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Effectiveness of a Multimodal Mindfulness Program for Student Health Care Professionals: A Randomized Controlled Trial

Sharon A. Gutman

Columbia University Medical Center - USA, sg2422@cumc.columbia.edu

Martha Sliwinski

Columbia University Medical Center - USA, ms2814@cumc.columbia.edu

Justin Laird

Columbia University Medical Center - USA, jl3059@cumc.columbia.edu

Jennifer Nguyen

Columbia University Medical Center - USA, jtn2119@cumc.columbia.edu

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Effectiveness of a Multimodal Mindfulness Program for Student Health Care Professionals: A Randomized Controlled Trial

Abstract

Background: The effectiveness of a multimodal mindfulness program incorporating traditional and nontraditional forms of active and nonactive meditation practices with a sample of occupational and physical therapy students was assessed in this study.

Method: Thirty-six participants were randomly assigned to an intervention or control group. The 8-week mindfulness program consisted of one weekly 40-min in-person group session and four weekly 10-min online guided meditations. Pre and postintervention measures included the Perceived Stress Scale (PSS), Student Stress Management Scale (SSMS), mindfulness activity log, open-ended qualitative questionnaire, GPA, and counseling visit frequency.

Results: Statistically significant differences, with large effect sizes, were found between intervention and control group PSS ($Z=-4.291$, $pd=-1.84$) and SSMS ($Z=-3.330$, $pd=-1.27$) postintervention scores. Statistically significant differences, with large effect sizes, were found between intervention group pre and postmindfulness activity ratings for each week and all weeks combined ($Z=-12.599$, $pd=1.29$). Qualitative data revealed eight themes including greater sleep quality, energy levels, self-compassion, and life-work balance. No statistically significant differences were found between intervention and control group counseling visit frequency and GPA.

Conclusion: As this is preliminary data about a novel intervention with a small student sample, effectiveness of this intervention should be further explored in a replication study.

Comments

The authors report that they have no conflicts of interest to disclose.

Keywords

student health care education, student stress, meditation

Cover Page Footnote

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Credentials Display

Sharon A. Gutman, PhD, OTR, FAOTA; Martha M. Sliwinski, PhD, PT; Justin M. Laird, PhD; Jennifer Nguyen, MPH, CHES

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Mindfulness is the practice of deeply focusing on the present moment with nonjudgement and acceptance (Tang et al., 2015). The consistent practice of mindfulness can help to cultivate states of emotional equanimity, mental stillness, and compassion for self and others (Greeson et al., 2015; van der Riet et al., 2018). Such states are intended to help people weather the ebb and flow of life that brings challenges and pain. Mindfulness meditation practices teach people to regulate perceived states of stress through mental training designed to facilitate attention to the present moment, relaxation, and the halting of dysfunctional thoughts (Lindsay & Creswell, 2017). Mindfulness meditation has been particularly effective at assuaging the cognitive ruminations accompanying anxiety and depression (Hoge et al., 2018; Khusid & Vythilingam, 2016). A growing body of literature has demonstrated the positive effects of mindfulness practices to reduce stress in a range of populations, including college students (Bamber & Schneider, 2016; Barbosa et al., 2013; Galante et al., 2018; Ramler et al., 2016).

It is well documented that college student stress levels have steadily increased in the last 5 years with 33.8% of students reporting anxiety levels that negatively impact school function (Coccia & Darling, 2016; Maykrantz & Houghton, 2018). School-related stress and anxiety have been found to be doubly problematic in graduate health care students seeking careers in medicine, dentistry, nursing, and physical and occupational therapy (Barbosa et al., 2013; McConville et al., 2017; van der Riet et al., 2018). Studies have found that 75% to 85% of graduate health care students report moderate stress levels while 10% to 12% report severe anxiety (Bruffaerts et al., 2018; Coccia & Darling, 2016; Galante et al., 2018). Stressors commonly emerge from financial problems and loan debt; juggling school and family responsibilities; transitioning from a moderately challenging undergraduate experience to intensive graduate work with increased workload and knowledge acquisition demands; and interacting, perhaps for the first time, with severely ill patients (Ahmad et al., 2017; Farquhar et al., 2018). As increasing numbers of first generation and minority college students enter health care professions, it is anticipated that student anxiety levels will continue to increase, since there is evidence that the above identified stressors may be pronounced in these populations (Graham et al., 2016).

