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"Awareness is the first step": An interprofessional course on mindfulness & mindful-movement for healthcare professionals and students

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ABSTRACT

High levels of stress and related burnout in healthcare professionals (HCPs) are prevalent and costly conditions. Mindfulness training has received recent attention as a possible prevention/intervention strategy to enhance resilience to stress and reduce risk of burnout in HCPs. The purpose of this mixed-methods pilot study was to evaluate the preliminary feasibility, acceptability, and preliminary effects of an 8-week mindfulness curriculum for interprofessional HCPs and trainees (n = 27). Qualitative findings supported feasibility and acceptability of the course for a wide variety of HCP disciplines, including nursing, dentistry, medicine, pharmacy, social work, mental health, and clinical research. Despite being limited by a small sample size, there were statistically significant reductions in perceived stress, anxiety, and specific aspects of burnout from pre-to post-intervention and there was a trend in an enhanced sense of personal accomplishment over time.

1. Introduction

High levels of stress and related burnout in healthcare professionals (HCPs) are prevalent and costly conditions. Although definitions vary, burnout is typically considered to be the combination of emotional, physical, and mental exhaustion accompanied by disengagement with work activities and decreased work-related effectiveness, all of which occur as a result to prolonged stress exposure [1–4]. Stress and burnout are associated with poor job-related performance including sub-optimal patient care, decreased patient satisfaction, and errors in patient care. Further, high levels of stress and burnout carry negative sequelae for HCPs' personal mental and physical health as well as for effective functioning within the healthcare team and system. From the perspective of a patient or a provider, these sequelae are unacceptable because of the individual health impact. Further, from a health systems' perspective, these sequelae can be hugely detrimental to effective and financially-viable functioning of a system which depends upon cost control and effective use of limited resources.

Burnout is experienced by HCPs of all types, including professionals and trainees in nursing, medical, dental, and other allied health fields. Studies suggest that up to 70% of nurses experience burnout and/or compassion fatigue (feelings of helplessness or anger in response to patient-related stressors) at some point [5–8]. Dentistry and oral and maxillofacial surgery, in particular, have also been identified as health care fields to be at particularly high risk of burnout [9,10], and often this is considered to be related to a decreased satisfaction from their work often triggering early retirement [11,12]. Likewise, burnout in mental health professionals have been documented in the average to moderate ranges, with high levels documented in students/trainees [13–15].

Burnout occurs most often because HCPs experience high levels of stress which may exceed the personal or system resources

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available to manage that stress. An extensive literature describes potential causes of HCP stress, from heavy workload and difficult patients, to moral distress, to personal stressors, to system-level issues, to length of time in a position, and more [1,16–19]. No matter the cause, prolonged exposure to high levels of stress can cause allostatic overload, or the cumulative wear and tear that is induced by dysregulated physiological stress management reactions, leading to degradations in mental and physical health [20,21]. The degree to which an individual perceives that stress to be significant and whether s/he has perceived control over the situation is highly relevant to whether negative sequelae occur [22]. Hence, in order to prevent adverse sequelae, interventions must impact an individual's perceptions of available coping abilities [23].

2. Background

Enhancing HCPs' resilience to stress is of utmost priority in order to prevent negative sequelae of stress and burnout. Prevention/intervention strategies for this prevalent and costly condition warrant close attention. Because burnout does not typically develop acutely but rather develops over a prolonged period of stress-exposure, there are multiple opportunities to prevent/intervene in order to enhance HCPs' resilience to stress and ultimately prevent burnout. Rates of burnout are correlated with working conditions on clinical units and higher performing clinical areas tend to be more collaborative [24,25]. It is imperative that interprofessional research identifies ways for HCPs to strengthen their internal environment, and thus their resilience and adaptation to the stressful world around them. Suggested prevention/intervention strategies for HCP stress and burnout include those which impact both individual-level and organization-level stress management, such as integrated approaches which normalize the experience of stress among all HCPs and create a culture of openness and understanding [26].

