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A Brief Mindfulness-Based Intervention (bMBI) to Reduce Teacher Stress and Burnout

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Abstract

Teacher stress and burnout contribute to attrition and stress-related health concerns. Despite some positive effects, previous mindfulness-based interventions (MBI) have failed to incorporate key elements of methodological rigor and have included large dosages despite research suggesting that such dosages are iatrogenic. The current study demonstrates the efficacy of a brief MBI (bMBI; four sessions, six total hours) to reduce self-reported stress, burnout, and depression, and suggests the bMBI can protect against deleterious impacts to physiological functioning. The study informs the design and implementation of future MBIs, including strategies for reducing intervention dosages, in order to improve effectiveness and maximize cost-effectiveness.

Keywords

stress; burnout; mindfulness; teachers; cortisol awakening response

Teaching has been identified as a highly stressful occupation (Smith et al., 2000) driven by consistent attentional control and executive functioning demands (Roeser et al., 2012; McCarthy & Lambert, 2006). The chronic nature of these stressors can extend teachers beyond their coping capacity and result in burnout (Selye, 1956; Lazarus & Folkman, 1984; Maslach et al.,1996; Jennett et al., 2003) and a breakdown of physiological systems (i.e., allostatic load; McEwen, 1998; Seeman et al.,1997; Bellingrath & Kudielka, 2017). Leading to emotional exhaustion, reduced teaching efficacy, and low job satisfaction (McCarthy et al., 2009; Klassen & Chiu, 2010), stress and burnout contribute to teacher attrition (Whipp, et al., 2007) with approximately 40% of teachers discontinuing teaching after five years (Ingersoll, 2002). The ILO/UNESCO Joint Committee of Experts on the Application of the Recommendations Concerning the Status of Teachers (1994) reported that accumulated stress contributes significantly to teacher attrition, with the estimated cost of teacher dropout estimated at $2.2 billion annually (Alliance for Excellent Education, 2004; 2005), representing a significant downstream cost of teacher stress and burnout. There are also considerable costs associated with managing negative physical and mental health outcomes

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associated with stress, burnout, and subsequent allostatic load (Lopez et al., 2006; Rice, 1999; McEwen, 1998; Mattei et al., 2010). Many interventions designed to reduce teacher stress and burnout have been only marginally successful (Klingbeil & Renshaw, 2018). The majority of these interventions have taken a person-centered approach to increase coping skills and capacity through cognitive-behavioral strategies (e.g., emphasizing time-management and cognitive restructuring; Żołnierczyk-Zreda, 2005; Awa, et al., 2010) with only a subset of these teacher education programs focused on directly facilitating "higher order" skills conducive to successfully coping with stressful vocational-specific demands (Roeser et al., 2012).

Over the past decade, mindfulness-based interventions (MBIs) have become increasingly recognized as an effective intervention to foster these higher-order skills for promoting health and well-being (i.e., stress, internalizing symptomology, etc.; Grossman et al., 2004; Carmody & Baer, 2008; Roeser et al., 2012) across numerous non-clinical adult populations. In particular, the few that have implemented MBIs for teachers have shown promise in increasing mindfulness skills as a means of reducing occupational stress and symptoms of burnout (see Table 1 for results of past studies). However, the majority of these interventions have included too many direct contact hours and thus potentially reduced intervention effectiveness (Klingbeil & Renshaw, 2018). Moreover, few studies have included physiological measures of stress and burnout (Harris et al., 2016; Flook et al., 2013; Roeser et al., 2013), and those that employed an objective measure of stress required large doses (i.e., minimally 21 direct contact hours). The current study sought to begin addressing these gaps by testing the efficacy of a brief randomized waitlist-controlled bMBI (6 total contact hours) to reduce teacher stress and burnout using both self-reported and physiological (i.e., cortisol awakening response [CAR]) measures in a sample of secondary school teachers.

Stress and Burnout in Teachers

Approximately one third of teachers report being stressed or extremely stressed (Geving, 2007; Collie et al., 2012). Research indicates teachers face a multitude of stressors in the school environment that each coincide with separate appraisal and coping responses (both physiological and psychological) that need to be engaged to meet the demands of the situation (Al-Fudail & Mellar, 2008; De Dobile & McCormick, 2005; Kyriacou, 2001; Travers & Cooper, 1996; Dunham & Varma, 1998). For example, on a daily basis, teachers will be exposed to a variety of social stressors (e.g., dealing with colleagues, administrators, and parents), time pressure (e.g., preparing lesson plans, grading, and adhering to curriculums for standardized testing), and other occupational demands specific to educating and managing students (e.g., teaching pupils who lack motivation and maintaining discipline in the classroom; Kyriacou, 2001) that each require a set of coordinated behaviors (Klusmann et al., 2008) and the ability to flexibly shift attention throughout the day (Marzano et al., 2003) to effectively cope with each individual stressor. Effectively managing stress requires several components of self-regulation, including significant attentional control, working memory capacity, and other executive functioning skills, which are often referred to as "higher order" skills given that they require elaborate networks and coordination amongst many different brain areas (Vohs & Baumeister, 2016;

McCarthy & Lambert, 2006; Boyle et al., 1995). Research shows that effective stress management via acquisition of these types of skills can lead to decreases in teacher distress, increases in job satisfaction, and, subsequently, lower rates of teacher attrition (Neves de Jesus & Conboy, 2001; Richardson & Rothstein, 2008). If not effectively managed, however, chronic stress may overwhelm the body's overall capacity to manage current and future stressors by diminishing teachers' regulation and coping abilities (i.e., stress management), in addition to their overall physical and psychological health (Schaufeli & Greenglass, 2001), which may lead to burnout syndrome (Schaufeli et al., 1993) and a greater allostatic load (McEwen, 2004).

Burnout syndrome is typically characterized by a depletion of one's emotional resources to cope with stressors (i.e., emotional exhaustion), and defined by feeling cynical, irritable, having a negative attitude toward work (i.e., depersonalization), and reduced self-efficacy and/or productivity (i.e., personal accomplishment; Maslach & Jackson, 1981; Maslach et al., 1996; Jennett et al., 2003). The nature of their profession often requires teachers to invest substantially in students, colleagues, and schools without receiving similar levels of reciprocal investment. Research shows that there are negative emotional, psychological, and professional repercussions when teachers' feel that their investments are not reciprocated (Van Horn et al., 1999). Together, the chronic lack of reciprocal investment and its associated negative outcomes predicts all three components of burnout, which functions as a compounding negative feedback loop that ultimately leads to burnout syndrome (Mearns & Cain, 2003).

Costs of Chronic Stress and Burnout

Chronic stress and burnout have been shown to be associated with increased rates of a variety of mental and physical health problems, including clinical depression, reduced immune system functioning, obesity, cognitive aging, and multiple types of cancer (Zechmeister et al., 2008; Saleh & Shapiro, 2008; Cohen et al., 2007). Along with maladaptive coping behaviors associated with managing stress (e.g., smoking, sleep deprivation, etc; Cohen et al., 2007), chronic stress has also been shown to lead to disease as a result of the degradation of physiological systems associated with the human stress response. This process is referred to as allostatic load (McEwen, 1998). The term "allostatic load" stems from the term "allostasis," which refers to a "maintenance of stability" or "remaining homeostatic through change" (McEwen, 1998). Chronic stress and symptoms of burnout are both associated with biomarkers of allostatic load (Juster, 2011). Specifically, research indicates the CAR, a difference score between the measurement of cortisol immediately upon awakening and 30 minutes afterwards, is a useful and practical marker of allostatic load (Pruessner et al. 1997; Wust et al., 2000; Fries et al., 2009), and corresponds with other validated self-report measures of teacher stress and burnout (e.g., Pruessner et al., 1999; Moya-Albiol et al., 2010). There is an adaptive range for the CAR (i.e., a 38–75% rise in waking cortisol levels to 30 minutes post-waking; Fries et al., 2009); overuse through repeated acute or chronic stress can lead to a maladaptive CAR (i.e., one that falls outside of 38–75% of waking cortisol levels; Fries et al., 2009). Utilizing a multimethod approach of measuring stress strengthens the analysis, as it can provide both additional information about

the health impacts of stress, as well as capture teachers' various experiences of stress that they may not readily perceive.

Given that approximately one third of teachers report being either stressed or "extremely stressed" (Geving, 2007; Collie et al., 2012), and up to 45% of teachers experience burnout at some point during their careers (thus making teachers the largest vocational subgroup in the burnout literature; Schaufeli & Enzmann, 1998), addressing teacher stress constitutes a major public health issue. Despite identified concerns and significant empirical investigation, it is still unclear how to effectively and efficiently combat teacher stress and burnout (Lambert & McCarthy, 2006).

