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Meta-Analytic Evaluation of Stress Reduction Interventions for Undergraduate and Graduate Students

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Growing numbers of students in college or graduate school experience high stress, resulting in adverse emotional, academic, and health outcomes. A variety of stress reduction interventions have been used with students, but their effectiveness has not been systematically examined. We used meta-analysis to evaluate the efficacy of stress reduction interventions for undergraduate and graduate students. Studies ($k = 43$) that used an appropriate control group and assessed distress before and after intervention were aggregated using a random-effects model. Most studies were conducted in the United States; others were from Asia, Europe, and Australia. Standardized mean gain difference effect sizes were calculated for anxiety and perceived stress for six intervention techniques. Moderators examined included student type (undergraduate and graduate) and duration of intervention. Results indicate that most interventions are effective in decreasing both outcomes in students. Cognitive–behavioral therapy, coping skills, and social support interventions were more effective in reducing perceived stress, whereas relaxation training, mindfulness-based stress reduction, and psychoeducation were more effective in reducing anxiety. Graduate students experienced greater reduction in anxiety than did undergraduates for relaxation training and psychoeducation interventions. Participants in both long- and short-term interventions showed significant reduction in anxiety and perceived stress relative to control groups, but for relaxation training, long-term interventions were more effective in reducing anxiety than were short-term interventions. Although all six techniques were effective in reducing at least one of the stress-related outcomes, the few differences in effectiveness suggest there is value in tailoring interventions toward the particular group and outcome being targeted.

Keywords: stress reduction intervention, anxiety, distress, students, meta-analysis

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Distress among young adult students is rising precipitously. Undergraduate students are presenting to counseling centers with mental health concerns in growing numbers, and poor self-rated emotional health has become increasingly common among students (American Psychological Association, 2013; Center for Collegiate Mental Health, 2014; Reetz, Krylowicz, & Mistler, 2014; Watkins, Hunt, & Eisenberg, 2012). Stress is often a precursor to depression, anxiety, and other mental health disorders in students (Augner, 2015; Beiter et al., 2015; Iqbal, Gupta, & Venkatarao, 2015; Watkins et al., 2012). In the past 25 years, students' perceptions of their own mental health have been declining, with a 13% decline from 2009 to 2010 (Pryor, Hurtado, DeAngelo, Blake, & Tran, 2010). Research has also suggested that the current generation of students struggles with stress management far more than did previous generations (Bland, Melton, Welle, & Bigham, 2012).

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Undergraduates report a wide range of stressors including academic pressures, social challenges, family strains, and financial concerns (Beiter et al., 2015). At the same time, these students are undergoing a transition from adolescence to adulthood (Arnett, 2014). Many struggle to solidify their identities, attitudes, and values, and some have not yet developed appropriate skills to cope well with stress (Arnett, 2014; London, Rosenthal, Levy, & Lobel, 2011). During their later college years, students also begin to make career decisions and pursue graduate training or occupational prospects that can engender stress (Beiter et al., 2015). Furthermore, some research attributes student stress increases to increasing numbers of people enrolling in degree-granting institutions. College enrollment increased by 11% between 1991 and 2001 and by 32% between 2001 and 2011 (National Center for Education Statistics, 2011). As the population of people who are attending college and graduate school has expanded, more of them may be underprepared. Students from diverse backgrounds also report experiences of stress on college campuses related to their racial and ethnic identity (Arbona & Jimenez, 2014). In addition, the cost of higher education has risen much more rapidly—260% from 1980 to 2014—than other commodities (~120% over the same period; Jackson, 2015). Consequently, students and their families are facing greater financial stress and more students are working while attending school (Heckman, Lim, & Montalto, 2014). Finally, older students are more numerous than in previous generations, and they may simultaneously be facing other stressors (Chung, Turnball, & Chur-Hansen, 2017). For example, the number of single mothers in college more than doubled from 1999 to 2012, and now accounts for 11% of all undergraduates (Institute for Women's Policy Research, 2017).

Graduate students also face substantial stress, particularly in medical, helping, and clinically oriented graduate programs. These students not only engage in rigorous theoretical learning but are also responsible for patients and simultaneously deal with a lack of knowledge and experience in a novel environment (Seibel, 2014). Some graduate nursing students, for example, report low confidence and an inability to complete tasks, which lead to increases in anxiety, perceived stress, and depression (Reeve, Shumaker, Yearwood, Crowell, & Riley, 2013; Wolf, Stidham, & Ross, 2015). Like their undergraduate counterparts, both clinically and nonclinically oriented graduate students also experience numerous other stressors, including test anxiety (Augner, 2015) and financial strains (Ho, Wong, Chow, & Cheng, 2015).

Facing this number and variety of challenges with insufficient coping skills can adversely affect students' psychological and physical health (Augner, 2015; Klainin-Yobas et al., 2014; Li & Yang, 2009). Stress and maladaptive coping strategies are related in students to poor sleep (Sawah et al., 2015), psychiatric disorders (Iqbal et al., 2015), substance abuse (Jackson, Shanafelt, Hasan, Satele, & Dyrbye, 2016; Moore, Burgard, Larson, & Ferm, 2014), physical health decrements (Klainin-Yobas et al., 2014), attrition, and poor academic performance (Sohail, 2013). A qualitative study of college administrators revealed that increases in mental health severity and psychosocial differences in the college population partly accounted for increased demand for college mental health services (Watkins et al., 2012). The trends are similar across countries and settings. For example, one study of Saudi Arabian medical students revealed that the prevalence of stress was 63%, and the prevalence of *severe* stress was 25% (Abdulghani, AlKanhal, Mahmoud, Ponnamperuma, & Alfaris, 2011). School-related stress has been associated with high rates of suicide in Asian Americans and in Asian countries (Leong, Leach, Yeh, & Chou, 2007), and numerous French studies have identified high rates of student distress, often associated with or leading to psychological disorders and suicidal ideation (Saleh, Camart, & Romo, 2017). Given the extent of deleterious outcomes associated with stress, identifying effective approaches to managing stress in undergraduate and graduate students is imperative.

Stress Reduction Interventions for Students

A variety of interventions have been created to alleviate stress in students. These interventions incorporate several techniques, either singly or in combination, most commonly including psychoeducation, relaxation training, cognitive–behavioral therapy (CBT), social support, coping skills training, or mindfulness training. The goal of psychoeducation is to in-

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crease knowledge of the causes of stress and its emotional, cognitive, behavioral, and physiological effects (Steinhardt & Dolbier, 2008). Relaxation training includes techniques such as progressive muscle relaxation, guided imagery, meditation, and biofeedback, and is designed to reduce or alter the physiological stress response (Henriques, Keffer, Abrahamson, & Horst, 2011; Ratanasiripong, Ratanasiripong, & Kathalae, 2012; Zargarzadeh & Shirazi, 2014). Cognitive–behavioral strategies aim to identify and change maladaptive thinking and behavior, such as catastrophizing and alcohol use (Orbach, Lindsay, & Grey, 2007). Interventions that employ social support provide environments where individuals are encouraged to communicate their experiences, thoughts, and feelings to one another (Ando, 2011; Kim, Lee, Kim, Noh, & Lee, 2016). Coping skills training focuses on tailoring skills to deal with specific stressors (Jones, 2004; Sheehy & Horan, 2004). Finally, mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1990) is based on the premise that enhancing one's ability to attend to present moment experiences in a receptive way reduces self-focused thoughts and emotions that lead to poor mental health (Call, Miron, & Orcutt, 2014; Chen, Yang, Wang, & Zhang, 2013; Phang, Mukhtar, Ibrahim, Keng, & Sidik, 2015; Warnecke, Quinn, Ogden, Towle, & Nelson, 2011). The selection of techniques incorporated into stress reduction interventions is based on assumptions about their likely effectiveness in a given context.

Various meta-analyses and systematic reviews have evaluated such stress reduction interventions. However, most studies have evaluated one intervention only, such as meditation (Sedlmeier et al., 2012), mindfulness (Grossman, Niemann, Schmidt, & Walach, 2004; Khoury, Sharma, Rush, & Fournier, 2015; Zenner, Herrnleben-Kurz, & Walach, 2014; Zoogman, Goldberg, Hoyt, & Miller, 2015), relaxation training (Bastani, Hidarnia, Kazemnejad, Vafaei, & Kashanian, 2005), or CBT (Hofmann & Smits, 2008; Regehr, Glancy, & Pitts, 2013; Stewart & Chambless, 2009). CBT, for example, has been shown in several analyses to be moderately (Hofmann & Smits, 2008) or strongly (Stewart & Chambless, 2009) effective, although the findings are based primarily on nonstudent samples. Benefits of relaxation training were demonstrated in a unique nonstudent population, namely, pregnant women (Bastani et al., 2005). In this study, relaxation training produced reductions both in anxiety and in perceived stress, with stronger effects on anxiety. MBSR interventions have also been used successfully in a variety of populations, including healthy adults (Chiesa & Serretti, 2009) as well as patients (Grossman et al., 2004), although there have been some contradictory findings regarding the specific benefits of this type of intervention. A meta-analysis by Goyal and colleagues (2014), for example, indicated that mindfulness interventions had moderate impact on anxiety (d = .38 at 8 weeks; .22 at 3–6 months), and little impact on stress or distress in adult clinical samples, whereas a different meta-analysis indicated that MBSR had larger effects on stress than on anxiety (Khoury et al., 2015).