Mindfulness training has received recent attention as one such prevention/intervention strategy for clinical populations and HCPs to enhance resilience [27–29]. Mindfulness is typically defined as non-judgmental present-focused awareness [30] and has been linked to reflective practice by clinicians [31]. Mindfulness is practiced by focusing on a specific present-moment stimulus, often the breath, guided imagery, mantra, or sound/word repetition, or through gentle body movements (e.g., yoga, Tai Chi). Mindfulness appears to be highly correlated with resilience [32]. Mindfulness curricula, such as mindfulness-based stress reduction, has received attention for its moderate effects on stress, depression, anxiety, and quality of life in healthy populations [33]. Several studies preliminarily support the use of mindfulness training to improve resiliency and decrease burnout in healthcare providers both at the training level and in practicing clinicians [34–36]. Mindfulness is conceptualized as a phenomenological state in which the practitioner is able to direct attention – inhibiting attention on past or future thought processes (e.g., ruminations and worries), by bringing attention to the object of focus. Theoretically, this self-regulation ability is thought to improve resiliency by reducing depressive rumination and anxious worrying, thereby leading to positive downstream effects, such as more cognitive resources for task attention, positive regulatory processes, and improvements in self-efficacy and motivation [37]. In addition, the practice of mindfulness may increase resiliency by improving the biological responses to stress [38]. Specifically, mindfulness training may lead to decreases in markers of physiological arousal (e.g., cortisol) in response to stress and may return the practitioner to baseline more quickly following a stressor, therefore reducing the negative effects of chronic stress [39–41]. Finally, mindfulness training has multiple clinical applications [42], hence clinicians may wish to learn applications of mindfulness not only for personal wellness but also to apply in clinical settings with patients.

In particular, mindful movement may be particularly helpful in improving resiliency in novice practitioners and highly stressed populations. It has been theorized that yoga, as an example of mindful-movement, has positive effects by way of integrating bottom up and top down stress-regulation via bidirectional feedback and interoceptive (i.e. both physical and emotional/cognitive) processes [40,43]. Specifically, the incorporation of rhythmic breathing practices, gentle movements, and guided relaxation with the practice of seated meditation may lead to greater interoceptive awareness and control (bottom-up regulation), and the practice of movement in particular may lead to greater physical awareness and self-efficacy (top-down regulation) [40,43]. These influences may produce synergistic effects as self-regulatory processes integrate, improving physiological and psychological health. There is compelling evidence in support of mindful-movement interventions for reducing stress and stress related outcomes [29,42,44]. Of note, recent studies have investigated the effects of a mindful-movement intervention on measures of burnout in medical students [45] and nurses [46]. While these interventions were similar to the current intervention, they did not include didactic on the application of mindfulness to specific stressors faced by clinicians, nor were they tailored to an interprofessional group of HCPs. However, those previous studies provide compelling evidence to suggest that a mindful-movement intervention specifically tailored to HCPs and HCP trainees may have positive effects on HCP-specific burnout. With a limited but promising evidence based for interventions related to mindful practice, further careful study is needed to define the content, dose, timing, and format of effective interventions.

The purpose of this study was to evaluate the preliminary feasibility, acceptability, and effects of an 8-week mindfulness curriculum for interprofessional HCPs and trainees. Using interprofessional education competencies and based upon foundational mindfulness and yoga literature, we have developed a course on mindfulness combined with mindful-movement for HCPs and trainees. The course was purposefully designed to use an interprofessional approach to enhancing mindfulness and stress resilience, given that most HCPs practice in an interprofessional environment. This study evaluates the following research aims [1]: explore the feasibility and acceptability of a mindfulness class for HCPs and HCP trainees; and [2] evaluate levels of and changes in psychological measures including depression severity, stress, anxiety, ruminations, emotional exhaustion, burnout, and perceived personal accomplishment in those who participated in the mindfulness for HCPs course.

3. Methods

3.1. Methodology/research design and ethical considerations

This study used a within-group repeated measures design to investigate the effects of a newly developed 8-week mindful-movement based intervention for HCPs and HCP trainees. Following approval by the Virginia Commonwealth University Institutional Review Board, data was collected from HCPs and HCP trainees who participated in the author-led 8-week mindfulness course at some point between September 2014 to May 2016. All participants were told that their participation was completely voluntary and provided informed consent. The intervention course was offered in an 8-week session, meeting once per week for 2 h. Intervention sessions were held in university rooms and participants were asked to bring a yoga mat to each session.

