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Mindfulness for teachers: A pilot study to assess effects on stress, burnout and teaching efficacy

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Abstract

Despite the crucial role of teachers in fostering children's academic learning and social-emotional well-being, addressing teacher stress in the classroom remains a significant challenge in education. The present study reports results from a randomized controlled pilot trial of a modified Mindfulness-Based Stress Reduction course (mMBSR) adapted specifically for teachers. Results suggest the course may be a promising intervention, with participants showing significant reductions in psychological symptoms and burnout, improvements in observer-rated classroom organization and performance on a computer task of affective attentional bias, and increases in self-compassion. In contrast, control group participants showed declines in cortisol functioning over time and marginally significant increases in burnout. Furthermore, changes in mindfulness were correlated in the expected direction with changes across several outcomes (psychological symptoms, burnout, sustained attention) in the intervention group. Implications of these findings for the training and support of teachers are discussed.

Keywords

mindfulness; teachers; burnout; stress; classroom behavior; cortisol; intervention

Teachers play a central role in creating a classroom climate that fosters student learning and social-emotional well-being. However, teaching can be stressful and managing classroom dynamics taxing. As a profession, teaching is plagued by significant turnover, often attributed to burnout, with documented rates of teacher turnover rising in public schools over the past decade (Ingersoll, 2001; NCES, 2011). For teachers who stay, stress can impact their ability to be responsive and effective in the classroom. Multiple sources of stress have been cited including time demands, workload, student disruptive behavior, and organizational factors (Blase, 1986; Boyle, 1995). Teachers also face increasing pressure and scrutiny with accountability to standardized tests. While these issues are complex and have a long history, to effectively address and support teachers in the current climate will require teacher involvement (Farber, 1991). The personal, societal, and financial costs associated with burnout are too high to ignore. Teachers' perceptions of stress and their ability to cope with demands are implicated in burnout (McCormick & Barnett, 2011). In particular, a sense of self-efficacy and connectedness with students and colleagues have been identified as important elements linked to teaching engagement and less emotional exhaustion and psychological distress (Klassen, Perry, & Frenzel, 2012; Tuettemann & Punch, 1992).

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Teacher stress and burnout have been an ongoing challenge in education. Providing resources to increase teachers' sense of personal efficacy and ability to manage stress may reduce burnout. Reducing and managing teacher stress is part of a formula for promoting a healthy classroom environment. Retaining teachers and providing them with tools for self-care can translate into increased effectiveness in their role in the classroom. Supporting teachers' ability to cope with the demands of the classroom and bolstering their own well-being is a necessity, with implications for students' learning and school success.

Most school-based interventions are designed for students. There are fewer efforts to address stress and burnout among teachers and boost teacher well-being. Programs that have been geared toward teachers are varied in scope and have been met with varying degrees of success (Richardson & Rothstein, 2008). However, there remains yet to be a program that is systematically implemented as part of professional training for teachers. Clearly more needs to be done to address and support teachers in meeting the continuously shifting demands of the classroom.

An approach to stress reduction that has gained increasing recognition is mindfulness training to target attention and emotion processing (Bishop et al., 2004). Used across a variety of settings, Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990) is a widely known form of mindfulness training that has been shown to reduce stress, depression, and anxiety (Grossman, Niemann, Schmidt, & Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010). These mental health concerns are frequently reported among educators (Kyriacou, 2001). Therefore, teachers may derive benefit from learning and practicing mindfulness techniques. However, given considerable workload demands, often juggled with family responsibilities, teachers may not seek out such training from a health care provider. Therefore, making training readily accessible and specifically relevant to educators outside of a strictly mental health care framework are important considerations. Our goal was to conduct a preliminary evaluation of a modified Mindfulness Based Stress Reduction (mMBSR) training specifically adapted for elementary school teachers.

Psychological and neuroscientific basis for mindfulness training

Mindfulness is described as paying attention in the present moment, on purpose, and without judgment (Kabat-Zinn, 1994). Mindfulness, which is derived from centuries old meditative traditions and taught in a secular way, has been linked to heightened activation in brain regions responsible for regulating attention and positive affective states including empathy and other prosocial emotions (Davidson et al., 2003; Lutz, Greischar, Rawlings, Ricard, & Davidson, 2004; Lutz, Slagter, Dunne, & Davidson, 2008). Emotions, attention and introspection are ongoing and labile processes that may be understood and studied as skills that can be trained, similar to others human skills like music, mathematics or sports (Davidson & McEwen, 2012). Use of MBSR in the workplace has shown that 8 weeks of training for employees of a biomedical company resulted in significantly increased relative left-sided anterior activation of the brain, a pattern that is associated with positive affect and well-being (see e.g., Tomarken, Davidson, Wheeler, & Kinney, 1992; Urry et al., 2004). The intervention group also showed more robust immune response to an influenza vaccine and significantly decreased self-reports of anxiety (Davidson et al., 2003).

Mindfulness training enhances attention by bringing awareness to the object of attention whether it is the breath, other bodily sensations, external stimuli, thoughts or emotions. Training may increase the ability to sustain engagement of self-regulatory neural circuits in the prefrontal cortex resulting in improved sustained attention and emotion regulation (Lutz, Slagter, Dunne, & Davidson, 2008) as well as alterations in functional connectivity of brain networks associated with attentional focus and reflective awareness of sensory experience

(Kilpatrick et al., 2011). In mindfulness, attention can be deployed flexibly either in a narrow, focused way or broadly, to encompass a range of stimuli. From these practices a greater awareness of sensory experiences may arise. Training attention also enables the deliberate cultivation of positive qualities through specific practices designed to promote empathy and prosocial attitudes. This form of mental training is associated with increased activity in cortical areas responsible for empathy and compassion (Lutz, Brefczynski-Lewis, Johnstone, & Davidson, 2008). Mindfulness may make individuals less reactive to negative experience and more likely to notice positive experience, resulting in a cascade of psychological and physiological benefits.

Approaches to stress management interventions may operate at different levels by targeting either the intensity of stress at work, perceptions or appraisals of stressful situations, and/or ways of coping with stress (Richardson & Rothstein, 2008). Mindfulness is likely to act on the latter two aspects, that is, perceptions of stress and coping with stress. Mindfulness does not directly act on the target of stress, though a shift in perception and response to stressors could conceivably alter the nature of the stressor itself. In this respect, mindfulness shares similarities with other approaches that have been successfully used to reduce workplace stress, like cognitive re-framing, but it also has distinct differences. Whereas a main ingredient of cognitive behavioral approaches involves replacing “maladaptive beliefs” with constructive, positive beliefs, a key difference with mindfulness is that it entails observing and noticing without reacting to or intentionally altering direct experience in the moment (Segal, Williams, & Teasdale, 2002). Certain practices are also specifically designed to cultivate an appreciation for and understanding of our interdependence with the world. A mindful approach to stress may involve noticing body sensations, observing thoughts, and emotions related to stress and practicing self-compassion.

