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

Amber Vermeesch  
*University of Portland, vermeesc@up.edu*

Susan B. Stillwell

Jane Scott  
*University of Portland, scottj@up.edu*

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INTerventions to Reduce Perceived Stress

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

A source of stress common to pharmacy and medical students included relationships (Beall et al., 2015; Finkelstein et al., 2007; Ford et al., 2014; Heins et al., 1984; Marshall et al., 2008). Whereas, psychology students found clinical practicum and working with clients to be stressful (Nelson et al., 2001). Athletic trainers reported uncertainty regarding the future as a source of stress (Reed & Giacobbi, 2004) illustrating the variety of sources of stress.

Two reviews and three meta-analyses focused on mental health promotion and stress reduction programs among university and medical students in general but not specifically graduate nursing students (Colman, et al., 2016; Conley, Durlak, & Dickson, 2013; Conley, Durlak, & Kirsch, 2015; Regehr, Glancy, & Pitts, 2013; S. Shapiro, D. Shapiro, & Schwartz, 2000). Shapiro et al., (2000) determined that medical students who participated in stress-management programs developed better coping and role resolution skills. Conley et al., (2015) and Regehr et al., (2013) found that programs including supervised practice of skills-training, particularly those focused on cognitive, behavioral and mindfulness, were more effective in reducing symptoms, including stress, among higher education students.

Behavior modification through non-pharmacological means such as mindfulness training, qigong, and stress management have been found to be effective in reducing stress in counseling, psychology, and medical graduate student populations (Abel, Abel, & Smith, 2012; Chrisman, Christopher, & Lichtenstein, 2009; Cohen & Miller, 2009; Finkelstein et al., 2007). Mind-body practices can be beneficial for reducing stress-related effects including physical, emotional, mental, spiritual, and interpersonal changes (Schure, J. Christopher, & S. Christopher, 2008).
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However, no studies evaluating effective interventions of perceived stress among graduate nursing students were found.

**PICOT Question**

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

**Aim**

Thus, to address our graduate nursing students’ concern, a systematic review was undertaken to evaluate the existing evidence with the aim of identifying evidence-based self-care interventions for coping with perceived stress.

**Methods**

**Search Structure**

**Definitions.** Because of similarities in academic demands, practicum or placement competencies, role transitions, and life stressors, graduate students were defined as individuals in the following programs: nursing, midwifery, pharmacy, podiatry, medical, social work, counseling, clinical psychology, athletic training, audiology, dental, dental hygiene, dietetics, medical technology, occupational therapy, physical therapy, physician assistant, radiologic technology, respiratory therapy, speech-language pathology, and chiropractic. Perceived stress was operationally defined as the degree to which one perceives an event or situation as threatening or demanding and beyond one’s coping resources as measured by the Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983). The PSS is a valid and reliable instrument in measuring perceived stress that has been translated into multiple languages, has
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reported alphas ranging from .84 to .86, and correlates with impact of life events and number of life events scores ranging from .20 to .49 (Cohen et al., 1983).

Sample questions include a) how often have you been upset because of something that happened unexpectedly?, b) how often have you felt that you were unable to control the important things in your life?, c) how often have you felt nervous and “stressed”? d) how often have you found that you could not cope with all the things that you had to do?, and e) how often have you been angered because of things that were outside of your control? Given our students’ descriptions of what they were experiencing and that these questions reflected most accurately the thoughts and feelings expressed by our students, stress was defined as perceived stress, not anxiety or mood states.

Search Strategy. Using the PICOT question, two authors searched CINAHL Plus with Full Text, PsycINFO, and MEDLINE. All three databases utilized the EBSCO platform and were searched individually allowing for full utilization of the unique thesauri. The thesauri for CINAHL Plus with Full Text, MEDLINE and PsycINFO were used to identify the controlled vocabulary for the individual elements of the PICOT question. Each thesaurus used similar terms for all elements of the question with the exception of the population. Therefore, the same keywords were used in each search string for all elements of the question with the exception of population. Keywords used in all databases were (study OR intervention OR experiment OR research) and (self-care OR selfcare OR self care OR stress OR coping OR anxiety OR mindfulness). There were no limiters placed on the searches (see Table 1).

Search Review. Two of the authors, one being an expert Evidence Based Practice (EBP) mentor, completed an asynchronous review of the 5,108 articles. Each author read the article title, the abstract, and accompanying metadata. Each used the following inclusion criteria and
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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the only randomized controlled trial (RCT) and the only study to measure stress longitudinally (Erogul, Singer, McIntyre, & Stefanov, 2014).