With regards to intervention development, our interprofessional team (PK: PhD-prepared nurse scientist; GD: oral-maxillofacial

surgeon; SB: clinical psychology PhD student) used a collaborative process to design and develop the 8-week mindfulness curriculum. The course was designed using a wide variety of material including but not limited to mindfulness-based texts and workbooks [47,48], extant literature previously noted, and numerous online resources, such as mindfulness-based applications for smartphones [49] and mindfulness-based worksheets [50,51]. Great lengths were taken to create didactic and small group discussions relevant to a broad and heterogeneous group with respect to chosen vocation and experience level. The course was designed to incorporate a variety of mindful practices and movement-based practices in order to provide students with a variety of experiences from which to draw. Course objectives and activities were in alignment with the core interprofessional education competency whereby students should "work with individuals of other professions to maintain a climate of mutual respect and shared values" [52].

3.2. Data collection and analysis

The first aim of this study was to evaluate the feasibility and acceptability of an 8-week mindfulness curriculum for interprofessional HCPs and trainees. To collect data for this aim, at the end of the course participants were asked to provide responses to open-ended questions about their experiences with the curriculum. Questions included [1]: what did you expect to gain by taking this course [2]; what has been most valuable about taking this course [3]; what has been least valuable about taking this course; and [4], do you expect to incorporate what was learned from this course into your future practice as a healthcare professional? To analyze this research aim, the written qualitative data were analyzed through content analysis based on descriptive qualitative methodology in the manner of a hermeneutic circle [53–55] in which the following iterative steps were used: read the written surveys to get an overall sense of the data, identify possibly relevant quotes from participants, re-read the surveys to confirm that the quotes were appropriately derived from the context, group quotes into categories based upon similarities, re-read the data, and ultimately identify themes and subthemes to examine and interpret. The major themes that arose were compared to the literature and were used to construct a coherent picture of participants' general experiences with the intervention. In order to enhance rigor, the following methods were used: to ensure dependability, a colleague unrelated to the study reviewed the data and confirmed themes that were identified by the authors; and, to ensure confirmability of findings and avoid researcher bias, all decision-making about participant quotes and theme development was documented by the authors and the documentation was evaluated by a colleague unrelated to the study. Mention of adverse events was also noted by authors reviewing quotes from participants.

The second aim of this study was to evaluate levels of and changes in psychological measures including depression severity, stress, anxiety, ruminations, emotional exhaustion, burnout, and perceived personal accomplishment in those who participated in the mindfulness for HCPs course. To collect these data, participants completed basic demographic questionnaires at baseline and completed the following measures at baseline and at the end of the 8-week intervention course: (a) *Depressive symptom severity*: Depressive symptom severity is evaluated using the Patient Health Questionnaire (PHQ-9), a widely used instrument which has been validated with a variety of populations [56,57]. The PHQ-9 includes self-report items regarding depressive symptoms over the past two weeks. Total scores range from 0 to 27: 0–4 indicates minimal depression, 5–9 mild depressive symptoms, 10–14 moderate depressive symptoms, 15–19 moderately severe depressive symptoms, and ≥20 severe depressive symptoms. (b) *Stress*: The Perceived Stress Scale-10 (PSS-10) is a widely used, psychometrically sound instrument which assesses the degree to which a participant perceives stress in his/her life during the past month [58–60]. The PSS-10 asks respondents to report about feelings such as unpredictability, uncontrollability, and overloading of stress in their lives; scores range from 0 to 40; higher scores correspond to a higher perceived stress level. (c) *Anxiety*: Current levels of anxiety ("state anxiety") is evaluated with the State-Trait Anxiety Inventory, Form Y (STAI). This study focuses specifically on state anxiety, as this is more likely to demonstrate change within an intervention period [61]. This measure yields reliable and valid scores [62]; the STAI scores range from 20 to 80, with higher scores representing higher levels of state anxiety. (d) *Rumination*: Rumination, or repetitive self-critical thinking, is evaluated with the 10-item Ruminative Responses Scale (RRS) which assesses the propensity to ruminate in association with sadness or depression. A psychometrically sound and widely used instrument, the RRS asks respondents to rate how often they experience various aspects of rumination [63]. The RRS has two factors of brooding (self-critical pondering) and reflecting (emotionally-neutral pondering or brainstorming). (e) *Burnout*: The Maslach Burnout Inventory- Human Services (MBI-HS) survey measures burnout in three domains: emotional exhaustion, depersonalization, and lack of personal accomplishment [64]. The MBI is a 22-item measure asking respondents to rate the frequency of several feelings and experiences on a 7-point Likert scale ranging from "never" to "daily." This instrument is the gold standard for measuring burnout in medical professionals and is well validated in this population [65–67]. For analysis of this second research aim, paired t-tests were used to compare levels at baseline and at the end of the 8-week intervention for those who completed both questionnaires. All quantitative analyses were completed in SAS EG v6.1 with a 0.05 significance level and 0.10 marginal significance level.