Applications of mindfulness for teachers

Mindfulness has been proposed as a form of professional development to manage the demands of teaching and several programs exist that offer this type of training, however, there is a need for more rigorous empirical research in this area (Roeser et al., 2012). The applications of mindfulness for classroom teachers are just beginning to be explored, with relatively few studies investigating the effects of mindfulness training for teachers. There is no consensus yet on the recommended format for such training. Investigators have used different approaches to mindfulness training, varying in terms of the breadth and types of practices taught (content of lessons), length of sessions, and overall duration of training. In the qualitative literature, Napoli (2004) conducted a study with three teachers who reported improved ability to manage conflict and anxiety and improved productivity in the classroom subsequent to mindfulness training.

One of the few empirical studies in the literature using a sample of classroom teachers employed a five week “standardized meditation” training that included weekly classes and a recommended dose of two daily twenty minute home and school practice sessions (Anderson, Levinson, Barker, & Kiewra, 1999). The standardized meditation training included mantra, observing breath, and group practice. The sample consisted of elementary, middle, and high school teachers randomly assigned to an intervention (n=45) or control group (n=46). Effects of training were assessed at pre-, post-, and one-month follow-up on measures of anxiety, burnout, and stress. Results showed improvements in state and trait anxiety, less emotional exhaustion (a facet of burnout), and reduced stress at post-test, and less depersonalization (another facet of burnout) at one-month follow-up. Strengths of this study were the inclusion of a control group and one-month follow-up assessment. Limitations were relying only on self-report measures, a relatively short training period, and

no measurement of mindfulness (as a purported key ingredient for change). The mantra practice used in their study is not part of MBSR training.

A more recent study of MBSR for primary school teachers included 10 intervention participants and no control group (Gold et al., 2010). Pre and post-test measures included a measure of depression, anxiety, and stress and a mindfulness scale. Teachers reported improvement in depression and stress and greater accepting without judgment (a component of the mindfulness scale). A strength of this study was using a widely studied model of mindfulness for training. Limitations were the lack of control group and reliance on self-report measures.

Another recent study focused on meditation combined with emotion regulation training for female teachers (Kemeny et al., 2012). Self-reports were collected across three assessment points (baseline, post-test, five-month follow-up) and experimental tasks were administered at baseline and/or post-test (final n=76). Training took place over an 8-week period, clustered in 4 all-day sessions/4 evening sessions (42 hrs). Teachers in the intervention group as compared to the control group reported more positive trait affect and increased mindfulness, showed improved ability to recognize others' emotions, as well as greater sensitivity to compassion-related words in a behavioral task, and amount of practice was related to less physiological reactivity (indexed by blood pressure) to a laboratory stress task (Kemeny et al., 2012). This intervention combined psychoeducation with meditation instruction in a time-intensive format.

Purpose of current study

Overall, while mindfulness training has been identified as a promising means for cultivating attention and reducing stress, little research has investigated this approach with teachers and its impact on their professional role. Some of the existing literature brings a qualitative lens to the subject, yet there are few empirical studies, and even fewer have included a comparison group which provides a much needed reference point. The current study adds to the literature by using multiple methods, which include both subjective reports and objective measures, to evaluate the effects of mindfulness training by comparing teachers who were randomly assigned to either the intervention or control group. In addition, we evaluate a closely adapted version of MBSR, a widely available form of training, which makes this type of training accessible to school districts with potential for scaling-up.

A primary goal of the present study was to adapt MBSR for teachers. We were interested in exploring the feasibility of offering training to teachers in a format that would be engaging and address concerns relevant specifically to their role as teachers. A second goal was to conduct a preliminary evaluation by assessing outcomes across variety of self-report and objective measures that may be impacted by mindfulness training, including observation of classroom teaching practices, computerized tasks related to attention and emotion regulation, and saliva sampling for cortisol as a physiological stress index. In addition, we sought to examine associations between change in mindfulness and change in other outcomes.

We expected mindfulness training to be associated with reduced burnout and psychological symptoms, increased mindfulness and improved performance on attention and emotion related tasks, as well as more effective classroom teaching practices. Furthermore, we expected that increases in mindfulness would be associated with the degree of improvement exhibited across these measures.

mMBSR Training

The standard MBSR curriculum was adapted for teachers to focus on integrating skills into the classroom. Two MBSR-trained instructors with over 15 years of experience led the intervention. Adaptations for teachers in this mMBSR course included presenting the training program exclusively for educators, extending the number of sessions, providing a variety of guided practice time options varying in length (e.g., 15 mins, 30 mins, 45 mins) and specific school related activities and practices (see Appendix for example lessons). The course was offered during the academic year in Fall 2011, which allowed teachers to directly apply the skills they learned within the context of their classroom and actual teaching. Outside of class, teachers were encouraged to practice between 15-45 minutes per day for six days/week and were provided with guided recordings to support their practice. The course lasted eight weeks, 2.5 hours/week, plus a day-long immersion (6 hours), totaling approximately 26 hours of group practice and instruction.

Method

Participants

A total of 18 public elementary school teachers were recruited to participate in the study in a medium sized Midwestern city. One additional teacher was recruited but withdrew prior to randomization. This participant's data has been excluded from all analyses. Teachers were drawn from a total of four elementary schools, with the majority of teachers ($n = 15$) coming from two schools initially contacted regarding participation in the study. All four schools serve predominantly low income and racial/ethnic minority populations. The composition of the four schools included 58% of enrolled students eligible for free or reduced lunch and 59% of students from racial/ethnic minority backgrounds. During recruitment teachers were informed that the study involved a “mindfulness-based wellness training” and that participants would be randomly assigned to either an intervention group or a wait-list control group. A total of ten participants were randomized into the intervention condition with the remaining eight randomized into a wait-list control condition. All baseline testing occurred prior to randomization. All participants were employed as classroom teachers during the study. The sample was predominantly female ($n=16$), with a mean age of 43.06 years (range = 25-56, $SD = 9.87$). Average years of experience teaching was 12.83 ($SD = 8.68$), years at the current location 7.69 years ($SD = 6.56$), and years teaching current grade 5.13 ($SD = 6.06$). 17 participants (94% of the sample) were of European American descent. 4 participants had Master's degrees (22%) with the remainder having Bachelor's degrees. The groups did not differ significantly on any demographic variables at baseline (independent t -test p -values = .104 - .990). There was a trend ($p = .104$) towards a difference on age with the treatment group slightly older ($M = 46.70$, $SD = 6.95$) than the control group ($M = 38.50$, $SD = 11.49$).