More distressingly, evidence now suggests that graduate school stress does not end with commencement, but rather intensifies as newly degreed health professionals enter a health care environment of highly curtailed patient length of stays, limited reimbursement for needed services, increased work demands, and staff shortages (Bridgeman et al., 2018). Burnout rates for health care professionals appear to be increasing in recent years with estimates ranging between 10% to 35% of practitioners eventually leaving direct patient care (Dyrbye & Shanafelt, 2016; Dyrbye et al., 2017). Burnout is also positively correlated with lower career satisfaction, higher frequency of patient errors, increased likelihood of leaving one's career, substance use, and suicidal ideation (Dyrbye & Shanafelt, 2016).

It is evident that health care graduate students need better resources and skills to manage the stress of their educational experience, skills that can then be used to navigate the health care environment to reduce burnout once students become practitioners. Although there is substantial evidence supporting the effectiveness of mindfulness training to reduce stress in college students, most reported programs involved traditional types of nonactive meditation processes, such as sitting meditation, yogic breathing techniques, guided visualization, and body scanning for progressive muscle relaxation (Spadaro & Hunker, 2016; Stillwell et al., 2017). While these practices form a central core in many meditation techniques, mindfulness meditation may also be used to engage in and maintain states of emotional equanimity during any activity (Wielgosz et al., 2019). When mindfulness practices are

engaged in during activities, or occupations, a phenomenon identified as a flow state may occur. Flow states are characterized by full immersion in activity and accompanied by feelings of well-being, heightened focus and concentration, lost sense of time, relinquishment of worry about past or future events, and the ability to be fully present in the moment (Sinnott et al., 2018). Graduate health care students experiencing high levels of stress resulting from exams, clinical internship demands, and family responsibilities could benefit from active mindfulness practices able to facilitate flow states. Learning such practices may be particularly critical for a generation of students who have been encouraged by the larger society to use an array of external stimuli as distraction instead of engaging in quieting states of internal reflection (Mendoza et al., 2018).

To address this need, the authors designed a multimodal mindfulness program encompassing both traditional and nontraditional forms of physically active and nonactive meditation practices that were intended to appeal to a sample of occupational and physical therapy students, based on experience that such students report greatest engagement when physically active and immersed in experiential practice. The program was also designed to incorporate a variety of media and sensory experiences including sound, visualization, and tactile experiences that would appeal to students with differing attentional capacities and sensory preferences. In addition, both online and in-person delivery strategies were employed to accommodate students with encumbered academic and personal schedules.

Based on a review of the literature, it appears that this is the first study to report the development and assessment of a multimodal mindfulness program for graduate health care students, specifically occupational and physical therapy students, in which students had the opportunity to participate in a variety of mindfulness activities that could enhance the ability to be present in the moment while relinquishing daily worries. This study considered the research question, could an 8-week multimodal mindfulness program help graduate health care students better manage and reduce stress both daily and over the course of one semester?

Method

Research Design

This study used a randomized, controlled design in which an intervention group received an 8-week mindfulness program, while a control group did not receive an intervention. In addition, narrative data was collected from intervention participants in the form of log entries and a postintervention open-ended questionnaire. The study was approved by Columbia University Irving Medical Center's (CUIMC) Institutional Review Board and was registered with ClinicalTrials.gov (NCT03704779). All of the participants provided written informed consent.

Participants

All first-year CUIMC occupational and physical therapy students currently completing their second semester of coursework were invited to participate in the study. The students who were practiced meditators or who had prior experience with mindfulness training were excluded from study participation, since such previous experience could have biased intervention results. The first 40 students who responded to an email invitation and who met inclusion and exclusion criteria were randomized to either the intervention or control group using a random numbers generator. Occupational and physical therapy students were randomly assigned to each group separately to achieve equal numbers of students in both intervention and control groups. Students who completed the study received a \$25 gift card at study end.

Instruments

Perceived Stress Scale (PSS). The PSS (Cohen et al., 1983) is a 10-item, 5-point, self-report Likert scale (1 = *no stress*, 5 = *high stress*) that measures stress level in the last month and was intended for use by community-dwelling adults. The scale, which requires 5 min to complete, yields a total score ranging from 10 (*no stress*) to 50 (*highest stress*) with scores 25+ indicating a possible stress disorder. Both internal consistency (Cronbach's $\alpha = .85, p < .01$) and test-retest reliability ($r = .85, p < .01$) were found to be high. The PSS was also moderately correlated with depressive and physical symptomatology ($r = .76, p < .01$) and social anxiety ($r = .48, p < .001$) in a sample of community-dwelling adults ranging from 20 to 65 years of age.

