

Impact of a University-Wide Interdisciplinary Mind-Body Skills Program on Student Mental and Emotional Well-Being

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Brenna K Novak, BS¹ , Anna Gebhardt, BS^{1,2},
Harini Pallerla, MS³, Susan Blocksom McDonald, MA³,
Aviad Haramati, PhD⁴, and Sian Cotton, PhD^{1,3} 

Abstract

Background: Positive effects of mind-body skills programs on participant well-being have been reported in health professions students. The success seen with medical students at this university led to great interest in expanding the mind-body skills program so students in other disciplines could benefit from the program.

Objective: The purpose of this study was to assess the effects of a 9-week mind-body skills program on the mental and emotional well-being of multidisciplinary students compared to controls. We also sought to determine if the program's effects were sustained at 1-year follow-up.

Methods: A cross-sectional pre-post survey was administered online via SurveyMonkey to participants of a 9-week mind-body skills program and a control group of students from 7 colleges at a public university from 2017–2019. Students were assessed on validated measures of stress, positive/negative affect, resilience, depression, anxiety, fatigue, sleep disturbance, mindfulness, empathy, and burnout. Scores were analyzed between-groups and within-groups using bivariate and multivariate analyses. A 1-year follow-up was completed on a subset of participants and controls.

Results: 279 participants and 247 controls completed the pre-survey and post-survey (79% response rate; 71% female, 68% white, mean age = 25 years). Participants showed significant decreases in stress, negative affect, depression, anxiety, sleep disturbance, and burnout, while positive affect, resilience, mindfulness, and empathy increased significantly ($P < .05$). Only sleep disturbance showed a significant decrease in the control group. Follow-up in a subset of participants showed that only mindfulness remained elevated at 1-year ($P < .05$), whereas the significant changes in other well-being measures were not sustained.

Conclusion: Participation in a 9-week mind-body skills program led to significant improvement in indicators of well-being in multidisciplinary students. A pilot 1-year follow-up suggests that effects are only sustained for mindfulness, but not other parameters. Future programming should focus on implementing mind-body skills booster sessions to help sustain the well-being benefits.

Keywords

mindfulness, mind-body, student well-being, burnout, mental health

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¹Center for Integrative Health and Wellness, University of Cincinnati College of Medicine, Cincinnati, Ohio

²Ohio University Heritage College of Osteopathic Medicine, Athens, Ohio

³Department of Family and Community Medicine, University of Cincinnati College of Medicine, Cincinnati, Ohio

⁴Department of Biochemistry, Molecular and Cellular Biology, Georgetown University School of Medicine, Washington, District of Columbia

Corresponding Author:

Sian Cotton, Department of Family and Community Medicine, University of Cincinnati College of Medicine, 231 Albert Sabin Way MSB 4358, PO Box 670582, Cincinnati, OH 45267, USA.

Email: sian.cotton@uc.edu



Introduction

Excessive stress and its negative consequences are prevalent across undergraduate and graduate students in a wide range of fields of study,^{1–6} and interventions to increase mental well-being and reduce burnout are warranted. The US Center for Collegiate Mental Health (CCMH) 2019 Annual Report indicated an upward trend in anxiety and depression over the last 8 years,⁷ with the most frequent concerns expressed by students who utilized university counseling services being anxiety (62.7%), depression (49.3%), and stress (43.6%) – conditions known to have a negative impact on academic performance.^{7,8} Chronic, excessive stress and elements of burnout have also been shown to correlate with an increase in unprofessional conduct, reduced altruistic professional values, and decreased empathy among healthcare students and professionals, which can persist throughout their careers.^{5,9–11} At the graduate and professional school level, medical students, law students, and music and art trainees are at the highest risk for developing symptoms of burnout.^{2–5,12} Burnout is a work-related syndrome defined as the state of emotional, physical, and mental exhaustion caused by excessive and prolonged stress,¹¹ and graduate students specifically are at high risk for developing such symptoms.^{1–5} Importantly, the impact of excessive stress and unmanaged anxiety reach beyond a student's professionalism and education, and are known to be correlated with an increase in suicide risk.^{4,7,13}

With the increasing awareness and recognition of the significant mental health challenges of students, universities have focused on improving treatment through increasing the capacity of mental health counseling services.⁷ However, universities continue to lack the available resources to adequately address this mental health crisis.¹⁴ In response, universities have focused not only on expanding mental health clinician capacity, but also implementing curriculum and culture changes, including increasing awareness of the importance of mental health.^{15–18} A key component to addressing the mental health crisis on college campuses is incorporating wellness education and prevention-based approaches to address chronic, excessive stress, and to provide students with the necessary tools to manage and cope with the stress.^{15–18}

Approaches that have received increased attention on university campuses and in medical schools as strategies to reduce stress and improve well-being are mindfulness-based interventions.^{6,15–20} Mindfulness, defined as an awareness that arises through paying attention, on purpose, in the present moment, non-judgmentally,²¹ is one example of a broader group of mind-body techniques, including breathwork, guided imagery, and biofeedback,

that have been associated with improved outcomes in a variety of populations.^{22–25} Positive, short-term effects of mind-body skills programs on students' well-being, anxiety, depression, and empathy have been reported in health professions students in particular.^{26–28} Limited data suggests that the positive effects of such programs may have long-term effects on perceived stress and empathy in medical and nursing students.²⁹ Given the excessive stress levels of students across disciplines, evaluating long-term strategies for stress reduction and building resilience in a multidisciplinary student body is critical.