Pre-test data collection occurred over the course of approximately four weeks. Teacher classroom behavior coding was completed on a sub-sample of 13 participants using a standardized coding system during observation visits to the classroom. Post-test data collection occurred over the course of approximately three weeks.

Measures

Psychological Distress—Psychological distress was assessed using the Symptom Checklist 90-R (Derogatis, 1994). The SCL-90-R is a widely used symptom checklist, focuses on specific symptoms associated with categories of psychological distress, and possesses adequate psychometric properties (Derogatis & Lazarus, 1994). The global

severity index (GSI), derived from the average of all 90 items, was used in analyses. Higher scores on the GSI indicate greater psychological distress.

Mindfulness and Self-Compassion—Mindfulness was assessed using the Five-Facet Mindfulness Scale, a 39-item self-report scale (FFMQ; Baer et al., 2008). The FFMQ measures five aspects of mindfulness that individuals may possess or learn through mindfulness training. These include (a) observing, (b) describing, (c) acting with awareness, (d) nonjudging, and (e) nonreactivity. The FFMQ possesses adequate psychometric properties including good construct and predictive validity as well as adequate internal reliability for all five subscale with Cronbach's α s between .75 and .91 (Baer et al., 2006).

Self-compassion was measured using the Self-Compassion Scale (SCS; Neff, 2003). As several of the constructs overlap conceptually with items included on the FFMQ, only the shared humanity subscale is reported here. This scale assesses the tendency to perceive one's experience as part of the larger human experience and possesses both good test-retest reliability ($r = .80$) and adequate internal consistency reliability ($\alpha = .80$; Neff, 2003). A higher score indicates a stronger tendency to view one's difficulties as part of the shared human experience rather than as a personal deficiency.

Burnout—The Maslach Burnout Inventory – Educators Survey (MBI-ES; Maslach, Jackson, & Leiter, 1996) is a 22-item scale used to assess three dimensions of burnout: emotional exhaustion, depersonalization, and personal accomplishment. Emotional exhaustion is characterized by feeling emotionally overextended and fatigued by one's work ($\alpha = .90$). Depersonalization involves impersonal and unfeeling responses towards students ($\alpha = .76$). Personal accomplishment entails feelings of competence and productivity at work ($\alpha = .76$). Higher scores on each subscale indicate a higher amount of the given construct (i.e., more emotional exhaustion, greater feelings of personal accomplishment).

Teacher Classroom Behavior—An observational coding system was used to assess teachers' behavior in the classroom. The Classroom Assessment Scoring System (CLASS; LaParo, Pianta, & Stuhlman, 2004) measures three dimensions of teaching behavior in the classroom: emotional support, classroom organization, and instructional support. Emotional support includes items relating to the classroom's emotional climate (positive climate, negative climate) as well as the teacher's contribution to the emotional environment (teacher sensitivity, regard for student perspectives). Classroom organization relates to teacher's behavioral management style, overall classroom productivity, and instructional learning format. Instructional support includes items measuring support for content related tasks: analysis and problem solving, quality of teacher feedback, and content understanding. On all three subscales, a higher score indicates more positive teaching behavior. An experienced trainer from Teachstone Training, the company that distributes the CLASS coding system, was hired in order to train ten undergraduate and bachelor's level research assistants in conducting the Upper Elementary CLASS coding (for Grades 3-5). Training occurred over the course of two days and all research assistants obtained an interrater reliability of .80 before conducting actual classroom observation sessions. Coders were blind to study hypotheses and conducted observation sessions during 1 ½-hour blocks on two separate days. In total, six observation periods were conducted for each teacher. Observations across the two days were averaged to create a composite score.

Cortisol Measurement—Saliva samples were collected to measure cortisol (nmol/L) over a span of three consecutive working days. Teachers were provided with sampling kits including pre-labeled salivettes with cotton swabs and given detailed instructions on how to collect saliva samples. Teachers were instructed to provide samples 30 minutes after

waking, before lunch, and before bed and not to eat or drink one hour before providing a sample. Three time points across the day were sampled to allow the analysis of both diurnal cortisol slope as well as morning post-waking cortisol levels. Both diurnal slope and morning cortisol have been found to be associated with levels of psychological stress (for a review, see Miller, Chen, & Zhou, 2007). Thirty minutes post-waking was chosen as the time point for the morning sample in order to assess the peak of the cortisol awakening response (Pruessner et al., 1997) without causing undue participant burden through the collection of multiple post-waking samples. Teachers recorded the time that each sample was taken and the samples were collected by researchers at school each afternoon over the course of the three days. Overall compliance was high, with only four samples missing (out of 171 possible samples, compliance rate of 97.7%) either due to a participant taking the sample at an incorrect time or a sample containing insufficient saliva for accurate assay. Saliva samples were shipped to a laboratory for analysis using standard procedures. Cortisol was natural log transformed prior to analyses to compensate for skewness typically found in the distribution of raw cortisol values (Sephton et al., 2000). For analyses, to be consistent with prior literature, we focused on morning cortisol levels and averaged across all three measurement days.

Neuropsychological and attentional tasks—The Cambridge Neuropsychological Test Automated Battery (CANTAB, 1999) is a computerized neurocognitive battery that was used to assess sustained attention and affective attentional bias.

The Rapid Visual Information Processing task (RVP) is a measure of sustained visual attention. Participants monitor a stream of digits flashing on the computer screen and click a button whenever they see a predetermined sequence of three digits presented. The outcome (RVP A) is quantified by how well participants detect target sequences based on the probability of their getting a hit versus false alarm (CANTAB, 2006).

The Affective Go/No-Go task (AGN) is a measure of emotional processing (Kaplan et al., 2006). During the task, affectively valenced words (e.g. happy, sad) are presented one at a time. In each trial, one valence is the target valence and a second valence is the distractor valence. Participants click a button only when a word from the target valence is presented. Responding to a word when it is not from the target valence is an error of commission and indicates an attentional bias towards the given valence. Only errors of commission were used in analyses.

