Brief Report

Leveraging Mindfulness to Reduce Stress and Improve Quality of Life Among Pharmacy Students

Brianna M. McQuadea,⁎, Yoon Soo Parkb, Jennie B. Jarretta,c, Janet Riddleb,†

a Department of Pharmacy Practice, University of Illinois Chicago College of Pharmacy, Chicago, IL, USA
b Department of Medical Education, University of Illinois at Chicago College of Medicine, Chicago, IL, USA
c American Medical Association, Chicago, IL, USA

A R T I C L E   I N F O

Keywords:
Mindfulness
Wellness
Health professions
Stress
Quality of life
Mental health

A B S T R A C T

Objective: Methods to improve stress and well-being for health profession trainees are limited. Mindfulness, elevating awareness to the present moment experience with compassion, has been shown to demonstrate effectiveness to enhance well-being. This research leverages techniques from mindfulness to develop and evaluate a credit-bearing longitudinal mindfulness elective, designed to teach mindfulness to improve stress and quality of life (QoL).

Methods: A mindfulness elective was created for pharmacy students. A longitudinal, case-control, survey-based design was used to compare stress and QoL between mindfulness participants and nonparticipant controls. Stress was assessed by the Perceived Stress Scale (PSS) and QoL by the SF-12 v2 Health-Related QoL Scale (SF-12 v2 QoL).

Results: Four weeks after course completion, the average PSS score was lower among participants compared to controls (18.58 SD 5.85 vs 20.79 SD 6.31, Cohen’s d = 0.36). The Mental Health Component score of SF-12 v2 QoL was higher among participants versus controls (41.94 SD 8.58 vs 36.93 SD 9.59, Cohen’s d = 0.55). The Physical Health Component score of SF-12 v2 QoL was lower among participants than the control group (46.13 SD 5.48 vs 48.62 SD 6.53, Cohen’s d = 0.41).

Conclusion: The results indicate small to moderate effect sizes associated with participation in a mindfulness elective, reducing stress and improving mental QoL among pharmacy students. The structure and potential benefits of the course can be extrapolated to other institutions. By offering course credit for mindfulness practice, health profession schools can support student wellness.

1. Introduction

Burnout and high levels of stress are well-documented sequelae of the intellectually and emotionally intense, high-stakes, fast-paced work required by healthcare professionals (HCPs). The negative impact on the individual, patient care, and the institution due to unmitigated HCP stress in work environments has been a prominent area of research. The calls to action for reducing burnout and improving HCP wellness have trickled down to HCP students as accreditation bodies have implemented extracurricular requirements to support student well-being. There is the concern that unmanaged stress will cause higher levels of burnout throughout their academic and professional career. It is important that students develop habits to promote engagement and resiliency for current and future practice.

One popular intervention to reduce stress and support mental health is mindfulness. Mindfulness is the skill of focusing on the present moment, without judgment or bias. Baer and colleagues theorized that mindfulness exerts its beneficial effects through observing, describing, acting with awareness, and nonjudging of and nonreactivity to inner experience, or the 5 Facets of Mindfulness. Through the enhancement of these facets, consistent mindfulness practice results in improved immune function, reduced blood pressure, cortisol levels, anxiety, depression, psychological well-being, and cognitive functioning. Implementing mindfulness practice in a meaningful way into the pharmacy education curriculum can be challenging due to limited curricular and personal time and the necessity for consistent practice for benefits. Providing protected time for practice and course credit as

⁎ Corresponding author.
E-mail address: bmcqua2@uic.edu (B.M. McQuade).
† Deceased

https://doi.org/10.1016/j.ajpe.2023.100096
Received 29 November 2022; Received in revised form 3 March 2023; Accepted 13 March 2023
Available online 9 May 2023
0002-9459/© 2023 American Association of Colleges of Pharmacy. Published by Elsevier Inc. All rights reserved.
an incentive may alleviate such barriers. We describe an elective mindfulness curriculum and its impact on stress and quality of life (QoL) in pharmacy students.

2. Methods

2.1. Mindfulness Curriculum

The mindfulness curriculum was adapted from the Koru Mindfulness Program and developed using the 6-Step Approach for Medical Education. Goals and objectives with corresponding educational strategies are presented (Appendix 1). The elective is a 1 credit hour course at the University of Illinois Chicago College of Pharmacy (UIC COP). The University of Illinois Chicago COP is a 4-year Doctor of Pharmacy program on a 2-semester system (August-December, January-May). The course was conceptualized as an in-person offering to facilitate group discussion and reflection. However, after only 4 in-person courses, COVID-19 required reformatting to distance learning using the Zoom platform. To encourage collaboration online, students were expected to have their cameras on unless approved otherwise. The course met for 80 min weekly over 8 weeks.

