*$p < .05$. **$p < .001$ (Bonferroni correction).

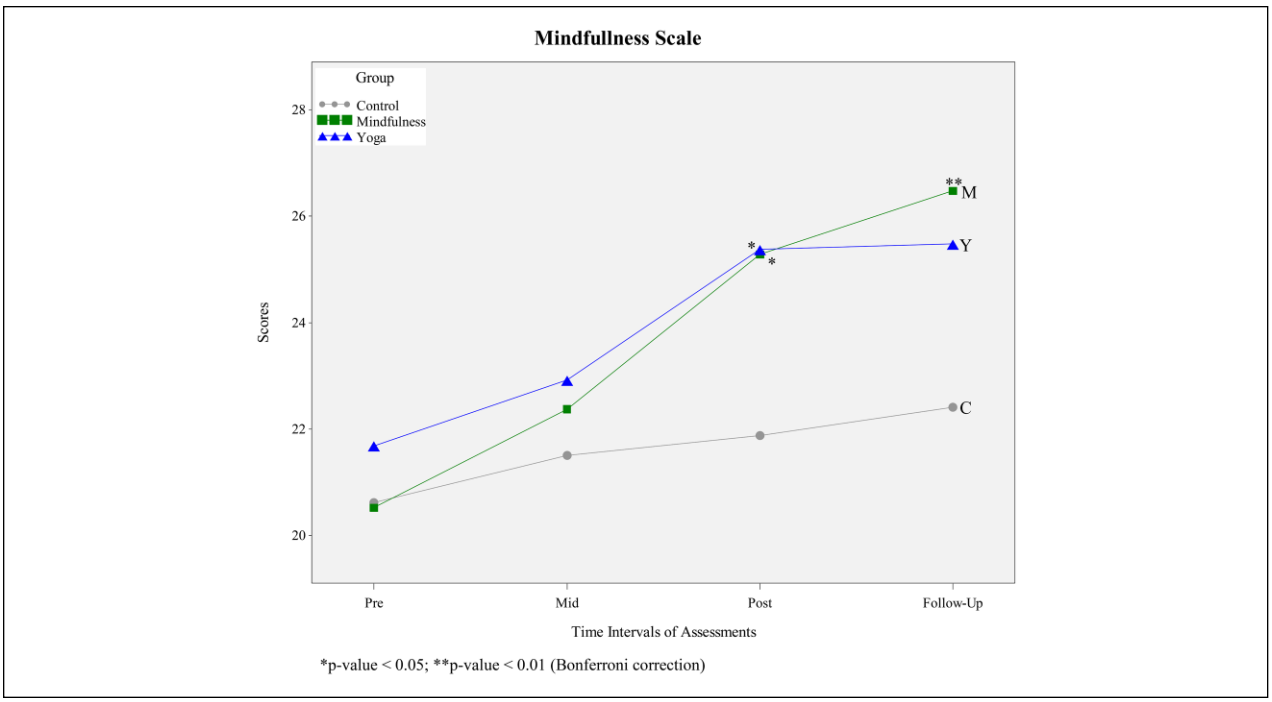


**Figure 7.** Improvements in mindfulness scores in intervention groups.
*$p < .05$. **$p < .001$ (Bonferroni correction).

This study demonstrates that both mindfulness and yoga practices may be beneficial to college students with depression and/or anxiety. These results are in agreement with the study conducted by Streeter et al. (2010) that indicated yoga intervention was effective in improving mood and decreasing anxiety. However, in Streeter's

study the subjects were recruited from the community. The study conducted by Simard and Henry (2009) with medical students also indicated that yoga intervention improved perceived stress and depressive symptoms. Also, consistent with the previous studies (Jain et al., 2007; Preddy et al., 2013), it was found that mindfulness helped with reduction of distress and depression in college students. As demonstrated in other studies ( Eastman-Mueller et al., 2013; Falsafi & Leopard, 2015; Neff & Germer, 2013), these interventions were effective in as little as in 8 weeks. In fact, the positive changes started to emerge by Week 4 and were maintained to the end of training.