Mindfulness Practice Compliance—Participants in the mindfulness training group completed practice logs on a weekly basis. Participants recorded the number of minutes per day spent engaging in formal (e.g., sitting meditation) and informal (e.g., brief moments of mindfulness) mindfulness practice. Composite variables were created to examine both minutes per day and frequency of mindfulness practice.

Statistical analyses

Independent samples t-tests were conducted to determine if the groups differed at baseline. Paired samples t-tests were conducted on outcome measures to examine within group change over time from pre- to post-test. To provide a metric for between-group comparisons, Cohen's (1988) *d* was computed using post-test scores and pooled post-test standard deviations using standard methods (Cooper, Hedges, & Valentine, 2009). Pearson's product moment correlations were used to examine relationships between changes across various measures. Difference scores capturing change over time (post-test minus pre-test) were calculated for all measures. Correlations between change scores in mindfulness (one purported mechanism of change in mindfulness interventions; Shapiro, Carlson, Astin, &

Freedman, 2006) and changes in other outcomes of interest were examined. Plots of statistically significant correlations were inspected visually for normality of distributions and to identify any outliers. Using a Fisher's r to z transformation, a test of the difference between change score correlations between groups was also conducted.

Results

Intervention group participants reported spending on average 21.7 minutes ($SD = 13.8$) per day in formal practice and 7.5 minutes ($SD = 4.7$) per day in informal practice. During the course of the intervention, teachers reported engaging in formal practice 83.7% of days during the eight week course ($M = 46.9$ days, $SD = 7.1$) and informal practice 88.7% of days ($M = 49.7$ days, $SD = 4.4$).

There were no significant differences at pre-test between groups on any of the measures (p -values ranged from .139, for CLASS instructional support, to .991). Descriptive statistics are reported by group in Table 1. Paired samples t -tests were conducted comparing pre- and post-test scores for each group separately (see Table 1). Both groups showed improvement on the mindfulness FFMQ observe subscale (intervention: $t(9) = 3.30, p = .009$, control: $t(7) = 2.40, p = .047$) and in performance on the task of sustained attention (intervention: $t(9) = 3.12, p = .012$, control: $t(7) = 2.11, p = .073$). Both groups showed a marginally significant flattening of diurnal cortisol profiles over time (intervention: $t(9) = 2.08, p = .067$, control: $t(6) = 2.44, p = .051$).

The intervention group showed significant improvement on several self-report measures including decreases in psychological symptoms (SCL GSI; $t(9) = -3.66, p = .005$), an increase on the mindfulness FFMQ describe subscale ($t(9) = 2.53, p = .032$) and self-compassion humanity subscale ($t(9) = 3.42, p = .008$), and decreases in burnout (MBI emotional exhaustion: $t(9) = -2.42, p = .038$; MBI personal accomplishment: $t(9) = 3.03, p = .014$). In addition, the intervention group improved in observer-rated classroom behavior (CLASS classroom organization: $t(6) = 2.51, p = .046$) and affective attentional bias (fewer AGN errors of commission: $t(9) = -3.16, p = .012$). Further inspection of AGN commissions separated by valence indicated that there was a decrease specifically in negative commissions ($t(9) = -2.58, p = .029$). No other significant differences were found in the intervention group over time.

The control group showed a significant decrease in morning cortisol ($t(6) = -2.48, p = .048$). A marginally significant increase in burnout (indicated by a decrease in MBI personal accomplishment: $t(7) = -2.35, p = .051$) was also found. No other changes were found in the control group from pre- to post-test.

Comparisons of effects between groups are quantitatively indexed by Cohen's d (Table 1). Given the multiple comparisons in this small sample and that detecting statistical significance is influenced by sample size, d provides a metric for comparing effects that is not biased by sample size. Correcting for the direction of d , such that larger positive d s indicate superiority of the intervention group over the control group, between-group effects ranged from $d = -.19$ to $.99$. In general measures that showed significant within-group changes yielded between-group d s favoring the intervention group in the medium to large range (Cohen, 1988; e.g., psychological symptoms, self-compassion, personal accomplishment, morning cortisol).

Correlations were computed between change in mindfulness and change in other outcome measures (Table 2). All changes scores were computed by subtracting pre-test from post-test values. In the intervention group, improvements in mindfulness were associated with

improvements on several other outcomes, including decreases in psychological symptoms (SCL GSI with FFMQ acting with awareness: $r = -.76, p = .010$; SCL GSI with FFMQ non-reactivity: $r = -.78, p = .007$) and burnout (MBI emotional exhaustion with FFMQ acting with awareness: $r = -.70, p = .024$; MBI depersonalization with FFMQ non-reactivity: $r = -.80, p = .006$) as well as increases in sustained attention (RVP A with FFMQ describe: $r = .76, p = .010$). Based on Cohen's (1988) guidelines, these correlations would be considered of medium to large magnitude. Correlations between these same variables in the control group were not significant. In addition, two of six correlations in the control group were in the unexpected direction (MBI emotional exhaustion with FFMQ acting with awareness: $r = .28, p = .509$; RVP with FFMQ describe: $r = -.49, p = .221$) and those in the expected direction were of smaller magnitude than those found in the intervention group. Associations between changes in mindfulness and changes in other outcomes (e.g., cortisol) were not statistically significant in either the intervention or control group.

Lastly, a test of the difference between independent correlations was conducted comparing the correlations found in the intervention group with those found in the control group. A statistically significant difference was found in the correlation between FFMQ describe and sustained attention ($r = .76$ and $-.46$ for the intervention and control group respectively, $z = 2.44, p = .014$). A marginally significant difference was found in the correlation between FFMQ acting with awareness and MBI emotional exhaustion ($r = -.70$ and $.28$, for intervention and control groups respectively, $z = -1.84, p = .065$). No other correlations differed significantly between the groups.

Discussion

The results of this pilot study suggest that a mindfulness intervention adapted for educators boosts aspects of teachers' mindfulness and self-compassion, reduces psychological symptoms and burnout, increases effective teaching behavior, and reduces attentional biases. The overall pattern of findings in this study is supported by a post-treatment between-group Cohen's d , an appropriate metric for this small sample, which indexes the magnitude of differences between groups. In line with results of the paired t-tests assessing change over time within each group, effect sizes based on a comparison of post-treatment scores showed a consistent pattern of greater gains in the intervention as compared to control group. A between-group effect larger than $d = .23$ was found for 12 (out of 16) of the outcome variables, suggesting potential for a mindfulness-based intervention to promote meaningful psychological and behavioral changes in elementary school teachers. It is again noteworthy that these effects were seen both on self-report measures as well as more on objective measures (behavioral tasks, cortisol, observer-rated behavior), which are considered less susceptible to influences such as social desirability (Heppner, Wampold, & Kivlighan, 2008).

