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# SAMYAMA: Stress, Anxiety, and Mindfulness; A Yoga and Meditation Assessment

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## RESEARCH/EDUCATION BRIEF

### **SAMYAMA: Stress, Anxiety, and Mindfulness: A Yoga and Meditation Assessment**

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#### **ABSTRACT**

**Objective.** To evaluate the impact of a 6-week yoga and meditation intervention on college students' stress perception, anxiety levels and mindfulness skills.

**Methods.** College students participated in a 6-week pilot program consisting of a 60-minute vinyasa yoga class followed by guided meditation once weekly, delivered by trained faculty at the University of Rhode Island College of Pharmacy. Students completed pre- and post-questionnaires to evaluate changes in the following outcomes: stress levels, anxiety levels, and mindfulness skills. The questionnaire was comprised of three self reporting tools: Beck Anxiety Inventory (BAI), Perceived Stress Scale (PSS), and Five Facet Mindfulness Questionnaire (FFMQ). Changes from baseline were assessed using numerical and categorical scales (low, medium, and high).

**Results.** Seventeen participants (ages 19-23) completed the study. Thirteen participants were female, and four were male. Nine of the students were enrolled in the PharmD program and eight from other majors. Anxiety and stress scores decreased while total mindfulness increased, with all changes statistically significant. Categorical pre-post data from BAI and PSS were statistically significant with no students reported being in the "high" category of both stress and anxiety post intervention.

**Conclusion.** Students demonstrated a reduction in stress and anxiety levels after completing a 6-week yoga and meditation program preceding final exams. Results suggest adopting a mindfulness practice for as little as once per week may reduce stress and anxiety in college students. Higher education may consider the inclusion of nonpharmacologic methods, such as yoga and meditation, to support student self-care.

**Keywords:** yoga, meditation, stress, anxiety, mindfulness, student

## INTRODUCTION

Stress is defined as “a state of mental or emotional strain or tension resulting from adverse or very demanding circumstances.”<sup>1</sup> Students enrolled in health care profession curriculums have been shown to demonstrate high levels of stress.<sup>2</sup> Pharmacy students, specifically, have demonstrated an increased level of stress and decreased quality of life throughout their curricular demands.<sup>3-8</sup> Nationally, stress among Americans is on the rise. Stress may negatively affect health and wellness leading to detrimental physical and emotional symptoms such as headaches, anxiety, and depression. In 2017, college-aged Americans reported higher levels of stress than older generations and often inadequately addressed stress through positive coping mechanisms.<sup>9</sup> One positive modality that has demonstrated a reduction in pharmacy student stress is physical exercise.<sup>2</sup>

The word “yoga”, derived from the Sanskrit word *yuj*, translates into “yoking” or “union”. The practice is a union of the Eight Limbs of Yoga, described by the scholar Patanjali, including pranayama (breathing), asana (movement), and dhyana (meditation).<sup>10</sup> Yoga and meditation have become more widely accepted as nonpharmacologic modalities for stress and anxiety reduction as well as general health.<sup>11-16</sup> Meditation has been shown to improve attention and self-awareness in many populations, including college-aged students.<sup>11</sup> Yoga’s effect on depression and anxiety has been studied repeatedly with medical and nursing students. Further, the majority of research on stress reduction and mindfulness with health care-related majors has been conducted on medical and nursing students.<sup>11,14,17</sup> Most recently, a systematic review of the literature evaluated incorporating mindfulness-based interventions for medical,

nursing, and psychology undergraduate students to reduce stress.<sup>18</sup> However, research is lacking on the effects of a dual yoga and mindfulness practice for pharmacy students.

Yoga and meditative practices may provide a skill set to assist college students in their coping mechanisms, both in and out of the classroom. The objective of this pilot project was to evaluate the efficacy of a 6-week yoga and meditation intervention on college students' stress perception, anxiety levels, and mindfulness skills. The information gathered from our research assisted in designing curricular opportunities within a Doctor of Pharmacy program to support students with coping mechanisms to navigate their academic and life stressors. The dual intervention of yoga and meditation may demonstrate more benefit in a shorter time frame than either practice separately.