Of research that has investigated stress interventions among students, most studies have evaluated either undergraduate (Regehr et al., 2013) or graduate (Galbraith & Brown, 2011) students exclusively. For instance, a meta-analysis of stress interventions with nursing students revealed that coping skills and changing maladaptive cognitions were effective in reducing perceived stress in this population (Galbraith & Brown, 2011). To our knowledge, no meta-analysis has examined which techniques are most effective in reducing distress among undergraduate *and* graduate students, and whether effectiveness varies depending on student population. Undergraduate and graduate students both experience a large number and variety of stressors during their education. Many interventions have been developed for both undergraduate and graduate student populations. However, it is not known whether undergraduate and graduate students benefit differentially from these interventions.

It is also important to examine whether interventions are differentially effective based on their duration. Van Daele, Hermans, Van Audenhove, and Van den Bergh (2012), for example, found that brief psychoeducation interventions to reduce stress were more effective than psychoeducation interventions of longer duration. Stress reduction interventions for students range from single-day programs to programs lasting several weeks. One of the briefest interventions is the 1-day outdoor experiential training program (Kanters, Bristol, & Attarian,

2002) that often incorporates coping skills training and social support in orientation programs at colleges and universities (Padilla-Meléndez, Fernández-Gámez, & Molina-Gómez, 2014). This intervention has been shown to reduce anxiety in graduate veterinary students (Kanters et al., 2002). Many other interventions last 8 weeks or more. For example, a multidimensional intervention in which nursing students met for 2 hours weekly for 12 weeks was effective in reducing their anxiety (Sharif & Armitage, 2004). Longer interventions may be more resource-intensive and require greater commitment from participants; however, if briefer interventions are not as efficacious, then greater investment may be worthwhile.

The Present Study

We used meta-analytic techniques to examine the effectiveness of interventions in reducing students' anxiety and perceived stress in comparison with control conditions. Examining changes in both anxiety and perceived stress offers a more comprehensive analysis of the impact of interventions. According to one of the most prominent theoretical frameworks for conceptualizing stress, cognitive appraisal is the process by which individuals evaluate whether a situation is stressful or benign (Lazarus & Folkman, 1984). Anxiety is a common emotional response to a situation perceived as stressful, although some emotion experts suggest that anxiety can be a more immediate response, not necessarily preceded by a cognitive appraisal or perception of stress (cf. Lazarus, 1999). Thus, it is valuable to examine perceived stress and anxiety independently and to determine whether interventions reduce one or both of these.

The aim of the present study was to evaluate the effectiveness of interventions in reducing students' anxiety and perceived stress. We used meta-analysis to examine effectiveness of six types of evidence-based interventions: CBT, coping skills training, relaxation training, MBSR, psychoeducation, and social support. In addition to identifying effective interventions, we also explored whether effectiveness is influenced by duration of the intervention or by student level (i.e., undergraduate vs. graduate).

Intervention Type

We compared changes in anxiety or perceived stress from before to after an intervention based on the type of intervention technique used: CBT, coping skills training, MBSR, relaxation training, psychoeducation, or social support. Because some interventions used more than one technique, some studies were included in multiple analyses. We tested the following hypotheses:

> *Hypothesis 1:* Interventions that incorporate techniques that aim to alter cognitive appraisals of stressors, specifically those that use CBT or coping skills training, will have robust effect sizes for perceived stress and smaller effect sizes for anxiety.
>
> *Hypothesis 2:* Interventions that aim to reduce negative emotional responses to stressors, specifically those that use relaxation training, will have robust effect sizes for anxiety and smaller effect sizes for perceived stress.
>
> *Hypothesis 3:* Interventions using MBSR, social support, or psychoeducational techniques will have similar effect sizes for both outcomes (perceived stress and anxiety) because such techniques focus both on cognitive appraisal and emotional responses.

Study hypotheses were evaluated by examining effect sizes for alleviation of anxiety and perceived stress, respectively. See Method section below.

Student Type

We also explored whether the efficacy of interventions varies depending on whether it is used with undergraduate or graduate students. Whereas both types of students face a variety of stressors during their education, undergraduate students experience a transitional period between late adolescence and early adulthood in which their identities, attitudes, and values may be unstable (Arnett, 2014). They may also have underdeveloped or untested coping skills and could therefore benefit differently than relatively older graduate students from interventions aimed at improving these skills. Because there is insufficient existing evidence to ad-

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vance a specific hypothesis, these analyses were exploratory.

Intervention Duration

Duration of intervention is also an important moderator to examine to determine whether there is justification for investing greater resources and participant time in longer lasting interventions, or whether briefer interventions are equally effective and more resource efficient. This analysis was also exploratory.

Method

Study Selection and Data Extraction

According to guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher, Liberati, Tetzlaff, Altman, & the PRISMA Group, 2009), a systematic literature search was conducted by searching bibliographic databases PsycINFO and PubMed (Medline). For both databases, the exact search date was 1 January 1980 through 31 December 2015. This period begins around the time of important developments in stress research and evidence-based interventions, including establishment by Hans Selye of the American Institute of Stress in 1978, the founding of John Kabat-Zinn's MBSR clinic (Kabat-Zinn, 1982), the integration of cognitive therapies and behavioral therapies to form CBT and the founding of the CBT special interest group by the Association for Advancement of Behavior Therapy (now the Association for Behavioral and Cognitive Therapies), and the growth and popularization of applications of psychoeducation by C.M. Anderson (Anderson, Hogarty, & Reiss, 1981). In addition, through covering a 35-year period, we strived to improve the reliability of meta-analysis results by including a larger number of studies than have been included in previous analyses of stress interventions. A Boolean search strategy was conducted with the following keywords and logic: (*stress management program* OR *stress management intervention* OR *stress inoculation training* OR *coping skills training* OR *mindfulness-based stress reduction* OR *relaxation training* OR *meditation*) AND (*stress* OR *distress* OR *anxiety*) AND (*cope* OR *coping*) AND (*student* OR *undergraduate* OR *graduate* OR *college* OR *university*). We also conducted a hand search of relevant journals. After removing duplicates, this process identified abstracts of 254 human studies published in English (Figure 1). Based upon examination of abstracts, 196 inappropriate articles were excluded (e.g., those lacking interventions), yielding 58 potentially eligible studies. Inclusion criteria were then examined. Studies were eligible for inclusion if they were published in a peer-reviewed journal (i.e., dissertations were excluded), used a prospective design with perceived stress or anxiety quantitatively assessed with a standardized measure both before and after the intervention, included undergraduate or graduate student participants, used a control group, and reported results needed to calculate an effect size. A total of 43 eligible articles were identified and included in the meta-analysis. The main outcome of interest was change in perceived stress and/or anxiety. The following were also extracted from articles: lead author, year of publication, country, intervention technique(s), sample size, intervention duration, study design, and subgroup (i.e., gender and year in school).

Psychological Distress Constructs and Measures

Some studies reported multiple relevant measures (e.g., two different anxiety measures), and their inclusion would violate statistical assumptions about independence. In these cases, a single measure was chosen a priori (Lipsey & Wilson, 2001). To maximize consistency, the frequency of use of psychological distress measures in the entire sample was calculated, and the most frequently used measure was chosen for the primary analysis.

Anxiety. Measures of anxiety included the State Anxiety subscale of the State–Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), the Tension-Anxiety subscale of the Profile of Mood States (McNair, Lorr, & Droppleman, 1992), the Test Anxiety Scale (Sarason, 1978), the Test Anxiety Inventory (Spielberger, 1980), the Hamilton Anxiety Rating Scale (Hamilton, 1959), the Anxiety subscale of the Depression, Anxiety, and Stress Scale (Lovibond & Lovibond, 1995), the Symptom Checklist–90–Revision (Derogatis, Rickels, & Rock, 1976), the Endler Multidimen-

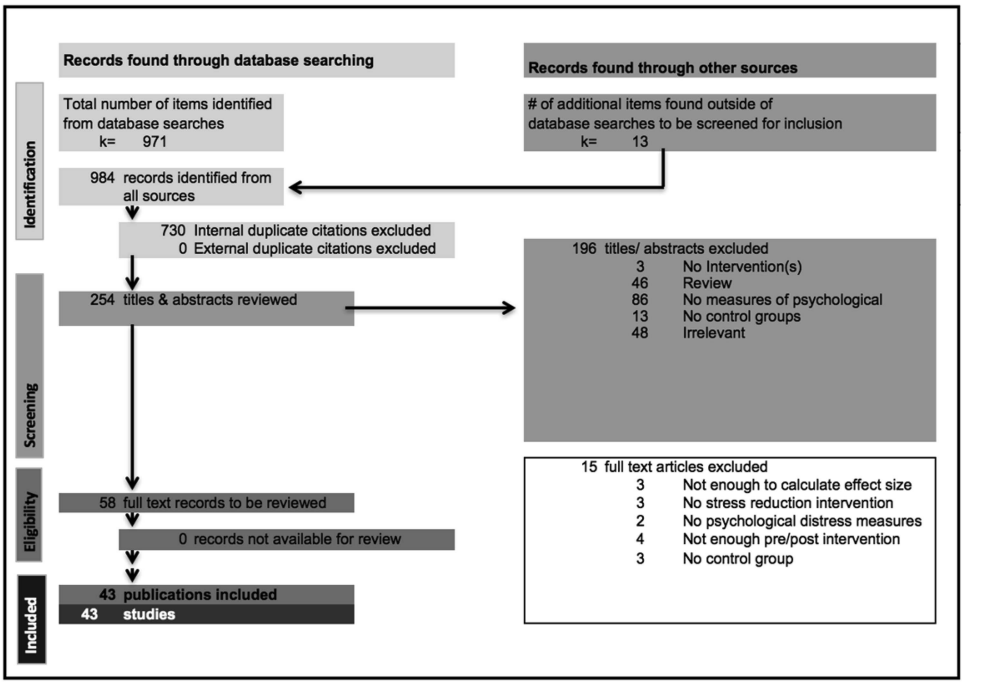

Figure 1. The process of study selection. The process is modeled after Moher et al. (2009).

sional Anxiety Scale–State (Endler, Edwards, & Vitelli, 1991), the General Distress, Anxious subscale of the Mood and Anxiety Symptom Questionnaire (Watson & Clark, 1991; Watson et al., 1995), and the Apprehension in Social/Academic Failure subscale of the Stressful Situations Questionnaire (Fischer & Corcoran, 1994).