As opposed to a controlled research trial, this study reports out on an ongoing program evaluation of a multidisciplinary curriculum-based well-being intervention. Specifically, the purpose of this study was to assess the mental and emotional well-being of a multidisciplinary group of students from 7 colleges at 1 university before and after a 9-week mind-body skills program compared to controls, and to determine if any significant changes were sustained at a 1-year follow-up.

Methods

Research Design

This study was conducted using a longitudinal, quantitative, self-report evaluation of student participants in a 9-week mind-body skills program and a control group on various constructs of mental and emotional well-being from 2017–2019. Participants and controls were assessed before and immediately following the program (9-week sample). A subset of both participants and controls completed the measures again at a 1-year follow-up (1-year follow-up sample). The decision to conduct longitudinal tracking of program participants and controls was made in 2019, thus 2018 was the first program year the 1-year follow-up data was collected.

Sample Recruitment

Faculty from 10 colleges across the university were interested in offering the mind-body skills program to students in their colleges and underwent the necessary training offered by the Center for Integrative Health and Wellness to prepare them to facilitate the groups. These included the Colleges of Medicine, Pharmacy, Law, Design, Allied Health Sciences, Nursing, and the Conservatory of Music. Three additional colleges offered the mind-body skills program to their students, but have not yet completed the 1-year follow-up assessment. Students were recruited for participation in the mind-body skills program via e-mail flyers sent out from their respective college administration offices and

from individual faculty members at this large Midwestern university. Some students also attended hour-long presentations about the program, where they were introduced to mind-body skills (e.g., brief guided imagery and breathing exercises) as well as the science and evidence behind the program. To be eligible for participation in the program, interested students completed an online application that collected contact information, a brief paragraph on why the student wanted to participate, and why they should be selected. Once all participants had enrolled in the program, controls were recruited via an e-mail request that was sent to comparable student populations in regards to college and program year. The e-mail specified that the request was only for students who were not current participants of the mind-body skills program. Controls were sent an e-mail request to complete the pre-survey and post-survey, with the incentive of a \$5 e-gift card upon completion of both surveys.

Program Description

Adapted from the Georgetown University Mind-Body Medicine Program,²⁸ the purpose of this 9-week mind-body skills program was to introduce a variety of mind-body modalities in a supportive group setting to students from colleges across the university, have them experience the practices, use the insights gained to enhance self-awareness, and foster self-care. Topics covered in the program include mindfulness, guided imagery, autogenic training, biofeedback, and breathing techniques, as well as art, music, and movement practices. Group members agreed to follow the set of group guidelines, which included confidentiality, mutual respect, and listening compassionately and non-judgmentally. The “I pass” rule was used to ensure that no participant felt compelled to speak or reveal information that he or she was uncomfortable sharing. In addition, participants were asked to adhere to punctuality, group commitment to attend (students must communicate to all group members if they are unable to attend a session), and home practice.

Each mind-body skills group had a maximum of 10 students and was led by 2 trained faculty or staff members as co-facilitators. Although some groups were comprised of facilitators and students from a single college, many groups were interdisciplinary, with a faculty member from a student’s home college facilitating alongside the respective college faculty member from a second college (e.g., pharmacy and medicine). Facilitators were required to complete an intensive, 3-day experiential retreat, which provided them with the training, tools, and strategic thinking to lead a group. Groups met for 2 consecutive hours once a week for 9 weeks.

During these sessions, students checked in with the other participants and facilitators, were introduced to and experienced a new mind-body technique each week, and shared their insights and reactions to their experiences with group members in a supportive environment. For homework, students were advised to practice the skills learned throughout the week for 20 minutes a day, at least 5 days a week, though this was not mandated nor tracked. Students were given resources for mental health treatment if they expressed a need for more formal mental healthcare.

Measures

The survey administered to students before and after the program was comprised of 10 validated measures assessing a range of mental and emotional well-being parameters.

Perceived Stress Scale (PSS)

The PSS is a 10-item instrument designed to measure the degree to which situations in one’s life are appraised as stressful over the last month.³⁰ The PSS assesses the degree to which individuals found their lives unpredictable, uncontrollable, and overloading – central elements in the experience of stress.³⁰ The PSS has been reported as having adequate internal and test-retest reliability, and has demonstrated correlation with related measures of psychological and physical well-being.³⁰ Higher scores on the measure indicate greater levels of perceived stress.

Positive Affect Negative Affect Schedule (PANAS)

The PANAS is a 20-item questionnaire measuring mood over the past week.³¹ Positive and negative affect represent 2 distinct constructs. Positive affect is the extent to which a person feels enthusiastic, active, and alert.³¹ Alternatively, negative affect represents a dimension of subjective distress and unpleasurable engagement, encompassing mood states such as anger, contempt, disgust, fear, and nervousness.³¹ Answers are given on a 5-point Likert scale ranging from “very slightly or not at all” to “extremely.” Higher scores are indicative of higher levels of positive or negative affectivity.