In addition, the amount of change in mindfulness from pre- to post-intervention was correlated with improvements in burnout, psychological symptoms, and attention in the intervention group. Specifically, an increase in self-reported non-reactivity was associated with reductions in both psychological symptoms and depersonalization and with increases in an objective measure of sustained attention. Increased acting with awareness was associated with reduced psychological symptoms and emotional exhaustion. An increase in self-reported describing experience was linked to greater sustained attention on an objective measure. These correlations between change scores in aspects of mindfulness and other outcome variables were detected only in the intervention group. This finding lends support to the conjecture common in the mindfulness literature (e.g., Brown, Ryan, & Creswell, 2007; Carmody, Baer, Lykins & Olendzki, 2009) that changes in mindfulness are a central mechanism for the positive changes observed in mindfulness interventions. The stance of

non-judgmental attention towards internal and external experience that is developed through mindfulness practices is consistent with research linking qualities of internally focused attention to social emotions, like compassion, as well as patterns of resting state brain activity that are tied to mental health and aspects of cognition (Immordino-Yang, 2011; Immordino-Yang, 2012). This work also converges with findings from the meditation literature showing improved attentional processing (Lutz et al., 2009; Slatger et al., 2007) and increased activity in brain regions involved in empathy and compassion related to practice (Lutz, Brefczynski-Lewis, Johnstone, & Davidson, 2008).

Findings from this pilot study also suggest that teachers who do not receive any intervention during the school year may be prone to increased physiological stress as reflected in lower morning cortisol levels and decreased sense of personal accomplishment. Lower morning cortisol, assessed via a single morning time point sample, has been associated with both acute (Aardal-Eriksson, Eriksson, & Thorel, 2001; King, Mandansky, King, Fletcher, & Brewer, 2001) and chronic (Goenjian et al., 1996; Kellner, Baker, & Yehuda, 1997) posttraumatic event distress. Higher morning cortisol levels, on the other hand, have been associated with more positive relationship functioning for women in a caretaking role (Adam & Gunnar, 2001). Over the routine course of a school year teachers in our sample appeared to experience a decline in cortisol functioning, as observed among the control group teachers who did not undergo any training. One hypothesis is that mindfulness training acts as a buffer for teachers against the impact of stress on cortisol change that may otherwise occur during the school year. However, this interpretation is based on cortisol levels remaining stable (or unchanged) in the intervention group and given the pilot nature of this work these results are preliminary and should be investigated in future work.

Strengths of this pilot study include assessing an intervention adapted specifically for classroom teachers using multiple measures across measurement domains and modalities (behavioral and physiological in addition to self-report), inclusion of a control group, comparison using Cohen's *d* effect sizes, and examination of changes in mindfulness in association with changes in other outcomes of interest. Limitations of this study include a small sample size with limited power to detect effects and multiple comparisons. In consideration of these limitations, we rely in part on between-group comparison effect sizes for interpreting results and as an indicator of the strength of intervention effects. In addition, the use of a single morning time point sample, rather than multiple post-waking samples, limits our ability to more precisely track the post-waking cortisol response (Pruessner et al., 1997).

This pilot study indicates that mMBSR may be one intervention modality that has potential for systematic implementation as a part of teachers' professional development. Results suggest that tending to stress reduction translates into tangible benefits for teachers' sense of well-being and effectiveness in the classroom, which in turn are likely to have a positive impact on students' own well-being and learning, for example, via the teacher-student relationship and classroom climate. Considering that these changes were observed in teachers after a relatively brief period (8-weeks of training), such training presents a cost-effective investment model for schools given the costs associated with teacher burnout and consequent repercussions for student academic performance. Policy decisions that take into consideration and support programs designed to enhance teacher personal and professional well-being have the potential to significantly improve educational practices.

Future research should examine this type of training in a larger national sample of teachers to replicate findings. In addition, investigating a combined approach to teacher and student training may offer promise as an approach to promote a healthy classroom environment. Mindfulness-based practices for children and adolescents are beginning to be explored with

initial evidence suggesting potential for these methods (Black, Milam, & Sussman, 2009; Davidson et al., 2012). Further work is also needed to assess the longer-term impact of training with follow-up assessments over time. Likewise attention to fostering sustainability of practices beyond the formal intervention period may be necessary in order to optimize outcomes. Just as physical health is bolstered by regular exercise, the benefits of mindfulness for mental health are likely to grow from consistent practice. Identifying linkages between specific practices and outcomes of interest is another avenue for future investigation along with exploring individual characteristics predictive of response to intervention. Mindfulness-based practices offer promise as a tool for enhancing teaching quality, which may, in turn, promote positive student outcomes and school success.

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Appendix 1. Modified Mindfulness-Based Stress Reduction for Teachers

The Modified Mindfulness-Based Stress Reduction (mMBSR) course for teachers is based on the Mindfulness-Based Stress Reduction (MBSR) course developed by Jon Kabat-Zinn at the University of Massachusetts Medical School. Like the original, the modified course included weekly sessions for 8 weeks along with a full practice day. The original MBSR was designed to teach participants to integrate and apply mindfulness to a range of every-day challenges arising from life stresses as well as medical and psychological conditions. The mMBSR curriculum mirrors the MBSR curriculum in overall class time, formal practices learned, themes presented, foundational attitudes, and class sequences. Specific adaptations for teachers include changes related to required practice time, length of practices, suggested additional informal practices, and specific school related activities.