Mindfulness: Theory and Intervention for Teachers

Developing and instilling regular practice of Mindfulness ("paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally"; Kabat-Zinn, 1994, p. 4) represents a promising avenue for fostering "higher order" skills to teachers as a means of reducing stress and burnout (Ancona & Mendelson, 2014). Modern theories of mindfulness (Renshaw, 2012; Brown et al., 2007; Shapiro et al., 2006) suggest that it consists of three primary tenets: Attentive Awareness ("the quality and duration of one's contact with whatever stimuli present themselves to one's mind in the here and now" [Renshaw & O'Malley, 2014, p. 246]); Receptive Attitude ("one's outlook toward and reaction to particular stimuli that arise in awareness and are attended to in the present moment" [Renshaw & O'Malley, 2014, p. 246]); and Intentionality, which has been conceptualized in two different ways. Some researchers (Renshaw & O'Malley, 2014; Brown et al., 2007) have described intentionality as "one's deliberate cultivation of an attentive awareness that is characterized by a receptive attitude, as opposed to simply recognizing or taking advantage of such features of one's mind whenever the chance occurs" [Renshaw & O'Malley, 2014, p. 247]), alluding to the purposeful cultivation of one's attention. Others have described intentionality as the purpose for cultivating the mindful awareness (Shapiro et al., 2006), which suggests that the reason an individual chooses to engage in a mindful practice implicitly impacts the qualitative nature of the practice (Shapiro, 1992). The current study utilizes a theoretical characterization of intentionality that encompasses both the former (i.e., the purposeful cultivation of mindfulness) and expands on this by including the elements of the latter conceptualization in emphasizing the importance of providing further direction for one's attention throughout one's practice (i.e., self-regulation and compassion).

MBIs have become increasingly popular in the Western world (Cullen, 2011) and have demonstrated efficacy for pain management, stress reduction, increased emotional regulation, decreased symptoms of depression and anxiety, and improvements in overall health and well-being (Kabat-Zinn, 2003; Pilkington et al., 2005; Teasdale et al., 2000; Carmody & Baer, 2008; Grossman et al., 2004). Results from MBIs within occupational settings also indicate significant reductions in stress and increases in well-being (Escuriex & Labbê, 2011; Irving et al., 2009; Virgili, 2013). One mechanism that has been posited to account for significant portion of variance in the effectiveness of MBIs is an increased capacity to down-regulate bottom-up, fast-onset stress reactions and to up-regulate slow, top-down nondominant response tendencies (Miyake et al., 2000; Roeser et al., 2013). These

processes allow individuals to better "recognize and regulate" (Roeser et al., 2013, p. 3) reactions to stressors in the environment and manage stress more effectively.

The application of mindfulness in teaching as a means of reducing stress and promoting well-being has become a popular endeavor over the past ten years (Hwang et al., 2017). Although there is substantial variation in the content covered among the various MBIs developed for teachers (Roeser et al., 2012), the majority of MBIs are characterized by either meditation or physical yoga practice (*asana*; Greenberg & Harris, 2012) and focus on training the mind through focusing one's attention in a chosen manner (e.g., "practices vary and include attending to the breath or body sensations, eating with awareness, open awareness of experience, and cultivation of loving kindness" [Ancona & Mendelson, 2014, p. 157]). These meditative practices aim to promote increased cognitive and emotional capacity via stimulation of the prefrontal cortex and other relevant brain regions (Kilpatrick et al., 2011; Lutz et al., 2008). Additionally, some MBIs for teachers focus on emotion skills instruction, mindful awareness practices, and compassion building activities to provide teachers with skills to reduce their emotional stress and provide them tools to build more effective relationships with their students (e.g., Jennings & Greenberg, 2009; Harris et al., 2016).

Although existing MBIs demonstrate great potential in effectively alleviating teacher stress, most have only yielded small-to-moderate reductions in teachers' self-reported stress (see Table 1 for past study results). Interestingly, one study (Ancona & Mendleson, 2014) requiring only 4.5 hours of direct contact reported similar effect sizes (d = .54 and .42 for stress and burnout, respectively) as interventions requiring significantly more direct contact, suggesting that greater intervention time demands may not translate to greater returns. Furthermore, the study yielding the largest effect size of any teacher focused MBI (Beshai et al., 2016; d = 1.23) included significantly less direct contact (11 hours) than several other studies, though more direct contact than Ancona and Mendleson (2014), suggesting the minimally-effective dose lies somewhere between 4.5 and 11 hours. However, Beshai and colleagues' (2016) study lacked several key elements of methodological rigor (i.e., randomization to groups and utilization of physiological measures of stress). Drawing from this prior research, the current study was designed to test a 6 hour bMBI on reductions in teacher stress and burnout using a rigorous study and measurement design. Findings will help contribute to initial/preliminary understanding of minimally-effective dose.

Despite its dire social, psychological, and health-based consequences, very few studies (Flook et al., 2013; Harris et al., 2016; Roeser et al., 2013; Ancona & Mendleson, 2014; Frank et al., 2015; Jennings et al., 2013) have examined teacher burnout (see Table 1). Among these studies, only two (Flook et al., 2013; Roeser et al., 2013) have demonstrated significant effects, leaving substantial question as to whether MBIs are effective in alleviating teacher burnout. Given the chronic and inexorable stressors faced by teachers (Kyriacou, 2001; Smith et al., 2000), in addition to the substantial costs associated with teacher burnout (McEwen, 1998; Schaufeli & Enzmann, 1998), it is important to examine whether MBIs can also help reduce burnout. Among previous MBIs, the only studies that identified significant changes in burnout had considerably high dosage (i.e., 26–30 hours). The current study will be the first to target reductions in burnout using a much briefer

intervention design (i.e., 6 hours), which is also important to improve the feasibility of the intervention for teachers already experiencing burnout.

Likewise, major funding agencies, including the NIH, calling for increased use of physiological measures to improve methodological rigor across the field of psychology (Insel et al., 2010). Including both self-reported and physiological measures of stress and burnout is particularly important as the combination of these measures can help to elucidate mechanisms of these phenomenon that neither one can do alone. Furthermore, physiological measures of stress and burnout can provide indicators for health implications that self-reported measures cannot fully account for. However, only three MBIs to date (Flook et al., 2013; Harris et al., 2016; Roeser et al., 2013) have assessed the degree to which the diurnal rise in morning cortisol is adaptive (i.e., cortisol awakening response [CAR]). None of these studies demonstrated significant changes in the intervention group from baseline to post-, but two of the studies (Flook et al., 2013; Harris et al., 2016) demonstrated significant reductions in CAR (i.e., a blunted response) for the control group ($d = .70$ and $d = .64$, respectively) typically characteristic of those who are experiencing symptoms of burnout. While more research is needed in this area, findings suggest the possible protective effect of an MBI on teacher's blunted physiological responses to chronic stress and burnout. The demanding dosages (range = 21–30 hours; $\bar{x}$ = 25.67 hours; $\tilde{x}$ = 24 hours) amongst the three studies that collected physiological measures of stress in comparison to the other MBI studies (range = 4.5–36 hours; $\bar{x}$ = 18.5 hours; $\tilde{x}$ = 16 hours) further underscores the need for briefer studies that also include both of these measurement modalities. However, the longest of the three studies (i.e., 30 hours for Roeser et al., 2013) was the only study that did not identify any significant differences in CAR between the intervention and control group, which supports conclusions drawn from a recent meta-analysis (Klingbeil & Renshaw, 2018) that there are diminishing returns, and potentially iatrogenic effects, for MBIs with dosages higher than 24 direct contact hours. The current study contributes to this burgeoning literature by assessing changes in CAR over the course of 16 weeks in a group of teachers receiving a brief MBI compared to a control group, and utilizing the lowest dosage of any MBI to measure CAR. Our findings will contribute to the understanding of a minimally-effective dose in the literature regarding physiological markers of stress in addition to self-reported stress and burnout. Furthermore, the current study involved a methodologically rigorous research design (i.e., randomized waitlist-control design and utilization of physiological measures of stress) to help address mixed findings of previous research likely resulting, at least in part, from variations in methods/design and rigor.

The Current Study

Previous studies investigating MBIs for teachers identified generally positive outcomes; however, many of these studies enacted burdensome training models that demonstrated diminishing returns and, in some instances, iatrogenic effects (Klingbeil & Renshaw, 2018). The lack of methodologically rigorous research and absence of physiological measures of stress in studies of shorter duration make the identification of appropriate and cost-effective dosages more difficult. To address these gaps in research, the current study implemented and measured the efficacy of a brief MBI (four sessions; six direct contact hours) that utilized a rigorous randomized controlled research design, and included assessment of physiological

measures of stress. Together, the findings of the current study will be discussed in regards to how it compares to the intervention dose and findings of previous MBI interventions, in order to provide preliminary evidence towards understanding minimally-effective dose. The primary aims of the study were addressed by measuring the extent to which the bMBI was effective in decreasing stress as measured by both self-report and by CAR (i.e., decreases in the number of teachers presenting with a maladaptive CAR from pre- to post-intervention), burnout (self-report), and general psychological distress (self-report) from pre- to post-intervention. We hypothesized that there would be significant improvements for all measures of stress, burnout, and psychological distress for teachers receiving the bMBI and no significant changes in the waitlist-control group.