4. Results

4.1. Sample

Of the forty-nine HCPs and trainees who participated in the mindfulness course, thirty-eight consented to participate in the research regarding the intervention course, all of whom completed the 8-week course. Although 100% completed the course, twenty-seven participants completed both the baseline and end-of-intervention questionnaires thus are included in the data analysis. Reasons for non-participation were not solicited from those who declined participation in the study. Fig. 1 demonstrates the CONSORT diagram for participants. Table 1 depicts the demographic characteristics of the participants at baseline. The majority of participants were female, white, and either currently in graduate school or had finished graduate school. Not all participants indicated their current healthcare professional field. Of the participants who did indicate this information at the baseline, the majority were in the nursing discipline, with the rest in dentistry, psychiatry/psychology, social work, medicine, pharmacy, and clinical research.

4.2. Findings: feasibility and acceptability

In order to determine feasibility and acceptability, data on registrants for the intervention course was analyzed. Although only 27 individuals completed the study-related surveys and were included in the analysis, a total of 49 individuals self-enrolled for the course with a 100% retention rate for the duration of the 8-week course, which suggests preliminary feasibility and acceptability.

Qualitative data from study participants after their completion of the 8-week intervention were analyzed for common findings.

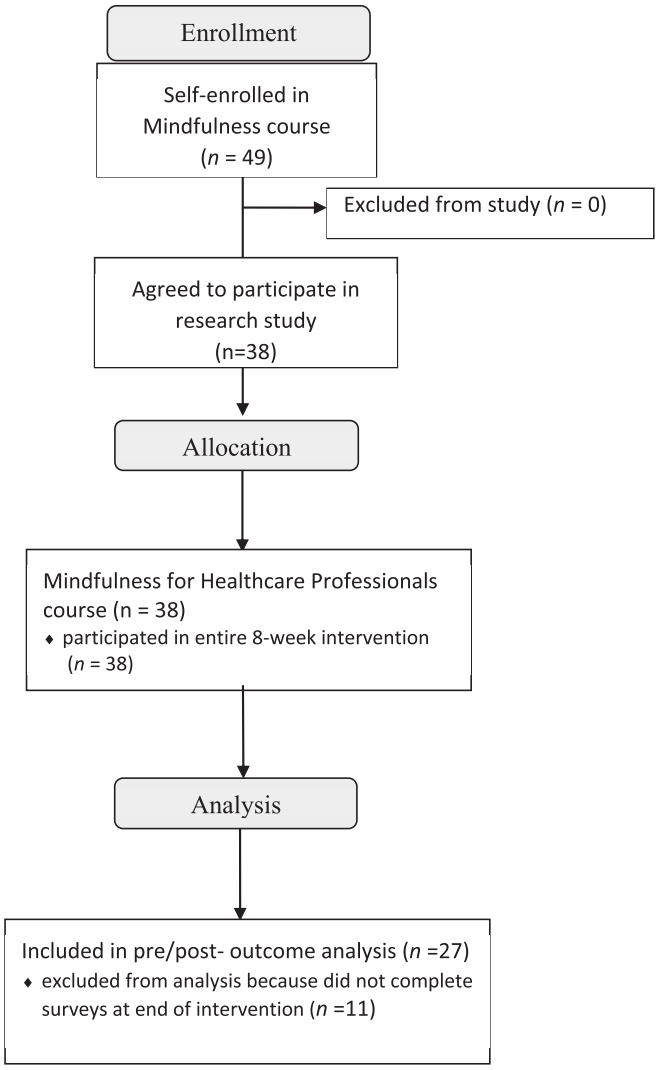

Fig. 1. CONSORT diagram.

