

BRIEF

Assessment of a Mindfulness Meditation Elective in an Accelerated Doctor of Pharmacy Program

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Objective. The objective of this study was to determine the effect of a live 14-week mindfulness elective course on the well-being of Doctor of Pharmacy (PharmD) students in an accelerated program.

Methods. Pharmacy students enrolled in a mindfulness elective participated in weekly class sessions that included an eight-week mindfulness program geared toward emerging adults. Eight weekly reflections were assigned to students and evaluated using the Text iQ text-analysis tool in Qualtrics. Investigators analyzed the sentiment scores assigned by Text iQ to detect differences in the tone of student reflections over time.

Results. Twenty-four students were enrolled in this elective, and 22 students submitted complete reflections for evaluation. Mean sentiment scores and the percentage of responses in sentiment score categories (very positive and positive, mixed and neutral, very negative and negative) for these reflections showed significant differences between weeks.

Conclusion. The tone of student reflections was more positive after the students learned and incorporated mindfulness practice into their accelerated PharmD curriculum.

Keywords: pharmacy student, mindfulness, stress reduction, well-being, elective

INTRODUCTION

Students in accelerated Doctor of Pharmacy (PharmD) programs experience significant levels of stress for many reasons, including academic evaluations.¹ The American Association of Colleges of Pharmacy (AACP) and the Accreditation Council for Pharmacy Education (ACPE) emphasize addressing student well-being, as seen in AACP policy statements and ACPE Standards.^{2,3} Studies show that mindfulness and meditation practices reduce general stress and improve overall well-being in students, with the majority of studies focusing on nursing, medical, and college/university students.⁴⁻¹⁰ It is known that test-taking stress and anxiety have been linked to decreased academic performance.¹¹⁻¹³ Some evidence suggests that mindfulness interventions lead to a reduction in assessment-related stress in health care professions students.^{4-6,9}

Koru Mindfulness (Koru Center for Mindfulness LLC) is an evidence-based, structured, mindfulness and mind-body skill development program geared toward emerging adults (those in their late teens through twenties).¹⁴ Koru includes a basic four-week program (Koru Basic)

and a 2.0 version that expands upon the skills and concepts covered in Koru Basic and includes a half-day silent meditation retreat.^{15,16} A randomized controlled trial conducted by Greeson and colleagues, evaluating Koru Basic compared to a wait-list control, found that university students who completed the four-week program had improvements in perceived stress, mindfulness, and self-compassion, and had fewer problems with sleep.¹⁴ Another four-week randomized control study by Smit and colleagues showed that a Koru Basic intervention improved students' sleep and reduced stress in college students during the COVID-19 lockdown.¹⁷

A 14-week elective for second-year students in an accelerated Doctor of Pharmacy program was developed at our university. We hypothesized that the feelings or sentiments described in reflections written by students in the elective would improve with exposure to the meditation and mindfulness practices. Specifically, improvement was predicted in the students' assessment of academic stress, emotional regulation, approach to time constraints, attitude toward meditation practice, and sleep.

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METHODS

A 14-week elective was developed based on the Koru Basic and Koru 2.0 programs. Both pharmacy practice faculty that designed and taught the course were certified

Koru teachers, and one was a certified yoga instructor. The elective was offered to second-year students with a cap of 24 students and ran from January through April of 2021. Classes were held via Zoom (Zoom Video Communications Inc) during the COVID-19 pandemic. The course consisted of eight 100-minute class sessions and one four-hour silent retreat. Student presentations rounded out the final two weeks of the semester. The class did not meet on the three holidays that occurred during the 14-week semester. Class sessions consisted of mindfulness meditations

(eg, breath awareness, walking meditation) and/or mind-body practice (eg, yoga) and instructor-moderated open discussion of students' direct experiences (Table 1). Instructors weaved mindfulness and self-compassion concepts into the open discussion. The four-hour silent retreat consisted of a period of continuous mindfulness practice integrating the meditation and mind-body practices that the students had previously learned. Students were assessed through weekly reflections, a presentation topic proposal, an evidence-based presentation, and attendance

Table 1. Elective Schedule for a Koru Mindfulness Meditation Elective in an Accelerated Doctor of Pharmacy Program

