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# Interventions to Reduce Perceived Stress Among Graduate Students: A Systematic Review With Implications for Evidence-Based Practice

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## INTERVENTIONS TO REDUCE PERCEIVED STRESS

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## Abstract

**Background:** Stress is a part of daily life for graduate students, including graduate nursing students. Contemporary graduate nursing students are facing unprecedented challenges to meet rigorous academic standards as they prepare for their advanced professional role to meet the demands of the nation's complex and ever-changing healthcare system (Baldwin, 2013, Kenty, 2000, Sochalski & Weiner, 2011). Empowering graduate nursing students to ease their perceived stress and minimize undesirable health effects may benefit their capacity to adapt and successfully manage perceived stress in their future healthcare role.

**Aim:** To conduct a systematic review to evaluate the existing evidence with the aim of identifying evidence-based self-care interventions for coping with perceived stress.

**Methods:** Systematic Review

**Results:** Eight studies meeting the criteria for this systematic review were critically appraised. The interventions varied from a stress management course to mind-body-stress-reduction (MBSR) techniques, such as yoga, breath work, meditation and mindfulness. All studies measured the outcome of stress with the Perceived Stress Scale. Each study demonstrated a reduction in perceived stress post intervention.

**Linking Evidence to Action:** Most effective self-care MBSR interventions include a) a didactic component, b) a guided MBSR practice session, and c) homework. Consideration should be given to a trained or certified MBSR instructor to teach the intervention.

*Keywords:* interventions, perceived stress, graduate students, systematic review, nursing, allied health

## **Interventions to Reduce Perceived Stress Among Graduate Students: A Systematic Review with Implications for Evidence-based Practice**

Stress is a part of daily life for graduate students, including graduate nursing students. Contemporary graduate nursing students are facing unprecedented challenges to meet rigorous academic standards as they prepare for their advanced professional role to meet the demands of the nation's complex and ever-changing healthcare system (Baldwin, 2013; Kenty, 2000; Sochalski & Weiner, 2011). Empowering graduate nursing students to ease their perceived stress and minimize undesirable health effects may benefit their capacity to adapt and successfully manage perceived stress in their future healthcare role.

Our graduate nursing students reached out to faculty and described their feelings of being overwhelmed, asking if this was normal, and asked for suggestions to handle the stress they were experiencing. As faculty in an academic setting which embraces an integrative health perspective, defined as:

...an approach that refocuses care on health and healing, appreciates the complexity of human beings, honors the innate ability of the person to heal, values the relationship between client and healthcare provider, is supported by evidence, and uses all appropriate modalities to facilitate healing (University of Portland School of Nursing Graduate Education, 2016)

we were intent to explore evidence-based self-care interventions that would mitigate perceived stress and support our graduate nursing students.

### **Background**

Too much stress, when an individual perceives itself to be overwhelmed, has deleterious effects not only physically, such as a weakened immune system (Cohen, Tyrell, & Smith 1993;

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McGregor, Antoni, Ceballos, & Blomberg, 2008), but also mentally and emotionally. Perceived stress exists among graduate students in general (Johnson, Batia, & Haun, 2008) and in particular graduate health science students, of whom graduate nursing students are a core member (Dutta, Pyles, & Miederhoff, 2005). Health science graduate students may encounter excessive personal, educational and work-related demands, and experience feelings of being overwhelmed or anxious (Stecker, 2004), pressure, tension and worry (Coffey et al., 2017) and exhibit depressive symptomatology (Melnyk et al., 2016).

Perceived stress in graduate nursing students has been documented in the literature for over 30 years (Mancini, Lavecchia, & Clegg, 1983; Maville, Kranz, & Tucker, 2004; Reilly & Fitzpatrick, 2009). Sources of stress include finances (Maville et al., 2004; Reilly & Fitzpatrick, 2009), time management (Maville et al., 2004), role responsibilities (Maville et al., 2004), relationships (Reilly & Fitzpatrick, 2009), and competing obligations (Maville et al., 2004). Other sources of stress were academic demands (Maville et al., 2004) and clinical practicum experiences aimed at learning to interact with clients (e.g. patients or health care consumers) (Mancini et al., 1983; Maville et al., 2004).

Graduate students from non-nursing health science programs report similar sources of perceived stress. Academic expectations were a source of stress for pharmacy, psychology, and medical students as well as physician assistants and athletic trainers (Beall, DeHart, Riggs, & Hensley, 2015; Finkelstein, Brownstein, Scott, & Lan, 2007; Ford, Olotu, Thanh, Roberts, & Davis, 2014; Heins, Fahey, & Leiden, 1984; Kuhn, Kranz, Koo, Cossio, & Lund, 2005; Marshall, Allison, Nykamp, & Lanke, 2008; Nelson, Dell'Oliver, Koch, & Buckler, 2001; Reed & Giacobbi, 2004). Financial obligations were a source of stress for all students except athletic trainers (Beall et al., 2015; Finkelstein et al., 2007; Ford et al., 2014; Heins et al., 1984; Kuhn et

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3 al., 2005; Marshall et al., 2008; Nelson et al., 2001). Whereas, time management was perceived  
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5 as stressful by all students except pharmacy students (Finkelstein et al., 2007; Heins et al., 1984;  
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7 Kuhn et al., 2005; Nelson et al., 2001; Reed & Giacobbi, 2004).

10 A source of stress common to pharmacy and medical students included relationships  
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12 (Beall et al., 2015; Finkelstein et al., 2007; Ford et al., 2014; Heins et al., 1984; Marshall et al.,  
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14 2008). Whereas, psychology students found clinical practicum and working with clients to be  
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16 stressful (Nelson et al., 2001). Athletic trainers reported uncertainty regarding the future as a  
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18 source of stress (Reed & Giacobbi, 2004) illustrating the variety of sources of stress.  
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22 Two reviews and three meta-analyses focused on mental health promotion and stress  
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24 reduction programs among university and medical students in general but not specifically  
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26 graduate nursing students (Colman, et al., 2016; Conley, Durlak, & Dickson, 2013; Conley,  
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28 Durlak, & Kirsch, 2015; Regehr, Glancy, & Pitts, 2013; S. Shapiro, D. Shapiro, & Schwartz,  
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30 2000). Shapiro et al., (2000) determined that medical students who participated in stress-  
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32 management programs developed better coping and role resolution skills. Conley et al., (2015)  
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34 and Regehr et al., (2013) found that programs including supervised practice of skills-training,  
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36 particularly those focused on cognitive, behavioral and mindfulness, were more effective in  
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38 reducing symptoms, including stress, among higher education students.  
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43 Behavior modification through non-pharmacological means such as mindfulness training,  
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45 qigong, and stress management have been found to be effective in reducing stress in counseling,  
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47 psychology, and medical graduate student populations (Abel, Abel, & Smith, 2012; Chrisman,  
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49 Christopher, & Lichtenstein, 2009; Cohen & Miller, 2009; Finkelstein et al., 2007). Mind-body  
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51 practices can be beneficial for reducing stress-related effects including physical, emotional,  
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53 mental, spiritual, and interpersonal changes (Schure, J. Christopher, & S. Christopher, 2008).  
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3 However, no studies evaluating effective interventions of perceived stress among graduate  
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5 nursing students were found.  
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**PICOT Question**