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

**Strengths and Limitations**

This is the only known systematic review to analyze studies in which the goal was to identify interventions to mitigate perceived stress in graduate health science students in the United States. The eight studies included in this review met the stringent inclusion criteria of only graduate students, within the United States, evaluating the effectiveness of peer-reviewed
interventions on perceived stress using the PSS and reporting the results in a statistical fashion. Major strengths of this systematic review are the reduction in perceived stress within the eight studies meeting the inclusion criteria, the use of the same measurement tool, and the surprising similarities of the interventions.

To locate the articles, the authors searched CINAHL plus with Full Text, PsycINFO and MEDLINE, using appropriate vocabulary and search strategies. Ancestry searching was performed on the retrieved articles. A search of grey literature was not performed. The authors acknowledge the potential of publication bias as a limitation and note that to create a reproducible search, limiting the search to published materials was necessary. Although Hartling et al. (2016) concluded the “majority of relevant studies [for a systematic review] can be found within a limited number of databases” (p.1), it is possible that other studies pertinent to our review might have been catalogued elsewhere. PubMed, where the most recent literature to be catalogued in MEDLINE would first appear, was not searched. By intentionally using only one proprietary search algorithm (in this case EBSCO’s algorithm and platform) the authors’ search could be readily reproduced.

In addition, the authors limited the search to studies published in English, and only those studies with quantitative analysis. These are real limitations, however, the authors were focused on retrieving evidence-based interventions that would be recommendable within an English speaking portion of the United States. To implement the findings in international settings, tailoring the interventions to their home institutions’ preferences would be necessary to maximize effectiveness.

Discussion
The aim of this systematic review was to identify evidence-based self-care interventions which effectively reduced perceived stress in graduate nursing students. In all studies, self-care interventions reduced perceived stress in graduate health science students. The predominate level of evidence, based on JBI Levels of Evidence, is a JBI Level 2. With the exception of one unblinded randomized controlled trial, JBI Level 1, studies were quasi-experimental with pre-post designs and only the unblinded randomized controlled trial measured the outcome longitudinally to determine the effects of the MBSR intervention. While a reduction in perceived stress at six months post intervention was found, it is not known what dose and frequency of the intervention would sustain the outcome throughout graduate school.

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

Implications for Practice and Research

Stress is positively correlated with depression, a mental health disorder that can hinder academic performance (Melnyk et al, 2016). Implementing a self-care MBSR program may be an encouraging practice for students entering health science graduate programs. Although the majority of participants in these studies were female students in graduate health science programs, no graduate nursing students were studied. Thus, further research with graduate
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)
homework. More research is needed to develop a standardized self-care MBSR protocol to
decrease perceived stress in the graduate student population and especially the graduate health science student and graduate nursing student populations.

Box 1  Linking Evidence to Action

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


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doi:10.1080/07448481.2013.802237


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Society for the Investigation of Stress, 24(5), 413-418.


The University of Portland. (2016). School of Nursing Graduate Education [webpage]. Retrieved from [https://nursing.up.edu/graduate-programs/index.html](https://nursing.up.edu/graduate-programs/index.html)
Figure 1. Flow diagram of studies selected.
Table 1
Search Strategy to Identify Studies

<table>
<thead>
<tr>
<th>Database</th>
<th>Search Structure</th>
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<tbody>
<tr>
<td>CINAHL Plus with Full Text</td>
<td>((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”) OR (counseling students OR clinical psychology students OR MSW students OR graduate students)) AND (study OR intervention OR experiment OR research) AND (self-care OR selfcare OR self care OR stress OR coping OR anxiety OR mindfulness)</td>
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<tr>
<td>MEDLINE</td>
<td>((MM “Education, Dental, Graduate”) OR (MM “Education, Medical, Graduate”) OR (MM “Education, Nursing, Graduate”) OR (MM “Education, Pharmacy, Graduate”) OR (MM “Education, Graduate+”) OR (MSW students OR Clinical Psychology students OR counseling students OR graduate students)) AND (self-care OR selfcare OR self care OR stress OR coping OR anxiety OR mindfulness) AND (study OR intervention OR experiment OR research)</td>
</tr>
<tr>
<td>PsycINFO</td>
<td>((MM “Graduate Psychology Education”) OR (MM “Dental Students”) OR (MM “Medical Students”) OR (MM “Postgraduate Students”) OR (MSW students OR clinical psychology students OR counseling students OR graduate students)) AND (self-care OR selfcare OR self care OR stress OR coping OR anxiety OR mindfulness) AND (study OR intervention OR experiment OR research)</td>
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### Evaluation of the Evidence