Method

Participants

Data for the current study were collected from teachers at a high-performing academic magnet high school in the Southeastern United States. Study participation was restricted to faculty members of this single school. The University of South Carolina IRB (Pro00071265) and school district IRB granted approval for inter-vention implementation and data collection procedures. Researchers presented on the study at the school's monthly faculty meeting one month prior to pre-intervention data collection to recruit participants for the study. Twenty-four faculty members expressed interest in participating in the bMBI and were randomly assigned to either the intervention group or the waitlist-control group. Of the 24 teachers who participated in both pre- and post-data collection, there were eighteen teachers, four guidance counselors, one school psychologist, and one assistant principal. The sample was predominantly female (95.8%), White (91.7%), and ranged from ages 25 to 70 (M age = 42.77; SD = 11.25). Teachers' years of experience ranged from 1 to 49 years (M = 15.58; SD = 11.98), and the majority of participants (83%) had obtained a Master's degree (8% Bachelor degree; 8% doctoral degree). Approximately 50% of participants indicated that they had received some form of mental health service in the past (i.e., individual/group therapy, marriage counseling, etc.).

Given the novel brevity of our intervention design, we adopted stricter program completion criteria (i.e., attendance at three or more sessions; 75%) than those used in past investigations (i.e., 33–50% of program sessions). Only one participant in the intervention group did not meet this criterion and was subsequently excluded from analyses. Overall program attendance was exceptional as all remaining participants included attended at least three sessions and, subsequently, were considered to have completed the program. See Table 2 for sample demographics.

Procedure

The study utilized a randomized waitlist-control design. Researchers consulted with the school's principal during the intervention development phase approximately six months prior to implementation to discuss interest, recruitment efforts, and possible barriers to implementation. Consultative feedback informed intervention design.

Teachers who expressed interest in participating in the intervention were randomly assigned to either the intervention (n = 12) or waitlist-control (n = 12) group after completing pre-intervention data collection. Participants assigned to the intervention group participated in the program during the Winter/Spring (January-June) semester of 2018 and the waitlist-control group was offered the intervention during the Fall (August-November) semester of 2018. Researchers formally solicited participants' availability prior to scheduling all program sessions in an attempt to maximize intervention feasibility given teachers' extensive time demands. All sessions were held in the school's lecture hall and delivered during the afterschool hours. As compensation for participation, those in the intervention group who completed the program received six continuing education credits (CECs) and teachers in the waitlist-control condition received six CECs following their completion of the program in the following academic semester.

Intervention.—The mindfulness program employed in this study was 16 weeks in duration and included one 90-minute session per month (i.e., four total sessions; six total contact hours). The program was developed specifically for the current study by two clinically trained researchers (the study's first and second authors) with extensive training in various therapeutic modalities and mindfulness-based interventions, and a developmental psychologist (the study's third author) with expertise in behavioral medicine. The curriculum was reviewed by an expert panel of researchers and licensed clinical psychologists who specialized in mindfulness-based therapeutic approaches and school-based mental health. After suggested modifications were integrated into the curriculum, it was tested on graduate students to provide additional input regarding its effective implementation. Program curriculum adhered to a cognitive-behavioral model of mindfulness comprised of the three separate tenets described above: attentive awareness, receptive attitude, and intentionality (Renshaw & O'Malley, 2014). Sessions one through three corresponded to these three tenants (i.e., session one: attentive awareness, etc.); an additional "integration" session constituted the fourth and final program session and focused explicitly on how these three constructs are conceptually and operationally interrelated. All participants were issued personalized workbooks facilitating and corresponding to various components of the program (i.e., didactics, journal entry, discussion, etc.).

Sessions were led by the first and second authors, two clinically trained researchers with expertise in multiple therapeutic modalities including those approaches involving mindfulness. Each session followed a similar format: (1) a review of content from the previous meeting (for sessions 2–4); (2) a present-moment awareness exercise; (3) a didactic presentation pertaining to the individual session topic and its relation to self-regulation of stress management; (4) a mindfulness activity where participants model, operationalize, and practice the topic skill (e.g., receptive attitude); (5) a group discussion facilitated by open-ended questions; (6) a journal entry; and (7) a closing exercise (e.g., progressive muscle relaxation). Participants were encouraged to complete "in-between notes" (i.e., open-ended response in teacher workbooks to be completed between sessions) in an effort to promote practice and application of mindfulness skills outside of individual sessions. Additionally, the workbook contained an appendix with an additional set of exercises parceled by each session and corresponding with the particular skills practiced during

the session. All of the curriculum was specifically adapted for teachers and program facilitators encouraged participants' exploration of how program content could inform both their personal and professional lives. Specific information on content and key themes of individual sessions is contained in Table 3. A detailed process evaluation was also conducted during implementation of the intervention and found the intervention was implemented with adequate fidelity, including appropriate dose and strong adherence to intervention curriculum, as well as strong acceptability, practicality, and demand (see Roberts et al., under review).

Measures

All data collection (i.e., surveys and cortisol sample collection) were administered to teachers at baseline (i.e., two weeks prior to the first intervention session) and post intervention (i.e., two weeks after the final intervention session). Basic demographic information (i.e., age, race, gender, level of education, years of experience, etc.) and participants' past or current involvement with mental health services (i.e., individual/group therapy, marriage counseling, etc.) was obtained for all participants using questionnaires/surveys (i.e., self-report).

Teacher Stress.—Teachers' perceived stress levels were assessed using a self-report measure (Teacher Stress Inventory; TSI) consisting of 49 items rated on a 5-point Likert scale. The TSI contains the following 10 subscales: Time Management (α = .71); Work-Related Stressors (α = .64); Professional Distress (α = ..68); Discipline and Motivation (α = ..92); Professional Investment (α = .59); Emotional Manifestations (α = ..90); Fatigue Manifestations (α = ..83); Cardiovascular Manifestations (α = .77); Gastronomical Manifestations (α = ..76); and Behavioral Manifestations (α = .68). Researchers adapted the original response choices for content clarification based on recommendations from pilot data (e.g., "Not noticeable/No strength" adapted to "Not true"). Although the measure demonstrated adequate psychometric properties in previous studies (Fimian & Fastenau, 1990), the internal consistency of the Professional Investment Subscale in its original state was unacceptable in the current study (i.e., $\alpha \leq .60$; DeVellis, 2016); however, after removing one item from the subscale (i.e., "I am not emotionally/intellectually stimulated on the job"), internal consistency improved to an acceptable range (α = .68). The internal consistency of the full scale in the current sample was excellent (α = .92).

Items on each subscale are summed and averaged to create a total subscale score; the ten subscale scores are also summed and averaged to create a total stress score. The current study analyzed the total stress score and each individual subscale separately to assess the separate dimensions of teacher stress, with higher scores indicative of greater amounts of perceived stress.

Teacher Burnout.—Teachers' symptoms of burnout were assessed using the Maslach Burnout Inventory-Educators Survey (MBI-ES; Maslach et al., 1996). The measure consists of 22 items yielding the following three subscales: Emotional Exhaustion (nine items; α = .80), Depersonalization (five items; α = .65), and Reduced Personal Accomplishment (eight items; α = .83). Internal consistency for the full scale was good (α = .87). Teachers rate

their experiences relative to item content on a 7-point "fully-anchored" scale (1 = *Never*, 7 = *Every day*).

Teacher Psychological Distress.—The Symptom Assessment-45 Questionnaire (SA-45; Davison et al., 1997) originally adapted as a short form of the Symptom Checklist-90 R (SCL-90-R; Derogatis, 1994), was used to assess teachers' psychological distress. The SA-45 is a brief assessment that evaluates symptoms contributing to different categories of psychological distress and has since been adapted for use with nonpatient populations (i.e., community samples; Maruish et al., 1998). The scale utilizes a 5-point Likert scale (ranging from "Not at all" to "Extremely") on which respondents indicate the degree to which several psychiatric symptoms included in the SA-45 have bothered them over the past seven days.

The SA-45 measures psychological symptoms across nine domains: Anxiety, depression, obsessive-compulsion, somatization, phobic anxiety, hostility, interpersonal sensitivity, psychoticism, and paranoid ideation. Responses to individual items also provide a summary score for the Global Severity Index (GSI). In addition to the GSI, the current study also analyzed the Anxiety (α = .68) and Depression (α = .88) subscales of the measure given they are the most commonly occurring symptoms in community samples (Kessler et al., 2003; English & Campbell, 2019; Auerbach et al., 2018).