Perceived stress. Measures of perceived stress included the Perceived Stress Scale (Cohen & Williamson, 1988), the Symptoms of Stress Inventory (Leckie & Thompson, 1979), the Brief Symptom Inventory (Derogatis, 1993), the Perceived Stress of Medical School (Vitaliano, Russo, Carr, & Heerwagen, 1984), the Stress subscale of the Depression, Anxiety, and Stress Scale (Lovibond & Lovibond, 1995), the General Distress, Mixed subscale of the Mood and Anxiety Symptom Questionnaire (Watson & Clark, 1991; Watson et al., 1995), the Revised Life Stress Scale for College Students (Chon, Kim, & Yi, 2000), and the Psychosocial Wellbeing Index–Short form (Chang, 2000).

Data Abstraction and Statistical Analyses

Typically, means and standard deviations for each anxiety and/or perceived stress outcome measure in each condition and time point were extracted for each study. In cases in which the mean, standard deviation, and sample size scores were not available, effect sizes were calculated using effect size estimates (e.g., F, t, or p values). The standardized mean gain difference effect size (d) was used to examine changes in psychological distress before and after intervention in the treatment group compared with a control group. This statistic is calculated by subtracting the control group gain score (posttest score minus pretest score) from the treatment group gain score and dividing the difference by the pooled pretest standard deviation (Reardon-Anderson, Stagner, Macomber, & Murray, 2005). A positive effect size indicates that the treatment group had a larger reduction in psychological distress than the control group. The individual effect sizes were then weighted by the inverse of their variance and averaged to obtain an aggregate effect size. De-

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scriptive information for each study was also abstracted for moderator variables, including the type of student (sample included only undergraduates vs. sample included graduate students) and duration of the intervention (<8 weeks vs. 8+ weeks). Analyses were conducted with Comprehensive Meta-Analysis Version 2.0 (Borenstein, Hedges, Higgins, & Rothstein, 2005). Random-effects aggregate effect sizes are reported.

Results

A description of the studies analyzed appears in Table 1. From the 43 studies, we extracted 35 effect sizes for anxiety and 20 for stress. Treatment group sample sizes ranged from 7 to 195 ($M = 45.8$, $SD = 38.1$). Control group sample sizes ranged from 12 to 162 ($M = 43.6$, $SD = 32.2$), resulting in a total of 4,400 treatment and control participants with sample mean ages ranging from 18.8 ($SD = 1.4$) to 36.1 ($SD = 10.7$) years. Thirty studies were conducted in the United States, two in the United Kingdom, two in Korea, two in Iran, and one each in Australia, China, India, Japan, Jordan, Malaysia, and Thailand. The majority of interventions ($k = 22$) used a combination of intervention techniques. In such cases, studies were included in multiple analyses based on the types of techniques included in their interventions. Of the 43 studies, 23 used relaxation training, 18 used psychoeducation, 17 used coping skills training, 13 used CBT, 11 used MBSR, and four used social support. Twenty-one studies used a single technique, namely, MBSR, relaxation training, psychoeducation, or CBT. Twenty-six interventions were short-term (1 day to 6 weeks), and 17 were of long-term duration (8 weeks to 12 weeks). The majority of studies (28) used undergraduate student samples; 15 were studies of graduate students. Anxiety and perceived stress aggregate effect sizes are presented for each of the six intervention components in Table 2. We evaluated the magnitude of aggregate effect sizes in terms of Cohen's (1988) recommendations: $d = 0.20$, small; $d = 0.50$, medium; and $d = 0.80$, large.

Anxiety

Individual effect sizes ranged from -0.64 to 4.17. Assuming a random-effects model, the inverse-variance weighted mean effect size for anxiety was 0.62, 95% confidence interval (CI) [0.37, 0.87], $p < .001$. These positive effect sizes indicate that participants receiving an intervention evidenced larger decreases in anxiety than the control group. The aggregate effect size for this analysis is considered an effect of medium size.

To test Hypotheses 1 through 3, effect sizes for reduction of anxiety based on each intervention technique separately were calculated. All of the aggregate effect sizes for anxiety based on technique used were positive. All were statistically significant except for social support (Table 2). Aggregate effect sizes were small for studies using CBT and for those using coping skills training, medium for studies using MBSR or psychoeducation, and large for relaxation training. Analyses supported Hypotheses 1 and 2, but not the hypothesis that social support would reduce anxiety (Hypothesis 3).

Effect sizes were significantly heterogeneous, $Q(34) = 370.47$, $p < .01$. Therefore, to explore whether the efficacy of interventions for anxiety varies depending on their duration and whether they are used with undergraduate or graduate students, two mixed-effects moderator analyses were conducted using an analogue-to-analysis of variance for categorical variables. Moderator analysis revealed that neither duration of intervention (short-term vs. long-term) nor type of student (undergraduate vs. graduate) was a statistically significant moderator of anxiety, $Q(1) = 2.02$, $p = .16$; $Q(1) = .99$, $p = .32$, respectively. Moderation analyses of intervention duration and student type on anxiety-related effects of specific intervention type were also conducted to offer a more fine-tuned test of these exploratory ideas. Duration was a significant moderator for relaxation training interventions only, indicating that the duration of intervention significantly reduced the level of heterogeneity, $Q(1) = 3.97$, $p < .05$. Although participants in both long- and short-term relaxation training interventions experienced a significant reduction in anxiety relative to participants in the control group, long-term relaxation training interventions ($d = 1.58$, 95% CI [0.74, 2.42], $p < .01$) were more effective for reducing anxiety than were short-term relaxation training interventions ($d = 0.63$, 95% CI [0.20, 1.05], $p < .05$). Type of student was a significant moderator for psychoeducation and for relax-

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Table 1
Summary of the Studies Included in the Analysis

Study	Country	Intervention techniques	*N*	Intervention duration	Design	Student type	Outcome	Subgroup
Ando (2011)[a]	Japan	Coping skills training, psychoeducation, social support	222	11 weeks	Experimental	Undergraduate	Anxiety	Female Male
Call, Miron, and Orcutt (2014)	United States	MBSR/relaxation training	91	Three 45-min sessions	Experimental	Undergraduate	Anxiety, perceived stress	NA
Chen, Yang, Wang, and Zhang (2013)	China	MBSR	60	30 min daily for 7 days	Experimental	Graduate	Anxiety	NA
Chiauzzi, Brevard, Thum, Decembrele, and Lord (2008)	United States	Coping skills training, psychoeducation, relaxation training	235	20 min, 4 times over 2 weeks	Experimental	Undergraduate	Perceived stress	NA
Deckro et al. (2002)	United States	CBT, psychoeducation, relaxation training	128	6 weeks	Experimental	Undergraduate	Anxiety, perceived stress	NA
Dolbier and Rush (2012)	United States	Relaxation training	128	20 mins	Experimental	Undergraduate	Anxiety	NA
Dziegielewski, Turnage, and Roest-Marti (2004)	United States	CBT, coping skills training, psychoeducation, relaxation training	48	45 mins	Experimental	Undergraduate	Anxiety	NA
Erogul, Singer, McIntyre, and Stefanov (2014)	United States	MBSR	57	weekly 75-min sessions for 8 weeks and a full day retreat	Experimental	Graduate	Perceived stress	NA
Fehring (1983)	United States	Relaxation training	78	8 weeks	Experimental	Undergraduate	Anxiety	NA
Finkelstein, Brownstein, Scott, and Lan (2007)	United States	Psychoeducation	72	10 weeks	Quasi-experimental	Graduate	Anxiety, perceived stress	NA
Flinchbaugh, Moore, Chang, and May (2012)	United States	Relaxation training, coping skills training	117	12 weeks	Quasi-experimental	Undergraduate	Perceived stress	NA
Fontana, Hyra, Godfrey, and Cermak (1999)	United States	CBT, coping skills training, psychoeducation, relaxation training	36	Six 45-min sessions	Experimental	Undergraduate	Anxiety	NA
Frazier et al. (2015)	United States	Coping skills training	194	2 weeks	Experimental	Undergraduate	Perceived stress, anxiety	NA
Godbey and Courage (1994)	United States	CBT, coping skills training, psychoeducation	19	6 weeks	Quasi-experimental	Undergraduate	Anxiety	NA
Hamdan-Mansour, Puskar, and Bandak (2009)	Jordan	CBT, coping skills training	84	10 weeks	Experimental	Undergraduate	Perceived stress	NA
Heaman (1995)	United States	CBT, psychoeducation, relaxation training	40	5 weeks	Experimental	Undergraduate	Anxiety	NA
Henriques, Keffer, Abrahamson, and Horst (2011)	United States	Relaxation training	35	4 weeks	Experimental	Undergraduate	Anxiety, perceived stress	NA
Hintz, Frazier, and Meredith (2015)	United States	Coping skills training	195	14, 10-min sessions	Experimental	Undergraduate	Anxiety, perceived stress	NA
Jain et al. (2007)	United States	MBSR, relaxation training	83	4 weeks	Experimental	Graduate	Perceived stress	NA
Johansson (1991)[a]	United States	CBT, coping skills training, psychoeducation, relaxation training	76	3 weeks	Experimental	Undergraduate	Anxiety	Seniors Sophomores
Jones (2004)	United States	Coping skills training, psychoeducation, social support	58	8 weeks	Experimental	Undergraduate	Perceived stress	NA
Kang, Choi, and Ryu (2009)	Korea	MBSR	41	8 weeks	Experimental	Undergraduate	Anxiety, perceived stress	NA
Kanji, White, and Ernst (2004)	United Kingdom	Relaxation training	93	8 weeks	Experimental	Undergraduate	Anxiety	NA
Kanters, Bristol, and Attarian (2002)	United States	Coping skills training, social support	135	1-day session	Quasi-experimental	Graduate	Anxiety	NA
Kim, Lee, Kim, Noh, and Lee (2016)	Korea	Coping skills training	84	Eight 2-hr sessions over 4 weeks	Experimental	Undergraduate	Anxiety, perceived stress	NA