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Title</th>
<th>Design</th>
<th>Sample and Setting</th>
<th>Independent variable (IV)</th>
<th>Dependent variable (DV)</th>
<th>Measurement</th>
<th>Statistical Analysis</th>
<th>Results</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abel et al</td>
<td>2012</td>
<td>The effects of a stress management course on counselors-in-training</td>
<td>Pre-Post</td>
<td>GS-C</td>
<td>IV SMC</td>
<td>DV Stress</td>
<td>PSS (subcategory)</td>
<td>ANCOVA</td>
<td>$F(1,92) = 15.98$</td>
<td>$p = .000$</td>
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<td>T: 55</td>
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<td>Negative self-statements</td>
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<td>76 Fe</td>
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<td>Positive self-statements</td>
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<td>Att= none reported</td>
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</table>

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. Attraction rate: NR
Facilitating speech-language pathology graduate students’ ability to manage stress: a pilot study

Beck & Verticchio (2014, Spring)

<table>
<thead>
<tr>
<th>QE w 1-GSTCD</th>
<th>IV</th>
<th>Yoga class</th>
</tr>
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<tbody>
<tr>
<td>T: 27</td>
<td>RA</td>
<td>DV</td>
</tr>
<tr>
<td>Ta = 13</td>
<td>Age (M) 21.85</td>
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<tr>
<td>20-23</td>
<td>3 married</td>
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<tr>
<td>Tb = 14</td>
<td>22.5</td>
<td></td>
</tr>
<tr>
<td>21-27</td>
<td>1 married</td>
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<td>C: 23</td>
<td>23</td>
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</tr>
<tr>
<td>21-31</td>
<td>4 married</td>
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<tr>
<td>23 Fe</td>
<td>23 Fe</td>
<td></td>
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<tr>
<td>Att:</td>
<td>Tb = 1</td>
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</tr>
<tr>
<td>C = 4</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>All Caucasian</td>
<td>High attenders: 0.58</td>
<td></td>
</tr>
<tr>
<td>Setting</td>
<td>Yoga classes 17.41 (5.93)</td>
<td></td>
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<tr>
<td>U Midwest</td>
<td>Cohen’s d for PSS scores for yoga group and comparison groups at pre and post testing.</td>
<td></td>
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<tr>
<td>USA</td>
<td>0.81</td>
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</tbody>
</table>

The small group of female students who enrolled in the course were randomly divided into two groups. All but 5 completed the intervention. No long-term evaluation of outcomes. Self-report with tool that measures perceived stress. Although, not nursing students, similar population e.g., graduate students in health-related field, and all subjects were female. Cost may include hiring an individual to implement yoga classes. Large effect for those who attended classes and those compared to comparison group. Students may respond positively to having yoga classes offered. Low risk to students.

Attrition rate: 10%
<table>
<thead>
<tr>
<th>Beck &amp; Verticchio (Fall 2014) Counseling and mindfulness practice with graduate students in communication sciences and disorders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Post</strong> GS–CSD</td>
</tr>
<tr>
<td>N = 20 [9 AU 11 S/L/ P]</td>
</tr>
<tr>
<td>17 Fe</td>
</tr>
<tr>
<td>Setting U Midwest USA</td>
</tr>
<tr>
<td><strong>Att = NR</strong></td>
</tr>
<tr>
<td><strong>IV</strong> Yoga + seated breath work + meditative techniques and reflection</td>
</tr>
<tr>
<td><strong>DV</strong> Perceived stress PSS</td>
</tr>
<tr>
<td>Independent samples, Mann-Whitney U tests <em>p</em> = .412</td>
</tr>
<tr>
<td>Pre: 15.4 (4.13) Post: 13.2 (5.22) Wilcoxon signed-ranks for combined students <em>p</em> = .019</td>
</tr>
</tbody>
</table>

No randomization; small number of participants, however, all completed the intervention. No long-term evaluation of outcomes. Self-report with tool that measures perceived stress. Although, not nursing students, similar population e.g. graduate students in health-related field, and majority of subjects were female. Would require faculty prepared in the therapy. Cost may include hiring an individual to implement the Yoga, meditative techniques and reflection. However, benefit to student may outweigh cost. Students may respond positively to the intervention. Low risk to students.