The class opened with a 5-minute meditation. Students were then invited to reflect on their individual practice experience, focusing on barriers and facilitators, for 20 min. The teacher shared a didactic session, including quotes around mindfulness themes (such as acceptance, resilience, the importance of the present moment), and invited the class to share their thoughts on the themes, for approximately 20 min. For the next half hour, the teacher-led mindfulness meditation practices (such as walking meditation, body scan meditation, labeling of thoughts mediation). After each practice, students were invited to share experiences and what they noticed. Common themes, barriers, and facilitators were highlighted by the teacher and explored in class discussion. At the end, students were asked to pick a mindfulness daily activity – separate from their devoted 10 min of mindfulness meditation per day. An example of a mindfulness daily activity is brushing teeth, in which students are invited to be fully present in the duration of the activity and its sensations. Specific course activities and topics are listed (Appendix 2).

2.2. Study Approach

A longitudinal, case-control, survey-based design was used to compare stress and quality of life between mindfulness participants and controls. Surveys were administered to participants and controls from 4 different semesters, Spring 2020 through Fall 2021. Surveys were completed prior to course (baseline, August and January for Fall and Spring semesters, respectively) and 4 weeks postcourse (November and April).

2.3. Participants

The elective was offered to all first-, second-, and third-year pharmacy students at UIC COP Chicago and Rockford campuses. Eligible pharmacy students were emailed via listservs at the end of the preceding semester. Seats were limited to 25 students per semester for increased group discussions and reflections on a first-come, first-serve basis. For primary outcome comparisons, a control group of first, second-, and third-year students not participating in the mindfulness curriculum was recruited via the same listservs to participate in the same surveys (baseline and postcourse). Students who voluntarily completed both surveys were included in the control group. The researchers anticipated a similar number of control students as the participant students (25–30 per semester).

2.4. Outcomes

The primary outcomes were the difference in stress and QoL between mindfulness participants and controls 4 weeks after the mindfulness course. The secondary outcome was the change in the 5 facets of mindfulness from baseline to 4 weeks postcourse in participants group.

2.5. Survey Measures and Data Collection

For the primary outcomes, the Perceived Stress Scale (PSS) and SF-12 v2 Health-Related QoL Scale (SF-12 v2 QoL) were used to measure stress and QoL, respectively. The PSS is an instrument validated to assess stress levels in the general population previously used in pharmacy students. The PSS is a 10-item Questionnaire scored from 0 (never) to 4 (very often) and results are summed, ranging from 0 to 40 with higher scores indicating higher stress. The SF-12 v2 QoL is a validated, QoL tool consisting of a mental health component summary (MCS) and a physical health component summary (PCS), with higher scores in each component indicating higher physical and mental health-related QoL. The MCS and PCS are scored using norm-based methods, with both PCS and MCS having a mean score of 50 in the general United States population. Both the PSS and SF-12 v2 QoL are available publicly.

Mindfulness change among participants was measured using the 5-Facet Mindfulness Questionnaire. The Questionnaire measures how mindfulness exerts its beneficial effects through observing, describing, acting with awareness, and nonjudging of and nonreactivity to inner experience. The Questionnaire is scored based on the 5 facets (observing, describing, awareness, nonjudging, and nonreactivity) on a scale of 1 (never or very rarely true) to 5 (very often or always true). Results are averaged among each facet, with higher scores indicating higher levels of mindfulness.

Survey instruments were pilot tested by fourth-year pharmacy students and first-year pharmacy residents to ensure usability and readability prior to the study. For the baseline survey, both intervention and control students filled out a baseline demographic survey, which included current stress coping mechanisms, followed by the PSS and SF-12 v2 QoL. Only the mindfulness course participants filled out the 5-Facet Mindfulness Questionnaire. The same questionnaires were redistributed to respondents in both the participant and control group at 4 weeks postcourse completion. Although participant students were required to answer the surveys for grades, they could opt out of research inclusion. The data were collected through Qualtrics.

2.6. Analysis

Demographic data were analyzed using Chi-square and Fisher's exact tests. For the primary outcomes, analysis of covariance tests was used. The primary investigator (BMM) reviewed all survey results and removed duplicate students from the control group who submitted multiple semesters (only first response was counted), or if they had participated in the mindfulness course. Data were analyzed using SPSS. The institutional review board approval was obtained from the University of Illinois Chicago.