Teacher Mindfulness.—Teacher mindfulness was assessed using a validated tool, the Five-Facet Mindfulness Questionnaire (FFMQ), that is designed to measure aspects of mindfulness that an individual can possess or learn through mindfulness training. The FFMQ consists of 39 items utilizing a 5-point Likert Scale. The scale measures five skills, each its own respective subscale, that previous research indicates are indicative of effective mindfulness practice: Observing (α = .86), Describing (α = .91), Acting with Awareness (α = .79), Non-reactivity (α = .93), and Nonjudgement of Inner Experience (α = .81) (Baer et al., 2008). Internal consistency for the full scale in the current sample was also excellent (α = .91).

Cortisol Response.—Past research has established salivary cortisol as an accurate and commonly utilized reflection of the actual amount of cortisol secreted within the body, making it a valid physiological marker of the human stress response (Scassellati et al., 2012). Additionally, the CAR has been validated as a reliable and minimally-invasive endocrine marker for the human stress response that allows for more effective control of collection, which mitigates the effects caused by variable levels throughout the day (Federenko et al., 2004; Pruessner et al., 1997).

Starstedt Salivettes® were distributed to all participants. Each participant was asked to provide two salivary cortisol samples upon awakening on two consecutive days at baseline and post-intervention (i.e. eight total samples per participant). Researchers instructed participants on how to provide their saliva sample immediately upon waking and 30 minutes thereafter on these days, as previous literature suggests this is appropriate practice (Hellhammer et al., 2007). Participants were also instructed to record their time of awakening and sample collection time. This is recommended practice as it ensures

differences in salivary cortisol concentrations are not attributable to the diurnal pattern of fluctuation, which research shows is particularly volatile during the first hour after awakening (Hanrahan et al., 2006; Hellhammer et al., 2007) and sensitive to anticipatory next day stress (Fries et al., 2009).

Analytic Procedures

Sample equivalence and descriptive statistics.—All analyses were conducted using SPSS v. 21.0 (IMB Corp, 2017). First, following randomization, chi-square analyses were used to compare the intervention and waitlist-control groups with respect to gender, age, race, years of experience, level of education, and history of receiving mental health services. These factors were to be included as covariates in subsequent analyses if any significant differences were observed. Independent samples *t*-tests were also used to provide assurance regarding equivalency of intervention and waitlist-control groups on measures of primary teacher outcomes and mindfulness at pre-intervention. Bivariate correlations for primary teacher outcomes and mindfulness were calculated to examine the relations between these variables following the implementation of the intervention. These analyses provided information regarding the extent to which variables demonstrated relations in directions that are conceptually expected.

Effect of bMBI on teacher outcome measures.—Participants' cortisol responses were categorized as adaptive (i.e., within 38–75% of an increase in response from waking to 30 minutes post-waking; Pruessner et al., 1997; Fries et al., 2009) or maladaptive (i.e., exhibiting a blunted response that falls below this range or a heightened response that is above this range). Chi-square analyses were used to determine whether there were significant changes from pre- to post-intervention regarding the number of participants that were categorized as having either an adaptive or maladaptive response in the intervention and waitlist-control groups, respectively. Cramer's *V* was calculated to determine the magnitude of the change from pre- to post-intervention in the intervention and waitlist-control groups, respectively. Given the vast heterogeneity in the CAR across individuals and variability in responses to stress and burnout (Wust et al., 2000; Miller et al., 2007; Pruessner et al., 1999), statistical analyses in samples with low power often fail to identify changes to this marker of stress. Therefore, these data were also analyzed further at a qualitative level to examine individual changes to CAR from pre- to post-intervention.

Paired samples *t*-tests were used to examine changes from pre- to post-intervention in the intervention and waitlist-control groups, respectively, on the TSI (including the full composite scale and the 10 separate subscales), MBI-ES (including the full scale and the three separate subscales), and the SA-45 (including the full scale [i.e., the GSI] and the Anxiety and Depression subscales).

Results

Sample Descriptives

Analyses indicated no significant differences across experimental groups with respect to gender, age, race, years of experience, level of education, or history of receiving mental

health services (see Table 2), therefore, none of these factors were included as covariates in subsequent analyses in order to reduce the risk for type II error. There was a significant difference between the intervention group and waitlist-control group regarding the number of teachers with an adaptive (as opposed to maladaptive) CAR at baseline (χ^2 [1, n = 23] = 4.537 p = .033; see Table 6) such that there were more teachers with an adaptive response in the control group than the intervention group at baseline. At pre-intervention, only one of 11 teachers in the intervention group exhibited a CAR within the adaptive range (i.e., 38–75% increase from waking levels compared to six of 12 teachers presenting with an adaptive response in the control group). No additional significant differences between experimental groups were observed on any teacher outcome measure or mechanism of change measure at pre-intervention.

Bivariate correlations at post-intervention indicated significant relations between the full mindfulness scale (FFMQ) and the full scales for teacher stress (TSI; r(22) = −.530, p = .009) and burnout (MBI-E; r(22) = −.428, p = .042; see Table 4) but not for physiological measures of stress (CAR) or psychological distress (GSI of the SA-45). Additionally, some mindfulness subscales were found to be associated with positive teacher outcomes at post-intervention, with the Nonjudgment subscale of the FFMQ significant and inversely related to teacher psychological distress (GSI; (r(22) = −.552, p = .006), and the Non-reactivity subscale of the FFMQ was significantly and inversely related to teacher's' self-reported of stress (TSI; (r(22) = −.602, p = .002; see Table 4). These findings demonstrate that at post-intervention teacher mindfulness (i.e., the targeted mechanism of change), is related to primary teacher outcomes at post-intervention. See Table 4 for details regarding relations amongst domains of mindfulness and teacher outcome variables, respectively.

Aim 1: Efficacy of bMBI on Teacher Stress and Burnout

Effect of bMBI on teacher stress.

Physiological Stress.: Figure 1 represents the CAR of each individual at pre- and post-intervention, and Figure 2 represents the average cortisol values at both waking and 30-minutes post-waking over the course of both days at pre- and post-intervention (see Table 5 for mean values in each group). Although chi-square analyses indicated no significant changes from pre- to post-intervention for the intervention group (χ^2 (1, n = 11) = .413, p = .521; see Table 6), there was a small effect (V = .193; Cohen, 2013) indicating a need for further examination to determine the directional nature of these changes. Likewise, there was also no significant effect for CAR from pre- to post-intervention in the waitlist-control group (χ^2 (1, n = 12) = 1.500, p = .221), but there was a medium effect (V = .354). Examining this shift from pre- to post-intervention more closely indicates that within the intervention group three teachers moved from exhibiting a maladaptive CAR to an adaptive response by post-intervention and one teacher moved from having an adaptive response to having a maladaptive (i.e., blunted for this individual) response (see Table 7). By comparison, three teachers in the waitlist-control group had shifted from demonstrating an adaptive response at baseline to a maladaptive response at post-intervention, and only one teacher had moved from exhibiting a maladaptive response to an adaptive response (see Table 7). Thus, a closer qualitative examination of these values, in conjunction with the small effect observed in the intervention and the medium effect observed in

the control group (V = .354), suggests there is a potential meaningful adaptive trend in physiological functioning for those in the intervention and a meaningful maladaptive trend in physiological functioning for those in the control group.

Self-Reported Stress.: Results from paired samples *t*-tests indicated significant reductions on self-reported teacher stress (i.e., TSI full scale) for the intervention group from pre- to post-intervention ($t(10) = 5.027$, $p = .001$; see Table 8). No significant reductions in self-reported stress from pre- to post-intervention were observed for the waitlist-control group ($t(11) = .803$, $p = .439$; $d = 1.54$).

Among the 10 subscales of the TSI, significant changes from pre- to post-intervention were observed for the following five subscales: Time Management ($t(10) = 3.474$, $p = .006$; $d = 1.06$); Work-Related Stressors ($t(10) = 3.382$, $p = .007$; $d = 1.03$); Professional Distress ($t(10) = 3.064$, $p = .012$; $d = .92$); Professional Investment ($t(10) = 2.451$, $p = .034$; $d = .75$); and Fatigue Manifestations ($t(10) = 2.335$, $p = .042$; $d = .71$). Of note, there was also a medium effect size observed for Emotional Manifestations ($d = .66$), but the paired-samples *t*-tests did not reach significance ($t(10) = 2.162$, $p = .056$). All remaining subscales did not demonstrate significant change (see Table 8). There were no significant changes observed on any of the subscales for the waitlist-control group.

Effect of bMBI on teacher burnout.—The intervention group reported significant reductions in symptoms of burnout (i.e., the full scale of the MBI-ES) from pre- to post-intervention ($t(10) = 3.012$, $p = .013$; $d = .92$; see Table 8), but no significant reductions in burnout from pre-to post-intervention were observed for the waitlist-control group ($t(11) = .771$, $p = .457$).