Brief Resilience Scale (BRS)

The BRS is a 6-item measure that evaluates an individual’s ability to bounce back or recover from stress.³² Responses are measured on a 5-point Likert scale, from “strongly disagree” to “strongly agree.” Higher scores indicate higher levels of resilience, as defined above.

Patient-Reported Outcomes Measurement Information System (PROMIS®) Short-Forms (Depression, Anxiety, Fatigue, Sleep Disturbance)

The PROMIS® is a compilation of scales designed to assess patient-reported symptoms, functioning, and health-related quality of life.³³ For this study, validated 4-item short-form versions were used to assess the domains of depression, anxiety, fatigue, and sleep disturbance. Questions assess symptoms experienced over the past week on a 5-point Likert scale, with responses ranging from “never” to “always.” The PROMIS® measures use a *T* score metric with a mean score of 50 and standard deviation of 10, with higher scores representing higher levels of each domain.³⁴

Five Facet Mindfulness Questionnaire (FFMQ-15)

The FFMQ is a 39-item self-report instrument assessing an individual’s dispositional tendency to be mindful in daily life.³⁵ The measure conceptualizes mindfulness as 5 related facets, including: (1) observing, (2) describing, (3) acting with awareness, (4) nonjudging of inner experience, and (5) nonreactivity to inner experience.³⁶ A 15-item condensed version of the FFMQ has been reported as a reliable and valid alternative, and thus was used in this study.³⁵ Responses on both versions are scored on a 5-point Likert scale, ranging from “never or very rarely true” to “very often or always true.” Higher scores on the measure reflect greater levels of mindfulness.

Interpersonal Reactivity Index (IRI)

The IRI assesses 4 separate constructs of empathy.³⁷ Responses are given on a 5-point Likert scale ranging from “does not describe me well” to “describes me well,” with higher scores reflecting higher levels of empathy. For this study, we utilized a 14-item selection for the *perspective taking* and *empathic concern* subscales. The IRI subscale of *perspective taking* assesses the tendency to spontaneously adopt the psychological point of view of others, and *empathic concern* measures feelings of sympathy and concern for others.³⁷

Maslach Burnout Inventory (MBI)

The MBI is a well-validated tool for assessing burnout. The full version of the scale assesses 3 domains of burnout: *emotional exhaustion*, *depersonalization*, and a sense of low *personal accomplishment*.³⁸ This study used a validated 2-item version of the MBI that has been found to produce results consistent with the full version.³⁹ The 2-item version addresses *emotional exhaustion* (“How often do you feel burned out from your work?”) and *depersonalization* (“How often do you feel you’ve

become more callous toward people since you became a student?”).³⁹ Items are scored on a 7-point Likert scale ranging from “never” to “daily.” Higher scores indicate increased levels of burnout.

Data Collection

Participants and controls were e-mailed and asked to voluntarily complete the survey at each time point via SurveyMonkey Inc., an online survey platform.⁴⁰ Students received up to 3 reminders via e-mail to complete the survey, and survey responses were matched using a unique university e-mail address.

Data Analysis

Descriptive statistics were generated to understand the constitution of groups, ensuring uniformity between the participant and control groups. Paired sample *t* tests were used to explore trends in outcomes of participants and controls before and after the 9-week program, and eta squared (η^2) was utilized to determine the effect size for each measure. Repeated measures ANOVAs and post hoc pairwise analyses were used to explore trends across the different time points in the 1-year follow-up sample, and effect size for each measure was determined using partial eta squared (η_p^2). Eta and partial eta squared effect sizes were interpreted as small (0.01), moderate (0.06), or large (0.14).⁴¹ Independent samples *t* tests were used to determine differences in change at the different time points between the participant and control groups. PROMIS® subscales were not included in the independent samples *t* tests because of different scoring criteria.³⁴ To explore relationships between changes in mindfulness and other well-being outcomes, correlations between change scores over time were examined. Analyses were completed using IBM SPSS Statistics 23.⁴² The University of Cincinnati Institutional Review Board determined that this study did not meet the regulatory criteria for research involving human subjects, and ongoing IRB oversight was therefore not required (IRB approval number: 20134383).

Results

Nine-Week Sample

Table 1 provides the demographic composition of the 279 participants and 247 controls who completed the survey before and immediately following the program. The response rate was 79%. The majority of the participants (84%) and controls (89%) were students in graduate or professional programs. There were no significant differences between the control group and participant group on main demographics, including college, gender, and race/ethnicity.

Table 1. Demographics.

	9-Week Sample		1-Year Follow-Up Sample	
	Participants <i>n</i> = 279	Controls <i>n</i> = 247	Participants <i>n</i> = 46	Controls <i>n</i> = 48
Age, Mean (Standard Deviation) (Range)	24.86 (6.52) (18–65)	24.87 (6.24) (18–59)	24.36 (7.06) (19–65)	25.77 (7.73) (18–49)
Gender, %				
Female	67.74	76.02	76.09	77.08
Male	31.90	23.58	23.91	22.92
Other (please specify)	0.36	0.41	0.00	0.00
Race/Ethnicity, %				
White, Anglo, European American; not Hispanic	67.74	69.80	69.57	66.67
Asian or Asian American	10.75	14.29	15.22	12.50
Black or African American	8.60	5.31	10.87	10.42
Hispanic or Latino	5.02	2.86	2.17	6.25
Biracial/Multiracial	3.94	5.71	0.00	4.17
Other (please specify)	3.94	2.04	2.17	0.00
Year, %				
Graduate and Professional Programs	83.65	88.94	95.65	88.89
Undergraduate	16.35	11.06	4.35	11.11
College, %				
Medicine	36.88	40.00	32.61	31.11
Pharmacy	15.59	12.34	26.09	20.00
Law	14.83	17.87	23.91	20.00
Conservatory of Music	12.55	10.64	2.17	6.67
Design	9.89	7.66	4.35	13.33
Allied Health Sciences	5.32	6.81	8.70	6.67
Nursing	4.94	4.68	2.17	2.22