MBSR and mMBSR share the following:

- Length of time: weekly 2.5 hour sessions spanning an eight week period
- A 7-hour day of mindfulness (following the 6th session)
- Practices learned: body scan, sitting meditation, walking meditation, loving-kindness meditation, choiceless awareness, and yoga
- Themes presented such as the fact that challenges and difficulties are workable, how seeing and not see things will determine to some extent how you will respond to them, and mindfulness as a means of working with stress
- Foundational attitudes brought to cultivating mindfulness which impact both the learning and the practice: beginner's mind, non-judgment, non-striving, patience, acceptance, letting go, and trust
- Each session includes: selective and sustained attention practices, introduction of new concepts, dyad/triad/whole group reflection/sharing about practice experiences in and out of class, reflecting on poetry or readings, mindful listening practice, and opportunity for questions

The mMBSR curriculum is distinct from MBSR in the following ways:

- Options for length of home practice: participants complete guided and unguided home meditation practices that range in length from 12 to 45 minutes. The guided practices include the following audio CDs:

- Guided Meditations for Love and Wisdom, 14 Essential Practices by Sharon Salzberg

- Set of three 30-minute practices (body scan, sitting, yoga) from the UW Madison Center for Mindfulness

- Guided Mindfulness Meditation Series 1 by Jon Kabat-Zinn
(www.mindfulnesscds.com)

- Informal practices are developed to be completed within the classroom/school environment to bridge practice into the work setting through interactions with students, parents and colleagues and teachers are also encouraged to practice at home and in their community.

Informal Practices:

These Informal Practices are written on punched 2" × 3" cards and hung from the teacher's lanyard to carry as a reminder throughout the school day.

1. Caring Practice 3x/day (this practice is intended to support a safe environment in the classroom)
 - May I be safe,
 - May the children be safe,
 - May all be safe,
 - May I help create through the qualities of (my) presence.
2. Dropping-in practice 3x/day
 - Noticing the body
 - Feeling the sensations of feet on the floor, relaxing the jaw, feeling sensations of breathing for 3 breaths
3. Noting places of ease in the body during the school day and breathing there
4. Noting places of tightness in the body during the school day and breathing there
5. Caring Practice 3x/day (this is the traditional loving-kindness practice offered)
 - May I (you) be safe
 - May I (you) be happy
 - May I (you) be healthy
 - May I (you) live with ease
6. Thoughts
 - I am not my thoughts
 - Thoughts come and go
 - I can let go and return to my task
7. Emotions
 - This moment
 - Noticing the emotion
 - Feeling it in the body

Drop the story

8. Pain

Feeling bare sensations

Noticing thoughts-let go

Noticing emotions

Returning to bare sensations

Offering “CPR” (from Beth Roth): Offering **C**aring attention or phrase, noticing **P**hysical sensations, and **R**eacting/responding)

9. Unconditional Presence

Can I bring unconditional presence and kindness to my automatic reactivity?

10. Pause, Relax, Open, Trust Emergence (Gregory Kramer)

11. Bringing awareness to emotions (as they occur in the classroom) and your response to them (feeling stuck, blocking, numbing, opening, shutting off, softening, offering Loving-Kindness, etc.)

12. When aware of students “reacting” (acting out, shutting down, caught in anger or self-judgment): can you see this as a signal that the student is “in pain”? Try offering (maybe silently) Caring Practice to the student and yourself or both.

Additional poetry from “Teaching with Fire: Poetry That Sustains The Courage to Teach” (Sam M. Intrator & Megan Scribner, Editors):

1. Additional shorter practices taught in class and practiced at home or school: 6-point body scan
2. Dead Bug movement practice
3. Stopping, calming, resting, healing (Thich Nhat Hanh)

School/classroom focused activities/practices offered during class. These 30-40 min. activities/practices are offered during various teacher mMBSR classes:

1. What makes a classroom alive? Safe?
2. Judging the Intentions of Others Practice (Conscious Discipline by Dr. Becky A. Bailey, pp. 161-162)
3. Stressors and Stress Cycle within the classroom: reactivity vs. response
4. Trigger Thoughts Practice (Conscious Discipline by Becky A. Bailey, pp. 31-32)
5. Emotional responses within the classroom
6. Stage Activity Practice (CARE Training by Tish Jennings, http://www.garrisoninstitute.org/index.php?option=com_civicrm&task=civicrm/event/info&reset=1&id=245&Itemid=998)

Information Session prior to class enrollment (1 hour)

Welcome and brief introduction to the mMBSR program including brief meditation experience and course commitment. Opportunity to ask questions and decide if the class is appropriate for the participant.

Overviews of two sessions are presented as examples

Week One

Theme: There is more right with you than wrong with you no matter what your challenges. Challenges and difficulties are workable and mindfulness practice is fundamental to this work since the present moment is the only time one has to learn and grow.

Attitude: Beginner's mind and non-judgment allow us to be kind to our own and our students' learning processes.

Typical Class Sequence:

Welcome and brief introduction of instructors.

Opening meditation: drop-in practice: bringing awareness to sensations within the body (including the sensations of the breath) followed by reflections on opening meditation.

Reflection:

“Anybody who has ever taught knows what we mean when we say teaching can consume us and smother the glow until it dims and flickers low. Most of us came to teaching with a zest for children, an ethic of service, and a mission to forge a better world through the act of teaching others. But to do it well over the span of a school year and the stretch of a career-- often within an institution and system punishing to our hearts and passions--is no small task. The forces complicit in dampening that spirit are powerful. Teachers face excessive demands on their time, heightened and manic pressure to raise test scores, and a sense of loneliness that comes from working in a profession that provides little time or opportunity to work with other adults.

Yet if schools are to be places that promote academic, social, and personal development for students, everything hinges on the presence of intelligent, passionate, caring teachers. Teachers have a colossal influence on what happens in our schools because day after day they are the ultimate decision makers and tone setters. They shape the world of the classroom. Thus we all need educators who each and every day can teach with fire.” -

Teaching with Fire

Experience: Teachers share their experience of “What makes a classroom difficult?” and “What makes a classroom come alive?” and the emotional experience of each. This leads into a discussion that develops guidelines for interactions/participation within the mMBSR sessions.

Guided meditation: “Reflections on Interconnectedness” (Guided Meditations for Love and Wisdom by Sharon Salzberg, CD 2, track 1) and reflection about the meditation.

Guided individual internal reflection: What has brought you here? What is one worry you may have? What do you really want? Participants write what is true for them and then have the opportunity to share in dyads.

Name Game: Participants have the opportunity to introduce themselves and share a comment they have written about their individual internal reflection as they learn each other's names. Participants are asked to use the newly learned “Dropping-in” practice before speaking. Instructors thank each participant for sharing and may make a comment or observation as the group welcomes each person.

Discussion about what we know about acute and chronic stress and how it impacts the body. Participants share comments about the physical experience of stress in their bodies (increased heat, increased heart rate, perspiring, tension, etc.)

Discussion regarding what mindfulness is and why we might choose to practice mindfulness to meet the stress we experience in our lives.