## **METHODS**

### ***Study Design and Period:***

We conducted a 90-minute yoga and meditation intervention at the University of Rhode Island College of Pharmacy (URI) in the Spring of 2017 for the last six weeks of the semester, preceding final examinations, a period of time often associated with increased stress and anxiety among college students. The project was limited to no more than 20 students (10 pharmacy and 10 non-pharmacy) to ensure an appropriate teacher to student ratio, accommodate space issues, and assess for any baseline differences in stress, anxiety, and mindfulness between students in a highly structured doctorate program versus students enrolled in majors with less rigorous demands. Recruitment was conducted via an electronic flyer posted on URI student social media pages and paper flyers posted throughout the campus library. Enrollment was on a first-come, first serve basis for students ages 18 to 23 years with moderate levels of perceived stress and limited exposure to yoga and meditation, based on the enrollment survey. Students were excluded from the program if they had completed a 200-hour Yoga Teacher Training Program (RYT<sup>®</sup> 200), prior certification in meditation instruction, or were pregnant. Participants did not receive any financial incentive. The first 20 applicable respondents were accepted to the program with 85% retained for the duration of the study. Three students did not attend the entire program for scheduling reasons.

***Cohort:***

The mean age of the participants was 20.7 years, with a range of 19 to 23. Thirteen participants were female (76%). The majority of participants were juniors (35%) with nine of the students enrolled in the Doctor of Pharmacy program (53%) and eight from other programs at URI. Other programs represented included Engineering, Arts and Sciences, Environment and Life Sciences, Education, Business, and Health Studies. The majority of participants reported some level of previous yoga (88%) and meditation experience (77%). Pharmacy and nonpharmacy students were well matched with pharmacy students reporting higher levels of stress and anxiety at baseline, though these numbers failed to reach statistical significance. See Table 1 for Baseline Characteristics.

***Intervention:***

The intervention consisted of a once weekly, 60-minute vinyasa yoga class followed by a 30-minute guided meditation practice. The yoga and meditation practices were led by faculty from the College of Pharmacy (COP), trained as an RYT<sup>®</sup> 200 and certified Shambhala Path Meditation Instructor, respectively, in a private classroom within the COP building. Students were encouraged to bring their own yoga mats; however, the research team provided extra mats if needed. Students completed a pre- and post-questionnaire on the first and last day to evaluate potential changes in stress levels, anxiety levels, and mindfulness skills via Google Forms. The intervention occurred during the last six weeks of the spring semester with the post-questionnaire delivered during the week of finals. The quantity of time devoted to meditation increased each week, beginning with ten minutes and gradually increasing to 30 minutes, by week six. A variety of meditative practices were presented, such as walking meditation and Shamatha (peaceful abiding).

***Outcomes Measures:***

The questionnaire was comprised of three, validated self reporting inventories: the Beck Anxiety Inventory (BAI), Perceived Stress Scale (PSS), and the Five Facet Mindfulness Questionnaire (FFMQ). The BAI self-reporting tool assesses the severity of generalized anxiety symptoms. This tool focuses on somatic symptoms of anxiety with 21 items. Responses are collected using a 4-point Likert scale from 0

(not at all) to 3 (severely) with a total score of 63 points. Scores ranging from 0-21 were categorized as “Low” anxiety, 22-35 as “Moderate” anxiety, and 36 or higher as “High” anxiety. The BAI demonstrates internal consistency, convergence with other anxiety measurements, and has been tested in many populations including college students.<sup>19-21</sup> The PSS reports an individual’s experience of stress. The tool measures psychological manifestations of stress, designed to assess “the degree to which individuals appraise situations in their lives as stressful.” Responses are collected using a 5-point Likert scale from 0 (never) to 5 (very often). Scores ranging from 0-13 were categorized as “Low” stress, 14-26 as “Moderate” stress, and 27-40 as “High” stress. This research utilized the 10 item inventory, also known as the PSS-10.<sup>22,23</sup> Last, the FFMQ, developed at the University of Kentucky by Dr. Ruth Baer, was utilized to assess student mindfulness which included Observing (FFMQ-O), Describing (FFMQ-D), Acting with Awareness (FFMQ-AwA), Non Judging of Inner Experience (FFMQ-NJ), and Nonreactivity to Inner Experience (FFMQ-NR).<sup>24</sup> Responses are collected using a 5-point Likert scale from 1 (never or very rarely true) to 5 (very often or always true). The three self-reporting inventories were administered electronically via Google Forms to all participants pre and post intervention.

#### ***Covariates & Statistical Analysis:***

In our analyses, time-invariant confounding is subtracted out by the individual level differencing and each person serves as their own control. In this short follow-up period, secular trends are less of a concern. Due to a small sample size and paired outcomes for each participant, Wilcoxon Ranked Signed tests and McNemar’s Exact tests were performed to assess statistical differences between pre- and post-scores. All data analyses were performed using RStudio Version 0.99.903 – © 2009-2016 RStudio, Inc. The results for McNemar's exact test was generated using SAS software. Copyright © 2018 SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA. This project was approved by the University of Rhode Island Institutional Review Board (IRB).