3. Results

3.1. Demographics

Demographic characteristics are shown in Table 1. Of the 93 students who enrolled in the course, 91 (97.8%) consented to demographic data collection; 76 (81.7%) consented to be included in the full research. Of the 63 control students who responded to the baseline survey, 56 (88.9%) responded to the 4-week postcourse survey for inclusion. The majority of participants were female with a Bachelor's degree. The only statistical difference between cohorts was professional year of school (p < 0.05). Participant and control cohorts reported...
control intervention leveraging a mindfulness elective demonstrates meaningful reduction in student stress and improvement in mental wellness. Compared to nonparticipants over the same time course, participants in the mindfulness elective had less stress and higher mental health-related QoL, emphasizing the utility of mindfulness as a wellness tool. Mindfulness traits increased among participants, as measured by the 5 Facet Mindfulness Questionnaire. Interestingly, the PCS score of the SF-12 v2 QoL among participants was lower than controls; while the causation is unknown, this could potentially be selection bias, with those with lower overall QoL self-selecting into the elective.

Higher levels of stress in pharmacy students are correlated with lower mental health-related QoL. Higher burnout results in lower perceived academic efficacy.9,15,19 Because of this alarming data, student well-being is emphasized in accreditation standards.6,7 Most campuses have amplified wellness support through a variety of resources, such as counseling, cognitive-based therapy, and even mindfulness classes. Yet knowledge and utilization of such services remain low.20 This could be due to siloing of wellness services from the health professions colleges. For example, at UIC, most Counseling and Wellness services (such as psychologists) are on the undergraduate campus, making physical distance a barrier. New, integrative approaches to wellness are needed to support accreditation standards. Lemay and colleagues found that a 6-week Yin Yoga and meditation intervention significantly decreased stress on the PSS and increased mindfulness facets through the 5 Facet Mindfulness Questionnaire among pharmacy faculty and students,21 similar to the results found in this study. Though causation cannot be determined in our study, the participant’s mindfulness facets increased, correlating to a decrease in stress and improvement in mental QoL compared to those who did not participate. Coupled with outcomes published previously,22 the results highlight that investing in a mindfulness or wellness course for credit is a novel and effective method that can supplement student well-being. Although this research was done at 1 institution specifically among pharmacy students, the concepts can be extrapolated to other health profession students.

The concept of mindfulness training among HCP students and its benefits are well documented.13,23 Most training, however, occur in addition to daily student responsibilities. The extra requirement of practicing mindfulness consistently for the sake of stress reduction can be counterproductive and result in under-utilization by the student body. Literature regarding the feasibility of integrating mindfulness practice into the core curriculum has shown high acceptance by students as a tool to manage their stress and anxiety and improve their

### Table 1
Baseline Demographics for Participant and Control Groups.

<table>
<thead>
<tr>
<th></th>
<th>Participants, % (n = 91)</th>
<th>Control, % (n = 63)</th>
<th>Total students, % (n = 154)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>68.1</td>
<td>68.3</td>
<td>68.2</td>
</tr>
<tr>
<td>Male</td>
<td>30.8</td>
<td>31.7</td>
<td>31.2</td>
</tr>
<tr>
<td>Agender</td>
<td>1.1</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>Degree**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor’s</td>
<td>71.4</td>
<td>73.8</td>
<td>72.4</td>
</tr>
<tr>
<td>Associate’s</td>
<td>30.8</td>
<td>24.6</td>
<td>21.1</td>
</tr>
<tr>
<td>High school</td>
<td>8.8</td>
<td>18.0</td>
<td>12.5</td>
</tr>
<tr>
<td>Other</td>
<td>5.5</td>
<td>1.6</td>
<td>3.9</td>
</tr>
<tr>
<td>Current pharmacy school year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First year</td>
<td>13.2</td>
<td>47.6**</td>
<td>27.3</td>
</tr>
<tr>
<td>Second year</td>
<td>74.7</td>
<td>23.8**</td>
<td>53.9</td>
</tr>
<tr>
<td>Third year</td>
<td>12.1</td>
<td>28.6**</td>
<td>18.8</td>
</tr>
<tr>
<td>Stress coping mechanisms*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spending time with family/friends</td>
<td>80.2</td>
<td>77.4</td>
<td>79.1</td>
</tr>
<tr>
<td>Sleep</td>
<td>79.1</td>
<td>85.5</td>
<td>81.7</td>
</tr>
<tr>
<td>Talking about it/ debriefing</td>
<td>62.6</td>
<td>59.7</td>
<td>61.4</td>
</tr>
<tr>
<td>Exercise</td>
<td>58.2</td>
<td>48.4</td>
<td>54.2</td>
</tr>
<tr>
<td>Recreational/ relaxation activities</td>
<td>52.7</td>
<td>48.4</td>
<td>51.0</td>
</tr>
<tr>
<td>Spiritual methods</td>
<td>22.0</td>
<td>24.2</td>
<td>22.9</td>
</tr>
<tr>
<td>Alcohol</td>
<td>20.1</td>
<td>22.6</td>
<td>21.6</td>
</tr>
<tr>
<td>Meditation/ mindfulness techniques</td>
<td>19.8</td>
<td>14.5</td>
<td>17.6</td>
</tr>
<tr>
<td>Yoga</td>
<td>15.4</td>
<td>6.5</td>
<td>11.8</td>
</tr>
<tr>
<td>Other</td>
<td>12.1</td>
<td>19.4</td>
<td>15.0</td>
</tr>
<tr>
<td>Formal counseling or therapy</td>
<td>6.6</td>
<td>4.8</td>
<td>5.9</td>
</tr>
<tr>
<td>Prescription drugs (anxiolytics, antidepressants)</td>
<td>2.2</td>
<td>8.1</td>
<td>4.6</td>
</tr>
</tbody>
</table>