Week	Topic	Skills/meditation	Readings/assignments
Week 1	No class (holiday)		<i>The Mindful Twenty-Something</i> Parts 1 and 2
Week 2	Orientation/syllabus overview	Diaphragmatic breathing Dynamic breathing	<i>The Mindful Twenty-Something</i> Part 3
Week 3	Koru Basic Week 1 Koru Basic Week 2	Body scan Walking meditation	<i>The Mindful Twenty-Something</i> Part 4 Koru Basic Week 1 reflection due ^a
Week 4	Koru Basic Week 3	Gatha Guided imagery Labeling thoughts	<i>The Mindful Twenty-Something</i> Part 5 Koru Basic Week 2 reflection due ^b
Week 5	No class (holiday)		
Week 6	Koru Basic Week 4	Eating meditation Labeling feelings	Real Happiness pages 1-34 Koru Basic Week 3 reflection due ^b Presentation topic proposal due
Week 7	Koru 2.0 Week 1	Ocean breathing Chair yoga Gatha	Real Happiness pages 35-105 Koru Basic Week 4 reflection due ^b
Week 8	Koru 2.0 Week 2	Chair yoga Loving kindness meditation	Real Happiness pages 106-180 Koru 2.0 Week 1 reflection due ^b
Week 9	Koru 2.0 Week 3 (silent retreat)	Review of practices learned in other sessions including guided meditations, yoga, dharma talk, eating meditation, walking meditation	Real Happiness pages 181-end Koru 2.0 Week 2 reflection due ^b
Week 10	Koru 2.0 Week 4	Chair yoga Open awareness	Koru 2.0 Week 3 reflection due ^c
Week 11	Off for retreat		Koru 2.0 Week 4 reflection due ^b
Week 12	Student presentations		
Week 13	Student presentations		
Week 14	No class (holiday)		

^a Reflection questions: Reflect on and write about the reason that you enrolled in this elective. What are you hoping to gain by the end of the semester? How committed are you to this change?

^b Reflection questions: Reflect on how your practice went overall this week. What did you experience? How did you incorporate the ideas we discussed in class? Consider the following: Progress with your practice; The attitudes of mindfulness.

Choose a quote or an excerpt from the required reading for this week that spoke to you. What was it about this quote or excerpt that you liked or didn't like? How might you apply this to your own life?

^c Reflection questions: Reflect on how the retreat went for you. What did you experience? How did you incorporate the ideas we discussed in class? Include the following: Progress with your practice; The attitudes of mindfulness.

and participation. Participants completed weekly reading assignments and a minimum of 10 minutes of home mindfulness practice, at least five days per week (see schedule in Table 1). The protocol for this study was approved by the university’s institutional review board.

Participants responded to eight open-ended reflection prompts over eight different weeks during the 14-week semester. We analyzed 176 anonymous responses from 22 participants by iterative coding and thematic grouping into categories. This resulted in four broad categories and multiple subcategories; the four broad categories included emotions/feelings, time/time management, academics, and meditation/mindfulness practice. One investigator added these categories to the Text iQ text-analysis tool in Qualtrics (Qualtrics International Inc), where the students’ deidentified, open-ended, reflections were housed.¹⁸ This software provided a quantitative representation for these qualitative responses. That is, Text iQ provided the number of responses in each category, a method that has previously been used successfully for analyzing qualitative data.^{19,20} All investigators then performed an inquiry audit to establish dependability of the findings through a review and examination of all open-ended reflections with their coded topics/categories. Finally, the Text iQ technology provided a sentiment score that ranged from -2 (very negative) to 2 (very positive) based on the emotion of the provided reflection; this created a sentiment score per reflection and an overall mean sentiment score for the topic/category. These sentiment scores were summarized as weekly mean sentiment scores (Table 2). A Welch analysis of variance (ANOVA) with a Dunnett post hoc test was conducted in GraphPad Prism 8.0 (GraphPad Software LLC) to determine whether these weekly means differed; a *p* value of $\leq .05$ was considered statistically significant. The percentage of comments/reflections for each week that were assigned very positive and positive, neutral and mixed, or negative and very negative scores by Text iQ were also tabulated and analyzed using repeated measures ANOVA in Graph Pad Prism 8.0 to determine whether there were differences between weeks; a *p* value of $\leq .05$ was considered statistically significant.

RESULTS

This study included 22 pharmacy students in their second professional year who were enrolled in a mindfulness elective course. Analysis of the weekly mean sentiment score showed a significant difference between weeks, with the baseline mean (week 1) being the lowest (Table 2). Post hoc comparisons of weekly mean sentiment scores yielded no significant results. When analyzing the percentage of responses in each sentiment category

Table 2. Mean Sentiment Scores and Percentages of Reflections Within Each Sentiment Score Category by Week

	Week 1: reason for taking course	Week 2: reflection Koru Basic	Week 3: reflection Koru Basic	Week 4: reflection Koru Basic	Week 5: reflection Koru 2.0	Week 6: reflection Koru 2.0	Week 7: reflection on retreat	Week 8: reflection Koru 2.0
Reflection sentiment score, mean (SEM) ^a	0.32 (0.14)	0.50 (0.17)	0.91 (0.19)	0.92 (0.12)	0.96 (0.15)	0.63 (0.18)	0.67 (0.14)	0.75 (0.09)
Reflections by sentiment, percentage of weekly total, ^b %								
Very positive and positive	30.0	61.9	56.5	37.5	82.6	70.8	75.0	79.2
Neutral and mixed	70.0	38	43.5	62.5	13.0	20.8	25.0	20.8
Negative and very negative	0	0	0	0	4.35	8.33	0	0

^a *p* = .0037 via Welch analysis of variance (ANOVA).