(*table continues*)

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Table 1 (*continued*)

Study	Country	Intervention techniques	*N*	Intervention duration	Design	Student type	Outcome	Subgroup
McWhirter, Okey, Roth, and Herlache (1995)	United States	CBT, coping skills training, psychoeducation, relaxation training	334	5 weeks	Quasi-experimental	Undergraduate	Anxiety	NA
Nidich et al. (2009)	United States	Psychoeducation, relaxation training	298	12 weeks	Experimental	Graduate	Anxiety	NA
Oman, Shapiro, Thoresen, Plante, and Flinders (2008)	United States	MBSR	44	8 weeks	Experimental	Undergraduate	Perceived stress	NA
Orbach, Lindsay, and Grey (2007)	United Kingdom	CBT, psychoeducation, relaxation training	90	8 weeks	Experimental	Graduate	Anxiety	NA
Phang, Mukhtar, Ibrahim, Keng, and Mohd Sidik (2015)	Malaysia	MBSR	75	5 weeks	Experiment	Graduate	Perceived stress	NA
Ratanasiripong, Ratanasiripong, and Kathalae (2012)	Thailand	Relaxation training	60	5 weeks	Experimental	Graduate	Anxiety, perceived stress	NA
Rausch, Gramling, and Auerbach (2006)	United States	Relaxation training	387	30 min	Experimental	Undergraduate	Anxiety	NA
Rosenzweig, Reibel, Greeson, Brainard, and Hojat (2003)	United States	MBSR	302	10 weeks	Quasi-experimental	Graduate	Anxiety	NA
Russler (1991)	United States	CBT, coping skills training, psychoeducation, relaxation training	57	16 hr over 2 weeks	Experimental	Undergraduate	Anxiety	NA
Shankarapillai, Nair, and George (2012)	India	Relaxation training	100	60 min	Experimental	Undergraduate	Anxiety	NA
Shapiro, Schwartz, and Bonner (1998)	United States	MBSR	78	8 weeks	Experimental	Graduate	Anxiety	NA
Shapiro, Brown, and Biegel (2007)	United States	MBSR	54	8 weeks	Quasi-experimental	Graduate	Anxiety, perceived stress	NA
Sharif and Armitage (2004)	Iran	CBT, psychoeducation, relaxation training	100	12 weeks	Quasi-experimental	Undergraduate	Anxiety	NA
Sheehy and Horan (2004)	United States	CBT, coping skills training, psychoeducation, relaxation training	22	4 weeks	Experimental	Graduate	Anxiety, perceived stress	NA
Smith (1989)	United States	Coping skills training, psychoeducation	36	5 hr over 2 weeks	Experimental	Undergraduate	Anxiety	NA
Steinhardt and Dolbier (2008)	United States	CBT, coping skills training, psychoeducation, social support	57	4 weeks	Experimental	Graduate	Perceived stress	NA
Warnecke, Quinn, Ogden, Towle, and Nelson (2011)	Australia	MBSR	66	8 weeks	Experimental	Graduate	Anxiety, perceived stress	NA
Zargarzadeh and Shirazi (2014)	Iran	Relaxation training	99	4, 30-min sessions	Quasi-experimental	Undergraduate	Anxiety	NA

Note. MBSR = mindfulness-based stress reduction; CBT = cognitive–behavioral therapy; NA = not available.
[a] Studies with subgroups contributed two effect sizes to analyses.

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Table 2
Analysis of Outcomes Following Intervention

						Moderator analyses (mixed-effects model)		
Intervention technique	Distress construct	k	d	Range	95% CI	Homogeneity test	Student type	Duration
CBT	Anxiety	12	0.38^{***}	−0.63 to 1.01	[0.15, 0.60]	$Q(11) = 23.55^{*}$	$Q_b(1) = 1.45$	$Q_b(1) = 0.27$
	PS	4	0.71^{***}	0.41 to 1.15	[0.37, 1.04]	$Q(3) = 5.54$		
Coping skills training	Anxiety	14	0.29^{**}	−0.63 to .89	[0.06, 0.52]	$Q(13) = 40.29^{***}$	$Q_b(1) = 0.63$	$Q_b(1) = 1.53$
	PS	8	0.45^{**}	−0.22 to 1.15	[0.15, 0.75]	$Q(7) = 26.91^{***}$	$Q_b(1) = 0.34$	$Q_b(1) = 0.08$
Relaxation training	Anxiety	20	0.82^{**}	0 to 4.17	[3.67, 4.67]	$Q(19) = 287.10^{***}$	$Q_b(1) = 8.36^{**}$	$Q_b(1) = 3.97^{*}$
	PS	8	0.36^{**}	−0.08 to 0.72	[0.13, 0.58]	$Q(7) = 11.55$		
MBSR	Anxiety	8	0.50^{**}	−0.64 to 1.23	[0.11, 0.88]	$Q(6) = 29.14^{***}$	$Q_b(1) = 0.52$	$Q_b(1) = 0.04$
	PS	7	0.40	−0.62 to 1.29	[−0.12, 0.92]	$Q(6) = 36.38^{***}$		
Psychoeducation	Anxiety	17	0.64^{**}	−0.63 to 4.17	[0.15, 1.13]	$Q(16) = 253.02^{***}$	$Q_b(1) = 6.77^{**}$	$Q_b(1) = 1.92$
	PS	6	0.43^{**}	−0.05 to 0.63	[0.15, 0.70]	$Q(5) = 10.00$		
Social support	Anxiety	3	0.24	−0.43 to 0.89	[−0.56, 1.03]	$Q(2) = 24.12^{**}$		
	PS	2	0.62^{**}	0.62 to 0.63	[0.25, 1.00]	$Q(1) = 0^{***}$	$Q_b(1) = 0$	$Q_b(1) = 0$

Note. CI = confidence interval; CBT = cognitive–behavioral therapy; PS = perceived stress; Q_b = between-groups heterogeneity for categorical moderators; MBSR = mindfulness-based stress reduction.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

ation training interventions, $Q(1) = 6.77$, $p < .01$; $Q(1) = 8.36$, $p < .01$, respectively. Graduate students experienced greater reduction in anxiety than did undergraduate students for both types of interventions. For the relaxation training intervention, both undergraduates and graduate students experienced a statistically significant reduction in anxiety relative to participants in the control group (graduate students: $d = 1.81$, 95% CI [1.06, 2.56], $p < 001$; undergraduate students: $d = 0.57$, 95% CI [0.20, 0.95], $p < .05$). For the psychoeducation intervention, graduate students experienced a significant reduction in anxiety relative to control group participants ($d = 1.78$, 95% CI [0.84, 2.73], $p < .001$), whereas undergraduates receiving this intervention experienced a marginally significant reduction in anxiety ($d = 0.40$, 95% CI [−0.05, 0.84], $p = .08$).

To rule out the possibility of bias by date of publication, moderator analyses of publication date on anxiety and anxiety-related effects of specific intervention type were conducted. Publication date was examined as a continuous variable as well as a categorical variable (comparing articles published through 2005 with those published after 2005 to create similar cell sizes). Meta-regressions revealed that publication date did not influence the effect sizes for anxiety or anxiety-related effects of specific intervention types.

Perceived Stress

Individual effect sizes for perceived stress ranged from −0.62 to 1.29. Assuming a random-effects model, the aggregate effect size was of small to medium size, 0.44, 95% CI [0.24, 0.64], $p < .01$. These positive effect sizes indicate that participants receiving an intervention evidenced larger decreases in perceived stress than the control group.

To test Hypotheses 1 through 3, effect sizes for reduction of perceived stress based on each intervention technique separately were calculated. All of the aggregate effect sizes for perceived stress based on technique used were positive. All were statistically significant except for MBSR (Table 2). Studies using CBT and social support had medium aggregate effect sizes; the aggregate effect sizes for coping skills training (0.45), psychoeducation (0.43), and relaxation training (0.36) were small to medium. Analyses

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supported Hypotheses 1 and 2, but not the hypothesis that MBSR would reduce perceived stress (Hypothesis 3).

Effect sizes were significantly heterogeneous, $Q(19) = 62.81$, $p < .01$. Therefore, to explore whether the efficacy of interventions for perceived stress varies depending on their duration and whether they are used with undergraduate or graduate students, two mixed-effects moderator analyses were conducted using an analogue-to-analysis of variance for categorical variables. Moderator analysis revealed that neither duration of intervention nor type of student was a significant moderator of perceived stress, $Q(1) = .01$, $p = .93$; $Q(1) = .11$, $p = .74$, respectively. To offer a more fine-tuned test, moderation analyses of duration and student type on stress-related effects of specific intervention type were also conducted; none was significant.

As for anxiety, additional moderator analyses of publication date on perceived stress and perceived stress-related effects of specific intervention type were conducted with publication date treated as a continuous and categorical variable. These meta-regressions revealed that publication date did not influence effect sizes for perceived stress or perceived stress-related effects of specific intervention types.