Among the three subscales of the MBI-ES, the intervention group reported significant reductions from pre- to post-intervention on the Emotional Exhaustion subscale of the MBI-ES ($t(10) = 4.001$, $p = .003$; $d = 1.21$). There were not significant effects for either the Depersonalization subscale ($t(10) = 0.820$, $p = .432$) or the Personal Accomplishment subscale ($t(10) = .540$, $p = .601$). There were no significant effects observed on the MBI-ES subscales in the control group from pre- to post-intervention.

Effect of bMBI on teacher psychological distress.—Paired samples *t*-tests demonstrated a significant improvement on the Depression subscale of the SA-45 for the intervention group from pre- to post-intervention ($t(10) = 2.352$, $p = .040$; $d = .71$; see Table 8). In comparison, there was not a significant improvement in depressive symptoms for the waitlist-control group ($t(11) = 1.764$, $p = .105$). The bMBI had less of an impact on other indicators of psychological distress. There were no significant improvements in general psychological distress (i.e., the full GSI scale of the SA-45) from pre- to post-intervention observed for the intervention ($t(10) = 1.139$, $p = .281$) or waitlist-control group ($t(11) = 1.488$, $p = .165$). The effect size indicates there were small improvements for the intervention group ($d = .34$) from pre- to post-intervention. There was also not a significant improvement in anxiety from pre- to post-intervention for either the intervention group ($t(10) = 1.009$, $p = .337$) or the waitlist-control group ($t(11) = 1.024$, $p = .328$).

Discussion

The primary aim of this study was to test whether a brief mindfulness-based intervention (bMBI) was efficacious in reducing teacher stress, burnout, and psychological distress. The results of this randomized waitlist-control trial indicate that only six total hours of direct face-to face contact appears to be sufficient to significantly reduce some markers of stress and burnout in teachers. Given the brief design of the intervention, we discuss these findings in terms of the ways in which this study provides preliminary insight into the minimally-effective dose needed to target this at-risk population and optimize the cost-effectiveness of MBI interventions for teachers.

Impact of the Intervention on Stress, Burnout and Psychological Distress

Despite having little power to detect significant effects in the intervention group ($n = 11$), the current study demonstrated significant findings in the expected direction, suggesting the bMBI has robust effects for reducing teachers' stress, burnout, and depression. Further examination of various components of stress indicate it was particularly effective for reducing stress related to time management, work, professional distress (e.g., "I am not progressing in my job as rapidly as I would like"), professional investment (e.g., "I am not emotionally/intellectually stimulated on the job"), and fatigue. Reductions in burnout were primarily related to emotional exhaustion, the initial phase of burnout in which teachers' capacity for coping with demands becomes overwhelmed. Overall, the effect sizes (ranging from $d = 1.03$ to 1.54) for these significant effects are equivalent to (e.g., Beshai et al., 2016) or far exceed those found for markers of stress and burnout in other MBI studies (see Table 1 for findings of previous studies) despite many of these studies implementing interventions of longer duration that required substantially more resources (e.g., Flook et al., 2013 [nine sessions with 26 direct contact hours]; Roeser et al., 2013 [11 sessions with 30 direct contact hours]). It is notable that the current study utilized the same measures of physiological stress (CAR) and burnout (the MBI-E), and measures of teacher stress (the 10 subscales of the TSI), that most parsimoniously overlapped with conceptual elements of measures used in past MBI studies for teachers (see Table 1) to allow for comparisons to be drawn across the outcomes of these studies. Many of the effect sizes across non-statistically significant measures of stress and burnout in the current study were also similar to those seen in previous studies of far greater duration. Together, these findings suggest an intervention of shorter duration (i.e., four sessions and six face-to-face contact hours) can be at least as effective, if not more effective, as those of longer durations that require far more resources and time investment from teachers. Furthermore, the only existing MBI study in the literature of shorter duration than the current study (Ancona & Mendleson, 2014; 6 sessions and 4.5 face-to-face contact hours) demonstrated only small-to-medium non-significant effects for these constructs (i.e., $d = .54$ and $d = .43$ for stress and burnout, respectively). This suggests that the additional time (i.e., 90 minutes) in the bMBI curriculum used in the current study may have provided meaningful incremental differences that have clinical significance.

The current study was only the third in the literature (Flook et al., 2013; Roeser et al., 2013) to demonstrate positive significant changes for symptoms of teacher burnout. Flook and

colleagues (2013) previously identified significant changes for two out of three components of burnout (i.e., emotional exhaustion and personal accomplishment), and Roeser and colleagues (2013) found a significant change on a measure that more broadly encompassed all three components of burnout. The effect sizes of the current study for measures of emotional exhaustion (d = 1.21) and total burnout (d = .99) exceed those demonstrated in prior studies (d = .25 for the emotional exhaustion component; Flook et al., 2013; d = .76 for burnout; Roeser et al., 2013). These findings are particularly important as they suggest that, despite abbreviations in dosage, the effects of this study's bMBI were at least as strong as those of prior studies demonstrating significant effects for burnout (i.e., six total contact hours in comparison to 26 [Flook et al., 2013] and 30 direct contact hours [Roeser al., 2013]). These findings are also notable considering the current study's conceptualization of mindfulness was similar to these prior studies, as were many of the elements included in the intervention (i.e., group-based intervention, active cultivation of mindfulness via guided activities, active reflection, etc.).

The current study also aimed to address areas of methodological rigor (i.e., utilizing a randomized waitlist-control design; assessing physiological markers of stress) still missing in this burgeoning literature on developing MBIs for teachers (Klingbeil & Renshaw, 2017). Physiological markers of stress, such as the CAR, are important for understanding the effects of chronic stress on the biological systems of individuals (e.g., allostatic load; McEwen, 1998), a process not captured by self-report measures alone. Additionally, specific to educational settings, teacher health problems can increase district health care and human resource costs associated with teacher illness, absenteeism, and attrition. Teacher stress and burnout may also adversely affect student engagement and learning through teacher absenteeism, exhaustion, and diminished teaching effectiveness (Briner & Dewberry, 2007; Jennings & Greenberg, 2009).

Given heterogeneity in cortisol responses often leads to difficulties in identifying statistically meaningful effects in smaller samples (Wust et al., 2000; Miller et al., 2007; Pruessner et al., 1999), along with a consideration of effect sizes, we also included a qualitative examination of the directional nature of shifts in cortisol responses from pre- to post-intervention in each group. The current study identified a small effect (i.e., Cramer's V = .194) whereby an adaptive shift occurred in physiological indicators of stress (as measured by CAR) for those in the intervention group. This was contrary to the maladaptive shift from baseline to post found in the control group for which a medium effect was observed (i.e., Cramer's V = .354). This finding is critical as it aligns with two previous studies (Harris et al., 2016; Flook et al., 2013) that suggested a portion of teachers who do not receive appropriate interventions to effectively manage stress typically experience a maladaptive shift in physiological functioning over the course of an academic semester. Despite these observed trends, we did not find significant improvements in physiological indicators of stress as measured by CAR. This may be due to teachers presenting with variable degrees of stress and burnout producing differing physiological patterns; this also may be due to the heterogeneity in the CAR at a population level that makes the detection of statistically significant trends difficult in small samples (Wust et al., 2000; Fries et al., 2009; Stalder et al., 2016). The former notion is supported through closer interpretation of the participants' individual cortisol levels (see Figures 1 and 2). These figures demonstrate that some teachers

with a maladaptive CAR exhibited a heightened response (i.e., increases above 75% of post-waking values) and others exhibited blunted responses (i.e., increases below 38% of post-waking values). Although both of these responses are maladaptive, the field's understanding of the pattern and progression of these responses across different populations and contexts is still in an early developmental stage (Miller et al., 2007; Pruessner et al., 1999). Further research is needed to determine how teachers' varying maladaptive physiological responses to stress can influence teacher health and occupational outcomes and the effectiveness of a bMBI. However, one clear and explicit finding from the current study is that teachers experience chronic stress at considerably high levels, as indicated by both self-report and physiological data, and that these stress levels take a toll on their biological functioning. The finding that a majority of teachers at baseline had maladaptive responses should be noted.