Data regarding the within-groups effects of the 9-week mind-body skills program on various mental and emotional well-being parameters are provided in Table 2. Significant decreases were noted in perceived stress, negative affect, depression, anxiety, sleep disturbance, and aspects of burnout (both *emotional exhaustion* and *depersonalization* declined) ($P < .05$). On the other hand, significant increases were observed in positive affect, resilience, mindfulness, *empathic concern*, and *perspective taking* ($P < .05$). Furthermore, the rise in mindfulness was significantly correlated ($P < .05$) with decreases in stress ($R = -0.53$), negative affect ($R = -0.47$), and *depersonalization* ($R = -0.34$), as well as increases in positive affect ($R = 0.44$), resilience ($R = 0.33$), and *perspective taking* ($R = 0.28$). Within the control group, most measures of mental and emotional well-being did not change following the 9-week period. The control group did show a significant decrease in sleep disturbance over the 9 weeks. However, anxiety and fatigue both increased significantly in controls at the end of the 9-week period ($P < .05$).

Between-groups, significant improvements were seen for participants of the mind-body skills program as compared to controls for all measures except *emotional exhaustion* ($P < .05$). Data for the between-groups

comparisons of participants as compared to controls are provided in Table 3.

One-Year Follow-Up Sample

To determine if any of the improvements in well-being parameters were sustained long-term, a subset of participants and controls were invited to complete the surveys at a 1-year follow-up. As shown in Table 1, 46 participants and 48 controls completed the survey and were able to be matched (response rate of 53%). The constitution of the 1-year follow-up sample was compared to the 9-week sample, and no significant differences were found on main demographics.

Data from the 1-year follow-up are provided in Table 4. Many of the parameters in this smaller sample size of participants did not change significantly from the pre-analysis to the post-analysis. However, a significant increase in mindfulness was evident after the 9-week program, and this increase was sustained at the 1-year follow-up (pre- $M = 43.58$; post- $M = 48.40$; follow-up $M = 48.20$, $P < .05$). In addition, *perspective taking* increased and sleep disturbance decreased significantly following the 9-week program for participants, but returned to baseline scores at the 1-year follow-up

Table 2. Data From Participants and Controls for 9-Week Sample (Within-Groups).

Measures	Participants (n = 279)					Controls (n = 247)				
	Pre-Mean (SD)	Post-Mean (SD)	t Score	P Value	η^2	Pre-Mean (SD)	Post-Mean (SD)	t Score	P Value	η^2
PSS	16.79 (4.52)	15.90 (5.71)	2.49	.01	0.03	16.01 (4.05)	16.53 (5.97)	-1.74	.08	0.02
PANAS										
Positive Affect	32.98 (7.02)	34.91 (7.27)	-3.87	<.01	0.07	33.79 (6.55)	33.01 (7.04)	1.79	.08	0.02
Negative Affect	23.90 (6.66)	21.70 (6.86)	4.56	<.01	0.09	22.77 (6.53)	22.79 (7.17)	-0.06	.95	0.00
BRS	19.87 (4.47)	21.34 (4.24)	-6.55	<.01	0.18	21.40 (4.11)	21.43 (4.37)	-0.16	.87	0.00
PROMIS										
Depression	54.20 (8.75)	51.68 (8.66)	4.16	<.01	0.08	53.18 (8.70)	52.54 (9.85)	1.21	.23	0.02
Anxiety	59.08 (7.76)	55.92 (8.80)	5.04	<.01	0.11	56.71 (8.65)	58.06 (9.02)	-2.62	.01	0.03
Fatigue	56.75 (7.88)	56.60 (8.83)	0.24	.81	0.00	55.71 (7.52)	59.10 (8.11)	-6.66	<.01	0.18
Sleep Disturbance	56.49 (3.29)	52.29 (3.57)	10.74	<.01	0.37	56.30 (3.25)	53.20 (4.07)	7.19	<.01	0.21
FFMQ	45.72 (8.85)	50.73 (8.03)	-9.53	<.01	0.32	47.84 (7.58)	48.21 (7.73)	-0.94	.35	0.00
IRI										
Empathic Concern	21.50 (4.25)	22.20 (4.51)	-3.14	<.01	0.04	21.05 (4.26)	20.69 (4.06)	1.63	.11	0.01
Perspective Taking	19.55 (4.12)	22.76 (4.14)	-13.55	<.01	0.47	19.30 (4.09)	18.91 (4.19)	1.70	.09	0.01
MBI										
Emotional Exhaustion	3.75 (1.41)	3.55 (1.43)	2.13	.03	0.02	3.87 (1.35)	3.82 (1.49)	0.48	.63	0.00
Depersonalization	2.62 (1.87)	2.23 (1.73)	3.14	<.01	0.05	2.73 (1.79)	2.90 (1.73)	-1.50	.14	0.01

Perceived Stress Scale (PSS); Positive and Negative Affect Schedule (PANAS); Brief Resilience Scale (BRS); Patient-Reported Outcomes Measurement Information System (PROMIS); Five Facet Mindfulness Questionnaire (FFMQ); Interpersonal Reactivity Index (IRI); Maslach Burnout Inventory (MBI).