These post-intervention surveys revealed three common themes [1]: participants signed up for the course with the expectation to gain self-care skills in an interprofessional setting and to learn methods to teach to patients [2]; participants reported an increased comfort with incorporating personal mindfulness practices into daily life; and [3], participants consistently reported plans to use mindfulness with their patients in the future. No mention of adverse events was noted. Quotes from participants are presented to support and elucidate these themes.

The first common theme was that almost all of the participants reported that their reasons for enrolling in the course were two-fold: to gain skills in self-care/personal balance and to learn skills to assist their patients. One participant summarized her expectations as follows: "*As a nursing student, I was hoping this course would assist me in working towards leading a more balanced lifestyle under pressure while also giving me tools and ways to incorporate these practices that I have benefited from so much into my day to day patient care.*" Many participants claimed that they had a general understanding of mindfulness prior to the course but that they elected to take the course because they didn't know how to apply it in everyday life, as reflected in another participant's comment: "*I never really knew what 'mindfulness' was in the sense of the word and what it looks like in everyday situations and the healthcare setting.*"

Table 1
Baseline demographic characteristics of participants.

	Participants ($n = 27$) mean (SD) or n (%)
Age	33.7 (15.6) [range 19–63]
Female	21 (78%)
White (non-Hispanic)	25 (93%)
Education	
High school degree	5 (19%)
College degree	11 (41%)
Graduate degree or currently in graduate school	11 (41%)
Marital/Partner status	
Single/divorced	16 (58%)
Married/partnered	11 (42%)
Employment status	
Full-time work	15 (56%)
Student/part-time work/no work	12 (44%)
Have children	6 (22%)
Currently exercise	23 (85%)
Currently practice yoga	9 (33%)
Currently practice meditation	9 (33%)
Currently use prayer	8 (30%)
Self-identified healthcare discipline	
Nursing	12 (44%)
Dentistry and medicine	4 (15%)
Psychiatry/Psychology/Social work	5 (19%)
Other: radiation, clinical research, pharmacy	3 (11%)
Undisclosed discipline	3 (11%)

Another participant admitted that his expectation of the mindfulness course was to teach him "*learn how to incorporate it with my patients*" although ultimately the most important lesson was that he needed to practice mindfulness in his personal life. Finally, a number of participants suggested that they also enrolled in the course in order to engage in interprofessional activities outside of the "traditional" setting. For example, one participant stated: "*I joined this course mainly because I love all things interprofessional … it was awesome that a mindfulness course, especially, was offered to multiple health care disciplines.*" Another participant reflected that "*stepping outside the confines of the lecture halls and hospital rooms has been both a relief and a blessing*" reflecting other participants' comments that learning mindfulness skills outside of the "traditional" setting was highly valuable.

The second common theme in the qualitative data was that participants enhanced their comfort with incorporating mindfulness practices into their daily lives by the end of the course. Many participants expressed a common surprise that "*you can be mindful anywhere at any time, when before I thought that you had to be in lotus position in a quiet secluded area*". One student suggested that the course enhanced "*my ability to incorporate what I've been learning in more formal environments into my day-to-day experience and interactions*" and another suggested that "*I've felt a sense of awakening in how to incorporate what I've learned formally into my daily life and interactions*". Participants expressed great appreciation for having learned practical tools "*to be more compassionate to myself as well as the ones I interact with throughout life*". One participant provided a summary of mindfulness as an important daily life skill, stating "*I am able to substantially improve my quality of life on a daily basis and over time; I think the cumulative effect is really making a positive impact in my health and well-being*". A few participants honestly reported that, despite having low expectations for outcome of the class, they ended up being pleasantly surprised with the personal benefits. One participant related a story about a recent chemistry test: "*It must be said again that I did not going into this class expecting much so when I read [the research on mindfulness] I wasn't at all convinced. That being said, before my last chemistry test I decided to do some deep breathing and found my*