Student Stress Management Scale (SSMS). The SSMS is a 12-item, 5-point, self-report Likert scale that requires 5 min to complete and yields a score ranging from 12 (*low stress*) to 60 (*high stress*), with scores of 25 indicating moderate stress. The SSMS was developed for this study to measure stress levels resulting from stressors that may be more specific to graduate students, as similar existent college student stress scales did not fully address such content (see Table 1). The 12 scale items were selected based on (a) a literature review of typical graduate health care student stressors and (b) the informal knowledge the first and second authors accrued through approximately 30 years of educational experience with this population. To establish face validity, a panel of five graduate occupational therapy students reviewed the 12 scale items and provided feedback that helped to refine the scale. No other SSMS psychometric properties have been established.

Table 1

Student Stress Management Scale

How much stress do the following cause you?	1	2	3	4	5
	<i>(low stress)</i>				<i>(high stress)</i>
Commuting	1	2	3	4	5
Taking tests	1	2	3	4	5
Writing papers	1	2	3	4	5
Group meetings	1	2	3	4	5
Dealing with professors	1	2	3	4	5
Dealing with fellow students	1	2	3	4	5
Dealing with roommates/neighbors	1	2	3	4	5
Dealing with family members	1	2	3	4	5
Juggling time commitments	1	2	3	4	5
Balancing home and school	1	2	3	4	5
Dealing with financial concerns	1	2	3	4	5
Maintaining time for personal wellness	1	2	3	4	5

Mindfulness activity logs. The intervention participants were asked to complete log entries after each mindfulness activity. Log entries asked the participants to provide both written narrative information and numeric ratings regarding stress levels before and after mindfulness activity participation. Numeric ratings were based on a 5-point Likert scale (1 = *low stress*, 5 = *high stress*). Completion of logs required 5 min.

Open-ended qualitative questionnaire. An open-ended qualitative questionnaire was developed for this study to collect narrative responses from intervention group participants at study completion. The questionnaire required 15 min to complete and consisted of eight questions that asked the participants to provide written information regarding (a) their experience of and satisfaction with the program, (b) which mindfulness activities were most and least helpful in managing stress, (c) whether and how the program helped them to regulate their moods and emotions, and (d) whether and how the program helped them to better manage school and personal responsibilities.

Grade point average (GPA) and counseling visit frequency. In addition, the participants were asked to self-report GPA and counseling visit frequency for the semester preceding and during the study. Counseling visits were defined as sessions with a counselor (e.g., psychologist, psychiatrist, social worker) either at or outside of the university.

Intervention

The intervention ran for 8 consecutive weeks, with the exception of spring break. Intervention consisted of two components: (a) one weekly 40-min in-person group session and (b) four weekly 10-min guided meditations that the participants could engage in at any time. The eight in-person group sessions consisted of the following:

Week 1: Relaxation response. This session consisted of a general overview of mindfulness, an exploration of different types of meditation as tools to enhance awareness and reduce stress (e.g., guided imagery, sitting mindfulness meditation, walking meditation, and progressive muscle relaxation), and opportunities to engage in experiential mindfulness practices.

Week 2: Creativity and flow state. The students engaged in creative activities selected to facilitate flow experiences characterized by focus in the present moment, relinquishment of worry about the past or future, and feelings of well-being (e.g., creating a miniature Zen garden of sand and stones, mindful coloring).

Week 3: Mindful movement. The students engaged in an exploratory session of basic yoga techniques, led by a certified instructor, as a method in which movement is used to center and ground one's thoughts in the present moment and in emotional states facilitating equanimity.

Week 4: Sound bath. The students engaged in a sound bath session, led by a licensed music therapist, in which music, vibration, and sound were used to experience transcendent states of time and being.

Week 5: Addiction information and management strategies. The students engaged in a discussion regarding the impact of substance use on their lived experiences. Alternative strategies for managing stress, such as movement, effective time management, restorative sleep patterns, and a nourishing relationship with food, were explored through reflective journaling and meditation.

Week 6: Emotional health tool kit. The students created emotional health toolkits by learning about and practicing (a) skills to better identify their emotions and physical responses to stress and (b) cognitive reframing techniques designed to challenge and modify perceptions of stress.

Week 7: Self-Compassion Tool Kit. The students created self-compassion toolkits by learning about and practicing self-compassion skills designed to challenge and release feelings of guilt, blame, shame, and unworthiness or self-doubt.

Week 8: Pet Therapy. The students engaged with certified pet therapy dogs to explore how interacting with animals can heighten focus in the present moment and facilitate feelings of well-being. The students who were allergic to or fearful of dogs were allowed to forgo this session and participate instead in the online meditations.

The guided meditations consisted of a series of eight YouTube videos created by Jason Stephenson, a practiced meditator and musician with 15 years of experience providing guided meditation materials to populations including prisoners in the United States and Australia. The guided meditations addressed sleep, quieting the mind, stress and anxiety, and test anxiety. The students could self-select the guided meditations to which they wished to listen.