Guided meditation: Introduction and breath meditation introduction (Guided Meditations for Love and Wisdom by Sharon Salzberg CD 1, Tracks 1 and 2) followed by reflection on practice.

Introduction to Loving-Kindness Practice, relating it to the experience of being safe in the mMBSR class and the experience of students feeling safe within the classroom. Loving-Kindness is in part wishing “safety” for us and others.

Formal Practice:

1. Alternate Breath Meditation (Sharon Salzberg CD 1 track 2/3)
2. Meditation on Balance (Sharon Salzberg CD 2 track 1)

Informal Practice:

Every day at School (wearing the practice cards on the lanyard may assist teachers’ ability to remember practices below)

1. Repeat the Loving Kindness Practice (90 seconds) a minimum of 3x a day while at school: once in the morning, once at your lunch break, and once at the end of the day.

Dropping in and feeling a complete inhalation/exhalation, resting at the end of the out-breath and then adding the wish for safety saying to yourself:

May I be safe,

May the children be safe,

May all be safe,

May I help create safety through the qualities of (my) presence

2. Several times throughout the day practice “dropping-in”. Tuning in to the body: feeling sensations in the feet, relaxing the jaw and feeling breathing for 3 breaths.

Week Four

Theme: Awareness of being stuck in one's life by our habitual, often unskillful, reactions to the internal and external stressors in our lives in an attempt to escape from difficulty. Honoring the conditions that may have precipitated developing these reactive patterns (avoid, ignore, resist, escape/addictions) and being curious about the bodily sensations, thoughts, and emotions present when stress arises and the long term impact on the body. Explore responding in the present moment as an alternative to habituated reactions to stress.

Attitude: Cultivating patience and not turning away as one keeps one's eye on the bandaged place

Typical Class Sequence

Drop-in practice followed by opportunity for participants to check-in about home practice.

Guided meditation: “Sitting at the window.” Attention to seeing form and the space from which the form arises; sound and the spaciousness of silence; breathing arising within the space of the body; thoughts arising from spaciousness and the mind's predilection to Velcro to the thought stream. Attention to thoughts arising and fading away while resting in the spaciousness of awareness. Ending with “Fire” poem from Teaching with Fire (Intrator & Scribner, Editors).

Reflection on experience of guided meditation:

“Though thoughts are nothing more than the ephemeral firing of neurons, we take them so seriously that they can frighten us, make us hate ourselves, or make us despise someone else... Our thoughts have the power to paralyze us, or start wars...If thoughts are making our world, it might be helpful to take a look at the world we're fashioning.” Leave your mind behind (McKay & Sutker)

Drop-in practice followed by writing a school related or home stressor on each of several small post-it notes of one color and a way that one deals with stress on each of several small post-it notes of another color. Participants stick stressor post-it notes on one wall and ways to cope post-it notes on another. Have someone volunteer to read stressors. Discuss similarities of stressors and frequency stressors occur. Have someone read ways to cope post-its then discuss healthy versus unhealthy forms of coping and the development of reactive patterns to stressors.

Choose one stressor (not the most difficult one) and write 10 thoughts that arise around that stressor. Pick one thought to work with during the guided meditation.

Guided meditation: inquiry practice related to the chosen thought followed by reflection about guided practice.

Formal Practice:

1. Breath meditation for 10 minutes every other day (on your own/not guided)- When a thought arises, notice the thought and then gently but firmly guide the attention back to sensations of the breath.
2. Combine the following 2 practices (16 min.) every other day (Allowing sounds or silence to be in the background while meditating)
 - Hearing Meditation (Sharon Salzberg, CD 1, tracks 4 and 5)
 - Letting Go of Thoughts Meditation (Sharon Salzberg, CD 2, track 3)

Informal Practice:

1. Using the “Thinking Hits” handout, exploring thoughts during the school day.

“What are my ‘favorite’ (most frequently occurring) thinking hits?” “How do they feel in the body?”

“Can I ‘drop-in’ (feeling to feet, relax jaw, breathing) in the midst of a ‘Thinking Hit’ without trying to push the thought away?”

- 2 Experiment with bringing the attitude of patience to practice and compassion to thoughts.

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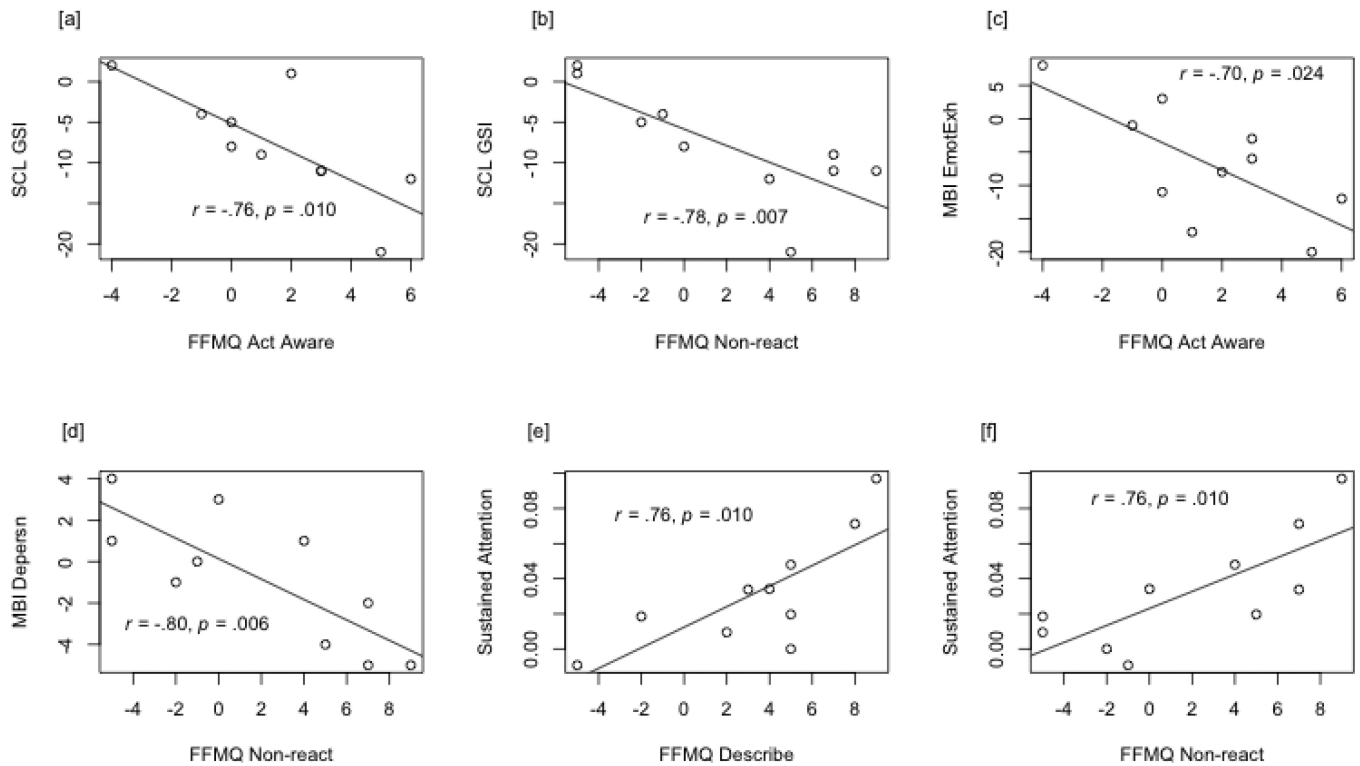