performance to be markedly improved– so that erased such doubt." Participants consistently suggested that they saw "*major changes in how stressful situations*" are handled when they used daily mindfulness practices. Many participants reported that the course was most successful because each weekly class combined didactic content and actual practice of specific mindfulness techniques, including yoga. This sentiment is reflected in one participant's summary of the class: "*Taking a few hours out of the week to discuss meaningful topics in class and then practicing what we talk about (ex. balance, self-compassion, etc.) during the yoga portion has been the most valuable part of taking this course*." Another participant stated that "*the breathing/yoga/meditation exercises relating to the topics helped me put my knowledge into movement and physical mindfulness*". Participants suggested that tying together the theory of mindfulness and specific mindfulness practices allowed them to "*recognize how necessary balance was*" and assisted them to make "*self-care a priority*".

The third and final theme in the qualitative data was that participants consistently expected to use mindfulness practices to benefit themselves and their patients in the future. Some participants had already started using mindfulness during patient care, as reflected by one participant's comment that "*being present during patient interactions has allowed me to better provide care and to achieve a greater sense of fulfillment under these roles*." Another participant reflected that various mindfulness practices have already allowed her to "*stay in the moment*" during clinical encounters:

> *Old behavior would have me worrying about how many patients are stacked up and waiting for me and my focus would be how far behind I'm running in my schedule. I have been able to be mindful of staying in the moment and actually feel that it has INCREASED my ability to move through a patient encounter faster and my patients seem to be happy and satisfied. By staying in the moment I'm finding that I am dialoging the entire time I'm with the patients and I'm able to gather information, process and come up with my treatment plan faster, and I am perceiving an increase in my patient's satisfaction for sure.*

The majority of participants reported plans to use specific techniques in the future. For example, one participant stated that "*I could imagine introducing basic techniques such as breathing exercises, and using awareness of the present moment to work towards altering [a patient's] perception of pain*"; another participant gave an even more specific example that "*I will use 'stop, breathe, and be' or some other grounding exercise before meeting with my clients. I will also, because I work with traumatized youth, try to help them with grounding exercises*". Participants reported that increased comfort with the practices on a personal level has increased their comfort with recommending practices to their patients. For example, one participant revealed that "*I am a huge advocate for these practices because I know how it helped me with control of anxiety and depression*"; another participant revealed that "*baby steps like deep breaths in the morning have helped me*" and she would encourage her patients to start with those simple practices as she did. Another participant summarized the benefit of mindfulness practices that "*awareness is definitely the first step*" both in one's personal life and professional life.

4.3. Findings: preliminary effects

Table 2 presents the overall average scores (and standard deviation) for each of the psychological measures of interest in the study at both the baseline and the end of intervention. Among the 27 participants who participated in the assessment at both baseline and end of intervention, paired t-tests were used to determine if there was evidence an individual's scores differed between baseline and end of intervention; p-values are presented in Table 2. On average, the observed change in the pre/post intervention scores for many of the key measures was in the positive, or beneficial, direction (i.e., reduced stress and anxiety, reduced burnout, enhanced personal accomplishment). There was evidence of significant differences in paired scores for the Perceived Stress Scale (PSS), State Anxiety (STAI), Emotional Exhaustion subscale of the Maslach Burnout Inventory (MBI), and the Depersonalization subscale of the MBI (all p-values<0.05). On average, an individual's PSS score was 2.26 units (95% CI: 0.14–4.37) higher at baseline than at end of intervention, indicating lower stress at follow-up. The average reduction in state anxiety was 7.7 units (95% CI: 2.75–12.59). A reduction of 5.63 units in the Burnout- Emotional Exhaustion subscale (95% CI: 2.20–9.06) indicates lower emotional exhaustion (a feeling of being emotionally overextended by one's work) by the end of intervention; a 2.07 unit reduction in the Depersonalization subscale (95% CI: 0.53–3.62), indicates reduced depersonalization (sense of unfeeling or impersonal responses to patients in one's care) over time. Additionally, there was trend in difference in the Personal Accomplishment subscale of the MBI (p-value<0.10). On average, there was a 1.3 unit increase in the Personal Accomplishment subscale from baseline to end of intervention (95% CI: −2.83–0.24). There were no significant differences between those who completed the end-of-intervention questionnaires (n = 27) and the course participants who did not complete the questionnaires (n = 11).