Studies that explored the effects of mindfulness on undergraduate students differed in designs and type/ length of interventions. However, there were adequate similarities to support the current study. In a randomized controlled study conducted by Oman et al. (2008), undergraduate students demonstrated significant benefits for stress reduction and forgiveness after receiving an 8-week training in mindfulness-based stress reduction compared with the control group. Terry et al. (2013) focused on the role of self-compassion in moderating students' reactions in transitioning to college life and in coping with social and academic demands. Students with higher scores in self-compassion reported less depression, and high satisfaction with university life. Burns et al. (2011) studied the effects of meditation over the course of two semesters on college students with a focus on anxiety, depression, and perfectionist thoughts. These students demonstrated significant declines on all variables. Jain et al. (2007) conducted a randomized controlled trial of mindfulness versus relaxation with medical, nursing graduate students, and undergraduate students in pre-health programs. The investigators compared a 1-month mindfulness training program versus a somatic relaxation training. Compared with the control group, both meditation and relaxation groups demonstrated significant decreases in distress, and increases in positive mood states over time. The meditation group also demonstrated decreases in distractive and ruminative thoughts and behaviors which are critical in helping individuals with depression and anxiety. Overall, the results of the current study were consistent with previous outcome studies.

Mindfulness and yoga trainings have a social support component that is beneficial to participants. However, this positive aspect of such training should be controlled in rigorous research (Falsafi & Leopard, 2015). While participants in this study were neither encouraged nor discouraged from interacting with each other, it did not appear that they socialized during the class and nothing suggests that they did so outside of the class. However, being a part of a group by itself even without socializing may be a factor that affects individuals' behaviors.

Although this study was open to both genders, most of the participants were females (86.4%). This is common in such modalities. Traditionally males may shy away from programs that include yoga and mindfulness practices, thinking that such programs are mostly for women. However, the number of female students among undergraduates at this university college was higher than male students (61% female vs. 39% male). Most of the participants in the study were Caucasians (59 students or 88%). There were 4 (5.9%) African Americans, 2 (2.9%) Hispanics, and 2 (2.9%) Asians. These numbers somewhat tracked with the university data on undergraduate ethnic/racial backgrounds (White 79%, African American 5%, Hispanics 6.6%, and Asians 2.9%). In a study that was conducted by the investigator (Falsafi & Leopard, 2015) using the same modalities, all participants were White and female although the study was open to both genders and all ethnic backgrounds. One major difference is that the majority of participants in this study (except two) were young adults. The younger generations may be more open to such modalities than older ones.

Although yoga and meditation are not considered religious practices and the training program offered a generic, nonsecular yoga program and meditation instructions, the parent of one of the participants had concerns about possible religious implications. However, the student decided to complete the training despite her parents' concerns. In the previous study by this investigator, the notion that mindfulness and yoga are forms of religious practices was stronger. This change in attitude may also be related to the fact that younger people are more open to new ideas.

The attrition rate in this study was about 25%. One may suggest that the fact that participants started feeling better was a motivator for regular attendance. However, the attrition rate was almost the same in all three groups. Other possible reasons could be interaction with the group leader, being a member of the group, and/or the reminder e-mails that they received occasionally from the group leader.

As discussed earlier, emerging adulthood naturally comes with a lot of uncertainty. Paths to the future have not yet been taken and there are unlimited choices ahead. Depression and anxiety are associated with regrets about what has happened in the past and worries about the future which make the situation more challenging for those who are suffering from these conditions. In mindfulness and yoga trainings, the participants initially simply learn to pay attention to their breaths, body sensations, body movements, and everything else that is happening in the moment. They learn to connect the body and mind by being present in the moment, which can help them access their inner wisdom, authentic desires, and ability to find their paths (Rogers & Maytan, 2012). Mindfulness and yoga trainings may have potentials for health promotion in college students.

