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Objectives: *Mindfulness-based practices have been shown to be effective in reducing depression and anxiety among college students. Less is known about whether coursework incorporating contemplative practices has similar beneficial effects. This study sought to investigate the benefits of a course focusing on contemplative practices that included mindfulness-based practice inside and outside the classroom.* Method: *In Study 1, 42 students enrolled in Meditation and Contemplative Practice, a course taught through the Department of Classics, Philosophy, and Religious Studies, completed measures of mindfulness, self-compassion, depression, and anxiety at the beginning and end of the semester. In Study 2, 43 students in this course, and 65 students in an Introduction to World Religions course completed the same measures at the beginning and end of the semester. In Study 3, 15 students enrolled in the contemplative practices course completed a pre-test, a post-test, and a follow-up assessment six weeks later.* Results: *Across all three studies mindfulness and self-compassion rose over the course of the semester. In Study 1, anxiety significantly decreased. In Study 2, those in the religious studies course did not experience increased mindfulness or self-compassion over the course of the semester. Furthermore, there were significant interactions indicating that the religion students increased in depression and anxiety over the course of the semester while those in the contemplative practices class decreased. Study 3 indicated that the gains made during the semester continued after the course was over.* Conclusions: *Results indicate that coursework on contemplative practices is beneficial to the mental health of college students.*

Mindfulness practice is linked to Buddhist tradition but has been increasingly used in psychological practice as a means to help individuals respond to emotional distress (Keng, Smoski, & Robins, 2011). Mindfulness typically has two components (Bishop et al., 2004). The first involves directing awareness to physical, mental, and emotional phenomena that arise within one's present experience including the way one's body and mind react to both pleasant and unpleasant stimuli. The second component of mindfulness involves approaching one's experience with a sense of non-resistance, compassion, and non-judgment. In a recent review of the literature, Goyal and colleagues (2014) concluded that there was strong evidence that mindfulness-based interventions were effective treatments for depression and anxiety.

Mindfulness interventions have been shown to be effective in college student populations. This is particularly important as college students have high levels of mental health problems. For example, in one study, one in three college students were found to experience mental health problems, including 24% who experienced internalizing problems such as depression and anxiety (Bruffaerts et al., 2018). In another study looking at 72 colleges and universities in the U.S., similar results were found with 18% of participants screening positive for depression and 10% screening positive for anxiety (Ketchen Lipson, Gaddis, Heinze, Beck, & Eisenberg, 2015). Rates were higher and treatment utilization was lower in large universities, public colleges, and among non-residential students. This is critical to study because research suggests that mental health problems are associated with lower academic functioning (Bruffaerts et al., 2018).

Much of the research on mindfulness interventions in the college context has focused on interventions through wellness programs coming from student health or mental health centers. These are typically several week classes that students participate in outside of the academic context, often using techniques of mindfulness-based stress reduction. Such interventions have been related to a number of positive outcomes including greater feelings of vitality (Canby, Cameron, Calhoun, & Buchanan, 2015), improved coping and time management (Mahfouz et al., 2018), decreased mind-wandering and increased attention (Morrison,

Goolsarran, Rogers, & Jha, 2014), lower levels of stress and rumination (Shapiro, Oman, Thoresen, Plante, & Flinders, 2008), decreased distress and improved subjective well-being (de Vibe et al., 2013), decreased depression and anxiety levels (Dvořáková et al., 2017), and decreased levels of distress that lasted a year after the intervention (Galante et al., 2018). Overall, reviews of interventions involving general wellness programs designed to decrease stress and increase the overall well-being of college students have found that those which focused on mindfulness training are among the most effective (Conley, Durlak, & Dickson, 2013; Regehr, Glancy, & Pitts, 2013). A review and meta-analysis of mindfulness interventions among college students found that mindfulness practices work particularly well to reduce anxiety (Bamber & Morpeth, 2019; Bamber & Schneider, 2016). Another meta-analysis showed that mindfulness interventions were also effective in reducing depression (Ma, Zhang, & Cui, 2019), and a more recent systematic review noted that mindfulness-based interventions are effective in reducing anxiety, depression, and stress, although long-term follow-up data is lacking overall (Chiodelli et al., 2020).

While these results are encouraging, most of the research on mindfulness training in college students has focused on interventions outside of the academic context. However, there is a growing movement to bring mindfulness practices into the higher education undergraduate curriculum. Scholars have argued that mindfulness-based practices are central to an integrative approach that views students and teachers as whole people and focuses on the meaning and purpose of higher education, combining intellectual achievement with compassion (Palmer, Zajonc, & Scribner, 2010). Those who support the use of contemplative practices in higher education also see it as a way for students to decrease stress, enhance their problem solving skills, and better connect what they learn in college with how they live their lives (Barbezat & Bush, 2013; Bush, 2011; Zinger, 2008). Cultivating a mindful disposition has been proposed as a goal of higher education as it encourages students to engage in careful observation and perspective taking, which are cornerstones of critical thinking (Ritchart & Perkins, 2000). Mindfulness has also been suggested as an important component of courses that emphasize diver-

sity as it allows students to become more conscious of their reactions to the power dynamics of gender or race (Berila, 2014). Supporters of contemplative practices in higher education believe that it can be useful across a wide range of disciplines and be integrated into almost any class setting through practices such as sitting in silence at the beginning of class, meditation, yoga, deep listening, and contemplative reading and writing (Barbezat & Bush, 2013).

There is limited research specifically looking at mindfulness within academic courses, however. Some of the existing research looks at how movement-based mindfulness practices are incorporated into physical education curricula (Caldwell, Harrison, Adams, Quin, & Greeson, 2010). Other research has looked at teaching mindfulness or mindful practices such as Qigong as part of the curriculum in counseling or social work training programs and has found that such courses improved both well being and clinical skills (Chrisman, Chambers & Lichtenstein, 2008; Gockel, Cain, Malove & James, 2013; Napoli & Bonifas, 2011). Some research has also explored adding a mindfulness component to other content courses. Such interventions appear to improve both class performance and mental health. For example, a brief mindfulness exercise before class was shown to be related to improved academic performance in an Introductory Psychology class (Ramsburg & Youmans, 2014). Another study found that incorporating meditation as part of a psychology course improved levels of reported mindfulness and decreased both rumination and state anxiety (Yamada & Victor, 2012). However, the courses in these studies were not explicitly about mindfulness practice.

Courses that focus specifically on mindfulness or other contemplative practices have begun to appear in the college curriculum. Indeed, there are many universities across the country that are beginning to offer a program of study that concentrates on contemplative practices. As of July 2020, the Center for Contemplative Mind in Society listed 15 U.S.-based programs that offered undergraduate majors, undergraduate minors, graduate certificates, or master's degrees in contemplative studies (http://www.contemplativemind.org/resources/study). These programs often include classes that focus entirely on learning and practicing mindfulness or other forms of contemplative practice. The specific

courses vary. Some involve simply teaching students about mindfulness and the science behind it; others are more experiential and involve the practice of mindfulness as a core component of the course.

Overall, there is very little research on whether such courses actually increase mindfulness or improve mental health, but the research that does exist is promising. Some of these classes teach about mindfulness without having a direct experiential component. In one quantitative study, students enrolled in a seven-week, lecture-based mindfulness course without an experiential component were compared to those in a wait-list control group (de Bruin, Meppelink, & Bögels, 2015). The researchers found that students in the course showed significantly increased levels of mindfulness, and these changes persisted at a six-week follow-up after the end of the class. However, this study did not assess specific aspects of students' mental health such as depression and anxiety. Another study looking at a course on the neuroscience of mindfulness found that those who enrolled in this course reported fewer barriers to meditation after the class (Olson, 2018). However, this study did not measure whether enrolling in the course increased levels of trait mindfulness or other mental health variables.