## RESULTS

During the six weeks of follow-up, anxiety and stress scores decreased while total mindfulness scores increased. BAI scores dropped an average of 9.6 points (Median = -9; 95% confidence interval (CI): -13.8, -5.3). PSS scores dropped an average of 7.9 points (Median = -8; 95% CI: -11.8, -4.0). FFMQ-O scores increased by an average 4.6 points (Median = 4.0; 95% CI = 2.0, 7.2;). Both FFMQ-AwA / FFMQ-NR scores increased 3.9 points (FFMQ-AwA: Median = 3.0; 95% CI = 1.7, 6.1 / FFMQ-NR: Median = 4.0; 95% CI = 1.8, 6.1). The largest increase was seen in the FFMQ-NJ score with a mean increase of 6.8 points (Median = 8.0; 95% CI = 3.5, 10.2). Categorical changes pre-post data from BAI and PSS were also statistically significant (P value = 0.008 and P value = 0.03, respectively) with no students reported being in the “high” category of both stress and anxiety post intervention. See Tables 2 and 3 for Results.

## DISCUSSION

The objective of our pilot project, SAMYAMA, was to evaluate the efficacy of a 6-week yoga and meditation intervention on college students’ stress perception, anxiety levels, and mindfulness skills. “Samyama”, a Sanskrit word, describes a state in which the mind and body are unified in focus on the present moment, i.e. mindfulness. Given the high prevalence of stress among college-aged students, this project was implemented to assist our students in developing positive coping mechanisms, or skills sets, to navigate their academic and life stressors. In the broader scheme, these mindful skills may support students by reducing their anxiety and stress yielding improved academic success, reduced “burn out”, and increased empathy toward patients.<sup>11,17-19</sup> SAMYAMA began six weeks before students started their final examinations, historically, a time of increased stress and anxiety among college students. The researchers sought to arm the students with mindfulness skills in preparation for this potential time of crisis. At the beginning of the project, approximately one-third of the students reported a high level of stress and anxiety; however, by the end, none reported high stress or anxiety. The post-questionnaire was administered during finals, several days after regular classes had ended, suggesting these findings withstand even with the rigorous demands on the students at that time.



Several studies have demonstrated benefit utilizing yoga or meditation, predominantly in medical, psychology, and nursing students; however, none have incorporated a dual intervention on pharmacy students specifically. O'Driscoll and colleagues conducted a systematic review on the benefits of Mindfulness Based Stress Reduction and Mindfulness Based Cognitive Therapy for undergraduate health and social care college students. Eleven studies met the inclusion criteria demonstrating benefits in student stress, anxiety, and mindfulness. Limitations included lack of long-term follow-up, potential risk of bias, and failure to cite the qualifications of those delivering the mindfulness intervention.<sup>18</sup> Another study demonstrating a reduction in stress and increase in self-compassion was conducted by Eroglu and colleagues on 59 first-year medical students in Brooklyn, NY, utilizing an 8-week dual intervention of didactic, classroom instruction with a home meditation requirement. A major limitation included poor adherence with the home meditation component yielding a mean number of minutes per meditation session of 14.6.<sup>11</sup> In contrast, our study incorporated the meditative practice within our intervention sessions ensuring a higher minimum number of minutes. Though our study did not require a home meditation component, practice was encouraged. Last, Warnecke and colleagues conducted a multicenter, single-blinded, randomized control trial consisting of sole, home-based guided meditation practice utilizing a 30-minute audio compact disc for final year medical students in Australia. Students documented adherence to daily, 8-week intervention in a written diary. Results demonstrated a reduction in stress and anxiety. Similar to our study, the PSS was used as the outcome measure. A reduction from baseline of -3.44 was observed as compared to our findings of -7.9, demonstrating a face-to-face, dual yoga and meditation practice, as opposed to home study, may yield a greater reduction in student stress.<sup>17</sup>

As compared to the literature, our pilot study demonstrated many strengths, including a high quality, dual yoga and meditation intervention in addition to well-qualified, experienced practitioners leading the sessions. Limitations to our pilot study included a small sample size and short duration of follow-up. Our study was limited by potential self-reported outcomes which may have led to reporting bias by participants. Further limitations included a lack of randomization and a control group. Future studies may be designed as a two arm evaluation with a control group. Strategies to ensure students

sustain their yoga and meditative practice long-term may include, but are not limited to, weekly yoga and meditation sessions within the College or University, lectures within required courses, involvement from student organizations, and “buy in”/participation by faculty.<sup>25</sup> Home-based practices utilizing Mindfulness Apps may also facilitate long term inclusion in daily practice and lend a more realistic evaluation of student practice time. Additionally, APP use may reduce recall bias. As a result of our research project, the URI COP has implemented a consistent yoga and meditation presence for all students, staff and faculty including once weekly drop-in, guided meditation sessions throughout the academic year. Additional meditation sessions are added during the week of final examinations for increased student support. Consistent with the research project, yoga is offered within the COP once weekly for the six weeks preceding finals. Colleges of Pharmacy may be limited in offering mindfulness practices due to a lack of trained practitioners and space; however, both may be overcome by including faculty support for training and potentially moving to an offsite location. At a minimum, incorporation of home-based practice should be encouraged and supported for all students.