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10 The PICOT question that drove the search for the evidence was: In graduate students (P)  
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12 how **does practicing** self-care interventions (I) compared to **those not practicing** self-care  
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14 interventions (C) affect perceived stress (O) during graduate school (T).  
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**Aim**

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18 Thus, to address our graduate nursing students' concern, a systematic review was  
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20 undertaken to evaluate the existing evidence with the aim of identifying evidence-based self-care  
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22 interventions for coping with perceived stress.  
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**Methods****Search Structure**

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31 **Definitions.** Because of similarities in academic demands, practicum or placement  
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33 competencies, role transitions, and life stressors, graduate students were defined as individuals  
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35 in the following programs: nursing, midwifery, pharmacy, podiatry, medical, social work,  
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37 counseling, clinical psychology, athletic training, audiology, dental, dental hygiene, dietetics,  
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39 medical technology, occupational therapy, physical therapy, physician assistant, radiologic  
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41 technology, respiratory therapy, speech-language pathology, and chiropractic. Perceived stress  
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43 was operationally defined as the degree to which one perceives an event or situation as  
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45 threatening or demanding and beyond one's coping resources as measured by the Perceived  
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47 Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983). The PSS is a valid and reliable  
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49 instrument in measuring perceived stress that has been translated into multiple languages, has  
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3 reported alphas ranging from .84 to .86, and correlates with impact of life events and number of  
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5 life events scores ranging from .20 to .49 (Cohen et al., 1983).  
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8 Sample questions include a) how often have you been upset because of something that  
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10 happened unexpectedly?, b) how often have you felt that you were unable to control the  
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12 important things in your life?, c) how often have you felt nervous and “stressed”?, d) how often  
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14 have you found that you could not cope with all the things that you had to do?, and e) how often  
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16 have you been angered because of things that were outside of your control? Given our students’  
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18 descriptions of what they were experiencing and that these questions reflected most accurately  
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20 the thoughts and feelings expressed by our students, stress was defined as perceived stress, not  
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22 anxiety or mood states.  
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27 **Search Strategy.** Using the PICOT question, two authors searched CINAHL Plus with  
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29 Full Text, PsycINFO, and MEDLINE. All three databases utilized the EBSCO platform and  
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31 were searched individually allowing for full utilization of the unique thesauri. The thesauri for  
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33 CINAHL Plus with Full Text, MEDLINE and PsycINFO were used to identify the controlled  
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35 vocabulary for the individual elements of the PICOT question. Each thesaurus used similar  
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37 terms for all elements of the question with the exception of the population. Therefore, the same  
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39 keywords were used in each search string for all elements of the question with the exception of  
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41 population. Keywords used in all databases were (study OR intervention OR experiment OR  
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43 research) and (self-care OR selfcare OR self care OR stress OR coping OR anxiety OR  
44  
45 mindfulness). There were no limiters placed on the searches (see Table 1).  
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51 **Search Review.** Two of the authors, one being an expert Evidence Based Practice (EBP)  
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53 mentor, completed an asynchronous review of the 5,108 articles. Each author read the article  
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55 title, the abstract, and accompanying metadata. Each used the following inclusion criteria and  
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saved articles to a unique EBSCO folder. Inter-rater reliability was established through applying the inclusion criteria to a number of test articles prior to this review process.

Inclusion criteria for article selection included:

- Self-Care as the intervention
- Participants were graduate students
- Perceived Stress as measured by the PSS
- Quantitative analysis of the outcome
- Conducted within the United States of America
- English Language
- Peer – Reviewed
- Approval of Institutional Review Board

## Results

### Data Extraction

Using the inclusion criteria, 5,020 articles were excluded in the initial review conducted by the three authors (see Figure 1) yielding 83 full text single studies and three meta-analyses and two literature review articles. Upon close examination, an additional 76 studies (from the 83) were excluded for not meeting the inclusion criteria (19 excluded for the type of stress studied, 23 excluded for not being the correct population, ten excluded for not being valid quantitative studies, eight for not having an intervention, 16 for not being within the United States). Additionally, the authors reviewed the 237 studies identified in the five review articles. Of these studies, 101 studies were duplicates and 135 were excluded for not meeting the inclusion criteria (13 excluded for the type of stress studied, 96 excluded for the population studied, nine excluded for not having an intervention, 12 excluded for not being within the



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United States, and five for not being peer-reviewed). Therefore, eight studies meeting the criteria for this systematic review were critically appraised (see Figure 1).

**Study Quality Assessment**

**Critical appraisal.** Two authors, one an expert EBP mentor and one a wellness expert, conducted rigorous appraisal of the eight identified studies using the critical appraisal tools of the Joanna Briggs Institute (JBI) (2016) for quasi-experimental studies and randomized controlled trials. The two authors who conducted the appraisals then met with the third author to discuss the appraisal findings.

**Evaluation of the evidence.** Key data were abstracted from each study and entered into an evaluation table to summarize the study characteristics. In addition to the strength and quality of the studies, the evaluation table includes the study design, identification of the sample and setting, independent and dependent variables, data collection tool, and the statistics and study findings (see Table 2). A meta-analysis was not performed for this systematic review.