Table 3. Data From Participants and Controls for 9-Week Sample (Between-Groups).

Measures	Participants (n = 279)	Controls (n = 247)	P Value	η^2
	Change Score*	Change Score*		
PSS	-0.88	0.52	<.01	0.02
PANAS				
Positive Affect	1.94	-0.78	<.01	0.04
Negative Affect	-2.20	0.02	<.01	0.03
BRS	1.46	0.03	<.01	0.06
FFMQ	5.01	0.37	<.01	0.11
IRI				
Empathic Concern	0.70	-0.37	<.01	0.03
Perspective Taking	3.21	-0.40	<.01	0.22
MBI				
Emotional Exhaustion	-0.19	-0.04	0.25	0.00
Depersonalization	-0.39	0.17	<.01	0.03

Perceived Stress Scale (PSS); Positive and Negative Affect Schedule (PANAS); Brief Resilience Scale (BRS); Five Facet Mindfulness Questionnaire (FFMQ); Interpersonal Reactivity Index (IRI); Maslach Burnout Inventory (MBI).

*Change scores were calculated by subtracting the pre-score from the post-score.

($P < .05$). All other outcomes of mental and emotional well-being either returned to baseline scores, or did not show significant improvement, at the 1-year follow-up for program participants. Within the control group,

fatigue was significantly lower at the 1-year follow-up compared to scores before and after the 9-week period ($P < .05$). Additionally, within the control group, sleep disturbance improved significantly following the 9-week period, but worsened significantly at the 1-year follow-up ($P < .05$). Between groups, significantly higher levels were found in *perspective taking* scores of participants compared to controls before and after the program ($P < .05$), but those differences disappeared at the 1-year follow-up.

Discussion

The impact of the 9-week mind-body skills program is clear, as there were overwhelmingly positive improvements in mental and emotional well-being in students who participated in the program. While these positive outcomes confirm previous results of mind-body skills programs in medical students,²⁶⁻²⁸ this study is one of few to document such effects in students from a broad range of disciplines, especially law, music, and design. Indeed, given the alarming rise in physician burnout, it is understandable that considerable attention has been focused on improving the well-being of medical students and others in the health professions.⁴³ However, students in several other high-pressure professions, such as law, music, and design, are also at risk for chronic stress and burnout, and universities must act proactively to address these issues for the well-being of their students

Table 4. Data From Participants and Controls for 1-Year Follow-Up (Within-Groups).

Measures	Participants (n = 46)				Controls (n = 48)			
	Pre-Mean (SD)	Post-Mean (SD)	Follow-Up Mean (SD)	η_p^2	Pre-Mean (SD)	Post-Mean (SD)	Follow-Up Mean (SD)	η_p^2
PSS	18.86 (5.50)	19.14 (5.10)	18.79 (6.04)	0.01	16.74 (4.54)	17.53 (5.97)	18.00 (6.48)	0.06
PANAS								
Positive Affect	31.45 (7.42)	33.13 (8.13)	32.08 (8.19)	0.06	33.43 (7.35)	33.41 (7.70)	31.96 (7.12)	0.06
Negative Affect	23.83 (6.60)	22.10 (6.07)	23.60 (7.43)	0.09	22.62 (6.46)	21.91 (6.36)	20.32 (6.19)	0.07
BRS	19.90 (4.34)	21.00 (3.97)	20.82 (4.28)	0.13	20.98 (4.29)	20.51 (4.49)	21.13 (3.97)	0.03
PROMIS								
Depression	54.83 (8.30)	53.10 (8.64)	52.58 (8.15)	0.07	55.00 (7.86)	53.83 (10.31)	53.00 (9.13)	0.07
Anxiety	59.89 (6.65)	57.91 (8.53)	57.22 (8.49)	0.13	58.16 (7.72)	59.61 (7.48)	57.22 (8.98)	0.08
Fatigue	58.23 (8.30)	56.78 (8.81)	56.00 (9.43)	0.06	57.26 (7.07)	59.16 (7.79)	54.28 ^{b,c} (9.31)	0.20
Sleep Disturbance	56.19 (3.35)	52.05 ^a (3.34)	56.33 ^b (3.75)	0.39	57.31 (3.67)	53.04 ^a (4.48)	55.78 ^b (3.00)	0.29
FFMQ	43.58 (8.73)	48.40 ^a (8.08)	48.20 ^c (9.03)	0.39	47.35 (6.95)	48.26 (7.94)	49.17 (6.89)	0.08
IRI								
Empathic Concern	21.66 (4.18)	22.41 (4.73)	21.09 (5.11)	0.14	20.13 (4.30)	20.27 (4.09)	20.40 (4.15)	0.01
Perspective Taking	19.08 (4.37)	22.54 ^a (3.96)	19.56 ^b (4.88)	0.60	18.84 (4.11)	18.76 (4.53)	19.44 (4.56)	0.05
MBI								
Emotional Exhaustion	3.90 (1.39)	3.67 (1.43)	3.67 (1.76)	0.05	3.96 (1.38)	4.00 (1.35)	3.72 (1.61)	0.04
Depersonalization	2.76 (1.61)	2.38 (1.53)	2.88 (1.76)	0.10	2.81 (1.79)	3.15 (1.63)	3.26 (1.78)	0.08