Other studies have focused on classes that teach about mindful principles but also incorporate an experiential component such as meditating during class. One qualitative study examining the effects of taking a three-week Buddhist philosophy class with a meditation component demonstrated that most students had benefits such as increased self-awareness, presence, and acceptance although some students were self-conscious and self-critical during the process (Godlaski, 2018). In a quantitative study, the effects of an experientially-based, semester-long course focused on compassion were investigated (Ko et al., 2018). Both self-compassion as well as compassion towards others were assessed. Data about mindfulness, depression, anxiety, and both self-reported and salivary stress were also collected. This course involved studying the biographies of spiritual leaders such as Gandhi and Mother Theresa. It also taught students a variety of mindfulness techniques and encouraged personal practice of these techniques. Furthermore, it had a service learning component (e.g., sitting with a person who was dying while

doing a loving kindness meditation). Students were randomized to either take the course or be placed on a wait-list to take the course in the future. They found that, compared to the wait-list control group, those who took the course had higher levels of mindfulness and compassion and lower levels of salivary stress. There were no differences found for depression, anxiety, or self-reported stress levels.

OVERVIEW OF THE CURRENT RESEARCH PROGRAM

This exploratory research aims to build on the limited work on the effects of teaching a course specifically focusing on the study of contemplative practices. While there is considerable research on the benefits of non-academic wellness mindfulness courses, there is a relative dearth of information on the benefits of integrating mindfulness into academic courses. While some courses may integrate mindful practices into content areas (e.g., Ramsburg & Youmans, 2014; Yamada & Victor, 2012) other courses specifically focus on the study of mindfulness and contemplative practices (e.g., Godlaski, 2018; Ko et al., 2018). Further, only some of these courses integrate a mindfulness practice component as integral to the class. Overall, there is very little quantitative research looking at the psychological effects of taking such courses. As contemplative practice majors and minors are growing in this country, the current study builds most directly on the work of Ko et al. (2018) to investigate the psychological effects of taking a class specifically focused on contemplative practices that includes a mindful practice component within the scope of the class.

Over the course of three waves of data collection, we investigated the effects of an undergraduate, practice-based contemplative studies class. Each wave of data collection took place over the course of an academic year with data collected from sections taught in both fall and spring semesters. In the first wave of data collection, we investigated the effects of the course on levels of mindfulness, self-compassion, depression, and anxiety using a pre-test/post-test design. In the second wave of data collection, we looked at the effects of the course on the same four constructs with the addition of a comparison group of students who enrolled in an introductory class not focused on contemplative practice.

In the third wave of data collection, we focused on the same four constructs but expanded the design to include a follow-up assessment a few weeks after the end of the semester in which they were enrolled in the course.

CONTEMPLATIVE PRACTICES COURSE

We investigated a course titled Meditation and Contemplative Practice, which is taught within the Department of Classics, Philosophy, and Religious Studies and is a core requirement of the Contemplative Studies minor. It is described in the catalog as follows:

> This course offers a practical, experiential, and theoretical introduction to mindfulness meditation and contemplation. Students learn and practice meditation techniques daily while exploring the contemplative practices and theories of diverse cultural traditions from a variety of disciplinary perspectives, such as philosophy, psychology, and neuroscience.

Taught by three different instructors, the course content varied slightly as each professor assigned some distinct readings. Syllabi for the three classes are provided in the online appendix. These included popular, and thus accessible, texts from diverse disciplines including philosophy, religious studies, psychology, and the contemplative sciences written by authors ranging from academics, like Dr. Jon Kabat-Zinn, originator of the Mindfulness-Based Stress Reduction system, to proponents of religious traditions, like the Dalai Lama. It was explicitly stated both on the syllabus and in class that students would never be asked nor required to believe in anything in particular. Thus, the class focused on cognitive skills rather than the adoption of a particular set of beliefs. The learning objectives for the course included exploring contemplative practices through classical and modern perspectives as well as though drama, philosophy, neuroscience, psychology, and art. Learning objectives also included increased concentration, engagement, and critical thinking skills, and the cultivation of ethical values such as sympathetic joy, compassion, equanimity, and loving kindness. All three instructors have been trained

extensively with monks and teachers from a variety of traditions including the Tibetan, Vipassana, and Theravada Buddhist traditions. The teachers have been training and practicing for a minimum of 15 years.

The defining feature of the course was the incorporation of mindfulness meditation practice, although each instructor focused on different aspects of mindfulness meditation (e.g., loving kindness, insight). Beginning with as little as five minutes of meditation and building up to 45 minutes by the last week of the semester, students meditated during class meetings. They were also asked to meditate daily outside of class, including weekends and holidays. Required outside meditation started at 10 minutes a day and increased throughout the semester to 45 minutes a day. However, it may be instructive to note that since the completion of data collection for this study, the three faculty teaching this class have moved to requiring only 20 minutes of meditation outside of class per day.

Students were required to write reflective journal entries about their experience of each outside meditation session. Worth a significant percentage of their grade in the course, journals were primarily evaluated quantitatively rather than qualitatively; grades reflected how many of the assigned minutes students completed more than how much progress in meditative skills (such as concentration) was demonstrated. To further integrate their experiences in contemplation, short reflection papers were assigned throughout the semester, and the course concluded with a final creative project in any medium that uniquely expressed the insights they gained through the class.

STUDY 1

Introduction

As described above, the first wave of data collection was a pre-post design where students enrolled in the Meditation and Contemplative Practice class completed parallel surveys at the beginning and end of the semester. We hypothesized that, over the course of the semester, students' levels of mindfulness and self-compassion would increase. We also hypothesized that their self-reported depression and anxiety symptoms would decrease.

Method

Participants. Fifty-six students completed the pre-test at the start of the semester in which they were enrolled in sections of the Meditation and Contemplative Practice class. Forty-two of those students subsequently completed the post-test at the end of the semester. Those who completed the post-test were not different from those who did not on age, gender, or class year. There were also no pre-test differences on the study variables assessing engagement in contemplative practices, mindfulness, self-compassion, or mental health.

The 42 students who participated in the entire study ranged in age from 18 to 28 years old ($M = 20.62$; $SD = 1.94$). Thirty participants (71.4%) identified as women, and 12 (28.6%) identified as men. The majority of participants were in their fourth year of college ($n = 23$; 54.8%); an additional eight (19%) were in their first year, three (7.1%) were in their second year, three (7.1%) were in their third year, and five (11.9%) were in their fifth year. The majority of participants also identified as White ($n = 35$; 83.3%); two participants (4.8%) identified as Asian/Pacific Islander, one identified as African American/Black (2.4%), one identified as Latino/Latina (2.4%). An additional one participant (2.4%) indicated they identified their race/ethnicity another way, and two (4.8%) chose not to answer this question. The most common self-identified socioeconomic status was middle class ($n = 20$; 47.6%). Participants also identified as upper-middle class ($n = 17$; 40.5%), working class ($n = 4$; 9.5%), and wealthy ($n = 1$; 2.4%).

Procedure. Students enrolled in the Meditation and Contemplative Practice course were invited to participate in the study during the second week of classes when students could no longer add the course to their schedule. Data collection took place during class time. Students were provided a link to the online survey by their professor and asked to participate in a study about the effects of taking this class. The professor then left the room while the students were given time to complete the survey so they did not feel undue pressure to participate.

When students went to the online survey, they first read an informed consent and decided whether they wished to participate in the study. Since data provided by students at the start of the semester would need to be connected to data provided at the end of the semester, students

were walked through creating a unique ID code that would be used to link their responses but could not be directly connected to them. They were asked to provide the first two letters of their mother's birth name, the first two letters of the town in which they were born, and the date of the month on which they were born. Students then completed the rest of the survey before being taken to an online debriefing page.

During the last week of classes, the same procedure was followed for the collection of the post-test data. Students received no compensation for their participation in this study.

Materials. All measures were completed at both the pre-test and the post-test.