Interventionists

Intervention was designed by all of the authors in a partnership between the university's occupational and physical therapy programs and the Center for Student Wellness. The first two authors were faculty in the occupational and physical therapy programs and were practiced meditators. Intervention delivery was primarily administered by the third and fourth authors, a licensed psychologist and a health promotion specialist from the Center for Student Wellness. As noted above, the yoga session was facilitated by a licensed yoga instructor, while the sound bath session was implemented by a licensed music therapist.

Control group. The control group did not receive intervention but completed the same pre and posttest measures as did the intervention group. At the study's end, the control group participants were invited to partake in a 2-hour workshop providing instruction in mindfulness techniques and strategies addressed through intervention. All study mindfulness materials were also provided to the control group participants at this time.

Data Collection

Baseline data collection. One week prior to intervention, all of the participants completed the PSS and SSMS independently and submitted their forms electronically or in hard copy to the first and second authors. The participants also submitted GPA and number of counseling visits attended in the preceding semester.

Intervention data collection. Intervention participants were asked to complete a log entry after participation in each mindfulness activity.

Postintervention data collection. One week after intervention, all of the participants were asked to independently complete and submit the PSS and SSMS. Intervention group participants were asked to independently complete and submit the open-ended qualitative questionnaire. One-week after semester completion, all of the participants were asked to submit their GPAs and number of counseling visits attended during that semester.

Data Analysis

A Mann Whitney *U* test was used to determine whether statistically significant differences existed between intervention and control group participants' PSS and SSMS scores at baseline and postintervention. A Wilcoxon signed rank test was used to determine if a statistically significant difference existed within the intervention group's before and after mindfulness log activity ratings. An independent *t*-test was used to determine whether statistically significant differences existed between

intervention and control group GPAs at baseline and postintervention. The number of counseling visits between intervention and control group participants at baseline and postintervention was analyzed categorically using a chi square, since the majority of reported frequencies ranged from 0-3 (Portney & Watkins, 2015).

Narrative data from the mindfulness activity logs and the open-ended qualitative questionnaire were analyzed using a conventional content analysis approach (Creswell & Creswell, 2018; Hsieh & Shannon, 2005) in which small units of data were categorized first, followed by larger phrases and themes, and finally mega themes. This first level of data analysis was carried out independently by the principal researchers (the first and second authors). Upon completion of the first level of analysis, the principal researchers compared independent findings and further refined themes to capture the most pertinent content addressing the research questions. Data analysis was conducted until both principal researchers reached consensus in theme development. Methods to ensure trustworthiness of data included (a) triangulating participant responses to the eight open-ended questionnaire items and (b) independent iterative analysis of the log and questionnaire transcripts performed by the first two authors (Creswell & Creswell, 2018).

Data were analyzed using SPSS version 25 and significance level was set at $\alpha < .05$. A power analysis suggested that with a sample size of 20 (per group) and a standard deviation of 7, we were powered to detect between group differences of 6.4 points on PSS pre and postintervention scores with a power of .80 at $\alpha < .05$ at a 95% confidence level (Snedecor & Cochran, 1991). A PSS score of 5 points is considered to be a minimally detectable important clinical change (Cohen et al., 1983).

Results

Thirty-eight participants enrolled in the study. Two withdrew in the first study week because of personal or family member illness leaving 36 who completed the study. Study completers were designated as those who attended six out of eight (75%) in-person mindfulness activity sessions and submitted log entries for 6 out of 8 weeks. The participants were largely female ($n = 29$, 80.55%; male: $n = 6$, 16.66%; non-specific: $n = 1$, 2.77%) and had a mean age of 24.27 ($SD = 2.09$, range = 22-32). Race and ethnicity data were self-reported as White ($n = 21$, 58.33%), Asian ($n = 12$, 33.33%), and Hispanic/Latino ($n = 3$, 8.33%). Both intervention and control groups equally consisted of 10 physical therapy students and eight occupational therapy students.

Perceived Stress Scale (PSS)

At baseline a Mann Whitney U test found no statistically significant difference between intervention ($M = 36.11$, $SD = 7.09$) and control group participant ($M = 33.16$, $SD = 7.00$) PSS scores ($Z = -1.363$, $p = .173$, $d = 0.41$). At postintervention a statistically significant difference between intervention ($M = 19.66$, $SD = 6.14$) and control group participants' ($M = 31.61$, $SD = 6.80$) PSS scores was found with a large effect size ($Z = -4.291$, $p < .000$, $d = -1.84$) (see Table 2).