The majority of the studies were pre-post design. The strongest level of evidence was one unblinded randomized controlled trial that used a random number generator to select the participants. No study included graduate nursing student participants. However, the participants in the studies were mostly female graduate students in graduate health science programs and similar to our population. Attrition rates of two of the studies (Cohen & Miller, 2009; Shapiro, Brown, & Biegel, 2007) exceeded 20%. The interventions varied from a stress management course to mind-body-stress-reduction (MBSR) techniques, such as yoga, breath work, meditation and mindfulness. All studies measured the outcome of stress with the PSS (Cohen et al., 1983). Each study demonstrated a reduction in perceived stress post intervention, however, the reduction in perceived stress in two of the studies was not statistically significant, including the

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3 the only randomized controlled trial (RCT) and the only study to measure stress longitudinally  
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6 (Erogul, Singer, McIntyre, & Stefanov, 2014).  
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8         **Synthesis of the interventions and outcomes.** Similarities and differences in the  
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10 intervention schedules, strategies, topics and homework of each stress reduction study are  
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12 presented (see Table 3). All eight studies included a didactic portion, experience component,  
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14 and homework. All studies included some type of self-care MBSR intervention. Breathing  
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16 technique and meditation were the most common interventions. The delivery of the intervention  
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18 occurred in universities located in the United States and ranged from six to 18 days, with the  
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20 majority of the interventions being held one day per week (Abel et al., 2012; Beck & Verticchio,  
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22 2014 a; Bond et al., 2013; Chambers, Phillips, Burr, & Xiao, 2016; Cohen & Miller, 2009;  
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24 Erogul et al., 2014; Shapiro et al., 2007). Only one study reported meeting five days per week  
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26 for three weeks (Beck & Verticchio, 2014 b). Total intervention session times ranged from 120  
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28 minutes (Chambers et al., 2016) to 1800 minutes (Shapiro et al., 2007) and included content on  
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30 stress, stress response, relaxation response, and stress management techniques delivered by  
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32 experienced teachers with advanced training or certification in the MBSR technique. Homework  
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34 included practicing the stress reduction technique only or the stress reduction technique  
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36 combined with reflective writing assignments. All studies reported a reduction in perceived  
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38 stress. Reported effect sizes ranged from small to large (see Table 4).  
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**Strengths and Limitations**

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48         This is the only known systematic review to analyze studies in which the goal was to  
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50 identify interventions to mitigate perceived stress in graduate health science students in the  
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52 United States. The eight studies included in this review met the stringent inclusion criteria of  
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54 only graduate students, within the United States, evaluating the effectiveness of peer-reviewed  
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3 interventions on perceived stress using the PSS and reporting the results in a statistical  
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5 fashion. Major strengths of this systematic review are the reduction in perceived stress within  
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7 the eight studies meeting the inclusion criteria, the use of the same measurement tool, and the  
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9 surprising similarities of the interventions.  
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13 To locate the articles, the authors searched CINAHL plus with Full Text, PsycINFO and  
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15 MEDLINE, using appropriate vocabulary and search strategies. Ancestry searching was  
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17 performed on the retrieved articles. A search of grey literature was not performed. The authors  
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19 acknowledge the potential of publication bias as a limitation and note that to create a  
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21 reproducible search, limiting the search to published materials was necessary. Although Hartling  
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23 et al. (2016) concluded the “majority of relevant studies [for a systematic review] can be found  
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25 within a limited number of databases” (p.1), it is possible that other studies pertinent to our  
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27 review might have been catalogued elsewhere. PubMed, where the most recent literature to be  
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29 catalogued in MEDLINE would first appear, was not searched. By intentionally using only one  
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31 proprietary search algorithm (in this case EBSCO’s algorithm and platform) the authors’ search  
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33 could be readily reproduced.  
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39 In addition, the authors limited the search to studies published in English, and only those  
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41 studies with quantitative analysis. These are real limitations, however, the authors were focused  
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43 on retrieving evidence-based interventions that would be recommendable within an English  
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45 speaking portion of the United States. To implement the findings in international settings,  
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47 tailoring the interventions to their home institutions’ preferences would be necessary to  
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49 maximize effectiveness.  
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### 52 Discussion

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3 The aim of this systematic review was to identify evidence-based self-care interventions  
4 which effectively reduced perceived stress in graduate nursing students. In all studies, self-care  
5 interventions reduced perceived stress in graduate nursing students. In all studies, self-care  
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22 interventions reduced perceived stress in graduate nursing students. In all studies, self-care  
23 interventions reduced perceived stress in graduate nursing students. In all studies, self-care

24 All studies had small sample sizes and were conducted in single site university settings,  
25 having the potential for bias, including selection bias. The MBSR interventions were not  
26 included or fully described in any of the studies. All but one study engaged individuals who  
27 were trained or certified in MBSR techniques to teach the technique. However, MBSR protocols  
28 varied in dose, frequency, and length of the intervention, making it difficult to recommend a  
29 standardized self-care MBSR approach, e.g. a stand-alone course or integration of the  
30 interventions throughout the curriculum. Nonetheless, what is known, is perceived stress in  
31 graduate health science students was reduced in all studies.

### Implications for Practice and Research

32 Stress is positively correlated with depression, a mental health disorder that can hinder  
33 academic performance (Melnik et al, 2016). Implementing a self-care MBSR program may be  
34 an encouraging practice for students entering health science graduate programs. Although the  
35 majority of participants in these studies were female students in graduate health science  
36 programs, no graduate nursing students were studied. Thus, further research with graduate  
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nursing students is needed to determine the effectiveness of self-care MBSR programs in reducing stress in this population. Additionally, this review captured the best available evidence of self-care MBSR interventions for graduate health science students in schools delivering traditional face-to-face programs in the United States. No studies of self-care MBSR programs implemented with graduate health science students enrolled in distance learning programs meeting our inclusion criteria were found. With numerous online graduate nursing programs, more studies are needed to determine the effectiveness of self-care MBSR programs in this educational delivery method.

**Recommendation**

The authors have assigned a JBI Grade A recommendation to all of the self-care MBSR studies (see Table 5). The outcome of perceived stress was reduced in all the studies, no matter the type or dose of the intervention. There are no reported risks or harms associated with self-care MBSR interventions in graduate health science students, and the cost is minimal considering the benefit of student well-being and their ability to use self care MBSR techniques throughout their life-time. The authors recommend graduate health science colleges and universities **consider incorporating a** self-care MBSR program to alleviate perceived stress and promote graduate health science students' well-being, **and tailor such a program** based on institution preferences, values, resources and feasibility, and be formatively and summatively evaluated to monitor sustainability and effectiveness.