Mindfulness. The Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) was used to assess mindfulness. This is a 39-item measure with five subscales assessing non-reactivity (e.g., "I perceive my feelings and emotions without having to react to them"), observing (e.g., "When I'm walking, I deliberately notice the sensations of my body moving"), awareness (e.g., "When I do things, my mind wanders off and I'm easily distracted" [reverse scored]), describing (e.g., "I'm good at finding words to describe my feelings"), and non-judgment (e.g., "I criticize myself for having irrational or inappropriate emotions" [reverse scored]). Items are responded to on a 5-point response scale ranging from 1 (*never/rarely true of me*) to 5 (*very often/always true of me*). Responses were averaged to form each subscale, and items were scored so that higher total scores represented greater endorsement of that facet of mindfulness. One item from the observing subscale ("I pay attention to sensations, such as the wind in my hair or sun on my face") was unintentionally left out of both the pre- and post-test surveys, so that subscale was formed using the remaining seven items. All five subscales were shown to have acceptable levels of internal consistency reliability in the original investigation: .75 for non-reactivity, .83 for observing, .87 for awareness, .91 for describing, and .87 for non-judgment (Baer et al., 2006). For the pre-test, the Cronbach's alphas were as follows: .84 for non-reactivity, .84 for observing, .81 for awareness, .90 for describing, and .91 for non-judgment. They were .90 for

non-reactivity, .71 for observing, .87 for awareness, .92 for describing, and .94 for non-judgment in the post-test.

Self-compassion. The short-form of the Self-Compassion Scale was used to assess levels of self-compassion (Raes, Pommier, Neff, & Guff, 2011). This measure consists of 12 items (e.g., "When I'm going through a very hard time, I give myself the caring and tenderness I need") that are responded to using a 5-point scale ranging from 1 (*almost never*) to 5 (*almost always*). Responses to items were averaged to form a total score where higher scores represented higher levels of self-compassion. This version of the measure was found to have good internal consistency reliability in the original investigation (α = .86). In this study, Cronbach's alpha was .83 for both the pre-test and the post-test.

Depressive symptoms. The 8-item version of the Patient Health Questionnaire (PHQ-8) was used to assess the frequency of participants' experiences of depressive symptoms during the two weeks prior to each data collection (Kroenke et al., 2009). A sample item is "Feeling down, depressed, or hopeless." This measure uses a 4-point response scale where 0 represents *not at all,* 1 represents *several days,* 2 represents *more than half the days,* and 3 represents *nearly every day.* Responses were summed to calculate a total score, and higher scores indicated greater experience of depressive symptoms during the previous two weeks. The measure has been shows to be reliable in prior research (Cronbach's α = .87; Hwang, Fleischmann, Howie-Esquivel, Stotts, & Dracup, 2011) and has been found to be useful and consistent in a college sample (Keum, Miller, & Inkelas, 2018). Internal consistency reliability in the present study was .80 for the pre-test and .82 for the post-test.

Anxiety symptoms. The GAD-7 is a 7-item measure of symptoms of generalized anxiety disorder and was used to assess participants' experience of anxiety symptoms in the two weeks preceding data collection (Spitzer, Kroenke, Williams, & Lowe, 2006). Participants responded to items using the same response scale described above for the PHQ-8, and a sample item is "Feeling nervous, anxious or on edge." Sum scores were calculated for this measure with higher scores representing greater experience of anxiety symptoms during the prior two weeks. The measure was found reliable in the original investigation with a Cronbach's

alpha of .92 and has been used in the past to measure anxiety reduction associated with mindfulness training in college students (Dvořáková et al., 2017). Cronbach's alpha for the present study was .91 and .93 for the pre- and post-tests, respectively.

Meditation. At both pre- and post-test, participants were asked about the frequency of their meditation practice as well as the length of their practice if they did meditate. On the pre-test, participants were asked to select the answer that best completed the sentence, "I engage in meditation practice…" with possible response options of *never, monthly, weekly, daily,* and *more than 1 time a day.* If they responded with anything other than *never*, participants were then asked to complete "My meditation sessions generally last…" with possible response options of *less than 5 minutes, 5-10 minutes, 10-20 minutes, 20-30 minutes,* and *more than 30 minutes.* Since meditation was part of class meetings, at post-test, these questions were revised to reflect meditation practice outside of class, but the response options remained consistent. The revised items read "During the course of this class, I engaged in meditation practice outside of class…" and "During the course of this class, my meditation sessions outside of class generally lasted…".

Results

Descriptive statistics for all study variables from both the pre- and post-test surveys as well as tests of pre-post differences are provided in Table 1. Repeated measures ANOVAs were used to test for pre-post differences on all measured variables.

At pre-test, the average reported frequency of meditation fell between *weekly* and *daily,* with the mean score closer to *daily.* The mean score for meditation duration was just above the value that represented *5-10 minutes* at pre-test. At post-test, the mean frequency was still between *weekly* and *daily*, but the mean score was closer to weekly. With the alpha correction, this was not a statistically significant decrease. The average duration score again fell between *5-10 minutes* and *10-20 minutes*, but the score was now closer to the longer duration—a significant increase.

Table 1

Descriptive Statistics and ANOVA Results for Study 1

	Pre-test		Post-test		Tests of Pre-test/Post-test Differences
	M	*SD*	*M*	*SD*	
Meditation frequency	3.72	.58	3.31	.82	$F(1,31) = 8.30$, $p = .007$, partial $\eta^2 = .21$
Meditation duration	2.07	.69	2.90	.80	$F(1,29) = 27.26$, $p < .001$, partial $\eta^2 = .48$
FFMQ: non-reactivity	2.80	.77	3.45	.75	$F(1,41) = 46.47$, $p < .001$, partial $\eta^2 = .53$
FFMQ: observing	3.34	.85	3.94	.53	$F(1,41) = 28.64$, $p < .001$, partial $\eta^2 = .41$
FFMQ: awareness	2.73	.68	3.41	.67	$F(1,41) = 36.29$, $p < .001$, partial $\eta^2 = .47$
FFMQ: describing	3.21	.90	3.65	.89	$F(1,41) = 17.33$, $p < .001$, partial $\eta^2 = .30$
FFMQ: non-judgment	3.23	.97	3.65	.97	$F(1,41) = 9.59$, $p = .004$, partial $\eta^2 = .19$
Self-compassion	2.94	.67	3.43	.70	$F(1,41) = 23.44$, $p < .001$, partial $\eta^2 = .36$
Depressive symptoms	7.05	4.20	6.19	4.28	$F(1,41) = 2.53$, $p = .12$, partial $\eta^2 = .06$
Anxiety symptoms	9.33	5.39	6.76	5.42	$F(1,41) = 8.70$, $p = .005$, partial $\eta^2 = .18$

Note. FFMQ = Five Factor Mindfulness Questionnaire; scores for meditation frequency and duration, the FFMQ subscales, and self-compassion could range from 1-5; depressive symptoms scores could range from 0 to 24; anxiety symptom scores could range from 0-21; higher scores on all measures represent greater endorsement of that construct.

Participants scores on all five subscales of the FFMQ showed statistically significant increases between the pre-test and the post-test indicating that mindfulness did increase while taking this class. Self-reported levels of self-compassion also significantly increased over the course of the semester.

At pre-test, 26.2% of our sample (n = 11) scored in the range on the PHQ-8 indicative of having major depressive disorder—the subcategories of moderate, moderately severe, and severe depression. At post-test, 11.9% of our sample (n = 11) scored in the range for clinical concern. There was no significant change in depressive symptomology scores over the course of the semester. For anxiety symptoms, however, there was a statistically significant decrease from pre-test to post-test. At pre-test, 42.9% of participants (n = 18) scored in the range for clinical concern—the moderate and severe subcategories. At post-test, only 10 participants (23.8%) scored in the range of clinical concern for generalized anxiety disorder.

Discussion

We found that, over the course of the semester, participants in the Meditation and Contemplative Practice course experienced greater levels of mindfulness, greater self-compassion, and significantly lower levels of anxiety. There was also numeric improvement in depression scores, although these changes were not statistically significant. This is somewhat consistent with the research of Ko et al. (2018) which found increased levels of mindfulness and self-compassion over the course of the semester but no significant differences in depression or anxiety—although the means in that study were trending in the direction of improved mental health outcomes. However, that study was different than ours in that both pre- and post-test assessments were taken during finals weeks (the pre-test assessment was conducted during the finals week of the previous semester). It is likely that students experience greater levels of depression and anxiety toward the end of the semester than at the beginning. Given this, the fact that we found a significant decrease in anxiety symptoms and non-significant improvement in depressive symptoms may be particularly meaningful.