Publication Bias

To assess publication bias, Rosenthal's fail-safe *N* values (Rosenthal, 1979) were calculated for significant effect sizes. For anxiety, ~1,965 studies would be needed to render the effect size statistically nonsignificant; for perceived stress, 298 studies would be needed to render the effect size statistically nonsignificant. Therefore, publication bias does not appear to pose a problem for the findings involving either anxiety or perceived stress.

Discussion

Because of the rising prevalence and serious consequences of stress among students, stress reduction interventions are an important tool for colleges and universities. However, no previous review has systematically examined the efficacy of such interventions by student level, type of intervention technique, or duration. Results of the present meta-analysis indicate that many types of stress intervention techniques are effective in reducing perceptions (perceived stress) and emotional responses to stress (anxiety) among students.

Coping Skills Training and CBT

Hypothesis 1 was the prediction that interventions using coping skills training or CBT would have greater impact on perceived stress than on anxiety because these techniques are designed to alter cognitive appraisals of stressors. Results of the meta-analysis offer support for this hypothesis. This finding advances existing research examining such interventions, both in students and in nonstudent populations. Although CBT evidenced only a small-to-medium effect size ($d = 0.38$) for reduction of anxiety in the present investigation, meta-analyses of CBT interventions conducted with groups other than students have revealed stronger effects for anxiety reduction (Hofmann & Smits, 2008; Stewart & Chambless, 2009). Collectively, these analyses suggest that CBT may be a more effective intervention for anxiety in nonstudent than student populations, although direct comparisons of these groups would be necessary to confirm this possibility.

Relaxation Training

Supporting Hypothesis 2, which predicted that interventions using relaxation training would have stronger effect sizes for anxiety than for perceived stress because these types of interventions aim to reduce negative emotional responses to stressors, we found that studies that included a relaxation training technique in their intervention did appear to be more effective in reducing anxiety than perceived stress. Relaxation training directly addresses psychological and somatic consequences of stress rather than instilling stress management skills. A similar pattern of effects was found in pregnant women by Bastani et al. (2005) who reported that relaxation training produced larger reductions in anxiety than in perceived stress.

Psychoeducation, Social Support, and MBSR

We hypothesized that interventions involving psychoeducation, social support, or MBSR

would reduce perceived stress and anxiety because these techniques aim to influence both cognitive appraisal and emotional responses to stress (Hypothesis 3). Findings for psychoeducation were consistent with this hypothesis: Psychoeducation did reduce both perceived stress (small effect) and anxiety (medium effect). A previous meta-analysis also found that psychoeducation had small effects on stress (mean posttest effect size = 0.27); that meta-analysis did not examine effects on anxiety, however (Van Daele et al., 2012).

In contrast, findings for social support and MBSR did not support the hypothesis that these interventions would reduce both perceived stress and anxiety. Interventions promoting social support reduced perceived stress only and had no effect on anxiety, whereas interventions using MBSR were moderately effective in reducing anxiety but did not reduce perceived stress. There is a considerable body of research demonstrating that social support can buffer the impact of stress on numerous outcomes, particularly when the type and amount of support offers good fit to recipient needs (see review by Uchino & Birmingham, 2011). It is not clear why social support interventions conducted with students did not reduce anxiety, but close inspection of these interventions might reveal whether they provided types or amounts of support appropriate to the needs of their student samples. In addition, the small number of studies ($k = 3$, $k = 2$) for social support interventions suggests that these findings are less likely to be precise and thus should be interpreted with caution.

As for MBSR, previous meta-analyses offer mixed findings about the benefits of this type of intervention across heterogeneous samples. Some indicate benefits of mindfulness meditation in reducing both stress and anxiety (Chiesa & Serretti, 2009), or improvements in a range of mental health variables including anxiety and depression (Grossman et al., 2004). Two more recent meta-analyses offer contradictory findings, with the results of one indicating moderate impact on anxiety and little impact on stress (Goyal et al., 2014), and the results of the other indicating that MBSR had larger effects on stress than on anxiety (Khoury et al., 2015).

Impact of Student Type and Intervention Duration

Most of the interventions evaluated here were equally effective for undergraduate and graduate students. To our knowledge, no previous study has explored differential treatment response for undergraduate and graduate students. The impact of each intervention on perceived stress was equivalent for both groups of students; for anxiety, graduate students evidenced a greater reduction than did undergraduate students from psychoeducation and relaxation training, but derived equivalent benefit from the remaining interventions. Although undergraduate and graduate students may be in different developmental stages and experience some different challenges, both groups face stress in their respective environments and both may be open to learning new, effective techniques to reduce feelings of distress. In fact, with the exception of one study, all participants were volunteers rather than required to participate in an intervention, suggesting that students may be particularly motivated to learn strategies to alleviate stress.

In addition, results suggest that most interventions lasting 8 weeks or more were no more effective in reducing anxiety or perceived stress than were interventions lasting fewer than 8 weeks, although for relaxation training interventions only, long-term interventions were more effective at reducing anxiety than were short-term interventions. Briefer interventions are usually less expensive, entail less participant burden, and have higher compliance than longer interventions. For most types of interventions, short-term versions may be sufficiently effective. This finding extends existing research on intervention duration. For example, Van Daele et al. (2012) found that briefer psychoeducational interventions generated better results, and Virgili (2015) reported that brief MBSR interventions were as effective as standard 8-week interventions. However, there is some evidence that longer interventions result in sustained change in various populations (Proeschold-Bell et al., 2017). Brief interventions may be effective with students because they can be incorporated easily into the time course of academic terms.

One must be cautious in drawing conclusions about the impact of sample and intervention

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characteristics on intervention efficacy. Both overall aggregate analyses yielded significant heterogeneity across studies. Thus, it is possible that moderators other than the ones evaluated in this study are accounting for overall heterogeneity. One potential moderator is gender composition of the sample. There was not sufficient statistical power to examine this factor in the group of studies analyzed. An important issue for future research is determining what types of interventions work best with what types of people. For example, there is reason to predict that interventions that increase social support (Ditzen & Heinrichs, 2014; Walen & Lachman, 2000) or those that involve psychoeducation (Van Daele et al., 2012) may be more effective for women than for men. Ethnicity, race, and cultural background may also be significant moderators of the efficacy of interventions. These possibilities can only be tested as more studies of diverse types of interventions with diverse samples become available for analysis. Nevertheless, it is notable that this research identified benefits of interventions for students from a variety of backgrounds and countries.

Study Limitations, Strengths, and Implications

One limitation of this analysis involves the number of studies included. Many studies were excluded because they did not administer standardized measures of anxiety or perceived stress both before and after an intervention or did not include a control group. Fail-safe *N* values provide little support for the presence of publication bias. The limited number of studies is particularly relevant to the moderator analyses, however, which should be considered cautiously. Only a modest portion of studies assessed perceived stress as an outcome; a majority of studies assessed anxiety. Meta-analysis is most powerful in testing moderators when the number of studies, and therefore the number of effect size estimates, is large. This means that the influence of moderators may have been underestimated because of limited power to detect differences.

The issue of independence is also important. Although the current analysis examined effects on perceived stress and anxiety based on intervention technique used, a majority of studies used multidimensional interventions and assessed both perceived stress and anxiety in a single study, so there is an overlap between many of the aggregate effects. When multiple outcomes are measured for the same individuals, effect sizes for those outcomes are not independent. Furthermore, if a technique reduces perceived stress, then reduction in anxiety may also occur, as cognitive appraisal often precedes emotional response (Lazarus & Folkman, 1984). Many studies also combined techniques that could have interacted to affect outcomes (Ando, 2011; Chiauzzi, Brevard, Thurn, Decembrele, & Lord, 2008). To examine whether effectiveness was associated with exposure to a greater number of intervention techniques, we conducted an exploratory simulated regression analysis of the moderating effect of number of techniques. It was not significant ($p = .73$). Nevertheless, caution is advisable in directly comparing one intervention technique with another based on our analytic approach.

It is also important to note the heterogeneity of measures of anxiety and perceived stress. The State–Trait Anxiety Inventory was the most frequently used measure of anxiety, accounting for 34.9% of all studies ($k = 15$). Six studies used the Profile of Mood States (POMS), four studies used the Depression Anxiety Stress Scales (DASS-21), and four used the Symptom Checklist (SCL-R-90). Other measures were the Hamilton Anxiety Rating Scale and the Sarason Test Anxiety Scale. Perceived stress was most commonly measured using the Perceived Stress Scale, which accounted for 30.2% of all studies. Heterogeneity of measurement may have constrained our ability to find effects, but the present meta-analysis revealed effects for both perceived stress and anxiety despite this constraint.

Because a majority of studies did not report long-term follow-up data, we cannot draw conclusions about how long the effects of interventions last. Students may show improvements in stress and anxiety immediately following a stress reduction intervention, but over time may return to baseline levels, especially without continued help. Alternatively, students may learn lifelong skills during interventions that can be used to combat stress long after interventions have been completed. Studies are needed that include longer term follow-up data. Similarly, because distress is related to other adverse outcomes in students, it would be valuable for future studies to examine physical health and

academic outcomes such as retention in programs, grade point average, or board certification and licensing exam scores. Psychosocial outcomes such as academic self-efficacy and satisfaction with fields of study may also be worthwhile to assess in future studies.

Given that the majority of control groups included in this review did not receive any intervention, but were merely assigned to waitlists or received nothing, a plausible conclusion from these results is that students benefit from any type of help, regardless of its content. Because few studies included in this meta-analysis had control groups assigned to an alternative intervention, a moderator analysis of the type of control group could not be conducted. However, as additional intervention studies are conducted and become available to evaluation by meta-analytic techniques, analyses examining control groups who engage in alternative activities rather than controls who receive nothing should be performed to determine the impact of participating in any intervention or participating in a particular stress reduction intervention.