Attrition rate = NR
Bond et al (2013) Embodied health: the effects of a mind-body course for medical students

Pre-Post MS

N=27

15 1st yr
12 2nd yr

Att = 3

DV: Perceived stress PSS

Mean change p Cohen’s d
Pre 1.55 Post 1.48 -0.05 (.62) 0.70 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%
<table>
<thead>
<tr>
<th>Chambers et al (2016)</th>
<th>Pre-Post</th>
<th>GS-PT N=24 1st and 2nd yr doctoral students</th>
<th>IV Beeja mantra-based meditation</th>
<th>PSS</th>
<th>t-test Pre (M, SE) 17.1 (1.2) Post (M, SE) 12.7 (1.1) p &lt; .001</th>
<th>Pre (M, SE) 52.7 (4.6) Post (M, SE) 34.8 (4.1) p .002</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=31 1st yr N=29 2nd yr</td>
<td>DV Stress</td>
<td>VAS</td>
<td>BP SBP DBP</td>
<td>Pre (M, SE) 111 (2) Post (M, SE) 108.1 (1.9) p .022</td>
<td>Pre (M, SE) 65.7 (1.6) Post (M, SE) 61.1 (14) p .005</td>
</tr>
<tr>
<td></td>
<td>Att=0</td>
<td>Doctor of Physical Therapy School CA</td>
<td>Cortisol AM PM</td>
<td>GAD 7</td>
<td>Pre (M, SE) 5.8 (0.5) Post (M, SE) 6.7 (0.6) p .076</td>
<td>Pre (M, SE) 0.86 (0.2) Post (M, SE) 1.1 (0.2) p .463</td>
</tr>
</tbody>
</table>

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 to teach the beeja mantra-based meditation.

Attrition rate: 0%
### Cohen & Miller (2009)

**Interpersonal Mindfulness Training for Well-being: a pilot study with psychology graduate students**

- **Pre-Post GS–P**
- **IV** Interpersonal Mindfulness Training
- **DV** Perceived Stress (PSS)
- **Att** = 7
- **28 Psych grad students**
- **20 Fe**
- **26 M age (22-46)**
- **66.7% white, 4.8% African American, Asian, Indian, white/Latina; Spanish/Mexican/Indian American**

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>F</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>M(SD) Pre</td>
<td>30.238(6.978)</td>
<td>25.857(8.968)</td>
<td>14.957</td>
<td>.001</td>
<td>0.545</td>
</tr>
<tr>
<td>PSS</td>
<td>14.381(7.372)</td>
<td>10.952(7.117)</td>
<td>5.733</td>
<td>.027</td>
<td>0.473</td>
</tr>
</tbody>
</table>

No randomization; small number of participants, however, all but 7 completed the intervention. No long-term evaluation of outcomes. Self-report 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.

**Attrition rate:** 7/28 28%

### Erogul et al (2014)

**RCT MS**

- **IV** Mindfulness-Based Stress Reduction (MBSR)
- **DV** Perceived Stress (PSS)
- **Att** = 1 scholastic reasons
- **N = 59 1st yr MS**
- **T 29 C 30**
- **Medical School NY**

<table>
<thead>
<tr>
<th></th>
<th>Pre 17.6(5.5)</th>
<th>Post 13.3(7.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M(SD) Pre</td>
<td>14.381(7.372)</td>
<td>10.952(7.117)</td>
</tr>
<tr>
<td>PSS</td>
<td>14.9(6.6)</td>
<td>14.9(6.6)</td>
</tr>
</tbody>
</table>

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-


Prospective cohort-controlled design
64 total; 22 intervention; all complete pre and post;
61 in control; 42 baseline; 32 post
T: 22
C: 42
Att= C 10
STAI present
STAI past month
T: 22
42 baseline; 32 post
C: 42
54 Fe
Private U SW
USA

IV MBSR
Master’s level counseling psychology program students enrolled in one of 3 required graduate courses.