**Conclusion**

Implementation of self-care MBSR interventions (see Table 3) can be tailored to the preferences and values of the educational institution. Most effective self-care MBSR interventions include a) a didactic component, b) a guided MBSR practice session, and c)

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3 homework. More research is needed to develop a standardized self-care MBSR protocol to  
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5 decrease perceived stress in the graduate student population and especially the graduate health  
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7 science student and graduate nursing student populations.  
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11 Box 1 Linking Evidence to Action

- 14     ▪ Conduct weekly sessions of self-care MBSR interventions by trained or certified  
15         MBSR instructors.
  - 16     ▪ Implement MBSR sessions ranging in frequency from 15 – 180 minutes per week  
17         for 3 – 18 weeks.
  - 18     ▪ Deliver didactic instruction on self-care MBSR topics such as stress, mindfulness,  
19         meditation, breath work, yoga, and relaxation.
  - 20     ▪ Practice self-care MBSR techniques within each session.
  - 21     ▪ Assign homework related to technique and practice.
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## INTERVENTIONS TO REDUCE PERCEIVED STRESS

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## INTERVENTIONS TO REDUCE PERCEIVED STRESS

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## INTERVENTIONS TO REDUCE PERCEIVED STRESS

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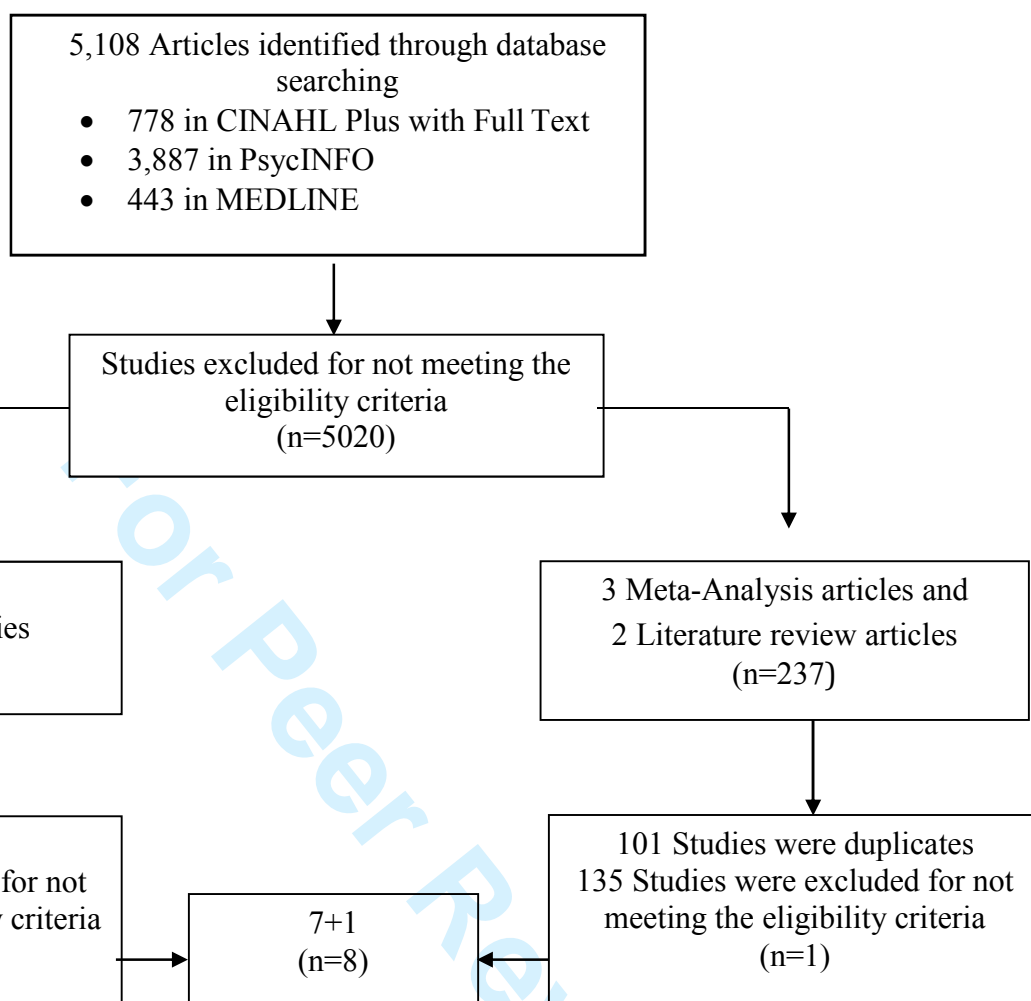


Figure 1. Flow diagram of studies selected.

Table 1  
 Search Strategy to Identify Studies

Database	Search Structure
CINAHL Plus with Full Text	<p>((MM "Students, Nurse Midwifery") OR ("Students, Nursing Graduate+") OR (MM "Students, Nursing Doctoral") OR (MM "Students, Nursing Masters") OR (MM "Students, Athletic Training") OR (MM "Students, Audiology") OR (MM "Students, Dental Hygiene") OR (MM "Students, Dietetics") OR (MM "Students, Medical Technology") OR (MM "Students, Occupational Therapy") OR (MM "Students, Physical Therapy") OR (MM "Students, Physician Assistant") OR (MM "Students, Radiologic Technology") OR (MM "Students, Respiratory Therapy") OR (MM "Students, Social Work") OR (MM "Students, Speech-Language Pathology") ) OR (MM "Students, Chiropractic") OR (MM "Students, Dental") OR (MM "Students, Medical") OR (MM "Students, Midwifery" OR (MM "Students, Pharmacy") OR (MM "Students, Podiatry"))</p> <p><b>OR</b> (counseling students OR clinical psychology students OR MSW students OR graduate students))</p> <p><b>AND</b> (study OR intervention OR experiment OR research)</p> <p><b>AND</b> (self-care OR selfcare OR self care OR stress OR coping OR anxiety OR mindfulness)</p>
MEDLINE	<p>((MM "Education, Dental, Graduate") OR (MM "Education, Medical, Graduate") OR (MM "Education, Nursing, Graduate") OR (MM "Education, Pharmacy, Graduate") OR (MM "Education, Graduate+"))</p> <p><b>OR</b> (MSW students OR Clinical Psychology students OR counseling students OR graduate students))</p> <p><b>AND</b> (self-care OR selfcare OR self care OR stress OR coping OR anxiety OR mindfulness)</p> <p><b>AND</b> (study OR intervention OR experiment OR research)</p>
PsycINFO	<p>((MM "Graduate Psychology Education") OR (MM "Dental Students") OR (MM "Medical Students") OR (MM "Postgraduate Students"))</p> <p><b>OR</b> (MSW students OR clinical psychology students OR counseling students OR graduate students))</p> <p><b>AND</b> (self-care OR selfcare OR self care OR stress OR coping OR anxiety OR mindfulness)</p> <p><b>AND</b> (study OR intervention OR experiment OR research)</p>