^b *p* = .0049 via repeated measures ANOVA.

(very positive and positive, mixed and neutral, very negative and negative), a significant difference in percentages between the weeks was noted (Table 2). As seen in the table, week 1 reflections had the lowest percentage of positive reflections; other weeks had larger percentages in the positive sentiment group. Sentiment scores related to the four broad categories (emotions/feelings, time/time management, academics, and meditation/mindfulness practice) were analyzed, and no significant differences were seen between weeks. Student reflections revealed many benefits and challenges when implementing a regular and consistent mindfulness practice (Appendix 1).

DISCUSSION

To our knowledge, this is the first study evaluating the effect of a live mindfulness meditation course in PharmD students in the professional portion of the program. Small studies have demonstrated positive effects of mindfulness- and yoga-based interventions on stress levels in undergraduate pharmacy students.²¹⁻²³ Lemay and colleagues conducted a study that included 17 college students, nine of which were PharmD students, who participated in a weekly 90-minute yoga and meditation session for six weeks. Significant improvements were seen in students' anxiety and stress levels. O'Driscoll and colleagues conducted two separate studies evaluating the effect of a four-week mindfulness course at pharmacy schools in Ireland.^{22,23} Improvements in stress levels in undergraduate pharmacy students were observed when compared to the wait-list control group.^{22,23} Zollars and colleagues showed that the use of a mindfulness-based phone application for four weeks had a positive effect on pharmacy students' stress levels and well-being.²⁴ McGuire and colleagues did not demonstrate a significant difference in mindfulness after use of a phone application, although the study intervention consisted of only 10 meditations over 10 days.²⁵

The Koru Mindfulness program was developed and designed for emerging adults, which parallels the age of most college students. Previous studies have demonstrated the effectiveness of this program with regard to stress levels, self-compassion, and sleep after only four weeks of the Koru Basic program.^{14,17} This current study evaluated the student experience for the entire eight-week Koru program (four-week Koru Basic and four-week Koru 2.0).

Results of this study showed more positive comments in student reflections and increased sentiment scores after the first week. This may correlate to an improvement in well-being, as seen in the written comments. The increase in positive comments over the semester is particularly interesting because the stress level of pharmacy students

tends to increase over time.^{26,27} No significant difference was observed in the four categories analyzed, which may be due to the small sample size and lack of power. It is also important to note that students were not explicitly asked to comment on these categories; rather, these categories were determined by the investigators post hoc (see Table 1 for reflection questions). Direct comparisons of weekly sentiment scores did not yield significant differences; however, question prompts varied from week to week during the course, making it a false comparison. Interestingly, the percentage of very positive and positive comments identified in Koru Basic week 4 reflections was noticeably lower when compared to other weeks. Upon reviewing specific comments made this week, it was discovered that many students did not find that week's mindful eating exercise and homework to be as beneficial as other mindfulness activities.

There are a few limitations to this study. First, though quantitative scores can be assigned to qualitative comments, it is important to note that these scores reflect the investigators' coding of the reflections and the subsequent scores assigned by the natural language processing algorithms of Text iQ. Second, the study is retrospective; plans to evaluate student reflections were not made until the investigators began to notice the positive comments made in the weekly reflections. As such, validated survey tools were not used, and demographic data were not collected. Third, while longer than other studies on meditation and pharmacy students' stress, this study was short-term, lasting the duration of one 14-week semester. Whether students continued to use the mindfulness techniques they learned or whether the effects of these practices were short-term only is unknown. Fourth, it is possible that the increase in sentiment score seen over time was simply due to students feeling more comfortable with meditation practice. Finally, these results apply only to this specific cohort of students in an accelerated PharmD program and are not generalizable to all students enrolled in PharmD programs.

Future studies should evaluate the effect of mindfulness-based interventions in pharmacy students on quantitative outcomes using validated scales, such as the Perceived Stress Scale or the Five Facet Mindfulness Questionnaire. Academic performance and/or levels of burnout could also be quantified. Moreover, it would be helpful to follow students for a longer period of time to determine whether any incorporate mindfulness into their lives in the long-term, and, if so, whether these practices provide long-term benefits.