Despite its limitations, results of the present study are encouraging and offer several implications for research as well as clinical application. All of the techniques were effective in reducing at least one of the stress-related outcomes (i.e., perceived stress, anxiety) in both short-term and long-term interventions. Of the interventions examined, relaxation training appeared to be the most effective intervention to reduce anxiety for undergraduates; relaxation training and psychoeducation appeared to be the most effective interventions against anxiety for graduate students. CBT, coping skills training, psychoeducation, and social support interventions were effective to reduce perceived stress in both groups of students. These findings suggest there is value in tailoring interventions toward the particular group and outcome being targeted.

In addition, given that stress is thought to precede anxiety (Lazarus & Folkman, 1984), targeting stress before its escalation and manifestation as anxiety may be an especially effective approach. We did not directly test the temporal precedence of stress and anxiety, but this is an important avenue for further research. Finally, a more detailed understanding of differences between students and other populations might help to explain whether and why they respond to interventions differently. Results of the present meta-analysis highlight that some disparities may exist in the effectiveness of stress interventions such as CBT for students and nonstudents. Such differences may be attributable to the unique stressors that students face or to their age, maturity, or life stage. Research addressing these important issues may help to inform and tailor interventions to the needs of students and can be used as a basis to allocate resources more effectively for interventions that will alleviate distress in students at all levels.

References

References marked with an asterisk are included in the meta-analysis.

Abdulghani, H. M., AlKanhal, A. A., Mahmoud, E. S., Ponnamperuma, G. G., & Alfaris, E. A. (2011). Stress and its effects on medical students: A cross-sectional study at a college of medicine in Saudi Arabia. *Journal of Health, Population, and Nutrition, 29,* 516–522. http://dx.doi.org/10.3329/jhpn.v29i5.8906

American Psychological Association. (2013). College students' mental health is a growing concern, survey finds. *Monitor on Psychology, 44,* 13.

Anderson, C. M., Hogarty, G., & Reiss, D. J. (1981). The psychoeducational family treatment of schizophrenia. *New Directions for Mental Health Services, 1981,* 79–94. http://dx.doi.org/10.1002/yd.23319811207

*Ando, M. (2011). An intervention program focused on self-understanding and interpersonal interactions to prevent psychosocial distress among Japanese university students. *Journal of Adolescence, 34,* 929–940. http://dx.doi.org/10.1016/j.adolescence.2010.12.003

Arbona, C., & Jimenez, C. (2014). Minority stress, ethnic identity, and depression among Latino/a college students. *Journal of Counseling Psychology, 61,* 162–168. http://dx.doi.org/10.1037/a0034914

Arnett, J. J. (2014). *Adolescence and emerging adulthood.* New York, NY: Pearson Education Limited.

Augner, C. (2015). Depressive symptoms and perceived chronic stress predict test anxiety in nursing students. *Central European Journal of Nursing and Midwifery, 6,* 291–297. http://dx.doi.org/10.15452/CEJNM.2015.06.0018

Bastani, F., Hidarnia, A., Kazemnejad, A., Vafaei, M., & Kashanian, M. (2005). A randomized controlled trial of the effects of applied relaxation training on reducing anxiety and perceived stress

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in pregnant women. *Journal of Midwifery and Women's Health, 50,* e36–e40. http://dx.doi.org/10.1016/j.jmwh.2004.11.008

Beiter, R., Nash, R., McCrady, M., Rhoades, D., Linscomb, M., Clarahan, M., & Sammut, S. (2015). The prevalence and correlates of depression, anxiety, and stress in a sample of college students. *Journal of Affective Disorders, 173,* 90–96. http://dx.doi.org/10.1016/j.jad.2014.10.054

Bland, H. W., Melton, B. F., Welle, P., & Bigham, L. (2012). Stress tolerance: New challenges for millennial college students. *College Student Journal, 46,* 362–376.

Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2005). *Comprehensive meta-analysis, Version 2.0*. Englewood, NJ: Biostat.

*Call, D., Miron, L., & Orcutt, H. (2014). Effectiveness of brief mindfulness techniques in reducing symptoms of anxiety and stress. *Mindfulness, 5,* 658–668. http://dx.doi.org/10.1007/s12671-013-0218-6

Center for Collegiate Mental Health. (2014). 2013 Annual report (Publication No. STA 14–43). Retrieved from https://sites.psu.edu/ccmh/files/2014/05/2013_CCMH_Report1.pdf

Chang, S. J. (2000). *Stress: Collection of health statistics and standardization of measurement*. Seoul, Korea: Gaechook Press.

*Chen, Y., Yang, X., Wang, L., & Zhang, X. (2013). A randomized controlled trial of the effects of brief mindfulness meditation on anxiety symptoms and systolic blood pressure in Chinese nursing students. *Nurse Education Today, 33,* 1166–1172. http://dx.doi.org/10.1016/j.nedt.2012.11.014

*Chiauzzi, E., Brevard, J., Thurn, C., Decembrele, S., & Lord, S. (2008). MyStudentBody-Stress: An online stress management intervention for college students. *Journal of Health Communication, 13,* 555–572. http://dx.doi.org/10.1080/10810730802281668

Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *The Journal of Alternative and Complementary Medicine, 15,* 593–600. http://dx.doi.org/10.1089/acm.2008.0495

Chon, K., Kim, K., & Yi, J. (2000). Development of the Revised Life Stress Scale for college students. *Korean Journal of Health Psychology, 5,* 316–335.

Chung, E., Turnbull, D., & Chur-Hansen, A. (2017). Differences in resilience between 'traditional' and 'non-traditional' university students. *Active Learning in Higher Education, 18,* 77–87. http://dx.doi.org/10.1177/1469787417693493

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the U.S. In S. Spacapam & S. Oskamp (Eds.), *The social psychology of health* (pp. 31–67). Newbury Park, CA: Sage.

*Deckro, G. R., Ballinger, K. M., Hoyt, M., Wilcher, M., Dusek, J., Myers, P., . . . Benson, H. (2002). The evaluation of a mind/body intervention to reduce psychological distress and perceived stress in college students. *Journal of American College Health, 50,* 281–287. http://dx.doi.org/10.1080/07448480209603446

Derogatis, L. R. (1993). *BSI Brief Symptom Inventory: Administration, scoring, and procedure manual* (4th ed.). Minneapolis, MN: National Computer Systems.

Derogatis, L. R., Rickels, K., & Rock, A. F. (1976). The SCL-90 and the MMPI: A step in the validation of a new self-report scale. *The British Journal of Psychiatry, 128,* 280–289. http://dx.doi.org/10.1192/bjp.128.3.280

Ditzen, B., & Heinrichs, M. (2014). Psychobiology of social support: The social dimension of stress buffering. *Restorative Neurology and Neuroscience, 32,* 149–162.

*Dolbier, C. L., & Rush, T. E. (2012). Efficacy of abbreviated progressive muscle relaxation in a high-stress college sample. *International Journal of Stress Management, 19,* 48–68. http://dx.doi.org/10.1037/a0027326

*Dziegielewski, S., Turnage, B., & Roest-Marti, S. (2004). Addressing stress with social work students: A controlled evaluation. *Journal of Social Work Education, 40,* 105–119.

Endler, N., Edwards, J., & Vitelli, R. (1991). *Endler Multidimensional Anxiety Scales*. Los Angeles, CA: Western Psychological Services.

*Erogul, M., Singer, G., McIntyre, T., & Stefanov, D. G. (2014). Abridged mindfulness intervention to support wellness in first-year medical students. *Teaching and Learning in Medicine, 26,* 350–356. http://dx.doi.org/10.1080/10401334.2014.945025

*Fehring, R. J. (1983). Effects of biofeedback-aided relaxation on the psychological stress symptoms of college students. *Nursing Research, 32,* 362–366. http://dx.doi.org/10.1097/00006199-198311000-00009

*Finkelstein, C., Brownstein, A., Scott, C., & Lan, Y. L. (2007). Anxiety and stress reduction in medical education: An intervention. *Medical Education, 41,* 258–264. http://dx.doi.org/10.1111/j.1365-2929.2007.02685.x

Fischer, J., & Corcoran, K. (1994). *Measures of clinical practice: A source book* (2nd ed.). New York, NY: Free Press.

*Flinchbaugh, C. L., Moore, E. W. G., Chang, Y. K., & May, D. R. (2012). Student well-being interventions: The effects of stress management techniques and gratitude journaling in the management edu-

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This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.

cation classroom. *Journal of Management Education, 36,* 191–219. http://dx.doi.org/10.1177/1052562911430062

*Fontana, A. M., Hyra, D. H., Godfrey, L., & Cermak, L. (1999). Impact of a peer-led stress inoculation training intervention on state anxiety and heart rate in college students. *Journal of Applied Biobehavioral Research, 4,* 45–63. http://dx.doi.org/10.1111/j.1751-9861.1999.tb00054.x

*Frazier, P., Meredith, L., Greer, C., Paulsen, J. A., Howard, K., Dietz, L. R., & Qin, K. (2015). Randomized controlled trial evaluating the effectiveness of a web-based stress management program among community college students. *Anxiety, Stress, and Coping: An International Journal, 28,* 576–586. http://dx.doi.org/10.1080/10615806.2014.987666

Galbraith, N. D., & Brown, K. E. (2011). Assessing intervention effectiveness for reducing stress in student nurses: Quantitative systematic review. *Journal of Advanced Nursing, 67,* 709–721. http://dx.doi.org/10.1111/j.1365-2648.2010.05549.x

*Godbey, K. L., & Courage, M. M. (1994). Stress-management program: Intervention in nursing student performance anxiety. *Archives of Psychiatric Nursing, 8,* 190–199. http://dx.doi.org/10.1016/0883-9417(94)90053-1

Goyal, M., Singh, S., Sibinga, E. M., Gould, N. F., Rowland-Seymour, A., Sharma, R., . . . Haythornthwaite, J. A. (2014). Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. *Journal of the American Medical Association Internal Medicine, 174,* 357–368. http://dx.doi.org/10.1001/jamainternmed.2013.13018

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57,* 35–43. http://dx.doi.org/10.1016/S0022-3999(03)00573-7

*Hamdan-Mansour, A. M., Puskar, K., & Bandak, A. G. (2009). Effectiveness of cognitive-behavioral therapy on depressive symptomatology, stress and coping strategies among Jordanian university students. *Issues in Mental Health Nursing, 30,* 188–196. http://dx.doi.org/10.1080/01612840802694577

Hamilton, M. (1959). The assessment of anxiety states by rating. *British Journal of Medical Psychology, 32,* 50–55. http://dx.doi.org/10.1111/j.2044-8341.1959.tb00467.x

*Heaman, D. (1995). The quieting response (QR): A modality for reduction of psychophysiologic stress in nursing students. *The Journal of Nursing Education, 34,* 5–10.