5. Discussion

The findings from this pilot study provide preliminary support of the feasibility, acceptability, and effects of an 8-week mindfulness and mindful-movement course for HCPs and trainees. There was significant interest in the course, with 49 individuals self-enrolling themselves into the program. Although the response rate to the research questionnaires was somewhat low (55%), the 100% retention rate in participants over the 8-week course suggests both feasibility of the format and acceptability of the content,

Table 2
Study variables for completers from baseline to end of intervention (n = 27).

Study variable	Baseline mean (SD) or *n* (%)	End of intervention mean (SD) or *n* (%)	*p*	95% CI on the difference
Perceived stress (PSS)	23.0 (5.5)	20.8 (3.8)	0.0372	(0.14–4.37)
Depression (PHQ9)	5.3 (3.7)	4.3 (4.1)	0.188	(−0.52 to 2.52)
State anxiety (STAI)	39.5 (11.6)	31.9 (9)	0.0036	(2.75–12.59)
Ruminations (RRS)	15.8 (8.7)	15.5 (8.8)	0.7095	(−1.49 to 2.15)
Emotional exhaustion (MBI subscale)	22.5 (11.9)	16.9 (9.7)	0.0023	(2.20–9.06)
Burnout: depersonalization (MBI subscale)	6.3 (5.3)	4.3 (4.2)	0.0106	(0.53–3.62)
Personal accomplishment (MBI subscale)	37.5 (6.8)	38.8 (6.4)	0.0945	(-2.83–0.24)

Note: lower scores indicate decreased symptoms in the PHQ9, PSS, RRS, and STAI; in the personal accomplishment score of the MBI, a higher score indicates enhanced personal accomplishment.

particularly given that the majority of participants were naïve to mindfulness and mindful-movement. Findings from qualitative data supported the feasibility of an interprofessional mindfulness course, as demonstrated in participants' statements about personal and professional reasons for enrolling in the course. Qualitative findings also supported acceptability of the content, as demonstrated in participants' reports of comfort with daily mindfulness practices and their plans to use mindfulness in future clinical encounters. There were statistically significant reductions in perceived stress, anxiety, and specific aspects of burnout, including depersonalization (or lack of feeling towards the patients in one's care) and emotional exhaustion from pre-to post-intervention. There was a trend in participants' sense of personal accomplishment over time. There were no significant differences in ruminations or depressive symptoms over time.

The preliminary effects of decreased perceived stress, symptoms of burnout, and anxiety are consistent with other pilot studies of mindfulness and yoga for clinicians [68,69] and for clinical populations [42]. Mindfulness interventions consistently show positive effects in healthcare provider populations: Krasner and colleagues investigated a mindfulness intervention for physicians and found positive effects on several outcomes, including decreases in burnout [34]. Another study investigated a brief four-day mindfulness intervention for medical students and found significant decreases in perceived stress [70]. Similar to our intervention, Bond and colleagues investigated a mindful-movement training for medical students and found nonsignificant mean decreases in perceived stress [45]. A cross-sectional study by Olson and colleagues (2015) suggests that mindfulness and self-compassion are more related to resilience and burnout than measures of empathy and emotional intelligence [71]. A recent systematic review suggests that mindfulness-based stress reduction is helpful for emotional competencies in HCPs [72]. These findings, coupled with the results from our pilot study suggest that mindfulness interventions may reduce stress and burnout in clinicians. Furthermore, these findings demonstrate the acceptability of interventions of this kind for clinical populations. The extant literature investigating yoga-based interventions for clinical populations is even more robust. Yoga interventions have been shown to effect positive changes for individuals with depression, chronic pain, cancer, and insomnia [38,73–75]. Taken together, there is a compelling basis for the positive effects of mindful-movement, such as yoga, interventions on populations with varying presentations of stress.