CONCLUSION

After students learned and incorporated mindfulness practices into their daily routine, the tone of their reflections

was more positive for the duration of one 14-week semester. Comments within individual topics were analyzed (emotions/feelings, time/time management, academics, and meditation/mindfulness practice); however, no differences in sentiment scores within these topics were seen over time. This is likely because reflection prompts were open-ended and there was a small sample size; hence, statistical power was lacking to find whether any difference exists. We suggest addressing these limitations through future studies using validated survey instruments and a larger sample size.

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Appendix 1. Select Comments from Reflections of Students in the Koru Course

Category(ies)	Direct quote
Emotions/feelings	
Reflection sample 1	“When I first started this class, I didn’t think it would impact my attitude that much, but I have noticed a huge difference on how I handle certain situations and how I deal with my emotions. This change has only happened within a couple of months of meditation. I am looking forward to continuing to practice and see more positive changes.”
Reflection sample 2	“This was possibly the most relaxing week I have had since starting the accelerated PharmD program. I can confidently say I contribute that to the Koru mindfulness course. Now that meditation has become a part of my daily routine, I typically start the day with a more positive outlook.”
Reflection sample 3	“I am more patient with myself, especially when things don’t turn out how I expect them to when previously I would have been disappointed with myself. I am more accepting of what I otherwise would overthink about. Being more accepting has helped me greatly in finding peace in my heart.”
Emotions/feelings and academics	
Reflection sample 1	“Going into this semester, I knew that adding meditation to my daily schedule would have some changes on my mood, but I never expected loving it this much. This feels like one of our hardest semesters so far, yet my grades are better than usual and I feel a lot less anxious about school.”
Reflection sample 2	“I feel more at peace, less stressed about exams I have coming up. I feel happier living alone and not sad about it. I embrace the alone time I have because it makes me appreciate others around me more.”
Reflection sample 3	“This week was a great week for me, one of my best weeks I’ve had ever. I got straight As on all of my exams this week and on my quizzes. I was so happy and at peace with my improvement in school and I know it has to do with meditating. I always meditate before an exam which will gets me focused for the exam. I can’t even describe the joy I have right now. I truly am astonished how meditation has really helped improve my life in all aspects. I am excited to see where this journey will take me.”
Reflection sample 4	“Although it’s impossible to stay in the present 24/7 I have noticed that I am more aware of my surroundings more and my emotions. The other day for instance, I was able to deal with a situation that upset me in a more peaceful way When I was taking the exam I realized that I wasn’t as anxious and I was able to concentrate more. Doing a meditation exercise right before an exam helps me a lot in focusing more and not feeling as nervous that I will do bad. I have more confidence actually.”
Academics	
Reflection sample 1	“I really like the meditation class. my productivity has increased, and I am able to focus more. My grades have also improved, and I am happy with that.”
Reflection sample 2	“With two exams this week I took advantage of the new practices we learned in class and incorporated them into the morning of. I was able to take the exams with a clear, focused mind, reaffirming myself of the present without feeling a sense of urgency to rush through.”
Reflection sample 3	“Last week during class a student talked about how she meditated after exams to help her not worry/stress about her grade and the answers that she put. I tried that this week after the Therapeutics exam. It actually really helped me, post exam. When we can review the exam that’s the part where I tend to beat myself up a lot because it makes me mad that I overlooked one small detail or just read the question wrong, and I get it wrong. It can get very frustrating but meditating after helped me stay grounded and let it go.”

(Continued)

Appendix 1. (Continued)

Category(ies)	Direct quote
Time/time management	
Reflection sample 1	“Some people may think that 15 minutes is too much time wasted on meditation but is not. Mindfulness can be seen as the gym for your mind and if you think about it, 15 minutes in 24 hours is nothing. I noticed that by just adding five minutes to each session I have been able to focus more on what I am doing. For example, next week I have a huge exam with too many chapters and confusing topics but instead of thinking about all de material I just close my eyes and breath. After that I just focused myself in one chapter and I stopped thinking about the rest of the material for that present moment.”
Meditation/mindfulness	
Reflection sample 1	“Something turned out not how I expected, but instead of being very upset, I thought very reasonably about it and calmly told myself that some things are out of my hands (instead of blaming myself) and that I did my very best. As a result, I did not dwell on it as much I would have before.”
Reflection sample 2	“At the start of the class, I was doing some work on myself, and now I have shifted it so that I am working with myself. I am not as unforgiving or hard on myself, I have learned to let things go, as well as becoming more accepting not only of others, but also of myself.”