DV Perceived Stress
Perceived

PSS
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

ANOVA

Past month
MBSR pre 3.17(1.19)
MBSR post 3.43(0.90)
Control pre 3.44(1.14)
Control post 3.43(0.90)

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-
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.
<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Stress Management Course</td>
<td>General Stress Management + Yoga</td>
<td>Yoga + seated breath work + meditative techniques and reflection</td>
<td>Yoga and Mindfulness elective course</td>
<td>Beeja mantra-based meditation</td>
<td>Interpersonal Mindfulness Training (IMT)</td>
<td>MBSR</td>
<td>MBSR in a 10 week Stress Management course</td>
</tr>
<tr>
<td>Intervention schedule</td>
<td>14 wks</td>
<td>18 wks</td>
<td>3 wks 5 d/wk 110 min/d 550/wk 1650 min total</td>
<td>11 wks 90 min/wk 990 min total</td>
<td>8 wks 15 min/wk 120 min total</td>
<td>6 wks 90 min/wk 600 min total</td>
<td>8 wks 75 min/wk 600 min total</td>
<td>10 wks 180 min/wk 1800 min total</td>
</tr>
<tr>
<td>wk 1 &amp; 2</td>
<td>Stress theory and symptom tracking</td>
<td>PS I and II Stress Management Unit</td>
<td>wk 2 M-F Breath work; meditation; 2 min reflection writing</td>
<td>wk 1-3 Breath awareness during asana; pranayama practice in seated or supine position</td>
<td>wk 1 Orientation to the program and to Beeja mantra-based meditation</td>
<td>wk 1-6 Each week: Sitting meditations increasing in length over the 6 weeks.</td>
<td>wk 7-8 Full day retreat</td>
<td>wk 3 2 h MBSR included each wk</td>
</tr>
<tr>
<td>wk 3 – 14</td>
<td>Stress mgmt. relaxation content and technique practice</td>
<td>PS III Refuting irrational thoughts</td>
<td>wk 3 M-F Breath work and a meditative technique; reflective writing Last class breath work and meditation discussion</td>
<td>wk 4 – 9 slow resistance breathing during asana</td>
<td>wk 2–8 Each week: 15 min review of practice protocol</td>
<td>Group review of mindfulness within the past week; mindfulness exercises emphasizing awareness of self in relation to others performed pre and post meditation;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Time Management Skills

PS VII Discussion of Management Techniques

Yoga class
- 6 wk
- 60 min/wk

### Discussion of the Participants' Experience

Faculty Credentials

- Course faculty
  - 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

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Faculty credentials</th>
<th>Course faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-class practice of techniques x2 wks; Stress diary</td>
<td>Registered yoga teacher and certified yoga therapist with 15 yrs experience</td>
<td>Experienced meditation teacher and practitioner with advanced training in mindfulness and related techniques</td>
</tr>
<tr>
<td>Viniyoga Classes x 6 wks</td>
<td>Yoga teacher</td>
<td>Licensed psychotherapist; 35 yrs practice in mindfulness meditation; attended MBSR foundational program at the Omega Institute</td>
</tr>
<tr>
<td>Practicing a technique: (1 of the following stress management techniques: deep, focused L&amp;D on counseling topics at every class; role play of counseling techniques</td>
<td></td>
<td>Experienced meditation teacher and practitioner with advanced training in mindfulness</td>
</tr>
<tr>
<td>Small group discussions</td>
<td></td>
<td>Yoga teacher</td>
</tr>
<tr>
<td>Stress diary</td>
<td></td>
<td>Experienced meditation teacher in Beeja mantra-based technique</td>
</tr>
</tbody>
</table>
| Log to track personal | | }

### In-class Practice of Techniques

In-class practice of techniques x2 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

### L&D on Counseling Topics

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

### Instructing on Breathing and Meditation Exercises

- 60 min yoga, deep breathing, and meditation
- Instructed to practice 2x/d; 20 min ea time; concluding ea session with 2 min of resting

### Full Day Retreat

- Full day retreat to immerse students in a day of mindfulness
- No experiential exercises in stress management

### Handouts to Illustrate Concepts

- Handouts to illustrate concepts
- Narrated guidance meditation audio files for body scan, breath meditation, and gentle yoga
- No experiential exercises in stress management

### 2-hour Training Sessions

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

### 3 Mindfulness Classes Focusing on the Present Moment

3 mindfulness classes focusing on the present moment included sitting meditations

### Verbal Guidance at Beginning of Session and End with Silence

Verbal guidance at beginning of session and end with silence

### Each Class Begins with a Review of Mindfulness Within the Past

Each class begins with a review of mindfulness within the past

### Mindfulness Techniques in the Present Moment

3 mindfulness classes focusing on the present moment included sitting meditations

### Handouts to Illustrate Concepts

- Handouts to illustrate concepts
- Narrated guidance meditation audio files for body scan, breath meditation, and gentle yoga
- No experiential exercises in stress management