The current study also assessed the impact of the intervention on changes in teachers' general psychological symptoms, anxiety, and depression. Of these, findings suggest that the intervention has the most potential for reducing symptoms of depression given the medium effect observed on this outcome measure. There are a number of reasons why the bMBI may have been more impactful for symptoms of depression than other psychological symptoms. Multiple studies have demonstrated a rapid decline in reported symptoms of depression following brief interventions aimed at increasing engagement in behaviors that align with an individual's values (Gawrysiak et al., 2009; Kohtala et al., 2015; Kyllönen et al., 2018). Given the emphasis on self-regulation and intentionality in the current study, it is unsurprising that there was a similar impact as interventions that more directly target depression. However, many mindfulness-based strategies work mechanistically by first drawing one's nonjudgmental awareness to the psychological and physiological experience of emotions, which allows for a greater attentional capacity and sustained engagement during uncomfortable emotional experiences as opposed to engaging in experiential avoidance (i.e., the avoidance of internal experiences such as thoughts, feelings, and emotions; Hayes et al., 1996). Although this decrease in experiential avoidance lends itself to improving symptoms of depression (via engagement in values-based behaviors that alleviates these symptoms), it may temporarily increase one's awareness and thus the intensity of acute anxiety before it begins to decline as a result of prolonged exposure to the anxiety-provoking events and contexts (Abramowitz et al., 2009). Although there were small effect sizes for improvements in symptoms of anxiety for the intervention group at two-weeks post-intervention, it is possible that with time these effects would grow larger with the increased exposure that could result from more practice and mastery in attending to the present moment during anxiety-provoking situations over time.

The observed impact of the bMBI, along with the significant inverse correlative relations found between mindfulness and teacher stress and burnout, suggest that mindfulness is an effective mechanism of change. However, other unmeasured mechanisms could also account for some of the positive effects of the intervention. For instance, research shows that teacher self-efficacy, or teachers' beliefs in their capacity to execute behavioral patterns in teaching-specific domains that are needed to perform competently as professionals (Bandura, 1997), mitigates stress, burnout, and general psychological distress (Schwarzer & Hallum, 2008; Skaalvik & Skaalvik, 2016). Although the current study did not directly measure this construct, the Time Management component of the TSI, for which there

was a statistically significant and large effect size, contains item content that aligns with elements of teachers' self-efficacy (i.e., scheduling and competently engaging in tasks despite feeling time constraints). Given the conceptual overlap between this component of stress and teacher self-efficacy, and the previous research demonstrating the inverse relation between teacher self-efficacy and teacher psychological distress, it is possible that increases to teacher self-efficacy may have contributed to some of the positive effects seen across various teacher outcome variables.

Increases in social support can be another unaccounted mechanism of change resulting from the group-based bMBI design. In fact, many of the teachers reported positive group dynamics of the intervention as a beneficial part of the intervention (e.g., "I think that part of the effectiveness is sharing/hearing others"; Roberts et al., under review). Although previous MBIs that have integrated specific social support elements into their curriculum did not demonstrate significant improvements to markers of stress (Reiser et al., 2016; Reiser & McCarthy, 2018), additional research will be needed to draw definitive conclusions about the possible contributions of social support.

Limitations and Future Directions

This study, which included a small sample size and employed a methodologically rigorous design (i.e., randomized control design; measurement of physiological stress), still found statistically significant positive effects in the intervention group suggesting that the bMBI was particularly effective for reducing teacher stress. However, our sample was largely homogenous in terms of race (91.3% white), education (95.7% having a Masters or Doctoral degree), and years of teaching experience (60.8% of teachers having over 10 years of experience; see Table 4), and the high school from which the teachers were sampled is a high-achieving school. These protective factors are likely to have made teachers more resilient than the average teacher, so future studies should aim to replicate these findings in a larger and more diverse sample of teachers to explore what types of stressors teachers face across different grade levels (i.e., elementary, middle, high school) and at schools with varying resources. Given that our sample included educators across a number of different roles (i.e., teachers, counselors, and administration) that include variable training and day-to-day experiences within the school day, it is important for future studies with larger sample sizes to examine variations in the effects of the intervention for individuals depending on their role in the school, their subject specialty, the grade level in which they teach, as well as individual-level differences based on prior training, education, years of experience, and age, among other variables. Furthermore, the results of current study could facilitate policy changes in schools that may seek to implement MBIs for early career teachers or teachers in training, incorporate mindfulness booster sessions regularly into professional development days, and target other important agents of change in schools who frequently interact with children (e.g., afterschool program staff).

Although this study employed a rigorous randomized controlled study design, there were still some limitations to the study design that future studies should seek to address. For instance, all teachers who enrolled in the study were interested in both stress management and mindfulness, thus it is possible that those in the control condition chose to engage in

other CEC or personal opportunities relating to these topics in order to more effectively build these skills. Likewise, all teachers in the current study were recruited from the same school further increasing the possibility of contamination of the control group. There were no significant positive changes observed in any of our targeted outcomes for teachers in the control group suggesting that contamination was kept to a minimum. However, to protect against this, future studies will need to implement a large randomized clustered school-based design or other type of stratified sample design with an active control group which is provided a standardized CEC offering unrelated to mindfulness or stress. Given the strong associations with social support and teacher stress described above (Burke et al., 1996; Greenglass et al., 1996), it may be useful to utilize a social support intervention as the active control to help determine the extent to which mindfulness functions as a mechanism of change beyond the effects of social support.

The current study provided strong preliminary evidence to support the development of briefer MBIs for teachers. Given the significant changes related to stress and burnout and large effect sizes that match, or exceed those of studies with higher dosages, it is clear that a briefer intervention can provide at least a similar degree of positive change across markers of stress and burnout as studies of greater duration. However, the current study is unable to make definitive determinations regarding a minimally-effective dose because it did not specifically compare interventions of varying dosages. Future studies should aim to further address this research question by testing interventions of multiple dosages while controlling for maximal amounts of confounding variables (e.g., similarities across theoretical underpinnings, intervention facilitators, and in characteristics of participants between groups).

Future studies can also seek to build off strengths in the methodological rigor of the current study by collecting measures of teachers' engagement in mindfulness practice outside of sessions and follow-up measurement on teachers' practices and outcomes following the cessation of the intervention. Acquisition of mindfulness skills amongst teachers and associated outcomes is likely to vary depending on practice outside of session (Reomer & Orsillo, 2003). Collecting follow-up measures would not only help to determine whether positive improvements in mindfulness practice and positive health outcomes are sustained, but, according to research suggesting that positive impacts of mindfulness may not be fully observed until an individual has extensively practiced the skills (Baer, 2003), it is possible for teachers to experience further benefits (i.e., further growth in mindfulness and greater improvement in health outcomes) of the bMBI in the subsequent months post-intervention as they master their mindfulness skills. Studies employing follow-up measurement may also be able to test different ways to continue promoting practice and engagement in mindfulness after the cessation of the intervention. These additional efforts can help determine how to best sustain teachers' mindfulness practice.

Conclusion

The current study implemented and tested a brief mindfulness-based intervention (bMBI) to reduce teachers' stress and burnout using a randomized waitlist-control design. There were several significant improvements for self-reported teacher stress, burnout, and psychological

distress in the intervention group but not in the control group. However, physiological changes in stress response were not significant., albeit trends were in expected directions. Future research should seek to replicate findings in a larger sample in order to utilize analyses that are better able to tease apart the nuances in participants' physiological functioning. Future research can use the findings from the current study to guide the development of bMBIs and can further expand our understanding of the mechanisms of change in bMBIs by examining the mediating effects of mindfulness collecting follow-up measurement, and exploring other potential variables that may contribute to the positive intervention outcomes (e.g., social support, teacher self-efficacy, and compassion). The current study provides at least preliminary evidence for the effectiveness of a brief intervention and is vital in guiding future studies that aim to address the critical need to reduce teachers' stress and burnout in a cost-effective manner.

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Highlights

- Mindfulness-based interventions have the potential to combat teacher stress and burnout.
- However, interventions with large dosages have had iatrogenic effects.
- The current study tests the efficacy of a brief mindfulness-based intervention.
- Significant positive intervention effects were found for stress, burnout, and depression.
- Findings support the development of briefer designs to improve efficacy and cost-effectiveness.