Perceived Stress Scale (PSS); Positive and Negative Affect Schedule (PANAS); Brief Resilience Scale (BRS); Patient-Reported Outcomes Measurement Information System (PROMIS); Five Facet Mindfulness Questionnaire (FFMQ); Interpersonal Reactivity Index (IRI); Maslach Burnout Inventory (MBI).

a = Significant between pre-score and post-score ($P < .05$).

b = Significant between post-score and follow-up ($P < .05$).

c = Significant between pre-score and follow-up ($P < .05$).

(and faculty). Our findings provide a good rationale for implementing mind-body skills programs for all students across disciplines.

Previous studies have attributed part of the success of such programs to the utility of teaching mind-body skills. In fact, there is evidence to support the notion that increased self-awareness through mindfulness and other practices can lead to better self-care and improved mental and emotional well-being.^{22,23} However, along with the specific mind-body techniques taught, a key component of this program is the supportive small group format that we believe is integral to this program's successful outcomes. For example, the group guidelines, especially those of confidentiality, mutual respect, and non-judgment, help to create a safe and supportive environment for students to discuss emotions, thoughts, successes, and obstacles related to their practice and daily life struggles. In addition, the role of the small group facilitators is critically important. They are typically faculty leaders from each college who serve as role models for the students. They are not simply facilitating the sessions but are active participants – modeling openness, vulnerability, compassionate listening without judgment, and connection.⁴⁴ For this reason, facilitators need to be trained appropriately, as their ability to create a safe environment is an essential element to foster the group

cohesiveness and improve the experience and outcomes for participants.

While participation in this mind-body skills program improved indicators of well-being following the 9-week program, sustained positive effects at 1-year follow-up were seen only for mindfulness. There may be several reasons for the lack of long-term effects. First, the small sample size of those who completed the surveys at the 1-year follow-up made it difficult to observe statistically significant changes. Increasing sample size in future follow-up studies should help rectify this issue. Another reason may relate to the loss of opportunity and accountability for continued practice after students complete the 9-week program. Many students and facilitators talk openly about this as the 9-week program comes to an end, asking how they are going to stay “accountable” for maintaining their mind-body skills practice. Successful behavior change requires reinforcement to support habit formation, and students lose the extrinsic reinforcement of the group after the program ends.⁴⁵ Booster sessions to encourage continued practice or curricular integration are potential solutions to maintain these positive effects and promote enduring student mental and emotional well-being. Additionally, the built-in social support provided by the group is a likely variable for improved well-being after completing the 9-

week program. Similarly, students often talk about this unique aspect of the program, and both the feeling of community and the realization that they are “not alone” due to the open sharing of participants in the program.

Interestingly, however, mindfulness did remain significantly elevated at the 1-year follow-up, a pattern described in several other similar studies.^{46,47} These findings, taken together, suggest that mindfulness, as a trait, may remain even without formal practice, and may have a positive impact on other aspects of well-being. In studies of the neurological underpinnings of mindfulness, 8 weeks of mindfulness practice has been found to cause enduring changes in brain function that persist even outside of formal practice,⁴⁸ which may explain the sustained high levels of mindfulness in the participants. Furthermore, while there are various mind-body practices taught within the program (including journaling, non-cognitive drawing, and breathwork), the constant thread throughout all sessions is mindfulness and self-awareness. This aspect is evident in the weekly opening mindfulness meditation, mindful walking and mindful eating exercises, and even during the “check in” period, in which participants are asked to self-reflect on their current state of well-being, again using mindfulness as a tool for self-awareness.

While these short-term results are promising and consistent with previous studies,^{25–27} future studies should investigate how programs can have additional long-lasting effects on other measures of well-being besides mindfulness. Researchers might consider investigating the impact of booster sessions for participants following intensive mind-body skills training to determine if additional practice and reinforcement can improve long-term benefits, since frequency of practice has been positively correlated with greater well-being benefits.⁴⁵

Following completion of the 9-week mind-body skills program (Level 1) at our university, students have the opportunity to take a 10-week program (Level 2) that builds upon the skills taught in the 9-week Level 1 program. This was also modeled from the program at Georgetown University. These advanced programs introduce additional mind-body activities such as body scans, non-cognitive coloring, gratitude journaling, and more to further promote and reinforce self-awareness and self-care. To our knowledge, these Level 2 programs have not been formally evaluated for sustained impact on outcomes. We also implemented drop-in meditation sessions both in-person and virtually, which were open to all students at the College of Medicine, however participation numbers were low for both platforms and, therefore, were not continued.