Interestingly, our data indicated that, over the course of the semester, participants were actually less likely to participate in meditation outside of the class period. This may be because they were meditating considerably during class. Nevertheless, they did report meditating for a longer period of time at the end of the semester compared to the beginning of the semester.

Without a comparison group, it is impossible to tell whether the changes we saw over the semester were due to the course or other factors, however. For example, in the spring semester, the pre-test was taken during winter and the post-test was taking during the spring. The improvement in mental health over the semester could have been due to a natural progression of positive mood with better weather. The inclusion of a comparison group is necessary to identify if changes or lack of changes over the course of the semester are unique to the Meditation and Contemplative Practice course.

STUDY 2

Introduction

While the results of Study 1 were promising, the positive changes over the course of the semester could have been due to other factors. Furthermore, as noted above, the lack of change in depressive symptomology does not necessarily mean that the class had no positive effect on this aspect of mental health. It is possible that, without such a class, students may have experienced an increase in depression over the course of the semester.

Given this, in Study 2, we expanded our explorations to compare the experiences of students in the Meditation and Contemplative Practice class to those enrolled in an Introduction to World Religions class, a class in the same department that was not focused on contemplative practices. We hypothesized that we would find an interaction between course and time of assessment for the measures of mindfulness, self-compassion, anxiety, and depression. Although students self-selected into these classes rather than being randomly assigned, we hypothesized

that they would not differ from each other on our measured variables at pre-test. However, we hypothesized that there would be differences at post-test. Specifically, we believed that the Meditation and Contemplative Practice students would have higher scores on the measures of mindfulness and self-compassion and lower scores on the measures of depression and anxiety symptoms than the Introduction to World Religion students at post-test. We also anticipated that we would replicate our results for from Study 1 for students enrolled in the contemplative practices class with these students showing increases in mindfulness and self-compassion and decreased levels of anxiety over the course of the semester. We hypothesized that similar changes would not be found for the students in the comparison class.

Method

Participants. Sixty-two students enrolled in sections of the Meditation and Contemplative Practice course completed the pre-test, and 43 of those students later completed the post-test. There were no significant differences between the people who did and did not complete the post-test on age, gender, class year, engagement in contemplative practices, mindfulness, self-compassion, or mental health. For the Introduction to World Religions students, 86 completed the pre-test, and 65 of those subsequently completed the post-test. Again, there were no significant differences between the students from this course who did and did not complete the post-test.

The 43 students from the Meditation and Contemplative Practice class who participated in both rounds of data collection ranged in age from 18 to 27 years old (M = 20.40; SD = 1.95). The majority of these participants identified as women (n = 30; 69.8%); 12 participants (27.9%) identified as men, and one participant (2.3%) indicated that they had a different gender identity. The majority of participants (n = 38; 88.4%) identified as White. An additional two participants (4.7%) identified as African American/Black, one (2.3%) identified as Asian/Pacific Islander, and one (2.3%) identified as multiracial. One other participant (2.3%) indicated that they identified their race/ethnicity another way. The majority

of participants self-identified as middle class (*n* = 23; 53.5%); participants also identified as upper-middle class (*n* = 14; 32.6%) and working class (*n* = 6; 14.0%). Participants from this course reported a variety of class years: seven (16.3%) were in their first year, 12 (27.9%) were in their second year, eight (18.6%) were in their third year, 11 (25.6%) were in their fourth year, and five (11.6%) were in their fifth year.

The 65 students in the Introduction to World Religions course who completed both the pre-test and post-test surveys ranged in age from 18 to 33 years old with a mean age of 20.00 (*SD* = 2.80). The majority of the participants enrolled in this class identified as women (*n* = 50; 76.9%); 13 participants (20.0%) identified as men, and two participants (3.1%) indicated that they had a different gender identity. The majority of participants (*n* = 53; 81.5%) identified as White. An additional four participants (6.2%) identified as Latino/Latina, four (6.2%) identified as Asian/Pacific Islander, two (3.1%) identified as African American/Black, and one (1.5%) identified as multiracial. One participant (1.5%) chose not to answer this question. The majority of participants self-identified their socioeconomic status as middle class (*n* = 33; 50.8%); participants also identified as upper-middle class (*n* = 21; 32.3%), working class (*n* = 10; 15.4%), and wealthy (*n* = 1; 1.5%). Most of the participants from this course identified as either first-year students (*n* = 32; 49.2%) or fourth-year students (*n* = 19; 29.2%). An additional six students (9.2%) identified as being in their second year, and eight (12.3%) identified as being in their third year.

Procedure. We followed the same procedures used in Study 1 with the exception of how the unique ID codes to connect pre-test and post-test data were handled. For this study, the researchers prepared envelopes for each student containing a unique ID code. Researchers who were not teaching the classes placed an index card with a unique ID number in an envelope with a student's name written on the outside. Envelopes for all students enrolled in a given class section were placed in a larger envelope. These envelopes were taken to the office manager for the department in which the classes were taught, and they were stored with her throughout the semester so professors would never be able to connect their students to specific responses or even know if they chose to participate in the study.

For students enrolled in the Meditation and Contemplative Practice class, during the second week of classes, the professor introduced the study as exploring the impact of classes from this department on students and asked them to participate. A student in the class was asked to retrieve the envelope with ID code envelopes from the department office manager and hand them out to the class. The professor left the room and gave people time to complete the survey. When students were done with the survey, they were instructed to put their ID code card back in the envelope with their name and return it to the larger envelope for the class. A student returned this envelope to the department office manager and let the professor know that the class was ready to proceed.

For students enrolled in the Introduction to World Religions class, one of the researchers who did not teach in that department came to class to introduce the study and request that students participate. Their actual professor was not in the classroom. All other procedures were the same as those used for the Meditation and Contemplative Practice students. After students completed the survey, the researcher let the professor know that the class was ready to resume while a student returned the envelope with ID codes to the department office manager.

The same procedures were followed for collection of the post-test data during the last week of the semester. Students were asked to recycle their ID code card after the post-test data collection. Any envelopes left in the envelope for the class were recycled by the department office manager at the end of the semester.

Students received no compensation for participating in either the pre-test or post-test data collection.

Materials. All measures were completed at both the pre-test and the post-test and were identical to those used in Study 1 as described above. One item from the FFMQ observing subscale ("I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow") was mistakenly left off the pre-test survey but was included in the post-test survey, however.

All measures were found to have acceptable internal consistency reliability at both pre- and post-test. The Cronbach's alphas for the FFMQ subscales at pre-test were .83 for non-reactivity, .69 for observ-

ing, .82 for awareness, .90 for describing, and .85 for non-judgment. At post-test, they were as follows: .84 for non-reactivity, .83 for observing, .79 for awareness, .90 for describing, and .86 for non-judgment. Cronbach's alpha for the self-compassion measure was .84 at pre-test and .89 at post-test. The reliability coefficients for the PHQ-8 were .88 and .86 for the pre- and post-test, respectively. They were .92 and .93 for the GAD-7 at pre-test and post-test.

Results

Descriptive statistics for all study variables at pre- and post-test for students in both the comparison group (Introduction to World Religions) and the mindfulness group (Meditation and Contemplative Practice) are provided in Table 2. Differences between groups and across time were tested using 2x2 mixed ANOVAs where class was a between-subjects variable and time of assessment was a repeated measures variable. For all measured variables, there was a significant class x time interaction, so only the interaction results are reported for the sake of parsimony (see Table 2). Each interaction was probed using *t*-tests, and these results are reported in Table 3.