Heckman, S., Lim, H., & Montalto, C. (2014). Factors related to financial stress among college students. *Journal of Financial Therapy, 5,* 3. http://dx.doi.org/10.4148/1944-9771.1063

*Henriques, G., Keffer, S., Abrahamson, C., & Horst, S. J. (2011). Exploring the effectiveness of a computer-based heart rate variability biofeedback program in reducing anxiety in college students. *Applied Psychophysiology and Biofeedback, 36,* 101–112. http://dx.doi.org/10.1007/s10484-011-9151-4

*Hintz, S., Frazier, P. A., & Meredith, L. (2015). Evaluating an online stress management intervention for college students. *Journal of Counseling Psychology, 62,* 137–147. http://dx.doi.org/10.1037/cou0000014

Ho, M., Wong, V. S. W., Chow, P. P. K., & Cheng, W. L. S. (2015). A study on nursing students' stress in Hong Kong. *HNE Handover: For Nurses and Midwives, 8,* 230.

Hofmann, S. G., & Smits, J. A. (2008). Cognitive-behavioral therapy for adult anxiety disorders: A meta-analysis of randomized placebo-controlled trials. *The Journal of Clinical Psychiatry, 69,* 621–632. http://dx.doi.org/10.4088/JCP.v69n0415

Institute for Women's Policy Research. (2017, September). *Single mothers in college: Growing enrollment, financial challenges, and the benefits of attainment*. Briefing Paper #C460.

Iqbal, S., Gupta, S., & Venkatarao, E. (2015). Stress, anxiety and depression among medical undergraduate students and their socio-demographic correlates. *The Indian Journal of Medical Research, 141,* 354–357. http://dx.doi.org/10.4103/0971-5916.156571

Jackson, A. (2015, July 20). *This chart shows how quickly college tuition has skyrocketed since 1980*. Retrieved from http://www.businessinsider.com/this-chart-shows-how-quickly-college-tuition-has-skyrocketed-since-1980-2015-7

Jackson, E. R., Shanafelt, T. D., Hasan, O., Satele, D. V., & Dyrbye, L. N. (2016). Burnout and alcohol abuse/dependence among U.S. medical students. *Academic Medicine, 91,* 1251–1256. http://dx.doi.org/10.1097/ACM.0000000000001138

*Jain, S., Shapiro, S. L., Swanick, S., Roesch, S. C., Mills, P. J., Bell, I., & Schwartz, G. E. R. (2007). A randomized controlled trial of mindfulness meditation versus relaxation training: Effects on distress, positive states of mind, rumination, and distraction. *Annals of Behavioral Medicine, 33,* 11–21. http://dx.doi.org/10.1207/s15324796abm3301_2

*Johansson, N. (1991). Effectiveness of a stress management program in reducing anxiety and depression in nursing students. *Journal of American College Health, 40,* 125–129. http://dx.doi.org/10.1080/07448481.1991.9936268

*Jones, L. V. (2004). Enhancing psychosocial competence among black women in college. *Social*

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Work, 49, 75–84. http://dx.doi.org/10.1093/sw/49.1.75

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4,* 33–47. http://dx.doi.org/10.1016/0163-8343(82)90026-3

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York, NY: Dell Publishing.

*Kang, Y. S., Choi, S. Y., & Ryu, E. (2009). The effectiveness of a stress coping program based on mindfulness meditation on the stress, anxiety, and depression experienced by nursing students in Korea. *Nurse Education Today, 29,* 538–543. http://dx.doi.org/10.1016/j.nedt.2008.12.003

*Kanji, N., White, A. R., & Ernst, E. (2004). Autogenic training reduces anxiety after coronary angioplasty: A randomized clinical trial. *American Heart Journal, 147,* E10. http://dx.doi.org/10.1016/j.ahj.2003.10.011

*Kanters, M. A., Bristol, D. G., & Attarian, A. (2002). The effects of outdoor experiential training on perceptions of college stress. *Journal of Experiential Education, 25,* 257–267. http://dx.doi.org/10.1177/105382590202500203

Khoury, B., Sharma, M., Rush, S. E., & Fournier, C. (2015). Mindfulness-based stress reduction for healthy individuals: A meta-analysis. *Journal of Psychosomatic Research, 78,* 519–528. http://dx.doi.org/10.1016/j.jpsychores.2015.03.009

*Kim, S., Lee, H., Kim, H., Noh, D., & Lee, H. (2016). Effects of an integrated stress management program (ISMP) for psychologically distressed students: A randomized controlled trial. *Perspectives in Psychiatric Care, 52,* 178–185. http://dx.doi.org/10.1111/ppc.12114

Klainin-Yobas, P., Keawkerd, O., Pumpuang, W., Thunyadee, C., Thanoi, W., & He, H. G. (2014). The mediating effects of coping on the stress and health relationships among nursing students: A structural equation modelling approach. *Journal of Advanced Nursing, 70,* 1287–1298. http://dx.doi.org/10.1111/jan.12283

Lazarus, R. (1999). *Stress and emotion: A new synthesis*. New York, NY: Springer.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer.

Leckie, M. S., & Thompson, E. (1979). *Symptoms of stress inventory: A self-assessment*. Seattle, WA: University of Washington.

Leong, F. T., Leach, M. M., Yeh, C., & Chou, E. (2007). Suicide among Asian Americans: What do we know? What do we need to know? *Death Studies, 31,* 417–434. http://dx.doi.org/10.1080/07481180701244561

Li, M.-H., & Yang, Y. (2009). Determinants of problem solving, social support seeking, and avoidance: A path analytic model. *International Journal of Stress Management, 16,* 155–176. http://dx.doi.org/10.1037/a0016844

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage.

London, B., Rosenthal, L., Levy, S. R., & Lobel, M. (2011). The influences of perceived identity compatibility and social support on women in nontraditional fields during the college transition. *Basic and Applied Social Psychology, 33,* 304–321. http://dx.doi.org/10.1080/01973533.2011.614166

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney, NSW: Psychology Foundation.

McNair, D. M., Lorr, M., & Droppleman, L. F. (1992). *Manual for the Profile of Mood States*. San Diego, CA: EdITS/Educational and Industrial Testing Service.

*McWhirter, B. T., Okey, J., Roth, S., & Herlache, L. (1995). Evaluation of a college level stress management course. *College Student Journal, 29,* 227–233.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & the PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Annals of Internal Medicine, 151,* 264–269. http://dx.doi.org/10.7326/0003-4819-151-4-200908180-00135

Moore, D. R., Burgard, D. A., Larson, R. G., & Ferm, M. (2014). Psychostimulant use among college students during periods of high and low stress: An interdisciplinary approach utilizing both self-report and unobtrusive chemical sample data. *Addictive Behaviors, 39,* 987–993. http://dx.doi.org/10.1016/j.addbeh.2014.01.021

National Center for Education Statistics. (2011). *Enrollment*. Retrieved from https://nces.ed.gov/fastfacts/display.asp?id=98

*Nidich, S. I., Rainforth, M. V., Haaga, D. A. F., Hagelin, J., Salerno, J. W., Travis, F., . . . Schneider, R. H. (2009). A randomized controlled trial on effects of the Transcendental Meditation program on blood pressure, psychological distress, and coping in young adults. *American Journal of Hypertension, 22,* 1326–1331. http://dx.doi.org/10.1038/ajh.2009.184

*Oman, D., Shapiro, S. L., Thoresen, C. E., Plante, T. G., & Flinders, T. (2008). Meditation lowers stress and supports forgiveness among college students: A randomized controlled trial. *Journal of American College Health, 56,* 569–578. http://dx.doi.org/10.3200/JACH.56.5.569-578

*Orbach, G., Lindsay, S., & Grey, S. (2007). A randomised placebo-controlled trial of a self-help Internet-based intervention for test anxiety. *Behav-*

This document is copyrighted by the American Psychological Association or one of its allied publishers.
This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.

iour Research and Therapy, 45, 483–496. http://dx.doi.org/10.1016/j.brat.2006.04.002

Padilla-Meléndez, A., Fernández-Gámez, M. A., & Molina-Gómez, J. (2014). Feeling the risks: Effects of the development of emotional competences with outdoor training on the entrepreneurial intent of university students. *International Entrepreneurship and Management Journal, 10,* 861–884. http://dx.doi.org/10.1007/s11365-014-0310-y

*Phang, C. K., Mukhtar, F., Ibrahim, N., Keng, S. L., & Sidik, S. M. (2015). Effects of a brief mindfulness-based intervention program for stress management among medical students: The MindfulGym randomized controlled study. *Advances in Health Sciences Education, 20,* 1115–1134. http://dx.doi.org/10.1007/s10459-015-9591-3

Proeschold-Bell, R. J., Turner, E. L., Bennett, G. G., Yao, J., Li, X. F., Eagle, D. E., . . . Toole, D. C. (2017). A 2-year holistic health and stress intervention: Results of an RCT in clergy. *American Journal of Preventive Medicine, 53,* 290–299. http://dx.doi.org/10.1016/j.amepre.2017.04.009

Pryor, J. H., Hurtado, S., DeAngelo, L. E., Blake, L. P., & Tran, S. (2010). *The American Freshman: National Norms Fall 2009*. Los Angeles, CA: University of California Press.