As with all studies, there are several limitations worth noting. A major consideration for all of the following limitations is that this study was not a controlled research trial, but rather an ongoing program evaluation

of a multidisciplinary curriculum-based well-being intervention. As such, one major limitation was our much smaller sample size at 1-year follow-up. As the longitudinal tracking of program participants and controls was a retrospective decision, it proved difficult to effectively track students as some had moved on to clinical years (medical school), graduated, or were no longer using their university e-mail addresses. Secondly, as we did not systematically track home practice, either during program participation or following the completion of the program, information on frequency of practice as it relates to outcomes was not available. Thirdly, although the heterogeneity of the sample can be interpreted as a strength of this study, it may also have prevented us from seeing some of possible significant trends in our data at the 1-year follow-up.

Nevertheless, important conclusions can still be drawn. Previous studies have focused primarily on the incorporation of mind-body skills training for wellness among healthcare students and professionals, making this study representing a range of fields of study an important addition to the current literature.^{49,50} Furthermore, this study provides a concrete example of how mind-body practices can be incorporated into other academic disciplines to help a broader range of students cope with stress through a program focused on self-awareness. These findings support the short-term benefits of a mind-body skills program in a university-wide multidisciplinary student group, and points to opportunities for future research on how best to support continued practice and thus improvements in well-being and the learning environment.

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ORCID iDs

Brenna K Novak  <https://orcid.org/0000-0002-5218-3254>
Sian Cotton  <https://orcid.org/0000-0003-2042-3169>

References

1. Geslani GP, Gaebelein CJ. Perceived stress, stressors, and mental distress among doctor of pharmacy students. *Soc Behav Pers.* 2013;41(9):1457–1468.
2. Levecque K, Anseel F, De Beuckelaer A, Van der Heyden J, Gisle L. Work organization and mental health problems in PhD students. *Res Policy.* 2017;46(4):868–879.
3. Reed K, Bornstein BH, Jeon AB, Wylie LE. Problem signs in law school: Fostering attorney well-being early in professional training. *Int J Law Psychiatry.* 2016;47:148–156.
4. Bullock G, Kraft L, Amsden K, et al. The prevalence and effect of burnout on graduate healthcare students. *Can Med Educ J.* 2017;8(3):e90–e108.
5. Ishak W, Nikraves R, Lederer S, Perry R, Ogunyemi D, Bernstein C. Burnout in medical students: A systematic review. *Clin Teach.* 2013;10(4):242–245.
6. Deckro GR, Ballinger KM, Hoyt M, et al. The evaluation of a mind/body intervention to reduce psychological distress and perceived stress in college students. *J Am Coll Health.* 2002;50(6):282–287.
7. Center for Collegiate Mental Health. 2019 Annual Report. 2020:1–34; Publication No. STA 20–244.
8. American College Health Association. *National College Health Assessment II: Reference Group Executive Summary Spring 2019.* Silver Spring, MD: American College Health Association; 2019:1–19.
9. Dyrbye LN, Massie FS, Eacker A, et al. Relationship between burnout and professional conduct and attitudes among US medical students. *JAMA.* 2010;304(11):1173–1180.
10. Wilkinson H, Whittington R, Perry L, Eames C. Examining the relationship between burnout and empathy in healthcare professionals: A systematic review. *Burn Res.* 2017;6:18–29.
11. Shanafelt TD, West CP, Sinsky C, et al. Changes in burnout and satisfaction with work-life integration in physicians and the general US working population between 2011 and 2017. *Mayo Clin Proc.* 2019;94(9):1681–1694.
12. Voltmer E, Schauer I, Schröder H, Spahn C. Musicians and physicians – A comparison of psychosocial strain patterns and resources. *Med Probl Perform Art.* 2008;23(4):164–168.
13. Dyrbye LN, Thomas MR, Massie FS, et al. Burnout and suicidal ideation among U.S. medical students. *Ann Intern Med.* 2008;149(5):334–341.
14. LeViness P, Gorman K, Braun L, Koenig L, Bershad C. *The Association for University and College Counseling Center Directors Annual Survey: 2019.* Indianapolis, IN: Association for University and College Counseling Center Directors; 2019:1–50.
15. Slavin SJ, Schindler DL, Chibnall JT. Medical student mental health 3.0: Improving student wellness through curricular changes. *Acad Med.* 2014;89(4):573–577.
16. Shiralkar MT, Harris TB, Eddins-Folensbee FF, Coverdale JH. A systematic review of stress-management programs for medical students. *Acad Psychiatry.* 2013;37(3):158–164.
17. Buchanan B, Coyle JC, Brafford A, et al. *The Path to Lawyer Well-Being: Practical Recommendations for Positive Change.* Chicago, IL: National Task Force on Lawyer Well-Being; 2017:1–73.
18. Poppowitz M, Dorgelo C. *Report on University-Led Grand Challenges.* Los Angeles, CA: UCLA; 2018:1–43.
19. Eroglu M, Singer G, McIntyre T, Stefanov DG. Abridged mindfulness intervention to support wellness in first-year medical students. *Teach Learn Med.* 2014;26(4):350–356.
20. Bauer-Wu S, Fontaine D. Prioritizing clinician wellbeing: The University of Virginia's Compassionate Care Initiative. *Glob Adv Health Med.* 2015;4(5):16–22.
21. Kabat-Zinn J. *Wherever You Go, There You Are.* New York, NY: Hearst Publications; 1994.
22. Goyal M, Singh S, Sibinga EMS, et al. Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. *JAMA Intern Med.* 2014;174(3):357–368.
23. Saeed SA, Cunningham K, Bloch RM. Depression and anxiety disorders: Benefits of exercise, yoga, and meditation. *Am Fam Physician.* 2019;99(10):620–627.
24. Kabat-Zinn J. Mindfulness-based interventions in context: Past, present, and future. *Clin Psychol.* 2003;10(2):144–156.
25. Bamber MD, Morpeth E. Effects of mindfulness meditation on college student anxiety: A meta-analysis. *Mindfulness.* 2019;10(2):203–214.
26. Williams MK, Estores IM, Merlo LJ. Promoting resilience in medicine: The effects of a mind-body medicine elective to improve medical student well-being. *Glob Adv Health Med.* 2020;9:1–9.
27. Greeson JM, Toohey MJ, Pearce MJ. An adapted, four-week mind-body skills group for medical students: Reducing stress, increasing mindfulness, and enhancing self-care. *Explore (NY).* 2015;11(3):186–192.
28. Karpowicz S, Harazduk N, Haramati A. Using mind-body medicine for self-awareness and self-care in medical school. *J Holist Healthc.* 2009;6(2):19–22.
29. van Vliet M, Jong M, Jong MC. Long-term benefits by a mind-body medicine skills course on perceived stress and empathy among medical and nursing students. *Med Teach.* 2017;39(7):710–719.
30. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav.* 1983;24(4):385–396.
31. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: The PANAS scales. *J Pers Soc Psychol.* 1988;54(6):1063–1070.
32. Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The Brief Resilience Scale: Assessing the ability to bounce back. *Int J Behav Med.* 2008;15(3):194–200.
33. Cella D, Riley W, Stone A, et al. The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult self-reported health outcome item banks: 2005–2008. *J Clin Epidemiol.* 2010;63(11):1179–1194.
34. PROMIS Adult Profile Instruments. Health Measures. <http://www.healthmeasures.net/images/PROMIS/man>