At pre-test, the average reported frequency for meditation for students in the comparison group fell between *never* and *monthly* with 73.8% of participants (n = 48) indicating that they never meditated. Among those who did meditate, the average duration score fell between *5-10 minutes* and *10-20 minutes*. For those in the mindfulness group, the mean frequency score fell between *weekly* and *daily* with 69.8% of participants (n = 30) indicating they meditated daily. The average duration for those who did meditate fell just above *5-10 minutes*. At post-test, the pattern for those in the comparison group was the same. For those in the mindfulness group, their frequency scores still fell between the same two scale anchors, but their average duration now fell just over *20-30 minutes*. The mindfulness group reported more frequent meditation than the comparison group at both pre-test and post-test. There was no significant difference between pre- and post-test scores for those in the comparison group, but there was a significance increase between reported frequency at pre- and post-test for the mindfulness group. A simi-

lar pattern was found for meditation duration. There was no group difference at pre-test for this variable, but at post-test, the mindfulness group reported significantly longer average duration. There was no change in duration for the comparison group, but duration significantly increased in the mindfulness group between pre-test and post-test.

For both the non-reactivity and awareness subscales of the FFMQ, the comparison group had significantly higher scores at pre-test, but at post-test, the mindfulness group scored significantly higher. For both subscales, there was no significant change in scores between pre-and post-test for the comparison group, but the mindfulness group's scores did significantly increase. For non-reactivity, the mindfulness group was significantly higher than the comparison group at the post-test. For awareness, there was no significant difference between the groups at the post-test, but the comparison group's score decreased (non-significantly) over the course of the semester while the mindfulness group's score increased.

The observing and describing subscales of the FFMQ showed the same pattern of results. The scores did not differ between the groups at pre-test, but the mindfulness group reported greater observing and describing at post-test. Comparison group scores did not change over the course of the study, but the scores for those in the mindfulness group significantly increased by post-test.

For the non-judgment subscale of the FFMQ, group scores did not differ at either pre-test or post-test, and scores for the comparison group did not significantly change over the course of the study. The mindfulness group, however, did show a significant increase in their levels of non-judgment between pre-test and post-test.

At pre-test, the mindfulness group reported significantly less self-compassion than the comparison group, but at post-test, the mindfulness group reported significantly more self-compassion. Scores for those in the comparison group did not show a significant change between pre-test and post-test, but self-compassion scores significantly increased for those in the mindfulness group.

Table 2

Descriptive Statistics and ANOVA Interaction Results for Study 2

	Pre-test		Post-test		Class x Time Interactions
	Comparison Group	Mindfulness Group	Comparison Group	Mindfulness Group	
	M (SD)	M (SD)	M (SD)	M (SD)	
Meditation frequency	1.38 (.72)	3.44 (.98)	1.42 (.68)	3.88 (.71)	$F(1,105) = 5.93$, $p = .02$, partial $\eta^2 = .05$
Meditation duration	2.41 (1.06)	2.15 (.54)	2.15 (.81)	4.10 (.66)	$F(1,49) = 71.68$, $p < .001$, partial $\eta^2 = .59$
FFMQ: non-reactivity	3.04 (.59)	2.69 (.61)	2.97 (.60)	3.29 (.69)	$F(1,105) = .34.90$, $p < .001$, partial $\eta^2 = .25$
FFMQ: observing	3.38 (.60)	3.24 (.55)	3.34 (.62)	3.81 (.54)	$F(1,105) = 35.46$, $p < .001$, partial $\eta^2 = .25$
FFMQ: awareness	2.98 (.59)	2.54 (.56)	2.96 (.56)	3.05 (.57)	$F(1,105) = 26.13$, $p < .001$, partial $\eta^2 = .20$
FFMQ: describing	3.24 (.74)	3.28 (.84)	3.22 (.69)	3.67 (.75)	$F(1,105) = 12.57$, $p = .001$, partial $\eta^2 = .11$
FFMQ: non-judgment	3.11 (.74)	2.91 (.77)	3.08 (.68)	3.24 (.83)	$F(1,105) = 8.99$, $p = .003$, partial $\eta^2 = .08$
Self-compassion	2.87 (.69)	2.50 (.64)	2.86 (.65)	3.16 (.88)	$F(1,106) = 27.53$, $p < .001$, partial $\eta^2 = .21$
Depressive symptoms	6.25 (4.74)	8.57 (6.57)	7.29 (5.31)	7.19 (5.80)	$F(1,105) = 6.74$, $p = .01$, partial $\eta^2 = .06$
Anxiety symptoms	8.57 (5.63)	9.93 (7.06)	9.28 (5.61)	8.10 (6.35)	$F(1,105) = 5.00$, $p = .03$, partial $\eta^2 = .05$

Note. FFMQ = Five Factor Mindfulness Questionnaire; scores for meditation frequency and duration, the FFMQ subscales, and self-compassion could range from 1-5; depressive symptoms scores could range from 0 to 24; anxiety symptom scores could range from 0-21; higher scores on all measures represent greater endorsement of that construct.

Table 3

Follow-up t-test Results for Significant Class x Time Interaction for Study 2

	Pre-test Group Differences	Post-test Group Differences	Comparison Group Pre-test vs. Post-test	Mindfulness Group Pre-test vs. Post-test
Meditation frequency	$t(106) = 12.53$, $p < .001$	$t(105) = 18.01$, $p < .001$	$t(64) = 0.44$, $p = .66$	$t(41) = 2.42$, $p = .02$
Meditation duration	$t(54) = -1.21$, $p = .23$	$t(59) = 9.99$, $p < .001$	$t(13) = -1.33$, $p = .21$	$t(36) = 14.68$, $p < .001$
FFMQ: non-reactivity	$t(106) = -3.03$, $p = .003$	$t(105) = 2.55$, $p = .01$	$t(63) = -1.05$, $p = .30$	$t(42) = 6.28$, $p < .001$
FFMQ: observing	$t(106) = -1.31$, $p = .19$	$t(105) = 4.09$, $p < .001$	$t(63) = -0.63$, $p = .53$	$t(42) = 6.47$, $p < .001$
FFMQ: awareness	$t(106) = -3.80$, $p < .001$	$t(105) = 0.87$, $p = .39$	$t(63) = -0.51$, $p = .62$	$t(42) = 5.15$, $p < .001$
FFMQ: describing	$t(106) = 0.20$, $p = .85$	$t(105) = 3.20$, $p = .002$	$t(63) = -0.43$, $p = .67$	$t(42) = 3.37$, $p = .002$
FFMQ: non-judgment	$t(106) = -1.27$, $p = .21$	$t(105) = 1.09$, $p = .28$	$t(63) = -0.38$, $p = .71$	$t(42) = 3.01$, $p = .004$
Self-compassion	$t(106) = -2.86$, $p = .005$	$t(106) = 2.05$, $p = .04$	$t(64) = -0.27$, $p = .79$	$t(42) = 5.14$, $p < .001$
Depressive symptoms	$t(106) = 2.14$, $p = .04$	$t(105) = -.09$, $p = .93$	$t(64) = 2.25$, $p = .03$	$t(41) = -1.51$, $p = .14$
Anxiety symptoms	$t(106) = 1.10$, $p = .28$	$t(105) = -1.01$, $p = .32$	$t(64) = 1.05$, $p = .30$	$t(41) = -1.91$, $p = .06$

Note. FFMQ = Five Factor Mindfulness Questionnaire.

At pre-test, the mindfulness group actually had significantly higher levels of depression. Fourteen students in the comparison group (21.5%) scored in the range of clinical concern for this measure. In the mindfulness group, 19 students (44.2%) scored in this range. At post-test, however, there was no difference in reports of depressive symptoms between the two groups. Eighteen students in the comparison group (27.7%) and 14 participants from the mindfulness group (33.3%) scored in the range of clinical concern by the end of the semester. Scores for those in the comparison group increased significantly between pre-test and post-test, but scores for those in the mindfulness group were not significantly different at post-test—although the mean score had decreased.

Anxiety symptom scores did not differ between the groups at either pre-test or post-test, and the scores for those in the comparison group did not significantly change over the course of the study. The anxiety symptom scores for those in the mindfulness group, however, did go down significantly by post-test. At pre-test, 30 comparison group participants (46.2%) scored in the range of clinical concern, and 33 (50.8%) did at post-test. For students in the mindfulness group, 21 (48.8%) reported scores in the clinical range at pre-test, and 17 (40.5%) did at post-test.