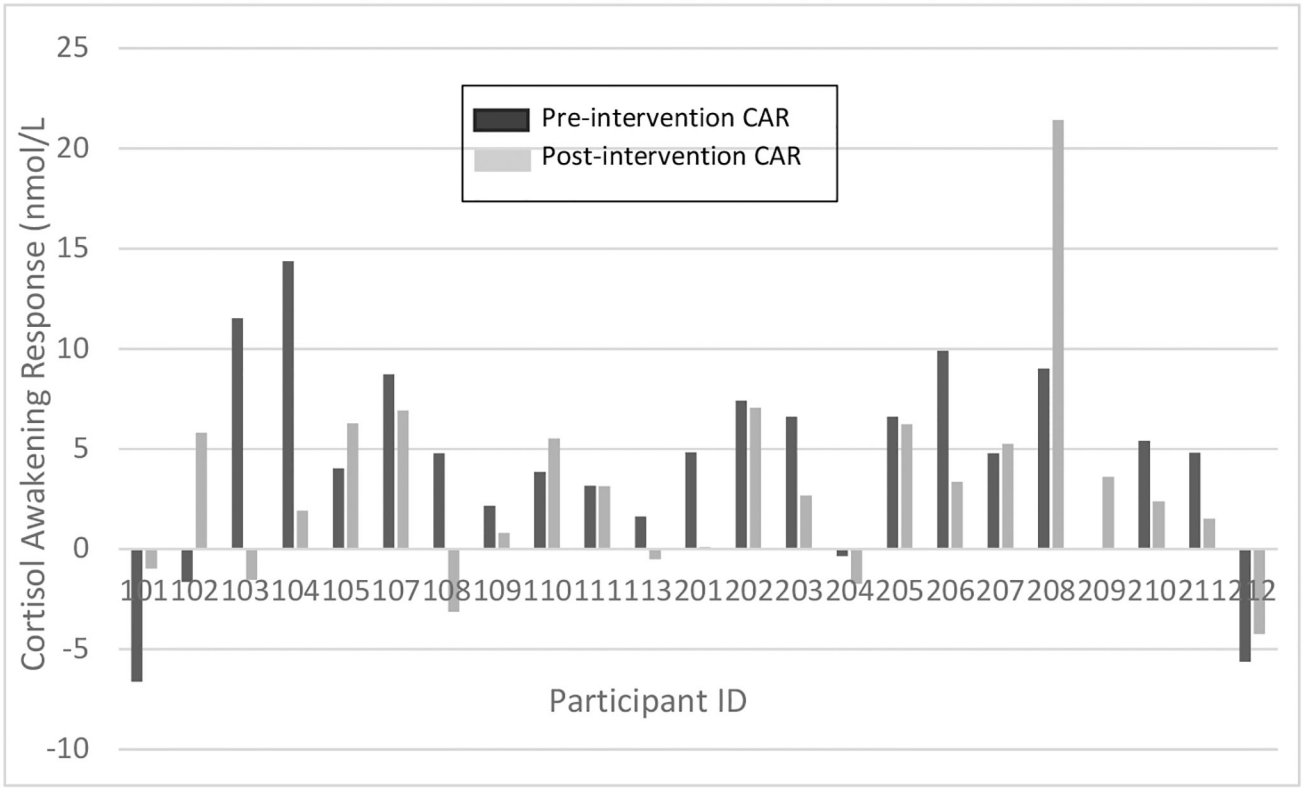

Figure 1.
Participant Cortisol Awakening Response (CAR) Values at Pre- and Post-Intervention

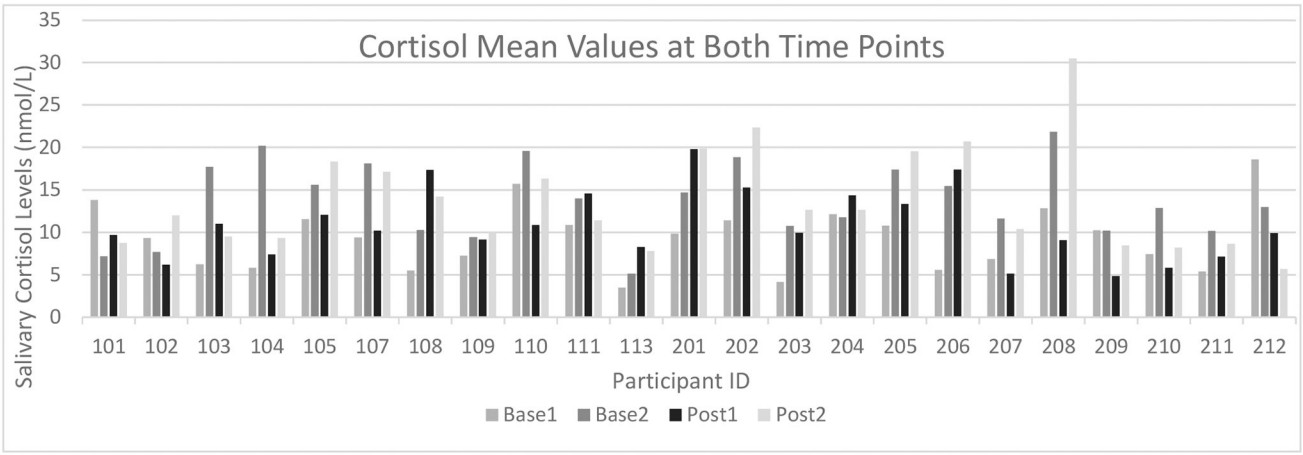

Figure 2.
Participant Salivary Cortisol Values at Waking and 30 Minutes Post-Waking

Table 1.

Details of previous MBI studies for teachers.

Author (year)	*n*	Research Design/ School Level	Dose	Primary Outcomes for Stress and Burnout
Ancona & Mendelson (2014)	43	RCT/Mixed	6 sessions; 4.5 total contact hours	Teacher Stress Inventory (change comparisons): $p < .10$; $d = .54$ MBI-ES EE (change comparisons): n.s.; $d = .42$
Benn et al. (2012)	38	RCT/Mixed	11 sessions; 36 total contact hours	PSS (change comparisons): $p < .10$; $d = .40$
Beshai et al. (2016)	89	Non-Randomized Control Trial/ Secondary	9 sessions; 11 total hours	PSS (change comparisons): $p < .05$; $d = 1.23$
Flook et al. (2013)	18	RCT/Elementary	9 sessions; 26 total contact hours	Reduction (pre-post) for intervention group on MBI-ES EE and MBI-ES PA ($p < .05$) and Increase for control group on MBI-ES PA ($p < .10$); MBI-ES (post comparisons): EE: $d = .25$; PA: $d = .99$; DP: $d = .03$ CAR (pre-post): n.s. for intervention group and reduction in cortisol functioning for control group $p < .05$; CAR (post comparisons): $d = .70$
Frank et al. (2015)	36	RCT/Secondary	8 sessions; 16 total contact hours	MBI-ES (change comparisons): EE: n.s.; $d = .18$; PA: n.s.; $d = .09$; DP: n.s.; $d = -.33$
Gold et al. (2010)	11	Pre-Post Comparison Trial/ Elementary	9 sessions; 25 total contact hours	DASS Stress (pre-post): $p < .05$; $d = .70$
Harris et al. (2016)	64	RCT/Secondary	64 sessions; 21 total contact hours	PSS (post comparisons): n.s.; $d = .41$; TUS: $p < .10$; $d = .43$; MBI-ES: EE: n.s.; $d = .25$; PA: n.s. $d = .23$; DP: $p < .10$; $d = .48$ CAR: $p < .05$; $d = .64$ (i.e., a blunted response for control group); Cort AUC: n.s.; $d = .16$; Systolic BP: n.s.; $d = .39$; Diastolic BP: $p < .05$; $d = .52$
Jennings et al. (2011; Study 1)	31	Non-Randomized Control Trial/ Elementary	4 sessions; 30 total contact hours	TUS (pre-post): TUS Task-Related Hurry: $p < .05$.; $d = .24$; TUS General Hurry: $p < .10$; $d = .27$
Jennings et al. (2013)	53	RCT/Mixed	4 sessions; 30 total contact hours	TUS (post comparisons): TUS Task-Related Hurry: n.s.; $d = .32$; TUS General Hurry: $p < .05$; $d = .42$; MBI-ES: EE: n.s.; $d = .04$; DP: n.s.; $d = .06$; PA: $p < .10$; $d = .40$
Reiser et al. (2016)	15	Pre-Post Comparison Trial/Did not specify	6 sessions; 6 total contact hours	Classroom Appraisal of Resources and Demands (post-comparisons): n.s.; $d = .23$
Reiser & McCarthy (2018)	45	Non-Randomized Control Trial/ Secondary	8 sessions; 8 total contact hours	Classroom Appraisal of Resources and Demands (change comparisons at post): n.s.; $d = .03$
Roeser et al. (2013)	113	RCT/Mixed	11 sessions; 30 total contact hours	Teacher Stress and Burnout (change comparisons at post): Teacher Stress: $p < .01$; $d = .57$; MBI-ES: $p < .01$; $d = .76$ Physiological Measures (change comparisons at post): CAR: n.s.; $d = -.22$; 30min waking: n.s.; $d = -.20$; Bed-time: n.s; $d = -.31$; Systolic BP: n.s.; $d = -.05$; Diastolic BP: n.s.; $d = --.16$; Resting Heart Rate: n.s.; $d = -.07$

Notes: PSS – Perceived Stress Scale; MBI-ES – Maslach Burnout Inventory- Educators Survey; EE – Emotional Exhaustion subscale of Maslach Burnout Inventory; DP – Depersonalization subscale of Maslach Burnout Inventory; PA – Personal Accomplishment subscale of Maslach Burnout Inventory; DASS – Depression Anxiety Stress Scales; TUS – Time Urgency Scale; CAR – Cortisol Awakening Response; Cort AUC – Cortisol Response Area Under the Curve; BP – Blood Pressure; Positive Cohen ‘s d values show a benefit towards the intervention over control or a reduction in symptom from pre-post where applicable.