---

*Control n = 61
**P < 0.05 for participants and controls comparison
*Control n = 62

### Table 2
Comparison of Participants (n = 76) and Control (n = 56) for PSS and SF 12v2 QoL Results.

<table>
<thead>
<tr>
<th>Survey instrument</th>
<th>Baseline, mean (SD)</th>
<th>Four weeks postcourse, mean (SD)</th>
<th>Change, (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSS</td>
<td>Participant</td>
<td>21.86 (5.46)</td>
<td>18.58 (5.85)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>19.73 (6.87)</td>
<td>20.79 (6.31)</td>
</tr>
<tr>
<td>p value</td>
<td>SF 12v2 PCS</td>
<td>&lt; .001</td>
<td>P &lt; .001</td>
</tr>
<tr>
<td></td>
<td>Participant</td>
<td>47.11 (6.21)</td>
<td>46.13 (5.48)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>47.90 (5.32)</td>
<td>48.62 (6.53)</td>
</tr>
<tr>
<td>p value</td>
<td>SF 12v2 MCS</td>
<td></td>
<td>P = 0.027</td>
</tr>
<tr>
<td></td>
<td>Participant</td>
<td>38.17 (8.57)</td>
<td>41.94 (8.58)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>38.15 (10.58)</td>
<td>36.93 (9.59)</td>
</tr>
<tr>
<td>p value</td>
<td></td>
<td></td>
<td>P &lt; .001</td>
</tr>
</tbody>
</table>

Abbreviations: PSS, Perceived Stress Scale; SF-12 v2 QoL, SF-12 v2 Quality of Life Scale

### Discussion

To our knowledge, this is the largest study evaluating the impact of a formal mindfulness course among pharmacy students. The case-
empathy as clinicians. However, it should be noted that mindfulness is most effective when practiced consistently, like physical exercise, and therefore may not be best implemented as a requirement for all students. Durand and colleagues developed a mindfulness elective for pharmacy students in Spring 2021. They reported that participants' positive reflection increased significantly by the end of the course. By offering credit through an elective mindfulness course, interested students can take advantage of protected time to attend sessions and practice individually to reap the benefits, as supported by Durand and colleagues and the quantitative outcomes in this study.

Limitations exist for this research. First, it is subject to selection bias, as motivated students self-selected the course. Second, because participants were required to complete surveys for grading (with research opt-out options), there may have been acquiescence bias if they answered how they perceived the instructor wanted. This could have resulted in inaccurately lower stress and higher QoL responses. The difference in stress and mental health-related QoL among cohorts could have been due to a variety of factors unrelated to, or in addition to, the mindfulness intervention; the difference in responders' professional year for participant and control groups may also have an impact. Controlling for all confounding factors is impossible. Despite these limitations, the results presented here add to the literature where minimal publications exist evaluating meaningful interventions to promote stress reduction and mental wellness.

5. Conclusion

The results indicate small to moderate effect sizes associated with participation in a mindfulness elective, with a reduction in stress and improvement in mental health-related QoL among pharmacy students. The structure and potential benefits of the course can be extrapolated to other institutions. By offering course credit for mindfulness practice, health profession schools can support student wellness.

Funding/Support

This research was made possible by an American College of Clinical Pharmacy Adult Medicine Practice and Research Network grant. ACCP had no role in project development, implementation, analysis, or manuscript writing.

Author Contributions

Brianna M. McQuade: Conceptualization, Methodology, Investigation, Data curation, Validation, Writing – original draft. Yoon Soo Park: Conceptualization, Methodology, Investigation, Formal analysis, Data curation, Writing – review & editing. Jennie B. Jarrett: Conceptualization, Methodology, Investigation, Data curation, Writing – review & editing, Supervision, Funding acquisition. Janet Riddle: Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, Supervision

Declaration of Competing Interests

Drs. McQuade and Jarrett have served as consultants for Trevena, Inc.

Acknowledgments

The authors would like to thank Megan Murtagh, PharmD candidate, for assistance in data collection and analysis for this manuscript.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ajpe.2023.100096.

References

6. Accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree. Accreditation Council for Pharmacy Education; Published 2015. [https://www.acpe-accred.org/pdf/Standards2016FNL.pdf], Accessed August 2, 2022.