## **CONCLUSION**

In this study, students demonstrated a reduction in stress and anxiety levels after completing a 6-week yoga and meditation program. These results suggest that adopting a mindfulness practice for as little as once per week for six weeks may reduce stress and anxiety in college students. Future studies including a larger number of students with long term follow-up are needed to ensure a sustained beneficial effect. Higher education, including Colleges of Pharmacy, may consider the inclusion of holistic methods, such as yoga and meditation, to support student self-care.

## **ACKNOWLEDGMENTS**

SAMYAMA was born from a sincere desire to share the gifts of yoga and meditation with our students before they were “in crisis” during finals, providing them with coping tools not only in school, but in life. We sincerely thank our collaborators, Erica Estus, Katherine Corsi, Annaliese Clancy, Alissa Margraf, Miranda Monk, and Margaret Smith for their assistance with study design, clinical input, and logistic support.

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Table 1. Characteristics among n = 17 SAMYAMA Participants at Baseline from the University of Rhode Island, Kingston, RI, Spring 2017

Characteristic		
<b>Age</b>		
Mean (SD)	20.7 ( $\pm$ 1.2)	
Range	19-23	
<b>Age Group (years) – n, %</b>		
< 18	0	0.0
18-<20	3	17.6
20-<22	10	58.8
$\geq$ 22	4	23.5
<b>Male sex – n, %</b>	4	23.5
<b>Female sex</b>	13	76.5
<b>University College (Major Represented)</b>		
Pharmacy (Pharm.D.)	9	52.9
Engineering (Biomedical Engineering)	1	5.9
Arts and Sciences (Economics, Political Science)	2	11.8
Environment and Life Studies (Marine Biology)	1	5.9
Education and Professional Studies (Secondary Education)	1	5.9
Business and Administration (Supply Chain, Fashion and Textiles)	2	11.8
Health Sciences (Kinesiology)	1	5.9
<b>School Year</b>		
Freshman	2	11.8
Sophomore	2	11.8
Junior (P1)	6	35.3
Senior (P2)	5	29.4
P3	2	11.8
<b>Yoga Experience</b>		
Yes	15	88.2
No	2	11.8
<b>Meditation Experience</b>		
Yes	13	76.5
No	4	23.5
<b>Hours Spent Studying (per day)</b>		
<1	0	0.0
1- <5	9	52.9
$\geq$ 5-10	8	47.1
>10	0	0.0

Table 2. Mean Outcomes among n = 17 SAMYAMA Participants from Baseline to 6 weeks Post Baseline from the University of Rhode Island, Kingston, RI, Spring 2017

Outcome	Baseline Mean	Six Weeks Mean	Difference Mean	p value <sup>1</sup>
Anxiety (BAI)	19.5	9.9	9.6	<.001
Perceived Stress (PSS)	21.8	13.9	7.9	<.001
Mindfulness (FFMQ Total)	115.5	136.6	21.2	<.001
Observing	25.8	30.4	4.6	.002
Describing	26.8	28.5	1.6	.09*
Awareness	22.4	26.3	3.9	.004
Nonjudging	21.9	28.8	6.8	.003
Nonreacting	18.5	22.4	3.9	.006

<sup>1</sup>p values calculated using the Wilcoxon Signed Rank Test due to non-normal paired data and a small study size.

\*Not statistically significant

Table 3. Categorical Outcomes among n = 17 SAMYAMA Participants from Baseline to 6 weeks Post Baseline from the University of Rhode Island, Kingston, RI, Spring 2017

<b>Outcome</b>	<b>Baseline N=17 (%)</b>	<b>Six Weeks N=17 (%)</b>	<b>p value<sup>1</sup></b>
Anxiety (BAI)			.008
High (%)	5.0 (29.4)	0.0 (0.0)	
Moderate (%)	6.0 (35.3)	3.0 (17.6)	
Low (%)	6.0 (35.3)	14 (82.4)	
Perceived Stress (PSS)			.03
High (%)	5.0 (29.4)	0.0 (0.0)	
Moderate (%)	11.0 (64.7)	10.0 (58.8)	
Low (%)	1.0 (5.9)	7.0 (41.2)	

<sup>1</sup>p values calculated using the McNemar's Exact Test for paired data.

\*Not statistically significant

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