Table 2

*Evaluation of the Evidence*

Author Year Title	Design	Sample and Setting	Independent variable (IV) Dependent variable (DV)	Measurement	Statistical Analysis	Results	Applicability
Abel et al (2012) The effects of a stress management course on counselors-in- training	Pre-Post	GS-C  T: 55 C: 46  76 Fe Att= none reported  Setting U SW USA	IV SMC  DV Stress	PSS (subcategory) ▪ Negative self- statements  ▪ Positive self- statements	ANCOVA	  $F(1,92)$ 15.98 $p = .000$ Partial $\eta^2$ .15   $F(1,92)$ 28.02 $p = .000$ Partial $\eta^2$ .23	No randomization; small number of participants, however, all completed the intervention. No long-term evaluation of outcomes. Self-report with well-recognized tool. Although, not nursing students, similar population e.g. graduate students in a health-related field, and majority of subjects were female. Would increase faculty workload if current faculty would offer the stress management course. Cost may include hiring a faculty member to teach this course. However, benefit to student may outweigh cost. Students may respond positively to a stress management course. Low risk to students  Attrition rate: NR

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3	Beck & Verticchio	QE w 1-	GS-S/LP	IV				
4	(2014, Spring)	GSTCD		Yoga class				
5	Facilitating		T: 27					The small group of female
6	speech-language		RA	DV				students who enrolled in
7	pathology		Ta = 13	Stress	PSS	Mean(SD)	No Tx:	the course were randomly
8	graduate		Age (M) 21.85				18.95 (4.75)	divided into two groups. all
9	students' ability to						Yoga classes	but 5 completed the
10	manage stress: a		20-23				17.41(5.93)	intervention. No long-term
11	pilot study		3 married					evaluation of outcomes.
12			Tb = 14					Self-report with tool that
13			22.5					measures perceived stress.
14			21-27					Although, not nursing
15			1 married			For high	16.83 (5.15) pre	students, similar population
16			C: 23			attenders:	13.39(6.53) post	e.g. graduate students in
17			23			Mean(SD)	p = .04	health-related field, and all
18			21-31					subjects were female.
19			4 married			Paired t test for	t(25) = 1.23	Cost may include hiring an
20			23 Fe			high attenders of	p = .23	individual to implement
21			Att:			yoga classes		Yoga classes.
22			Tb =1					Large effect for those who
23			C = 4					attended classes and those
24								compared to comparison
25			All Caucasian			Cohen's d	0.58	group. Students may
26						High attenders	medium effect	respond positively to having
27			Setting					yoga classes offered. Low
28			U Midwest					risk to students.
29			USA					
30								
31			Age (M)					Attrition rate: 10%
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3	Beck & Verticchio	Pre-Post	GS-CSD	IV	Independent		No randomization; small
4	(Fall 2014)			Yoga + seated	samples, Mann-		number of participants,
5	Counseling and		N = 20	breath work +	Whitney U tests	$p = .412$	however, all completed the
6	mindfulness		[9 AU	meditative			intervention. No long-term
7	practice with		11 S/L/ P]	techniques and			evaluation of outcomes.
8	graduate students			reflection			Self-report with tool that
9	in communication		17 Fe			Pre: 15.4 (4.13)	measures perceived stress.
10	sciences and			DV	Wilcoxon	Post: 13.2 (5.22)	Although, not nursing
11	disorders		Setting	Perceived stress	signed-ranks	$p = .019$	students, similar population
12			U Midwest	PSS	for combined		e.g. graduate students in
13			USA		students		health-related field, and
14							majority of subjects were
15			Att = NR				female.
16							Would require faculty
17							prepared in the therapy.
18							Cost may include hiring an
19							individual to implement the
20							Yoga, meditative
21							techniques and reflection.
22							However, benefit to student
23							may outweigh cost.
24							Students may respond
25							positively to the
26							intervention. Low risk to
27							students.
28							
29							Attrition rate = NR
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Bond et al (2013)  
Embodied health: the effects of a mind-body course for medical students

Pre-Post

MS  
N=27  
15 1<sup>st</sup> yr  
12 2<sup>nd</sup> yr

Att = 3

IV:  
Deep breathing, meditation, yoga

DV:  
Perceived stress PSS

Setting  
U Eastern USA

No demographics reported

PSS score	Pre	1.55
	Post	1.48
Mean change		-0.05(.62)
<i>p</i>		0.70
Cohen's d		0.14

No randomization; small number of participants, however, all but 3 completed the intervention. No long-term evaluation of outcomes. Self-report with tool that measures perceived stress. Although, not nursing students, sample was medical students. Demographics not reported. A small favorable effect of this intervention on perceived stress. Intervention is low risk. Cost may include hiring an individual to create and teach the Mind-Body course. If required – would add cost to student tuition. Authors proposed the small effect may be related to stress reduction over the 11-week timeframe.