Table 2

Participant Perceived Stress Scale Scores

	Preintervention	Postintervention
Intervention Group (n = 18)		
	26	18
	41	17
	38	24
	40	15

31	22
36	20
33	19
34	16
37	22
37	12
46	23
39	20
50	33
46	32
28	12
32	15
30	11
25	23

$M = 36.11$	$M = 19.66$
$SD = 7.09$	$SD = 6.14$

Control Group (n = 18)

27	25
25	23
29	28
35	30
28	30
42	40
34	32
30	33
29	26
26	24
34	31
42	40
32	28
45	46
34	36
28	29
28	25
49	43

$M = 33.16$	$M = 31.61$
$SD = 7.00$	$SD = 6.80$

Student Stress Management Scale (SSMS)

At baseline a Mann Whitney U test found no statistically significant difference between intervention ($M = 23.61$, $SD = 3.53$) and control group participant ($M = 23.05$, $SD = 2.46$) SSMS scores ($Z = -0.207$, $p < .83$, $d = .18$). At postintervention a statistically significant difference between intervention ($M = 20.83$, $SD = 4.71$) and control group participant ($M = 27.38$, $SD = 5.56$) SSMS scores was found with a large effect size ($Z = -3.330$, $p < .001$, $d = -1.27$) (see Table 3).

Table 3
Participant Student Stress Management Scale Scores

Preintervention	Postintervention
Intervention Group (n = 18)	
23	25
26	21
26	22
23	20
21	26
23	20
19	15
20	18
23	19
23	18
29	32
21	16
32	30
27	21
22	18
20	16
27	21
20	17
<i>M</i> = 23.61	<i>M</i> = 20.83
<i>SD</i> = 3.53	<i>SD</i> = 4.71
Control Group (n = 18)	
22	23
21	18
24	35
27	25
25	24
25	24
20	29
26	24
23	25
23	20
21	33
24	25
20	29
25	32
21	34
19	32
22	23
27	38
<i>M</i> = 23.05	<i>M</i> = 27.38
<i>SD</i> = 2.46	<i>SD</i> = 5.56

Mindfulness Activity Log Ratings

A Wilcoxon signed rank test found a statistically significant difference, with a large effect size, between intervention group participants' pre ($M = 3.17$, $SD = 1.15$) and postmindfulness activity ratings ($M = 1.83$, $SD = .90$) for all 8 weeks combined ($Z = -12.599$, $p < .000$, $d = 1.29$). Log scores were also analyzed by week and showed statistically significant differences between intervention group participants' pre and postmindfulness activity ratings with large effect sizes for each study week (see Table 4).

Table 4

Intervention Group Mindfulness Activity Log Ratings by Week

	Premindfulness Activity	Postmindfulness Activity	Statistical Significance and Effect Size
Week 1 (65 log entries)	$M = 3.60$, $SD = 0.94$	$M = 1.90$, $SD = 0.76$	$Z = -7.089$, $p < .000$, $d = 1.98$
Week 2 (52 log entries)	$M = 3.34$, $SD = 0.88$	$M = 1.75$, $SD = 0.68$	$Z = -6.223$, $p < .000$, $d = 2.02$
Week 3 (55 log entries)	$M = 3.29$, $SD = 0.91$	$M = 1.58$, $SD = 0.71$	$Z = -6.298$, $p < .000$, $d = 2.09$
Week 4 (58 log entries)	$M = 3.34$, $SD = 0.94$	$M = 1.63$, $SD = 0.69$	$Z = -6.632$, $p < .000$, $d = 2.07$
Week 5 (40 log entries)	$M = 3.62$, $SD = 0.89$	$M = 1.75$, $SD = 0.74$	$Z = -5.434$, $p < .000$, $d = 2.28$
Week 6 (27 log entries)	$M = 3.44$, $SD = 0.75$	$M = 1.55$, $SD = 0.64$	$Z = -4.523$, $p < .000$, $d = 2.71$
Week 7 (27 log entries)	$M = 3.33$, $SD = 0.87$	$M = 1.37$, $SD = 0.56$	$Z = -4.425$, $p < .000$, $d = 2.67$
Week 8 (16 log entries)	$M = 3.68$, $SD = 1.1$	$M = 1.75$, $SD = 0.77$	$Z = -3.477$, $p < .001$, $d = 2.03$

GPA and Counseling Visits

An independent t -test found no statistically significant difference between intervention and control group GPA for the semesters preceding ($t = -.935$, $p < .72$) and during intervention ($t = -1.101$, $p < .09$) (see Table 5). Similarly, a chi square test found no statistically significant difference between intervention and control group counseling visit frequency for the semesters preceding ($\chi^2 = .72(1)$, $p < .39$) and during intervention ($\chi^2 = .40(1)$, $p < .52$) (see Table 6). Data for counseling visits were analyzed categorically because of the low number of counseling visits reported for most of the participants.

