

## LETTER TO THE EDITOR

### Response to Letter to the Editor Commenting on “Impact of a Yoga and Meditation Intervention on Students”

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*To the Editor:* As a result of the COVID-19 pandemic, and the increase in stressors and uncertainty, mindfulness and coping strategies are essential components to support well-being. Thus, we are grateful for the opportunity to continue the conversation regarding yoga, meditation, and mindfulness in reducing stress and anxiety in college-aged students by responding to Léonard and colleagues.<sup>1</sup>

First, we concur with Léonard and colleagues that additional study interventions would have been ideal. In our manuscript, it was not feasible to extensively describe the specific contents of the yoga sessions. As stated in the Methods section, the intervention consisted of a 60-minute vinyasa yoga class followed by a 30-minute guided meditation.<sup>1</sup> Vinyasa yoga, commonly referred to as “flow” yoga, is distinct from other styles of yoga, such as yin, hatha, and restorative. Common in the United States, vinyasa yoga classes are composed of a unique sequence of postures, transitioning smoothly from pose to pose. Our classes, or protocols, included thoughtful sequencing of postures reflective of vinyasa yoga classes that are readily available to the public and taught by Registered Yoga Teachers (RYT 200), as was our yoga instructor who had over a decade of practice experience. Quality check procedures would have been ideal to implement in a larger study if such valid assessments existed for this intervention. However, with such a small sample, we would not be able to exclude data points if found to be invalid through such an assessment. We agree that more attention could have been paid to metrics for feasibility; however, we were successful in recruiting participants, implementing the intervention, and collecting outcome data. Therefore, the entire project and process is a demonstration of feasibility of this type of study at the University of Rhode Island, College of Pharmacy (URI COP); thus, we refer to this as a pilot study.<sup>2</sup> Last, we agree that future research should include a control group that is comparable to the intervention group, ideally with assignment to the intervention and control groups randomized. Given that this pilot study was focused on feasibility and examining preliminary results from a small

sample, we did not have the resources to recruit a larger sample and randomize participants to intervention and control groups.

Several points stated by Léonard and colleagues were valuable to clarify the study and statistical design; however, many points were not accurate. First, Léonard and colleagues repeatedly referred to “both yoga instructors,” and further stated, “Moreover, both instructors did not receive the same yoga training, which might have biased the procedures and affected the internal validity, as it is unclear whether the instructors disseminated the same yoga routine (eg, postures, time holding the postures, etc),” yet we clearly stated in the Methods section that our yoga intervention was delivered by one RYT 200 and our meditation intervention was delivered by a Shambhala Path Meditation instructor, two distinct individuals, thus negating this critique.<sup>1</sup> Next, Léonard and colleagues raised concerns about the external validity of our study. In the original publication, we made limited claims about external validity (ie, generalizability) of our findings.<sup>3</sup> In fact, we agree the results may not be generalizable beyond our institution (URI COP). In a future study, participants could be obtained from different types of higher education settings, thereby addressing the impact of the intervention in different populations. Alternatively, in a larger sample, we could employ methods to generalize within-trial estimates to specific target populations of interest. Furthermore, quality check procedures would not improve external validity, but could improve internal validity if a valid procedure were developed for this intervention. Third, Léonard and colleagues stated a lack of adjustment for confounding; however, our approach adjusts for confounding by using a pre-post analysis. Time-invariant confounding is subtracted out by the individual level differencing, and each person serves as their own control.<sup>4</sup> In this short follow-up period, temporal trends are less of a concern. The sample size was limited such that we were not able to run models that further adjusted for measured covariates. Regarding social desirability bias, we evaluated changes from pre to post intervention, so the impact of social desirability bias could impact both measures and possibly cancel out in the difference measures employed in the analysis. Léonard and colleagues questioned our hypothesis that students may experience higher levels of stress during final examinations, yet if true, this would have only attenuated our results towards

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the null. With regard to statistical power, Léonard and colleagues provided a power calculator for a four-arm study and their choice of statistical test was not clear. In this study, if power calculations were performed, these should be based on exact statistical tests, given the small sample size. However, because the analysis was for the purpose of generating hypothesis and providing preliminary estimates for an adequately powered future study, we did not perform power calculations for our study. Nonetheless, we employed statistical tests and procedures that provide valid statistical inference for small samples. For statistical tests, we performed exact tests, which are statistically valid for this type of study data and sample size. Due to the small sample sizes, the study may have been underpowered, thus, we acknowledged this point in the Discussion section.<sup>1</sup> Last, Léonard and colleagues stated we did not report effect sizes; however, we reported the effect sizes as differences in means (post-scores minus pre-scores). Of note, their statement, "Lastly, although the results were statistically significant, the effect sizes were not reported, keeping us from knowing whether the decrease in symptoms was clinically significant," does not reflect what was published in our manuscript.

Although we appreciate the professional dialogue on methodology, it is imperative to remain focused on the intent and beneficial outcomes of this research. Students exhibit high levels of stress and their progress towards wellness, including a reduction in stress and anxiety, is of paramount importance.<sup>5-10</sup> Our pilot study, termed SAMYAMA, was born from a sincere desire to create an environment where our students, faculty, and staff could practice mindfulness together. Secondary to existing literature supporting the benefits of mindfulness and our own grassroots research efforts, the URI COP has implemented a consistent yoga and meditation presence, including weekly drop-in guided meditation sessions since 2017, as supported by the American Association of Colleges of Pharmacy.<sup>1,11</sup> In spite of the COVID-19 restrictions, yoga classes have continued by using outdoor space and ensuring proper physical distancing, and meditative practices have been guided virtually using

online platforms. Creating a wellness culture to support students' well-being has strong potential for benefits in higher education and should not be discouraged nor restrained, but instead evaluated and adopted across university settings.

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