Ratanasiripong, P., Ratanasiripong, N., & Kathalae, D. (2012). Biofeedback intervention for stress and anxiety among nursing students: A randomized controlled trial. *International Scholarly Research Network Nursing, 2012,* 827972. http://dx.doi.org/10.5402/2012/827972

*Rausch, S. M., Gramling, S. E., & Auerbach, S. M. (2006). Effects of a single session of large-group meditation and progressive muscle relaxation training on stress reduction, reactivity, and recovery. *International Journal of Stress Management, 13,* 273–290. http://dx.doi.org/10.1037/1072-5245.13.3.273

Reardon-Anderson, J., Stagner, M., Macomber, J. E., & Murray, J. (2005). *Systematic review of the impact of marriage and relationship programs*. Washington, DC: Administration for Children and Families, U.S. Department of Health & Human Services.

Reetz, D. R., Krylowicz, B., & Mistler, B. (2014). The association for university and college counseling center directors annual survey. *Aurora, 51,* 60506.

Reeve, K. L., Shumaker, C. J., Yearwood, E. L., Crowell, N. A., & Riley, J. B. (2013). Perceived stress and social support in undergraduate nursing students' educational experiences. *Nurse Education Today, 33,* 419–424. http://dx.doi.org/10.1016/j.nedt.2012.11.009

Regehr, C., Glancy, D., & Pitts, A. (2013). Interventions to reduce stress in university students: A review and meta-analysis. *Journal of Affective Disorders, 148,* 1–11. http://dx.doi.org/10.1016/j.jad.2012.11.026

Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin, 86,* 638–641. http://dx.doi.org/10.1037/0033-2909.86.3.638

*Rosenzweig, S., Reibel, D. K., Greeson, J. M., Brainard, G. C., & Hojat, M. (2003). Mindfulness-based stress reduction lowers psychological distress in medical students. *Teaching and Learning in Medicine: An International Journal, 15,* 88–92. http://dx.doi.org/10.1207/S15328015TLM1502_03

*Russler, M. F. (1991). Multidimensional stress management in nursing education. *The Journal of Nursing Education, 30,* 341–346.

Saleh, D., Camart, N., & Romo, L. (2017). Predictors of stress in college students. *Frontiers in Psychology, 8,* 19. http://dx.doi.org/10.3389/fpsyg.2017.00019

Sarason, I. G. (1978). The Test Anxiety Scale: Concept and research. In C. D. Spielberger & I. G. Sarason (Eds.), *Stress and anxiety* (Vol. 5, pp. 193–216). New York, NY: Wiley.

Sawah, M. A., Ruffin, N., Rimawi, M., Concerto, C., Aguglia, E., Chusid, E., . . . Battaglia, F. (2015). Perceived stress and coffee and energy drink consumption predict poor sleep quality in podiatric medical students: A cross-sectional study. *Journal of the American Podiatric Medical Association, 105,* 429–434. http://dx.doi.org/10.7547/14-082

Sedlmeier, P., Eberth, J., Schwarz, M., Zimmermann, D., Haarig, F., Jaeger, S., & Kunze, S. (2012). The psychological effects of meditation: A meta-analysis. *Psychological Bulletin, 138,* 1139–1171. http://dx.doi.org/10.1037/a0028168

Seibel, M. (2014). For us or against us? Perceptions of faculty bullying of students during undergraduate nursing education clinical experiences. *Nurse Education in Practice, 14,* 271–274. http://dx.doi.org/10.1016/j.nepr.2013.08.013

*Shankarapillai, R., Nair, M. A., & George, R. (2012). The effect of yoga in stress reduction for dental students performing their first periodontal surgery: A randomized controlled study. *International Journal of Yoga, 5,* 48–51. http://dx.doi.org/10.4103/0973-6131.91714

*Shapiro, S. L., Brown, K. W., & Biegel, G. (2007). Teaching self-care to caregivers: Effects of mindfulness-based stress reduction on the mental health of therapists in training. *Training and Education in Professional Psychology, 1,* 105–115. http://dx.doi.org/10.1037/1931-3918.1.2.105

*Shapiro, S. L., Schwartz, G. E., & Bonner, G. (1998). Effects of mindfulness-based stress reduction on medical and premedical students. *Journal of Behavioral Medicine, 21,* 581–599. http://dx.doi.org/10.1023/A:1018700829825

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This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.

*Sharif, F., & Armitage, P. (2004). The effect of psychological and educational counselling in reducing anxiety in nursing students. *Journal of Psychiatric and Mental Health Nursing, 11,* 386–392. http://dx.doi.org/10.1111/j.1365-2850.2003.00720.x

*Sheehy, R., & Horan, J. J. (2004). Effects of stress inoculation training for 1st-year law students. *International Journal of Stress Management, 11,* 41–55. http://dx.doi.org/10.1037/1072-5245.11.1.41

*Smith, R. E. (1989). Effects of coping skills training on generalized self-efficacy and locus of control. *Journal of Personality and Social Psychology, 56,* 228–233. http://dx.doi.org/10.1037/0022-3514.56.2.228

Sohail, N. (2013). Stress and academic performance among medical students. *Journal of the College of Physicians and Surgeons—Pakistan, 23,* 67–71.

Spielberger, C. D. (1980). *Test Anxiety Inventory: Preliminary professional manual*. Palo Alto, CA: Consulting Psychologists Press.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State–Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.

*Steinhardt, M., & Dolbier, C. (2008). Evaluation of a resilience intervention to enhance coping strategies and protective factors and decrease symptomatology. *Journal of American College Health, 56,* 445–453. http://dx.doi.org/10.3200/JACH.56.44.445-454

Stewart, R. E., & Chambless, D. L. (2009). Cognitive-behavioral therapy for adult anxiety disorders in clinical practice: A meta-analysis of effectiveness studies. *Journal of Consulting and Clinical Psychology, 77,* 595–606. http://dx.doi.org/10.1037/a0016032

Uchino, B. N., & Birmingham, W. (2011). Stress and support processes. In R. J. Contrada & A. Baum (Eds.), *The handbook of stress science: Biology, psychology, and health* (pp. 111–121). New York, NY: Springer.

Van Daele, T., Hermans, D., Van Audenhove, C., & Van den Bergh, O. (2012). Stress reduction through psychoeducation: A meta-analytic review. *Health Education and Behavior, 39,* 474–485. http://dx.doi.org/10.1177/1090198111419202

Virgili, M. (2015). Mindfulness-based interventions reduce psychological distress in working adults: A meta-analysis of intervention studies. *Mindfulness, 6,* 326–337. http://dx.doi.org/10.1007/s12671-013-0264-0

Vitaliano, P. P., Russo, J., Carr, J. E., & Heerwagen, J. H. (1984). Medical school pressures and their relationship to anxiety. *Journal of Nervous and Mental Disease, 172,* 730–736. http://dx.doi.org/10.1097/00005053-198412000-00006

Walen, H. R., & Lachman, M. E. (2000). Social support and strain from partner, family, and friends: Costs and benefits for men and women in adulthood. *Journal of Social and Personal Relationships, 17,* 5–30. http://dx.doi.org/10.1177/0265407500171001

*Warnecke, E., Quinn, S., Ogden, K., Towle, N., & Nelson, M. R. (2011). A randomised controlled trial of the effects of mindfulness practice on medical student stress levels. *Medical Education, 45,* 381–388. http://dx.doi.org/10.1111/j.1365-2923.2010.03877.x

Watkins, D. C., Hunt, J. B., & Eisenberg, D. (2012). Increased demand for mental health services on college campuses: Perspectives from administrators. *Qualitative Social Work: Research and Practice, 11,* 319–337. http://dx.doi.org/10.1177/1473325011401468

Watson, D., & Clark, L. A. (1991). *The Mood and Anxiety Symptom Questionnaire*. Unpublished manuscript, Department of Psychology, University of Iowa, Iowa City, IA.

Watson, D., Weber, K., Assenheimer, J. S., Clark, L. A., Strauss, M. E., & McCormick, R. A. (1995). Testing a tripartite model: I. Evaluating the convergent and discriminant validity of Anxiety and Depression Symptom Scales. *Journal of Abnormal Psychology, 104,* 3–14. http://dx.doi.org/10.1037/0021-843X.104.1.3

Wolf, L., Stidham, A. W., & Ross, R. (2015). Predictors of stress and coping strategies of U.S. accelerated vs. generic baccalaureate nursing students: An embedded mixed methods study. *Nurse Education Today, 35,* 201–205. http://dx.doi.org/10.1016/j.nedt.2014.07.005

*Zargarzadeh, M., & Shirazi, M. (2014). The effect of progressive muscle relaxation method on test anxiety in nursing students. *Iranian Journal of Nursing and Midwifery Research, 19,* 607–612.

Zenner, C., Herrnleben-Kurz, S., & Walach, H. (2014). Mindfulness-based interventions in schools—a systematic review and meta-analysis. *Frontiers in Psychology, 5,* 603. http://dx.doi.org/10.3389/fpsyg.2014.00603

Zoogman, S., Goldberg, S. B., Hoyt, W. T., & Miller, L. (2015). Mindfulness interventions with youth: A meta-analysis. *Mindfulness, 6,* 290–302. http://dx.doi.org/10.1007/s12671-013-0260-4

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