Attrition rate: 3/27 = 11%

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3	Chambers et al	Pre-Post	GS-PT	IV	PSS	Pre (M, SE)	17.1 (1.2)	No randomization; small number of participants; No long-term evaluation of outcomes. Self-report with tool that measures perceived stress. Although, not nursing students, sample was graduate students in a health-related field. 58% of the participants were male. No other demographics reported. Perceived stress was reduced. Intervention is low risk. Cost may include hiring an individual teach the beeja mantra-based meditation.
4	(2016)		N = 24	Beeja mantra-	t-test	Post (M, SE)	12.7(1.1)	
5	Effects of		1 <sup>st</sup> and 2 <sup>nd</sup> yr	based		<i>p</i>	< .001	
6	Medication on		doctoral	meditation				
7	stress levels of		students			Pre (M, SE)	52.7(4.6)	
8	physical therapist			DV	VAS	Post (M, SE)	34.8(4.1)	
9	students		N=31 1 <sup>st</sup> yr	Stress		<i>p</i>	.002	
10			N=29 2 <sup>nd</sup> yr					
11					BP			
12			Att=0		SBP	Pre (M, SE)	111(2)	
13						Post (M, SE)	108.1(1.9)	
14			Doctor of			<i>p</i>	.022	
15			Physical					
16			Therapy		DBP	Pre (M, SE)	65.7(1.6)	
17			School			Post (M, SE)	61.1(14)	
18			CA			<i>p</i>	.005	
19					Cortisol			
20					AM	Pre (M, SE)	5.8(0.5)	
21						Post (M, SE)	6.7(0.6)	
22						<i>p</i>	.076	
23					PM			
24						Pre (M, SE)	0.86(0.2)	
25						Post (M, SE)	1.1(0.2)	
26						<i>p</i>	.463	
27					GAD 7			
28						Pre (M, SE)	6.6(0.8)	
29						Post (M, SE)	4.8(0.7)	
30						<i>p</i>	0.12	
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Attrition rate: 0%

Worldviews on Evidence-Based Nursing For Review Only

Author (Year)	Design	Setting	Participants	Intervention	Comparison	Outcomes	Notes
Cohen & Miller (2009)	Pre-Post	GS-P	28 Psych grad students	IV Interpersonal Mindfulness Training	PSS	ANOVA Cohen's d M(SD) Pre Post 30.238(6.978) 25.857(8.968) F 14.957 p .001 d 0.545	No randomization; small number of participants, however, all but 7 completed the intervention. No long-term evaluation of outcomes. Self-report with tool that measures perceived stress. Although, not nursing students, sample was graduate students in a health-related field. Majority of the participants were female. A medium favorable effect of this intervention on perceived stress. Intervention is low risk. Cost may include hiring an individual to create and teach the mindfulness training session
			Att= 7 20 Fe 26 M age (22-46) 66.7% white 4.8% African American, Asian, Indian, white/Latina; Spanish/Mexican/ Indian American	DV Perceived Stress Anxiety BeckAI		M(SD) Pre Post 14.381(7.372) 10.952(7.117) F 5.733 p .027 d 0.473	Attrition rate: 7/28 28%
Erogul et al (2014)	RCT	MS	N = 59 1 <sup>st</sup> yr MS T 29 C 30	IV MBSR	PSS	Pre M(SD) Tx 17.6(5.5) C 18.3(7.1) p .66 Post Tx 13.3(5.1) CI 17.3(7.7) Diff 3.63 p .03 CI 95% [0.37-6.89] 6 mo Tx 14.9(6.6)	Small number of participants, however, all but 1 completed the intervention. Measured stress 6 months after the intervention. Although there is a difference in perceived stress between the groups, it was not statistically significant. The participants were not nursing students; however, the sample was health-
			Att =1 scholastic reasons Medical School NY	DV Stress			

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						C	18.4(6.86)	related. No demographics reported. Intervention is low risk.
						Diff	2.91	
						p	.08	Hiring an individual to create and deliver the Mindfulness intervention may be costly.
						CI 95%	[-0.3.7-6.19]	
								Attrition rate: 1/59 < 2%
Shapiro et al, (2007)	Prospective cohort-controlled design	GS-C/P	IV MBSR			ANOVA		No randomization; small number of participants. However, almost 50% of the control group did not complete the intervention. No long-term evaluation of outcomes. Self-report with tool that measures perceived stress. Although, not nursing students, sample was health-related. Majority of participants were female. This intervention had a favorable effect on perceived stress. Intervention is low risk. Cost may include hiring an individual to teach mindfulness.
Teaching self-care to caregivers: Effects of mindfulness-based stress reduction on the mental health of therapists in training.	64 total; 22 intervention; all complete pre and post;	Master's level counseling psychology program students enrolled in one of 3 required graduate courses.	DV Perceived Stress	PSS		PSS		
	61 in control; 42 baseline; 32 post	T: 22 C: 42				MBSR pre	24.64(7.81)	
						MBSR post	18.36(5.15)	
						C pre	21.72(7.14)	
						C post	22.91(7.54)	
						p	.0001	
						MBSR pre	3.17(1.19)	
						MBSR post	2.18(1.09)	
				STAI present		C pre	2.67(1.11)	
						CI post	2.76(1.01)	
		Att=				p	.0005	
		C 10						
				STAI past month		Past month		
		54 Fe				MBSR pre	3.43(0.90)	
						MBSR post	2.51(0.77)	
		Private U SW USA				Control pre	3.33(1.05)	
						Control post	3.44(1.14)	
						p	.0002	
								Attrition rate: 10/64 15%

Note. ANCOVA = Analysis of covariance; Att = attrition; AU = audiology; BeckAI = Beck Anxiety inventory; BP = Blood pressure; CA = California; CI = confidence interval; C = control/comparison; Diff = difference; DBP = diastolic blood pressure; DV = dependent variable; Fe = female; GAD = general anxiety disorder; GS-C = graduate student-counselors in training; GSCSD = graduate students communications science disorders; GS-PT = graduate students physical therapy; GSTCD = group single treatment counterbalanced design; GS/CP = graduate student counseling psychology; GS-S/L P = graduate student – speech-

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language pathology; GS-P = graduate students in psychology; IV = independent variable; M = mean; MBSR = mind body stress reduction; mo = months; MS = medical students; N = number; NR = not reported; NY = New York;  $p$  = probability; PS = perceived stress; PSS = perceived stress scale; QE = quasi experimental; RA = randomly assigned; RCT = randomized controlled trial; SBP = systolic blood pressure; SD = standard deviation; SE = standard error; S/L/P = speech language pathology; SMC = stress management course; STAI = State – Trait- Anxiety Inventory; SW = southwest; T = treatment; Ta = treatment a group; Tb = treatment b group; Tx = treatment; U = university; USA = United States of America; VAS = Visual Analogue Scale; yr = year.