The findings from this study are unique in the literature for two reasons. First, this course was purposefully designed to include both theory-driven didactic content as well as hands-on experiences of mindfulness-based movement practices, including yoga. As revealed in the qualitative data, participants consistently stated that their enhanced comfort with mindfulness in daily life was thanks to the fact that class time was used to tie together theory and practice of mindful movement. Participants expressed appreciation for the fact that the formal practice of mindfulness and yoga techniques were emphasized in our intervention. Although others have demonstrated the importance of formal mindfulness practice alongside informal practices [76,77] this intervention is unique especially in its targeted didactic for healthcare professionals, coupled with mindfulness and yoga practices. To our knowledge, this is the first intervention to target interdisciplinary HCP trainees using clinician-specific didactic coupled with gentle yoga and mindfulness practice. Further, participants frequently mentioned interest in the course for both self-care and for use in caring for patients. Adding content related to teaching mindful practices to patients is a reasonable next step, especially with increasing evidence of the benefits of mindful practice clinically [29]. Second, the findings from this study are unique in that the study sample consisted of wide variety of health care professional disciplines, including nursing, dentistry, medicine, pharmacy, social work, mental health, and clinical researchers. In the post-intervention surveys, participants consistently expressed an appreciation for the interprofessional nature of the course and the “non-traditional” approach of education. This approach is relevant for future applications because training interprofessional clinical teams to be more mindful might be an approach to strengthen interprofessional practice and enhance clinical outcomes by creating more mindful clinic units.

Despite the study's contributions to the literature about mindfulness and burnout in HCPs, there are limitations that warrant attention. First, the small sample size contributes to restrictions in data analysis. Due to the small sample size ($n = 27$), the confidence intervals are wide and potentially clinically significant differences are not statistically significant. For example, given the observed difference and standard deviation, the power for the paired comparison with the depression (PHQ-9) scale was calculated to only be 55%. Second, this study employed convenience sampling which yielded a higher percentage of individuals in the nursing discipline who completed the study-related questionnaires than in other disciplines, which may limit generalizability of findings. Future studies should use efforts to recruit all disciplines equally for data collection. Third, this was not a controlled study and, while differences in stress, symptoms of burnout, and anxiety may be related to participation in the mindfulness intervention, it is possible that the changes could be related to numerous unrelated factors including the natural variation in psychological states over time. Finally, although there were 49 individuals enrolled in the course, only 38 agreed to participate in research regarding the course and, of those, 27 completed all study-related questionnaires (55% response rate). Not only did this convey difficulty for data analysis, it raises the possibility of selection bias and suggests that researchers of mindfulness with HCPs must consider new methods for effective recruitment of HCPs and HCP trainees into research studies. However, despite the fact that only 55% of individuals engaged in the research about the course, it is encouraging that there was 100% retention rate in the course itself; this supports feasibility and acceptability of the intervention.

6. Conclusion

In conclusion this pilot study provides important preliminary findings particularly for faculty and administrators interested in reducing stress and burnout in their student and clinician populations by adding mindfulness content to current curricula or continuing education programs. In this pilot program, healthcare professionals and trainees reported finding the course to be an important adjunct to traditional healthcare provider training, filling a large void present in traditional curricula which largely avoids self-care topics. Students were overwhelmingly favorable in their reviews and the word spread quickly around the campus about the course and it's potential. Stress, burnout, and anxiety are commonly reported in health science students and there is attention being focused on how to best deal with increasing student resilience [71,78–80]. Our findings are consistent with other research about mindfulness and related courses which have been shown to increase medical students' self-regulation and self-compassion and improve well-being and attitudes associated with patient care [34,45]. Our interprofessional program lowered participants' stress and anxiety and reduced measures of burnout. This study contributes to the literature about the integration of hands-on formal practices of mindful-movement with didactic concepts in an

interprofessional setting and is encouraging regarding feasibility and acceptability of course content and delivery. Further study is warranted which involves larger sample sizes and control groups. Further course development should address HCPs' desire to apply their personal experience and knowledge of mindfulness to teaching skills to patients.

Conflict of interest statement

None declared.

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