Table 5*Grade Point Average (GPA)*

Semester Preceding Intervention	Semester During Intervention
Intervention Group Participants (n = 18)	
2.939	3.090
3.600	3.847
3.310	2.970
3.170	3.468
3.635	3.813
3.730	3.729
3.905	3.849
3.600	3.530
3.588	3.378
3.730	3.849
3.890	3.900
3.710	3.400
3.800	3.770
3.600	3.680
3.870	3.850
3.930	3.910
3.830	3.910
3.700	3.800
<i>M</i> = 3.64	<i>M</i> = 3.65
<i>SD</i> = 0.26	<i>SD</i> = 0.28
Control Group Participants (n = 18)	
3.920	4.090
3.287	3.288
3.950	3.850
3.350	3.410
3.305	3.387
3.621	3.667
3.870	3.668
3.760	3.607
3.506	3.698
4.090	3.637
3.900	3.520
3.900	3.840
3.610	3.600
3.890	3.700
3.520	3.500
3.830	3.840
3.730	3.700
3.930	3.890
<i>M</i> = 3.72	<i>M</i> = 3.66
<i>SD</i> = 0.24	<i>SD</i> = 0.19

Table 6
Frequency of Participant Counseling Visits

	Semester Preceding Intervention	Semester During Intervention
Intervention Group Participants (n = 18)		
	1	4
	0	5
	0	2
	0	3
	0	0
	0	0
	0	0
	0	0
	0	2
	0	0
	0	4
	0	3
	0	3
	2	3
	0	0
	0	0
	1	0
	0	0
	<i>M</i> = 0.27	<i>M</i> = 1.61
	<i>SD</i> = 0.57	<i>SD</i> = 1.78
Control Group Participants (n = 18)		
	0	0
	0	0
	0	0
	0	0
	0	0
	1	6
	0	0
	0	0
	0	0
	0	0
	0	0
	6	9
	0	3
	2	0
	0	0
	0	0
	0	0
	0	0
	<i>M</i> = 0.50	<i>M</i> = 1
	<i>SD</i> = 1.46	<i>SD</i> = 2.52

Qualitative Data from Mindfulness Activity Logs and Open-Ended Questionnaire

Eight themes emerged from the narrative data.

Better sleep. As a group, the participants reported that the guided meditations, particularly when used before sleep, helped them to halt racing thoughts and more readily fall and stay asleep. “The meditations really helped my sleep. I don’t know anything else that has shut my brain off from school and homework better” (Participant 3). Participant 12 stated:

This semester I felt more stressed and anxious than normal and I needed something to help calm me down. Listening to the videos before going to bed puts me right to sleep. After listening to them for 10 min, I feel much more relaxed and at ease than earlier in the day.

Stress reduction. The participants reported that both the in-person mindfulness activity sessions and the guided meditations helped them better manage stress. Many reported that stress management became easier as the study progressed.

[This semester] I stressed out over exams. I learned that doing the mindfulness activities before class helps me stay focused while in class and controls my anxiety when I’m not understanding. I feel like everything is placed back into perspective and that I am under control and not stressed out anymore. (Participant 16)

The regular mindfulness activities definitely lowered my stress levels. I had fewer anxious thoughts and felt less overwhelmed. It felt like there was less of a burden on my shoulders despite the amount of difficulties and hardships I experienced this semester. (Participant 7)

Clearer focus throughout the day. The Participants reported that the mindfulness activities helped them to clear their minds and attain a greater focus that remained throughout the day.

Before meditating I felt anxious about my days and I was overthinking about what had to be done for school. After meditating, I feel very calm and clear minded. I am able to set a realistic schedule that separates tasks throughout the week so it is more realistic for me to accomplish. (Participant 2)

In the middle of the day I am always tired, stressed, and unfocused. Using the mindfulness activities in the middle of a busy day helps me to feel more relaxed, focused, and more prepared for the rest of the day. (Participant 5)

Greater energy levels. The participants also indicated that the mindfulness activities sometimes increased their energy level.

I was feeling anxious because I would go home and realize that I had many chores to do before even starting any [school] work. I decided to do the guided meditations at home because I felt overwhelmed. After the meditations, I felt very connected to my body and my body actually felt lighter and more energized. I realized how heavy my body felt after such long days. I felt more energy to tackle my work with a more positive mindset. (Participant 11)

The mindfulness sessions always made me feel energized and ready to go back to class. (Participant 13)

Greater feelings of self-compassion. Many participants reported that they learned skills to be kinder to themselves and more self-compassionate.