### 2-hour Training Sessions

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

### No Experiential Exercises

No experiential exercises in stress management
<table>
<thead>
<tr>
<th>Topics</th>
<th>Stress theory and response</th>
<th>Chronic stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress management:</td>
<td>Relaxation techniques and skills for coping with stress: how to change the situation or your reaction to the situation</td>
<td></td>
</tr>
<tr>
<td>Neuroscience lectures</td>
<td>Stress management techniques: how to change the situation or your reaction to the situation</td>
<td>Stress physiology: Health effects of stress levels</td>
</tr>
<tr>
<td>Stress overview</td>
<td>Stress; How to manage reactivity: Stress management techniques: humor, exercise, hypnosis, social support, acupuncture</td>
<td>Review of practice protocol and technique: Review of mindfulness including informal practice and journal assignments</td>
</tr>
</tbody>
</table>
### 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.

Assignments were related to counseling.

Practice breathing, meditation and yoga 3x/wk.

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

### Assignments

Assignments were related to student experience of mindfulness inside and outside of class.

Weekly assignments include:
- Written record: feelings pre and post practicing the technique.
- Stress diary.

Weekly reflections.

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

Wk 5 - 8 self-guided meditation.

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

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

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.
### Table 5

**JBI Grade of Evidence**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Abel (2014)</th>
<th>Beck (F 2014)</th>
<th>Bond</th>
<th>Chambers</th>
<th>Cohen/Miller</th>
<th>Erogul</th>
<th>Shapiro</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feasibility:</strong> Is the cost of the practice, availability of the practice or resource, and sufficient experience or competency available to implement the practice?</td>
<td>Yes, the 14-week MBSR Course is feasible. We would need to hire the MBSR instructor.</td>
<td>Yes, the 18-week General Stress Management course is feasible. We would need to hire a Yoga and MBSR instructor.</td>
<td>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 a Yoga and MBSR instructor.</td>
<td>Yes, the 11-week elective course of yoga, meditation, and didactics is feasible. We would need to hire a Yoga and MBSR instructor.</td>
<td>Yes, the 6-week course of interpersonal mindfulness training (IMT) is feasible. We would need to hire an IMT instructor.</td>
<td>Yes, the 8-week, 75 minute MBSR course offered as part of the Stress and Stress Management course would be feasible. We would need to hire a MBSR Zinn instructor, preferably a trained psychotherapist.</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Appropriateness:</strong> Is the intervention culturally acceptable, transferable, and adaptable to differing circumstances?</td>
<td>Yes, similar demographic. The majority of the study participants were women. This type of intervention would align with an integrative health perspective.</td>
<td>Yes, similar demographic. Majority of these participants were female graduate students. This type of intervention would align with an integrative health perspective.</td>
<td>Yes, age group and area of study were similar; no demographics given for 1st and 2nd year students in the study. This type of intervention would align with an integrative health perspective.</td>
<td>Yes, similar age group; majority of study participants were men. This type of intervention would align with an integrative health perspective.</td>
<td>Yes, similar age group; no additional demographic given. This type of intervention would align with an integrative health perspective.</td>
<td>Yes, similar demographic and the majority of participants were female. This type of intervention would align with an integrative health perspective.</td>
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<tr>
<td>Meaningfulness:</td>
<td>Is the intervention associated with more positive experiences rather than negative experiences?</td>
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<tr>
<td>Yes, no negative experiences were reported and positive experiences were reported.</td>
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<tr>
<td>Yes, no negative experiences and results were positive.</td>
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<tr>
<td>Yes, no students reported negative effects and many reported positive effects.</td>
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<tr>
<td>Yes, there were no negative outcomes and significant reduction in perceived stress and blood pressure readings.</td>
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</tr>
<tr>
<td>Yes, no students reported negative outcomes and many reported positive effects.</td>
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<tr>
<td>Yes, the intervention had positive outcomes and no reported negative effects.</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effectiveness:</th>
<th>Is there a beneficial effect of the intervention and is it safe?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, the intervention was beneficial and safe.</td>
<td></td>
</tr>
<tr>
<td>Yes, the intervention was beneficial and safe.</td>
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<tr>
<td>Yes, the intervention was beneficial and safe.</td>
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<tr>
<td>Yes, the intervention was beneficial and safe.</td>
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<tr>
<td>Yes, the intervention was beneficial and safe.</td>
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</tbody>
</table>

*Note. All Grade A Recommendations.*