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For Peer Review

Table 3

Synthesis of the Interventions

Study	Abel et al	Beck & Verticchio S2014	Beck & Verticchio F2014	Bond et al	Chambers et al	Cohen & Miller	Erogul et al	Shapiro et al
Intervention	Stress Management Course	General Stress Management + Yoga	Yoga + seated breath work + meditative techniques and reflection	Yoga and Mindfulness elective course	Beeja mantra-based meditation	Interpersonal Mindfulness Training (IMT)	MBSR	MBSR in a 10 week Stress and Stress Management course
Intervention schedule	14 wks 120 min/wk 1680 min total	18 wks 50 min/wk 900 min total	3 wks 5 d/wk 110 min/d 550/wk 1650 min total	11 wks 90 min/wk 990 min total	8 wks 15 min/wk 120 min total	6 wks 90 min/wk 540 min total	8 wks 75 min/wk 600 min total	10 wks 180 min/wk 1800 min total
	wk 1 & 2 Stress theory and symptom tracking	PS I and II Stress Management Unit	wk 2 M-F Breath work; meditation; 2 min reflection writing	wk 1-3 Breath awareness during asana; pranayama practice in seated or supine position	wk 1 Orientation to the program and to Beeja mantra-based meditation [time not specified]	wk 1-6 Each week: Sitting meditations increasing in length over the 6 weeks. Group review of mindfulness within the past week;	wk 7-8 Full day retreat	wk 3 2 h MBSR included each wk
	wk 3 – 14 Stress mgmt. relaxation content and technique practice	PS III Refuting irrational thoughts PS IV Mindful eating PS V Engaging in breathing exercise PS VI	wk 3 M-F Breath work and a meditative technique; reflective writing Last class breath work and meditation discussion	wk 4 – 9 slow resistance breathing during asana	wk 2– 8 Each week: 15 min review of practice protocol	mindfulness exercises emphasizing awareness of self in relation to others performed pre and post meditation;		

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Time management skills

discussion of the participants experience

PS VII  
Discussion of management techniques

Yoga class  
6 wk  
60 min/wk

Faculty credentials

Course faculty

Registered yoga teacher and certified yoga therapist with 15 yrs experience

Registered yoga teacher and certified yoga therapist with 15 yrs experience

Yoga teacher

Experienced meditation teacher in Beeja mantra-based technique

Experienced meditation teacher and practitioner with advanced training in mindfulness and related techniques

Licensed psychotherapist; 35 yrs practice in mindfulness meditation; attended MBSR foundational program at the Omega Institute

Experienced meditation teacher and practitioner with advanced training in mindfulness

Strategies

Students selected a personal stress-related symptom they wished to change and tracked it for 2 wks

Viniyoga  
Classes x 6 wks

L&D on counseling topics at every class; role play of counseling techniques

Instruction on breathing and meditation exercises;  
  
60 min yoga, deep breathing, and meditation

Each student received a personal beeja (seed) mantra; Step-wise instruction on beeja (seed) mantra  
  
Instructed to practice 2x/d; 20 min ea time; concluding ea session with 2 min of resting

3 mindfulness classes focusing on the present moment included sitting meditations  
  
Verbal guidance at beginning of session and end with silence

Handouts to illustrate concepts  
  
Narrated guidance meditation audio files for body scan, breath meditation, and gentle yoga

2-hour training sessions in sitting meditation, body scan, Hatha yoga, guided loving-kindness meditation, and informal practices emphasizing bringing mindfulness into day-to-day life

In-class practice of techniques x2 wks;

Small group discussions  
  
Stress diary  
  
Practicing a technique: (1 of the following stress management techniques: deep, focused

At start of each day of class for 3 wks: 5 min of easy yoga postures followed by seated breath work; then standing

30 min instruction on mind-body research; assigned readings of peer reviewed

Each class begins with a review of mindfulness within the past

Full day retreat to immerse students in a day of mindfulness

No experiential exercises in stress management



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<p>symptom progress;  Cognitive processing-discussion, and Q&amp;A interactions after each class;  Class start with open discussion r/t concerns re the course;</p>	<p>breathing while counting the breath; normal inhalation followed by a sighing exhalation done 8 – 12 times; or mantra meditation)  Optional: practicing relaxation responses described by Benson &amp; Klipper (2001)</p>	<p>position for lateral bend, forward bend, extending backward and final forward bend; then sitting to do a final forward bend. While sitting, breath work sequence X12 times. [Breath work = inhale 6 counts, hold for 2 counts, exhale six count and hold breath out for 2 counts]</p>	<p>articles related to the neuroscience lecture, e.g. Yoga and GABA, mindfulness and chronic pain  Classes include slow and measured asana practice, followed by 15 min relaxation-based exercise  Other weeks focus on mindfulness; one week ended with a 10 min guided walking meditation practice</p>	<p>week (journal entries; informal practice) Each session includes a mindfulness activity that focuses on awareness of self in relation to others; followed by a meditation; followed by a group discussion of how the participants experienced the activity differently. Other exercises emphasizing body awareness included: Whole group exercises and guided movement</p>	<p>techniques</p>
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<p>Topics</p>	<p>Stress theory and response  Stress management: relaxation techniques and skills for coping with stress</p>	<p>Chronic stress  Stress management: how to change the situation or your reaction to the situation</p>	<p>Neuroscience lectures  Stress management techniques</p>	<p>Stress physiology  Health effects of stress levels  Review of practice protocol and technique</p>	<p>Review of mindfulness including informal practice and journal assignments</p>	<p>Stress; How to manage reactivity</p>	<p>Stress overview  Stress management techniques: humor, exercise, hypnosis, social support, acupuncture</p>
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Breathing and body awareness;	Breath and breathing techniques;	Breath work – seated and standing	Breathing techniques (pranayama and ujjayi)		Breathing-based yoga	Hatha yoga
Relaxation response and progressive muscle relaxation;	Relaxation response; Importance of the relaxation response				Body scan	Body scan
Meditation	Meditation	Meditation	Meditation (dhanyas)	Health benefits of meditation		Meditation: Sitting, Loving-kindness
		Yoga postures: lateral bend, forward bend, extending backward and final forward bend positions	Yoga postures (asana)			
Worry control Thought stopping	Mindfulness				Mindfulness exercises with a focus on awareness of the present moment and self in relation to others	Mindfulness based meditation
Refuting irrational thoughts,	Refuting irrational ideas					Mindfulness (informal practice)
Time management	Time management					

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Other topics

Goal setting  
Assertiveness training  
Visualization, imagery  
Nutrition and exercise  
Autogenics

Homework

35 min formal mindfulness practice, mindful awareness of daily routines, pleasant and unpleasant events, and communication  
  
5 -15 min informal practice for remainder of the course

Assignments from Davis et al (2008) The relaxation & stress reduction workbook

Stress management technique 1x/day, 5 days/wk x 1 month;

Written record: feelings pre and post practicing the technique

Stress diary

Assignments were related to counseling

Practice breathing, meditation and yoga 3x/wk

Practice Beeja mantra-based meditation 20 min 2x/d

Weekly assignments related to student experience of mindfulness inside and outside of class.