## Strengths and Limitations

The study design was enhanced by inclusion of a control group in the design. Also, having a follow-up session provided an opportunity to observe if the participants in the intervention groups were able to maintain the positive changes without having weekly classes. Another strength of the study was related to the sample selection. The selection of participants was based on a two-phase process. The first phase was an online screening. Then those who appeared to be qualified based on their responses were interviewed individually by the psychiatric clinical nurse specialist. This second phase of the selection process ensured that self-identifying participants met the study criteria.

The intervention trainings were nonsectarian, which made it easier for all participants to resonate with it, irrespective of their religious beliefs. The same instructor provided training to both intervention groups and collected data from all three groups. This ensured that participants in all groups received similar information regarding the study. Also, the groups were assembled in the same building, providing similar environments. The clinician was a psychiatric clinical nurse specialist and a certified holistic nurse, as well as a certified yoga teacher. She also had training in trauma-sensitive yoga. Providing a psychologically safe place is important, and using trauma-sensitive language when instructing participants is essential (Emerson & Hopper, 2011). To ensure that participants keep track of their home practice, they were asked to complete a short form on their home practice at each session. While this method still relies on self-report, it provides a better opportunity to collect the information on home practice through journaling. The participants were asked to summarize from their journal any significant information related to their depression and anxiety, and changes in their treatment. This information was collected during the follow-up session.

There were several limitations in the study. The sample size was small and the population was mainly Caucasian female undergraduate students, which makes generalization of the study findings difficult. Data were obtained based on self-report (paper and pencil), which is subject to recall bias. Adding physiological measures of anxiety and depression would make the findings more reliable. Also, interaction with the group leader and journaling can be confounding factors. Since the comparison of these two modalities have not been studied in this population, the information obtained from this study can still make a valuable contribution to this area of research. The study can be improved with a randomized sampling, instead of a quasi-randomized sampling, a higher number of participants, and a more diverse sample.

## Conclusions and Implications

This study has implications for a cost-effective treatment for these disorders, and the findings from this study can provide useful information to university counseling centers and health care insurance companies. Both interventions (mindfulness and yoga practices) can be effective in helping students cope with depression and/or anxiety. The fact that both interventions seemed to be helpful with symptoms of depression and/or anxiety provides more tools to college students and other individuals who suffer from these disorders. Some individuals find mindfulness practices easier than yoga because there are minor limitations in when and where it can be practiced. Individuals can practice mindfulness while they are doing the dishes, or while they are waiting in line at the grocery store, or waiting for a red light to change. Others prefer yoga because it is a practice that involves the body and mind. Both depression and anxiety present symptoms that affect the body, and practicing yoga can be beneficial to those individuals (Van Der Kolk, 2014; Woolery, Myers, Sternlieb, & Zeltzer, 2004). Practicing these modalities on a regular basis is important. Individuals who practice such modalities on a regular basis tend to respond to situations rather than react to them (Falsafi & Leopard, 2015). These findings can provide useful information to insurance companies and also have important implications for clinicians in various practice settings particularly counseling centers in colleges and universities.

## Relevance to Nursing

The findings from this study have important implications for psychiatric nurses in various clinical settings including counseling centers in colleges and universities. Nurses encounter patients with depression and/or anxiety in addition to various medical conditions in their practice. Medical conditions including chronic and terminal illnesses can lead to depression and anxiety, and mindfulness and/or yoga practices may be beneficial to such patients and their families. This is also a great opportunity for psychiatric and holistic nurses to collaborate with each other. Nurses have also the opportunity to collaborate with other health care providers such as physicians, social workers, and physician assistants to provide such modalities to patients/clients who can benefit from them.

## Recommendations for Future Research

The study can be improved with more participants and a more diverse sample. Measuring biological markers (brain scanning and cortisol level) as indicators of changes, in addition to self-report by participants, may

make the results of this study more affirmative. Also, a strong qualitative component, such as interviewing participants at each data collection session, may provide additional information about the effects of these modalities. Future research could also focus on effects of individual versus group practice for both interventions. Despite these limitations, this study suggests that mindfulness and yoga practices may be effective in helping college students cope with anxiety and/or depression. Further research is needed to confirm these findings.

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