Table 2.

Sociodemographic characteristics of the current study by condition.

Sociodemographic characteristic	Intervention (*n* = 11) *n* (%)	Waitlist-control (*n* = 12) *n* (%)	χ^2 (df)	*P*
Gender				
Female	10 (91)	11 (100)	χ^2 (1) = 1.140	.286
Male	1 (9)	0 (0)		
Age				
20 – 29	1 (9)	2 (17)	χ^2 (4) = 2.161	.706
30 – 39	3 (27)	4 (33)		
40 – 49	2 (18)	3 (25)		
50 – 59	4 (36)	2 (17)		
60 – 69	0 (0)	0 (0)		
70 – 79	0 (0)	1 (8)		
Race				
White	10 (91)	11 (92)	χ^2 (2) = 2.008	.366
Black	0 (0)	1 (8)		
Other	1 (9)	0 (0)		
Years of experience				
0 – 9	3 (27)	6 (54)	χ^2 (3)= 6.254	.100
10 – 19	4 (36)	2 (18)		
20 – 29	4 (36)	1 (9)		
30 +	0 (0)	3 (27)		
Level of education				
Bachelor’s Degree	0 (0)	1 (8)	χ^2(2) = 4.017	.134
Master’s Degree	9 (82)	11 (92)		
Doctorate Degree	2 (18)	0 (0)		
Received past mental health services				
Yes	5 (45)	7 (58)	χ^2 (1) = .381	.537
No	6 (55)	5 (42)		

Table 3.

Overview of content and key themes of individual sessions in bMBI curriculum.

Session	Mindfulness tenant	Activities	Key session themes
1	Attentive awareness	Introduction to mindfulness, program facilitators, teacher workbooks; group rules; sensory experience exercise; participant goals for program participation; didactics regarding attentive awareness (i.e., types of attention, attentional demands of teachers and students); topic exercise and reflection; group discussion; journal entry; progressive muscle relaxation	Identifying participants' goals for program participation; daily attentional demands; effects of chronically not cultivating attentive awareness (i.e., "on auto-pilot")
2	Receptive attitude	Review of attentive awareness, session one journal entry, in-between notes; introductory exercise; didactics regarding receptive attitude, (i.e., approaching situations with openness, curiosity, and acceptance); topic exercise and reflection; group discussion; journal entry; loving kindness meditation	Operationalizing "approach with curiosity, openness, and acceptance"; effects of non-receptive attitude (i.e., experiential avoidance); willingness; self-compassion
3	Intentionality	Review of receptive attitude, session two journal entry, in-between notes; review of program goals; introductory exercise; didactics regarding intentionality (i.e., values-based discussion of effort, psychological grit); topic exercise and reflection; group discussion; journal entry; progressive muscle relaxation	Review of program and participant goals; identifying participant values; compassion as a value; competing thoughts and distressing emotions as barriers to intentional behavior; development of SMART goal
4	Integration	Review of intentionality, session three journal entry, in-between notes; topic exercise and reflection; video presentation; discussion of how three tenants of mindfulness interrelate; discussion of continued application of mindfulness strategies (i.e. barriers, future goals) concluding exercise	Operationalizing and integrating tenants of mindfulness in personal and professional life; identification of barriers to continued practice

Table 4.

Correlations between mindfulness and primary outcome variables at post-intervention.

Variable	1	2	3	4	5	6	7	8	9	10
1 – FFMQ Full	-									
2 – FFMQ Observe	.740*	-								
3 – FFMQ Describe	.532*	.469*	-							
4 – FFMQ Act with Awareness	.711*	.339	.406	-						
5 – FFMQ Nonjudgment	.550*	.137	−.246	.241	-					
6 – FFMQ Non-reactivity	.863*	.600*	.435	.555*	.413*	-				
7 – CAR	−.082	−.176	−.164	.096	.003	−.026	-			
8 – TSI	−.530*	−.277	−.163	−.349	−.396	−.602*	.030	-		
9 – MBI	−.428*	−.204	−.273	−.265	−.374	−.272	.077	.693*	-	
10 – GSI	−.334	−.258	−.035	.000	−.552*	−.051	.127	.410	.665*	-

*Correlations at post-intervention significant at $p < .05$.

$n = 12$

Table 5.

Mean cortisol response values.

	Intervention (*n* = 11)				Waitlist-control (*n* = 12)			
	Pre		Post		Pre		Post	
Outcome measure (scale)	***M***	**SD**	***M***	**SD**	***M***	**SD**	***M***	**SD**
Cortisol Awakening Response (CAR; nmol/L)	4.18	5.84	1.63	3.87	4.44	4.41	3.97	6.37
Cortisol T1 (immediately upon waking)	9.00	3.77	10.62	3.19	9.60	4.03	11.01	4.98
Cortisol T2 (30min post-waking)	13.18	5.44	12.25	3.69	14.04	3.71	14.98	7.50

Table 6.

Chi square analyses for cortisol awakening response

Sociodemographic characteristic	Adaptive CAR at Pre-Intervention	Maladaptive CAR at Pre-Intervention	Adaptive CAR at Pre-Intervention	Maladaptive CAR at Post-Intervention	χ^2 (df)	*p*	Cramer's *V*
Intervention Group (*n* = 11) (Adj. Standardized Residuals)	1 (−6)	10 (.6)	3 (−.6)	8 (.6)	χ^2 (1) = .413	.521	.194
Waitlist-Control Group (*n* = 12) (Adj. Standardized Residuals)	6 (1.2)	6 (−1.2)	4 (1.2)	8 (−1.2)	χ^2 (1) = 1.500	.273	.354

Table 7.

Shifts in teachers' CAR from pre- to post-intervention.

Sociodemographic characteristic	Participants Remaining Adaptive	Participants Moving from Adaptive to Maladaptive	Participants Remaining Maladaptive	Participants Moving from Maladaptive to Adaptive
Intervention Group (n = 11)	0	1	7	3
Waitlist-Control Group (n = 12)	3	3	5	1

Table 8.

Mean comparisons of teacher outcome variables by group.

	Intervention (n = 11)					Waitlist-control (n = 12)				
	Pre		Post			Pre		Post		
Outcome measure (scale)	***M***	**SD**	***M***	**SD**	***d***	***M***	**SD**	***M***	**SD**	***d***
TSI total (1–5)	2.65	.49	2.34*	.50	1.54	2.94	.50	2.85	.48	.22
Time Management	3.82	.63	3.36*	.62	1.06	3.76	.44	3.61	.61	.22
Work-Related Stressors	3.20	.64	2.63*	.72	1.03	3.57	.47	3.36	.75	.32
Professional Distress	2.67	.92	2.00*	.69	.92	3.00	.83	3.15	1.03	.22
Discipline and Motivation	2.12	.90	2.27	.77	.28	3.35	.75	3.40	1.01	−.07
Professional Investment	2.32	.86	1.95*	.57	.75	2.38	.83	2.27	.57	.02
Emotional Manifestations	3.00	1.03	2.65	1.02	.66	2.90	1.15	2.81	1.45	.14
Fatigue Manifestations	2.51	.84	2.05*	.69	.71	2.67	1.07	2.60	.90	.12
Cardiovascular Manifestations	2.03	.67	1.85	.79	.24	2.58	1.20	2.17	.87	.58
Gastronomical Manifestations	1.64	.94	1.76	1.12	.26	1.78	.91	1.67	.80	.17
Behavioral Manifestations	1.50	.54	1.52	.49	.04	1.81	.89	1.67	.82	.25
MBI-ES total (0–6)	2.93	.82	2.58*	.75	.92	2.93	.67	2.86	.64	.23
MBI Emotional Exhaustion (0–6)	4.06	1.10	3.38*	1.22	1.21	3.81	.94	3.48	1.19	.40
MBI Depersonalization (0–6)	2.09	1.03	1.93	.74	.24	2.25	.66	2.17	.76	.15
MBI Personal Accomplishment (0–6)	2.18	1.01	2.09	.87	.16	2.35	.84	2.59	.81	.40
SA-45 GSI (45–225)	73.36	21.41	68.36	19.08	.34	76.92	18.85	71.08	14.02	.43
SA-45 Depression	1.83	1.05	1.41*	.58	.71	1.70	.83	1.45	.51	.51
SA-45 Anxiety	1.85	.63	1.65	.32	.30	1.83	.60	1.63	.41	.30

* Mean differences from pre- to post-intervention significant at $p < .05$.

Note:

Lower scores on the:

TSI indicate less stress.

MBI-ES indicate fewer symptoms of burnout.

SA-45 indicate fewer psychological symptoms.

Negative *d* values indicate poorer outcomes.