I was feeling really bad about myself because of mistakes I made and I kept beating myself up over it. After the mindfulness sessions, I felt better. I developed skills for talking to myself in a kind way. I recognized bad habits that I used to cope and thought of new ones for myself. I was able to calm my thoughts down and think rationally, and I realized that everyone makes mistakes. I stopped punishing myself for mistakes and am able to put them behind me and move forward. (Participant 8)

I felt very sad and anxious because I had a very bad day and I had to deal with some very difficult people. I felt a lot calmer after the self-compassion session. I was able to clear my head, do some self-reflection, and let go of the day's worries. I put it in the past and realized I had done nothing wrong. (Participant 17)

Importance of taking time for self. The participants reported that the intervention helped them to learn the importance of taking time to engage in activities for their own well-being.

The mindfulness activities helped me learn the importance of spending time each day slowing down, quieting my mind, releasing stress, and taking time for myself. I learned that taking as small as 10 min out of my day can positively influence my mental health. (Participant 6)

It was incredibly helpful to have a designated time of the week to work on personal wellness and mindfulness. It forced me to take time to focus on my mental health without doing anything else. And it allowed me to process uncomfortable feelings in a constructive environment with tools that I can keep using. (Participant 12)

Greater life balance. The importance of taking time for oneself may have facilitated feelings of greater life balance in some participants.

The mindfulness activities have helped me to have a better work-life balance. When I am working, I am now fully present and productive and don't allow distractions to take away from this time. When I am with my loved ones, I am fully present as well and I try my hardest not to bring in the stress from school into my home life. (Participant 1)

Prior to this study, I felt a little guilty when I was not actively doing something or I would need to plan out when I was going to relax. This study helped me learn the importance of self-care and taking time daily just to unwind. It's made me feel more centered and balanced. (Participant 10)

New tools for well-being. The participants stated that the intervention taught them new skills to better manage stress in daily life, which had previously been unknown to them.

I learned a lot of new techniques that I did not know could encourage mindful thinking and I have been able to see mindfulness as a really useful and simple way to change my mindset and look at life more positively. (Participant 3)

Mindfulness activities that were reported as most beneficial were the guided meditations, movement session, sound bath, emotional health toolkit session, and the self-compassion toolkit session. Participants expressed that these activities in particular provided skills that helped them to better self-regulate their emotions and moods, be present in the moment and release cognitive ruminations, increase self-confidence and compassion, and decrease school related anxiety. Although intervention participants reported that they were satisfied with intervention delivery, some participants reported that they would have liked materials available on smart phone apps.

Discussion

Evidence for the effectiveness of the mindfulness intervention was demonstrated through (a) the statistically significant differences between the intervention and control group's postintervention PSS and SSMS scores, (b) the statistically significant differences between the intervention group's before and after activity log ratings, and (c) the intervention group's qualitative data. Study findings support the growing body of literature demonstrating the effect of mindfulness programs to reduce student stress (Bamber & Schneider, 2016; Barbosa et al., 2013; Galante et al., 2018; Greeson et al., 2015; McConville et al., 2017; Stillwell et al., 2017). However, the study uniquely contributes to this literature, as it was the first to incorporate an array of physically active mindfulness activities beyond traditional forms of nonactive practices (e.g., sitting meditation, yogic breathing techniques, guided visualization, and body scanning for progressive muscle relaxation).

This study was novel in that it involved a multimodal mindfulness program that exposed students to an array of different activities that could facilitate stress management, but incorporated differing media that could appeal to students with varying attentional capacities, sensorimotor needs, and self-regulation skills. For example, while traditional sitting meditations have been well studied for their stress management properties (Davis et al., 2019; Hoge et al., 2018), the author's experience as educators and practitioners led to our surmise that some students would benefit more from movement based mindfulness activities, while others would prefer the incorporation of sound, visualization, and tactile experiences in combinations unique to each participant. It was an aim of this study to allow students to have autonomy in the ability to tailor the mindfulness activities to their own specific needs and preferences. Such autonomy may have contributed to the effectiveness of the intervention.

Typical graduate health care students' schedules are overloaded, and one aim of the intervention was to allow students moderate control over the type and timing of their mindfulness activities, particularly during exams. For this reason, students were allowed to select specific guided meditations from an array of choices and use them at self-selected times during the week. That only two students withdrew from the study in the first week as a result of personal or family member illness, and that all of the participants completed 75% of in-person sessions and log entries, reinforces the intervention group participants' reports that the mindfulness activities were meaningful and beneficial. Although the submission of log entries did decrease as the study progressed, particularly during the last 3 weeks during exams and assignment deadlines, there is evidence that participants may have continued to use their newly learned mindfulness strategies in that time period. In their open-ended qualitative questionnaires, many of the participants reported that they continued their use of mindfulness skills to alleviate anxiety during exams.