- uals/PROMIS_Adult_Profile_Scoring_Manual.pdf. Published February 13, 2020. Accessed May 31, 2020.
35. Gu J, Strauss C, Crane C, et al. Examining the factor structure of the 39-item and 15-item versions of the Five Facet Mindfulness Questionnaire before and after mindfulness-based cognitive therapy for people with recurrent depression. *Psychol Assess*. 2016;28(7):791–802.
 36. Baer RA, Smith GT, Lykins E, et al. Construct validity of the Five Facet Mindfulness Questionnaire in meditating and nonmeditating samples. *Assessment*. 2008;15(3):329–342.
 37. Davis MH. Measuring individual differences in empathy: Evidence for a multidimensional approach. *J Pers Soc Psychol*. 1983;44(1):113–126.
 38. Maslach C, Jackson SE. The measurement of experienced burnout. *J Occup Behav*. 1981;2(2):99–113.
 39. West CP, Dyrbye LN, Sloan JA, Shanafelt TD. Single item measures of emotional exhaustion and depersonalization are useful for assessing burnout in medical professionals. *J Gen Intern Med*. 2009;24(12):1318–1321.
 40. SurveyMonkey Inc. San Mateo, California. <http://www.surveymonkey.com>. Accessed November 2, 2020.
 41. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers; 1988.
 42. IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.
 43. National Academies of Sciences, Engineering, and Medicine. *Taking Action Against Clinical Burnout: A Systems Approach to Professional Well-Being*. Washington, DC: The National Academies Press; 2019.
 44. Pallerla H, Novak B, McDonald S, Molano J, Cotton S. Impact of mind-body skills training and group facilitation on faculty and staff well-being: Changing the culture of the learning and work environments. Oral and poster presentation at: Center for Innovation and Leadership in Education (CENTILE) Conference; October 27–October 30, 2019; Washington, DC.
 45. Kemper KJ, Rao N, Gascon G, Mahan JD. Online training in mind-body therapies: Different doses, long-term outcomes. *J Evid Based Complementary Altern Med*. 2017;22(4):696–702.
 46. Solhaug I, de Vibe M, Friborg O, et al. Long-term mental health effects of mindfulness training: A 4-year follow-up study. *Mindfulness*. 2019;10(8):1661–1672.
 47. de Vibe M, Solhaug I, Rosenvinge JH, Tyssen R, Hanley A, Garland E. Six-year positive effects of a mindfulness-based intervention on mindfulness, coping and well-being in medical and psychology students: Results from a randomized controlled trial. *PLoS One*. 2018;13(4):1–17.
 48. Desbordes G, Negi LT, Pace TWW, Wallace BA, Raison CL, Schwartz EL. Effects of mindful-attention and compassion meditation training on amygdala response to emotional stimuli in an ordinary, non-meditative state. *Front Hum Neurosci*. 2012;6:1–15.
 49. Staffaroni A, Rush CL, Graves KD, Hendrix K, Haramati A, Harazduk N. Long-term follow-up of mind-body medicine practices among medical school graduates. *Med Teach*. 2017;39(12):1275–1283.
 50. Scott C, Vincenzi F, Smith D, Gorrin K, Trantham J. Mind-body skills elective: A 7-year follow-up of health professions students. *J Complement Med Alt Healthcare*. 2019;9(1):1–8.