Figure 1.

Scatterplots of the correlation between changes in mindfulness and changes in psychological and behavioral outcomes for treatment group only. Change scores calculated as post – pre values. Higher values for changes in mindfulness facets indicate increases in mindfulness from pre- to post-intervention. [a] Increases in acting with awareness and [b] non-reactivity associated with decreases in general psychological symptoms (SCL GSI). [c] Increases in acting with awareness associated with decreases in emotional exhaustion aspect of burnout (MBI EmotExh). [d] Increases in non-reactivity associated with decreases in depersonalization aspect of burnout (MBI Depersn). [e] Increases in describe and [f] non-reactivity associated with increases in sustained attention.

Table 1

Pre- and Post-Test Means and Standard Deviations for Psychological, Behavioral, and Physiological Outcomes

Measure	Intervention		Control		Cohen's d
	Pre-Test	Post-Test	Pre-Test	Post-Test	
SCL GSI	53.30 (7.47)	45.50 (7.89) **	53.88 (4.16)	49.88 (8.61)	0.53
FFMQ Observe	24.20 (6.48)	28.60 (4.88) **	24.13 (6.22)	26.88 (5.52) *	0.33
FFMQ Describe	28.90 (3.93)	32.30 (3.37) *	30.00 (4.38)	31.38 (4.34)	0.24
FFMQ Act Aware	27.90 (3.81)	29.40 (4.14)	26.38 (6.30)	27.63 (5.90)	0.35
FFMQ Nonjudge	30.70 (6.11)	33.30 (3.97)	30.50 (4.57)	32.63 (6.46)	0.13
FFMQ Nonreact	22.20 (4.21)	24.10 (3.25)	21.50 (2.56)	22.25 (4.23)	0.50
SC Hum	3.35 (1.02)	4.08 (0.76) **	3.38 (0.81)	3.31 (0.83)	0.97
MBI EmotExh	25.90 (9.01)	19.20 (9.08) *	20.38 (8.68)	21.63 (10.35)	0.25
MBI Depersn	5.40 (4.25)	4.60 (4.90)	5.38 (4.98)	4.75 (6.18)	0.03
MBI PersAcc	39.60 (5.54)	42.20 (4.64) *	39.50 (6.50)	36.88 (6.20) ^t	0.99
CLASS EmotSupp	4.92 (0.57)	5.25 (0.76)	5.38 (0.49)	5.05 (0.70)	0.28
CLASS ClsOrg	5.19 (0.58)	5.50 (0.45) *	5.35 (0.77)	5.27 (1.11)	0.28
CLASS InstrSupp	3.49 (0.50)	3.69 (0.54)	3.98 (0.60)	3.84 (1.00)	-0.19
Sustained Attention	0.91 (0.07)	0.94 (0.05) *	0.91 (0.02)	0.94 (0.04) ^t	-0.03
AGN Tot Com	15.30 (8.71)	10.90 (5.92) *	15.63 (4.14)	12.88 (5.96)	0.33
Morning Cortisol	3.13 (0.37)	3.06 (0.61)	3.30 (0.32)	2.67 (0.47) *	0.70

Note:

SCL = Symptom Checklist, GSI = Global Severity Index; FFMQ = Five-Facet Mindfulness Questionnaire; SC = Self-Compassion Scale, Hum = Shared Humanity Subscale; MBI = Maslach Burnout Inventory, EmotExh = Emotional Exhaustion, Depersn = Depersonalization, PersAcc = Personal Accomplishment; CLASS = Observer-rated teacher classroom behavior, EmotSupp = Emotional Support, ClsOrg = Classroom Organization, InstrSupp = Instructional Support; Sustained Attention = Rapid Visual Information Processing accuracy score (RVP A); AGN = Affective Go-No Go task, Tot Com = Total commissions; Cohen's d computed comparing treatment and control post-test scores using pooled post-test standard deviation, directions of Cohen's d were modified so that larger positive ds indicate superiority of the intervention group over the control group.

^t
p < .10

*
p < .05

**
p < .01 for paired pre-post t-test; standard deviations reported in parentheses;

Table 2

Correlations between changes in mindfulness and changes in psychological and behavioral outcomes.

Mindfulness Subscale	Outcome Measure	Intervention			Control		
		r	95% CI	p-value	r	95% CI	p-value
FFMQ Act Aware	SCL GSI	-0.76	[-.94, -.25]	0.010	-0.42	[-.87, .40]	0.296
FFMQ Non-react	SCL GSI	-0.78	[-.95, -.30]	0.007	-0.19	[-.79, .59]	0.656
FFMQ Act Aware	MBI EmotExh	-0.70	[-.92, -.13]	0.024	0.28	[-.53, .82]	0.509
FFMQ Non-react	MBI Depersn	-0.80	[-.95, -.34]	0.006	-0.32	[-.84, .50]	0.437
FFMQ Describe	Sustained Attention	0.76	[.25, .94]	0.010	-0.49	[-.89, .33]	0.221
FFMQ Non-react	Sustained Attention	0.76	[.25, .94]	0.010	0.03	[-.69, .72]	0.937

Note: Sustained Attention = Rapid Visual Information Processing; mindfulness subscales from Five-Facet Mindfulness Questionnaire; SCL GSI = Symptom Checklist Global Severity Index; EmotExh and Depersn = Emotional exhaustion and depersonalization subscales from Maslach Burnout Inventory.