Journal Informal practice

Daily guided meditation via audio files for 20 min x 4 wks

Wk 5 - 8 self-guided meditation

Weekly reflections

Daily mindfulness practice diaries: time in sitting meditation, body scan, yoga, and informal mindfulness practice

Note. d = day; d/wk = day per week; h = hour; L&D = lecture and discussion; MBSR = mind body stress reduction; min = minute; min/tl = minutes total; wk = week; wks = weeks; Q&A = question and answer; r/t = related to; PS = Professional Seminar; GABA = gamma-aminobutyric acid; x = times.

Table 4  
Outcome Synthesis

Study	Abel et al	Beck & Verticchio (S2014)	Beck & Verticchio (F2014)	Bond et al	Chambers et al	Cohen & Miller	Erogul et al	Shapiro et al
Population	GS-C	GS-S-LP	GS-CSD	MS	GS-PT	GS-P	MS	GS-C/P
Intervention	Stress Management Course	Yoga	Yoga + seated breath work + meditative techniques and reflection	Deep breathing, meditation, yoga	Beeja meditation	Interpersonal Mindfulness Training	MBSR	MBSR
PSS Outcome	↓	↓	↓	↓ *	↓	↓	↓ ↓ **	↓
Cohen Effect Size	NR	0.81 large	NR	0.14 small	NR	0.54 moderate	NR	NR

Note. GS-C = graduate students - counseling; GS-C/P = graduate student in counseling - psychology; GS-CSD = graduate students in communication sciences and disorders; GS-P = graduate students in psychology; GS-PT = graduate students in physical therapy; GS-S-LP = graduate students in Speech-Language Pathology; MBSR = mind body stress reduction; MS = medical students; NR = not reported; PSS = perceived stress scale.

\* Not statistically significant.  
\*\* Not statistically significant - Outcome measured at 6 months post-intervention.

Table 5  
JBI Grade of Evidence

Grade	Abel	Beck (S 2014)	Beck (F 2014)	Bond	Chambers	Cohen/Miller	Erogul	Shapiro
<b>Feasibility:</b> Is the cost of the practice, availability of the practice or resource, and sufficient experience or competency available to implement the practice?	Yes, the 14-week MBSR Course is feasible. We would need to hire the MBSR instructor.	Yes, the 18-week General Stress Management course is feasible. We would need to hire a Yoga and MBSR instructor.	Yes, the 3-week, 5 days a week mindfulness training integrated segments, explored at the beginning of each class would be feasible. We would need to hire the MBSR instructor.	Yes, the 11-week elective course of yoga, meditation, and didactics is feasible. We would need to hire a Yoga and MBSR instructor.	Yes, the 8-week Beeja mantra meditation training is feasible. We would need to hire the instructor.	Yes, the 6-week course of interpersonal mindfulness training (IMT) is feasible. We would need to hire an IMT instructor.	Yes, the 8-week, 75 minute MBSR course would be feasible. We would need to hire a MBSR Zinn instructor, preferably a trained psychotherapist.	Yes, the 10-week MBSR course offered as part of the Stress and Stress Management course would be feasible. We would need to hire a trained MBSR instructor.
<b>Appropriateness:</b> Is the intervention culturally acceptable, transferable, and adaptable to differing circumstances?	Yes, similar demographic. The majority of the study participants were women. This type of intervention would align with an integrative health perspective.	Yes, similar demographic. All participants were female and lived off campus. This type of intervention would align with an integrative health perspective.	Yes, similar demographic. Majority of these participants were female graduate students. This type of intervention would align with an integrative health perspective.	Yes, age group and area of study were similar; no demographics given for 1 <sup>st</sup> and 2 <sup>nd</sup> year students in the study. This type of intervention would align with an integrative health perspective.	Yes, similar age group; majority of study participants were men. This type of intervention would align with an integrative health perspective.	Yes, similar demographic. The majority of the participants were female and of similar age. This type of intervention would align with an integrative health perspective.	Yes, similar age group; no additional demographic given. This type of intervention would align with an integrative health perspective.	Yes, similar demographic and the majority of participants were female. This type of intervention would align with an integrative health perspective.

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4	<b>Meaningfulness:</b>	Yes, no	Yes, no	Yes, no	Yes, no	Yes, there	Yes, no	Yes, the	Yes, the intervention
5	Is the intervention	negative	negative	negative	students	were no	students	intervention had	had positive outcomes
6	associated with	experiences	experiences	experiences	reported	negative	reported	positive	and no reported
7	more positive	were	reported and	and results	negative	outcomes	negative	outcomes and	negative outcomes.
8	experiences	reported and	students who	were positive.	effects and	and	effects and	there were no	
9	rather than	positive	did Yoga in		many	significant	many	reported	
10	negative	experiences	the first 6		reported	reduction in	reported	negative effects.	
11	experiences?	were	weeks had		positive	perceived	positive		
12		reported.	the best		effects.	stress and	effects.		
13			results.			blood			
14						pressure			
15						readings.			
16									
17	<b>Effectiveness:</b>	Yes, the	Yes, the	Yes, the	Yes, the	Yes, the	Yes, the	Yes, the	Yes, the intervention
18	Is there a	intervention	intervention	intervention	intervention	intervention	intervention	intervention was	was beneficial and
19	beneficial effect of	was	was	was	was beneficial	was	was	beneficial and	safe.
20	the intervention	beneficial	beneficial	beneficial and	and safe.	beneficial	beneficial	safe.	
21	and is it safe?	and safe.	and safe.	safe.		and safe.	and safe.		

Note. All Grade A Recommendations.