Changes were not observed between intervention and control group participant pre and poststudy GPAs or counseling visit frequency. Baseline and poststudy GPAs were high for both intervention and control group participants, indicating that despite reports of moderate stress by both groups (as observed

through PSS and SSMS scores), our sample of students were high achievers who performed well academically. The frequency of counseling visits at both baseline and poststudy was low for both groups. Low counseling visit frequency occurring during the semester preceding the study may have been expected, since it was the students' first academic semester in their respective health care programs and they may have lacked both knowledge of the university's counseling services and time to attend if desired. During the study, the participants in the control group may still have lacked knowledge regarding available counseling services and time to attend, while the participants in the intervention group may have felt that they were receiving help through the mindfulness intervention.

Through an occupational lens, mindfulness practices can be considered a self-care activity intended to maintain emotional equanimity, self-regulation, and self-compassion. The growing body of evidence demonstrating that mindfulness programs can reduce stress in graduate health care students suggests that such programs should be integrated into standard educational practices. Researchers have found that mindfulness training can help health care students to become more present with and have greater compassion for their clients (Barbosa et al., 2013; Dean et al., 2017). This finding may be critical, as several researchers have found that students on clinical internship who are engaged in procedural learning tend to report lower levels of compassion for clients (Neumann et al., 2011; Stratton et al., 2008). Mindful practitioners who are able to be more fully engaged in the present moment with their clients may be more adept at listening and collaboratively developing a treatment plan that is acceptable and congruent with client health goals. Further research is needed to better substantiate this speculation.

Limitations

One limitation was the study's small sample. Although the study was underpowered, statistically significant differences between PSS and SSMS postintervention scores between intervention and control groups were nevertheless able to be detected. A second limitation was a decrease in log submissions as the study progressed, which hindered the ability to understand whether students were using mindfulness activities to manage stress as assignments and exams increased. Although there was some evidence in their open-ended qualitative questionnaires that the participants were continuing to use mindfulness activities during this time, it is unclear how many of the participants engaged in newly learned techniques and how helpful these were in managing stress levels. A third limitation was the lack of psychometric properties of the SSMS, an instrument developed specifically for this study because similar college stress level scales did not encompass the range of typical graduate health care student stressors. Although the SSMS had no psychometric properties other than face validity, SSMS findings were supported both by PSS scores and the participants' narrative responses, lending support to the validity of the data collected through the SSMS. A final limitation involved the enrollment of only occupational and physical therapy students. Although the participants likely experienced stress levels similar to other health care students (e.g., medicine, nursing), without the participation of a broader range of students, it is unclear if the intervention would similarly affect students from varying health care professions.

Future Research

Because this was a small study of a novel intervention providing preliminary data, immediate future research should involve a replication study with larger sample and more rigorous qualitative analysis. It may also be beneficial if log entry recording and submission were available through more

convenient methods, such as mobile phone apps and voice activated recording systems. If the SSMS were to be used in future studies, it would be necessary to establish scale validity and reliability.

Conclusion

This study demonstrated that a multimodal mindfulness program that incorporated traditional and nontraditional forms of active and nonactive meditation practices was able to reduce stress in a small sample of occupational and physical therapy students. Properties of the program that may have uniquely contributed to effectiveness included the integration of (a) both physically active and nonactive techniques, (b) a variety of media and sensory experiences (e.g., sound, visualization, and tactile experience) intended to appeal to students with differing attentional capacities and sensory preferences, and (c) both online and in-person delivery strategies to accommodate encumbered student schedules. Reported benefits included greater sleep quality, energy levels, self-compassion, and life-work balance. Because the study involved a small sample providing preliminary data, immediate future research should involve replication with larger samples and more rigorous qualitative analysis. Mindfulness programs may not only help health care students to better manage stress, but may help them to become more mindful practitioners who are able to be more fully present with and listen to patient concerns. Mindful practitioners may be better equipped to collaboratively design meaningful and effective treatment plans that are congruent with patient health care objectives.

Sharon A. Gutman, PhD, OTR, FAOTA, is a professor in the programs in occupational therapy in the Department of Rehabilitation and Regenerative Medicine at Columbia University Irving Medical Center

Martha M. Sliwinski, PhD, PT, is associate professor in the programs in physical therapy in the Department of Rehabilitation and Regenerative Medicine at Columbia University Irving Medical Center

Justin M. Laird, PhD, is associate director for the Center for Student Wellness/Student Health Service at Columbia University Irving Medical Center

Jennifer Nguyen, MPH, CHES, is a health promotion specialist for the Center for Student Wellness/Student Health Service at Columbia University Irving Medical Center

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