Discussion

Our results indicated that, at pre-test, the students enrolled in the Meditation and Contemplative Practice class had lower levels of mindfulness, specifically awareness and non-reactivity, than those enrolled in Introduction to World Religions. They also had lower levels self-compassion and higher levels of depression. It is interesting that students who selected into a mindfulness class had higher levels of distress than those who did not. Students may seek out this type of class because they hope that mindfulness skills could help them deal with the psychological distress they are experiencing.

At post-test, these patterns had shifted. Those in the mindfulness group had higher levels of mindfulness (specifically, they were more non-reactive, observant, and better able to describe their experiences) and higher levels of self-compassion. They were not different from the comparison group on either depression or anxiety at post-test. However,

over the course of the semester, those in the Meditation and Contemplative Practice class significantly increased in mindfulness and self-compassion. They did not show significantly decreased levels of depression or anxiety symptoms, but the pattern of data showed a decrease over the course of the semester. In contrast, those in the Introduction to World Religions class actually showed statistically significantly *increased* scores in depressive symptoms over the course of the semester as well as a non-significant pattern of increased anxiety symptoms.

Numerically, those in the mindfulness group became less depressed and anxious over the course of the semester while those in the comparison group became more anxious and depressed. The level of decrease in depression and anxiety symptoms over the course of the semester was comparable to or larger than those from another using the same measure (Dvořáková et al., 2017). These differences were statistically significant in the Dvořáková study, likely due to the fact that they had considerably more participants. It is also important to note that, in the Dvořáková study, the control group did not experience rising anxiety or depression over the course of the intervention. This was likely due to different timing of the measures; in their study the post-test assessment was completed in November, presumably before the stress of the end of the semester. Decreased anxiety and depression in the mindfulness group is consistent with the broader literature on the effectiveness of mindfulness intervention in general populations (Chiodelli et al., 2020).

It is also instructive to examine whether self-reported engagement in meditative practices changed over the course of the semester. Those enrolled in the Meditation and Contemplative Practice course reported being more likely to meditate at the pre-test assessment than those enrolled in Introduction to World Religions. Those enrolled in the contemplative practice class meditated more frequently but were more distressed at the start of the semester. It is likely that this group was interested in meditation (thus, they enrolled in the class) but did not have the skills, knowledge, or experience to use meditative practice in service of increased mental health. Indeed, those who meditated reported a relatively short duration of meditation at the beginning of the semester. Over the course of the semester, those in the contemplative practice class reported being more likely to meditate and were meditating for a considerably longer time

than did participants in the religious studies class who meditated. This increased time spent in meditation may have been related to their improved mental health over the semester.

STUDY 3

Introduction

While the results from Studies 1 and 2 were promising, we felt it would be instructive to know whether the benefits of the Meditation and Contemplative Practice class persisted over time. Once the semester ends, any demand characteristics inherent in feeling as though one was "supposed" to be mindful when taking a mindfulness course would likely fade. Furthermore, after the end of the semester, students were no longer required to engage in regular mindfulness practice as part of a graded course. Thus, any maintenance of gains would indicate that students would have either continued engaging in mindfulness practice on their own or that the gains associated with a period of mindfulness practice are long-lasting, even in the absence of continued practice. Whether or not students continue to engage in regular meditation practice, gains in mindfulness and improved mental health that continue after the end of the course would be particularly promising in terms of the potential long-term mental health effects of taking this type of course.

Furthermore, there is some evidence that the benefits gained during courses that focus on mindfulness can actually continue to increase after the course is over. For example, in a study by De Bruin et al. (2015), gains in mindfulness were maintained or grew seven weeks after a lecture-based mindfulness course ended. Those who were novice meditators were more likely to continue to improve after the course ended while experienced meditators showed the bulk of their improvement during the course and maintained these gains at follow-up. However, this course was not specifically designed to teach mindfulness skills and focused more on the academic study of mindfulness. Other research has not included follow-up data. For example, in a study by Ko et al. (2018) about the effects of a self-compassion seminar, the final data collection was done during the final exam week of the semester in which students took the class. Thus,

the focus of this study was to explore whether any positive benefits of the Meditation and Contemplative Practice class would last six weeks after the end of the semester.

We hypothesized that we would replicate the results of Studies 1 and 2 for the contemplative practices class. Specifically, we anticipated that, over the course of the semester, students would decrease in self-reported depression and anxiety symptoms while reporting increased self-compassion and mindfulness. We also hypothesized that these gains would be maintained at a follow-up assessment that took place six weeks after the end of the semester. As this class required that participants engage in mindfulness practice throughout the semester, we did not anticipate that there would be further improvement in mental health and mindfulness at the follow-up test as compared to the post-test as students were no longer required to engage in these practices.

Method

Participants. Fifty-five students enrolled in the Meditation and Contemplative Practice class completed the pre-test. Of those, 22 only participated in the study through the post-test data collection, and 15 went on to complete both the post-test and the follow-up test. There were no significant differences at pre-test between the people who completed all three waves of data collection and those who did not on gender, class year, age, depression, anxiety, mindfulness, meditation frequency, or meditation duration at pre-test. However, those who completed all three waves of data collection had lower self-compassion score at pre-test (M = 2.41; SD = .64) than those who did not complete all three waves (M = 2.84; SD = .62), $F(1,55) = 5.51$, $p = .02$, partial $\eta^2 = .09$.

The 15 students who completed the pre-test, post-test, and follow-up data collection comprised the final sample for this longitudinal investigation. They ranged in age from 18 to 46 years old (M = 22.20; SD = 6.84). The majority of these participants identified as women (n = 10; 66.7%); the remaining five participants (33.3%) identified as men. The majority of participants (n = 10; 66.7%) identified as White. In addition, there was one participant (6.7%) who identified as Asian/Pacific Islander, one participant (6.7%) who identified as Latino/Latina, and one participant

(6.7%) who identified as Native American. Furthermore, one participant (6.7%) indicated that they identified their race/ethnicity another way, and one participant (6.7%) chose not to answer this question. The most common self-identified socioeconomic status was middle class (*n* = 9; 60.0%). Participants also identified as working class (*n* = 5; 33.3%) and as living in poverty (*n* = 1; 6.7%). The majority of participants were in their fourth year (*n* = 8; 53.3%), but we also had participants who were completing their first year (*n* = 2; 13.3%), second year (*n* = 3; 20.0%), and third year (*n* = 2; 13.3).

Procedure. This study used the same procedure as Study 2 for the pre-test and post-test data collection, but no comparison class was included. Data was collected during the second week of classes and again during the final week of classes.

As in Study 2, participants received their unique numerical identification code through index cards placed inside envelopes with their names. However, unlike the previous studies where the ID numbers were assigned randomly and not tracked by the researchers, the researchers who were not involved in teaching the course kept a record of which students had which ID number so that these students could be contacted with their ID number for the follow-up data collection after the end of the semester in which they were enrolled in the course. The researchers teaching the course never had access to the list connecting the names of their students to specific ID numbers, so they had no way of identifying what students reported or who opted to participate.

The researchers who did not teach the course contacted each of the students enrolled in the class by email six weeks after the semester ended. Students were reminded of the study and asked to participate in a final data collection about the impact of this class. They were provided with their unique ID code in this email along with a link to the online survey. All students received a second reminder email one week after the first email was sent.

Students received no compensation for their participation in the pre-test and post-test data collections. Students who participated in the follow-up data collection were entered in a raffle to win one of four $25 Amazon gift cards as a thank you for their participation.

Materials. All measures were completed for all three phases of data collection and were identical to those used in Studies 1 and 2. The wording of the meditation frequency and duration items were slightly al-

tered for the follow-up survey. The revised items read "Since the end of the semester, I have engaged in meditation practice…" and "My meditation sessions since the end of the semester have generally lasted…."All measures were found to have acceptable internal consistency reliability at both pre- and post-test. The Cronbach's alphas for the FFMQ subscales at pre-test were .85 for non-reactivity, .73 for observing, .75 for awareness, .86 for describing, and .90 for non-judgment. At post-test, they were as follows: .85 for non-reactivity, .80 for observing, .74 for awareness, .90 for describing, and .88 for non-judgment. At follow-up, they were .87 for non-reactivity, .79 for observing, .87 for awareness, .89 for describing, and .93 for non-judgment. Cronbach's alpha for the self-compassion measure was .84 at pre-test, .91 at post-test, and .93 at follow-up. The reliability coefficients for the PHQ-8 were .89, .79, and .81 for the pre-test, post-test, and follow-up, respectively. They were .93, .91, and .89 for the GAD-7 at pre-test, post-test, and follow-up.

Results

Descriptive statistics for all study variables from the pre-test, post-test, and follow-up phases of data collection are provided in Table 4. Changes in the measured variables across the three time periods were tested using repeated measures ANOVAs.

The average reported meditation frequency at pre-test fell nearly half way between *weekly* and *daily,* and the mean was identical at post-test. At follow-up, the mean fell between *monthly* and *weekly,* with the mean score closer to monthly. There was a statistically significant change in meditation frequency over time (see Table 4), and post-hoc tests indicated that the means at pre-test ($p = .001$) and post-test ($p < .001$) significantly differed from the follow-up mean, indicating less meditation frequency at follow-up than during pre-and post-test. In terms of meditation duration, the mean at pre-test was just above the value that represented *5-10 minutes*. At post-test, the mean fell at the midpoint between the *10-20 minutes* and *20-30 minutes* responses, and the mean fell at exactly *10-20 minutes* at follow-up. This was a statistically significant change, and the mean at pre-test differed from both the means at post-test ($p = .01$) and follow-up ($p = .003$). Post-test and follow-up scores did not significantly differ ($p = .17$).

Table 4

Descriptive Statistics and ANOVA Results for Study 3 Participants with Pre-test, Post-test, and Follow-up Scores

	Pre-test		Post-test		Follow-up		Tests of Differences Over Time
	M	SD	M	SD	M	SD	
Meditation frequency	3.62^{A}	.87	3.62^{A}	.77	2.23^{B}	1.17	$F(2,24) = 18.60$, $p < .001$, partial $\eta^2 = .61$
Meditation duration	2.25^{A}	.71	3.50^{B}	.93	3.00^{B}	.54	$F(2,14) = 8.867$, $p = .03$, partial $\eta^2 = .56$
FFMQ: non-reactivity	2.62^{A}	.66	3.12^{B}	.71	3.13^{B}	.66	$F(2,28) = 9.05$, $p = .001$, partial $\eta^2 = .39$
FFMQ: observing	3.56^{A}	.53	3.67^{AB}	.64	3.83^{B}	.49	$F(2,28) = 2.67$, $p = .09$, partial $\eta^2 = .16$
FFMQ: awareness	2.60^{A}	.70	3.08^{B}	.60	3.30^{B}	.75	$F(2,28) = 19.67$, $p < .001$, partial $\eta^2 = .58$
FFMQ: describing	3.30^{A}	.79	3.45^{A}	.86	3.58^{A}	.73	$F(2,28) = 1.45$, $p = .25$, partial $\eta^2 = .09$
FFMQ: non-judgment	2.65^{A}	1.00	3.08^{B}	.87	3.09^{B}	1.10	$F(2,28) = 3.48$, $p = .045$, partial $\eta^2 = .20$
Self-compassion	2.41^{A}	.59	2.88^{B}	.94	2.99^{B}	.87	$F(2,28) = 16.43$, $p < .001$, partial $\eta^2 = .54$
Depressive symptoms	8.60^{A}	6.33	6.80^{AB}	4.20	5.60^{B}	4.14	$F(2,28) = 4.21$, $p = .03$, partial $\eta^2 = .23$
Anxiety symptoms	11.47^{A}	6.39	9.27^{B}	5.26	7.40^{B}	5.47	$F(2,28) = 8.57$, $p = .001$, partial $\eta^2 = .38$

Note. FFMQ = Five Factor Mindfulness Questionnaire; scores for meditation frequency and duration, the FFMQ subscales, and self-compassion could range from 1-5; depressive symptoms scores could range from 0 to 24; anxiety symptom scores could range from 0-21; higher scores on all measures represent greater endorsement of that construct. Means for a construct with different superscripts are significantly different.

Participants' scores on the FFMQ showed statistically significant changes on three of the five subscales. There was no significant change in observing or describing scores, but it is notable that post-hoc tests did indicate a significant increase between pre-test and follow-up for the observing subscale (p = .03). For non-reactivity, pre-test scores were significantly lower than scores at both post-test (p = .001) and follow-up (p = .007), but post-test and follow-up scores did not differ (p = .94). The same pattern was found for non-judgment. Pre-test scores were significantly lower than post-test (p = .02) and follow-up scores (p = .04), and there was no significant change in scores between post-test and follow-up (p = .95). Awareness pre-test scores were also significantly lower than post-test (p = .001) or follow-up scores (p < .001). Follow-up scores were also higher than post-test scores, but this difference did not quite meet traditional standards for statistical significance (p = .06). Self-compassion scores followed the same general pattern with scores at post-test (p = .001) and follow-up (p < .001) being significantly higher than pre-test scores, but there was again no difference between post-test and follow-up scores (p = .29).

At pre-test, six participants (40.0%) scored in the range on the PHQ-8 that is used as a marker for clinical concern. At post-test, five participants (33.3%) were in the clinical range. At follow-up, four participants (26.7%) scored in this range. There was a statistically significant change in depression scores over time with scores at pre-test being significantly higher than scores at post-test (p = .01). There were no differences between post-test scores and either pre-test scores (p = .16) or follow-up scores (p = .19).

For anxiety symptoms, nine participants (60.0%) scored in the range indicative of having generalized anxiety disorder at pre-test. At post-test, seven participants (46.7%) were in the clinical range. By follow-up, only five participants (33.3%) were in this range. There were statistically significant changes over time. While there was no significant difference between post-test and follow-up scores (p = .12), pre-test scores were significantly different than both post-test (p = .04) and follow-up scores (p < .001).

Discussion

Only 15 students participated in all three phases of data collection for this longitudinal study. Thus, the results for this study should be taken as

exploratory. Nevertheless, we found results indicating that the positive effects of the Meditation and Contemplative Practice class appear to last after the semester is over. Furthermore, the group that completed the follow-up survey did not differ on most measures from the larger sample that began the study. In fact, they were less self-compassionate at pre-test. Thus, we can tentatively generalize our follow-up to the rest of the class.

Looking simply at the differences from pre- to post-test, the results largely replicated those from Study 1 and Study 2. Specifically, participants were more non-reactive, more aware, more non-judging, and more self-compassionate at post-test compared to pre-test. They also had significantly decreased reports of anxiety symptoms over the course of the semester.

When looking at the follow-up data, it is clear that the gains experienced by those in the Meditation and Contemplative Practice class continued after the semester was over. Gains were maintained for all the mindfulness variables that had improved from pre-test to post-test. In addition, scores for observing continued to rise such that, by follow-up, participants were more observing than at pre-test. Scores for awareness also continued to go up after the end of the semester, although the difference between post-test and follow-up scores did not meet traditional standards of statistical significance. Gains were also maintained for self-compassion, anxiety, and depression. In fact, participants continued to make gains on these variables after the semester was over, although the change from post-test to follow-up did not meet traditional levels of statistical significance.

Looking at meditation practice throughout the semester and into the follow-up period, participants were no more likely to meditate outside of class between the pre-test and the post-test and decreased in meditation frequency after the class was over. They did, however, increase the time spent meditating between pre-test and post-test, and there was no significant change after the semester ended. Thus, it is likely that the gains seen over the course of the semester may have been due to the in-class meditation practice as well as due to consideration of the course content rather than additional meditation taking place outside of class.

One limit of the current study is that there was no comparison group. It is possible that a decrease in depression and anxiety after the semester is over is a natural progression and would be seen in a comparison group as well. However, given the results of Study 2, there is no reason to think that students in a comparison group would experience an increase in mindfulness or self-compassion over the course of the semester as did the students in the Meditation and Contemplative Practice class. Furthermore, we learned from Study 2 that there may be a natural tendency for depression and anxiety to increase over the course of a semester.

It is important to note that gains in mindfulness, self-compassion, and mental health were maintained even though students decreased their formal meditation practice after the end of the semester. In fact, they reported meditating less frequently at the follow-up test than at the pre-test. It makes sense that students would engage in less frequent formal meditation after an intensive semester where they were required to meditate daily as students may have felt that they needed a break. Nevertheless, mindfulness is not simply something that happens during meditation. It is a mindset that one can take into daily life whether or not one practices formal meditation (Bishop et al., 2004). Thus, it appears that students had a shift in their general approach to daily life and were more likely to engage in the world in an aware, open, and non-judgmental manner and to engage in self-compassion. This change appeared to be independent of engaging in formal meditation practice. Longer-term follow-up would be useful to determine whether such a shift toward approaching daily life with awareness, compassion, and a lack of judgment would continue. It would also be interesting to note whether participants would be more likely to resume a formal meditation practice at some point later in their lives. It is also important to note that current iterations of this class have capped the required outside meditation to 20 minutes a day (as opposed to a maximum of 45 minutes which was in place while we collected data for this study). This decreased requirement may actually make it more feasible for students to feel as though they have the time to continue a meditation practice after class is over.

GENERAL DISCUSSION

The results of these three exploratory studies paint a very encouraging picture of the mental health benefits of this academic course focused on contemplative practices. All three studies demonstrated that, over the course of a semester, participants enrolled in this class increased their levels of mindfulness and self-compassion. Studies 1 and 3 showed decreases in anxiety, and Study 3 also showed decreased depressive symptoms. While two studies did not demonstrate decreased depression over the course of the semester, the results from Study 2 shed some light on why this might be the case. In the absence of the Meditation and Contemplative Practice course, results from the comparison group indicated that the natural progression was for depression to increase over the course of the semester. In Study 2, the inclusion of the comparison group allowed us to see that this progression was reversed in the students in the contemplative practices class.

Previous research has been mixed on whether coursework in contemplative practices would decrease depression and anxiety. For example, in the Ko et al. (2018) study, there were no differences between pre- and post-test measures of anxiety and depression, although both assessments were taken during final exam weeks—a time that is likely highly stressful for students. Furthermore, the scores did decrease over the course of the study even though the difference was not statistically significant. On the other hand, in the Dvořáková et al. (2017) study, anxiety and depression levels did significantly decrease with the mindfulness intervention. However, that intervention was targeted specifically to improve students' mental health rather than focusing on the academic study of contemplative practices and mindfulness. Other research on academic courses on contemplative practices did not assess anxiety or depression (e.g., De Bruin et al., 2015).

This series of studies adds to the growing literature on the benefits of teaching mindfulness-based practices to college students. While a number of studies have looked at targeted interventions designed specifically to improve mental health (e.g., Canby et al., 2015; Dvořáková et al., 2017), fewer studies have looked at coursework designed to teach the theory of mindfulness in an academic context. Courses that teach mindfulness and

contemplative practices can be purely academic, such as the course evaluated in the De Bruin et al. (2015) study (although this course did incorporate short mindfulness exercises in class) or the neuroscience of contemplative practices course evaluated by Olsen (2018). Such courses can also be more experiential such as the self-compassion course evaluated in the Ko et al. (2018) study, which incorporated a service learning component and encouraged mindfulness practice outside of class. The course that was evaluated in the present series of studies was both academically grounded and required a great deal of experiential practice. Most notably, an increasing portion of class time was spent in contemplative meditation throughout the semester, and students were also required to engage in daily meditation and journal about their experiences.

Given the rise of contemplative practice academic programs and courses focusing on the academic study of contemplative practices, a better understanding of the effects of these classes is essential. In these studies, the effects of this course were positive, and the benefits persisted after the course was over. Given the high level of mental health issues faced by college students (see Bruffaerts et al., 2018), allowing students to have academic experiences that positively affect their mental health may help them better cope with the stresses of college life. Such courses may also decrease the burden on student mental health centers.

It is important to note that there can occasionally be negative reactions associated with mindfulness practice. A recent literature review found negative effects in up to 10% of participants engaging in mindfulness-based interventions (Baer, Crane, Miller, & Kuyken, 2019). These negative reactions tend to occur when troubling emotions arise during meditation. They are usually temporary and are seen as an important part of the process. Indeed, one goal of contemplative practices is to learn how to deal with troubling emotions in a calm and non-reactive manner. However, negative effects may be particularly likely to occur in individuals with a trauma history, and it is possible that meditation could trigger memories of assault or other abuse (Baer et al., 2019; Treleaven, 2018). There is also some concern that meditation can trigger dissociative or derealized states of disconnection with the self, especially if it is more explicitly

connected to Buddhist philosophies of "no-self" (Lindahl & Britton, 2019). When mindfulness is used in a clinical setting, therapists are encouraged to warn clients of the possibility of distressing experiences and to make a plan about what to do if uncomfortable feelings, emotions, or memories arise (Segal, Williams, & Teasdale, 2013). There is increasing interest among practitioners of contemplative practices to become informed of the potential impacts of trauma on mindfulness practice and have tools to address it (Treleaven, 2018). Professors teaching such courses should do this as well, and they may need additional resources or training to do this effectively. Further, resources for students who need mental health support should be provided. In the Meditation and Contemplative Practice course that we evaluated, this was part of the introduction to the content for all sections.

While we did not see any indication of negative effects overall, we did not specifically ask whether participants had experienced any negative effects as a result of their mindfulness practice. Thus, on the whole, whatever negative effects students may have experienced were likely temporary. Future research investigating course-based mindfulness practices should more specifically explore these issues.

LIMITATIONS AND FUTURE RESEARCH

These results should be interpreted in light of some limitations. Only our second study had a comparison group, and random assignment was not used as students registered for both courses through the typical course registration process. One may think that those who enroll in a contemplative practices class would be more mindful at the start of the semester than the typical student. However, our results actually indicated the opposite—those who enrolled in the Meditation and Contemplative Practice class were generally less mindful at the outset. In fact, they appeared more distressed overall. Nevertheless, they may have selected this class because they were hoping that they would receive psychological benefits from taking it and were interested in mindfulness as a mechanism for improving their mental health and well-being. Given that by the post-test, the students in the Meditation and Contemplative Practice class actually

demonstrated significantly less distress than those in the control course, it does appear that this class may have helped them meet these goals. Future research should attempt to use random assignment to ensure that any differences between groups were not due to self-selection factors. It is also important to note that the students who are experiencing the most distress may not enroll in this class in the first place, and if they enroll, they may have dropped before the pre-test data collection occurred during the second week of classes. Given this, future research would benefit from considering a pre-test data collection after enrollment and before the first week of classes. Finally, it is important to note that our strongest findings were the increases in mindfulness and self-compassion and our findings about anxiety and depression were less consistent. Given the fact that mindfulness was explicitly taught in these classes, it is not surprising that mindfulness improved over the course of the semester. Although course instructors did not see survey results and this was made clear to the students, there is also the possibility students were influenced by demand characteristics of the study. Thus, we cannot definitively conclude that increases in mindfulness and self-compassion caused any reported improvement in depression and anxiety. Longitudinal research would be needed to make definitive causal conclusion. Additionally, future cross-sectional research may also wish to examine levels of mindfulness or changes in levels of mindfulness as mediators of potential positive mental health effects.

Our results were also limited by the demographics of our sample. Our sample was representative of the university where this data was collected. Nevertheless, it consisted largely of middle-class White women. Future research should attempt to integrate contemplative practices in college settings with more diverse populations to determine whether the benefits found in this study would generalize to a broader population.

In sum, academic courses that focus on contemplative practices are growing in college and university settings. These courses often combine teaching about mindfulness from a philosophical, psychological, or neuroscientific perspective, with the teaching and practice of experiential skills. As colleges continue to work with student populations reporting

high levels of psychological distress, they may wish to embrace these types of courses as a way to help students develop tools to deal with the stresses of adjusting to college and living in our stressful and overstimulating world.

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