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**Mindfulness- and self-compassion-based intervention for educators:
Effects of a school-based cluster randomised controlled study**
by

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Abstract

Objectives: The present study investigates the effectiveness of an 8-week mindfulness-based intervention designed to improve educator wellbeing and implemented concurrently in multiple school sites.

Methods: Using a cluster (school) randomised controlled design, 185 educators working in 20 Australian schools were randomised to an intervention group (10 schools, number =85, Mean age = 42.34 years) or a control group (10 schools, number =100, Mean age = 43.7 years). Multiple regression analysis was performed to examine effects of intervention on wellbeing and teaching-related outcomes and students' sense of connectedness to teachers measured post intervention after controlling for the baseline.

Results: The intervention predicted lower levels of perceived stress ($\beta = -0.196, p < 0.01, 95\% \text{ CI } [-4.00, -0.92]$) and sleep difficulty ($\beta = -0.175, p < 0.05, 95\% \text{ CI } [-7.54, -0.46]$), and higher levels of mindfulness ($\beta = 0.252, p < 0.001, 95\% \text{ CI } [2.60, 6.12]$), self-compassion ($\beta = 0.207, p < 0.001, 95\% \text{ CI } [0.14, 0.43]$) and cognitive reappraisal in emotion regulation ($\beta = 0.152, p < 0.05, 95\% \text{ CI } [0.19, 4.03]$) at immediate post-intervention, with medium to large effect size, after controlling for effects of corresponding variables at baseline. These effects largely remained significant at six-week post-intervention. Improved educator wellbeing did not accompany improvements in teaching but students' sense of connectedness to teachers.

Conclusions: The findings suggest that mindfulness-based interventions may contribute to the overall educator wellbeing and this may increase students' sense of connectedness to teachers without themselves undergoing any intervention.

Keywords: educator stress, mindfulness, self-compassion, emotion regulation, student perception

Introduction

Educators are critical for shaping student life experiences (Brown, Vesely, Mahatmya, & Visconti, 2017) and teaching is an occupation that provides high levels of satisfaction (Klassen & Chiu, 2010). Teaching requires frequent interactions with students, parents and other school personnel, along with the demonstration of highly developed interpersonal skills (Kottwitz, Gerhardt, Pereira, Iseli, & Elfering, 2018). The emotional nature of their work (e.g., showing warmth and care for students) is however likely to create stress (Kinman, Wray, & Strange, 2011; Schutz, 2014). The education sector is in fact reported to be one of the most stressful professions (Gallop, 2014; Safe Work Australia, 2013).

Recent mindfulness-based intervention (MBI) studies reported positive effects on wellbeing and teaching as demonstrated by reductions in education stress and increases in teaching efficacy (e.g., Flook, Goldberg, Pinger, Bonus, & Davidson, 2013; Frank, Reibel, Broderick, Cantrell, & Metz, 2015; Jennings et al., 2017; Taylor et al., 2015). However, most MBIs for educators have been assessed in a research context and there has been little research examining the effectiveness of MBIs in the school context (Bailey et al., 2018).

Educator stress is the experience of unpleasant negative emotions arising from aspects of working as educators, triggered by educators' perception of threat in dealing with the demands imposed on them (Kyriacou, 2011). Students' challenging behaviour has been repeatedly reported as a major reason for educator stress, along with workload, time management, behaviour management, lack of support and unstable employment (Heikonen, Toom, Pyhälö, Pietarinen, & Soini, 2017; Paquette & Rieg, 2016; Kim, Youngs, & Frank, 2017). Stress negatively influences educators' physiological and psychological wellbeing (Kottwitz et al., 2018; Mérida-López, Extremera & Rey, 2017). Sleep is an important indicator situated in the nexus between the two aspects of wellbeing. Higher levels of stress and sleep disturbance are closely linked among educators (Kottwitz et al., 2018). Primary and secondary educators with higher stress and strain reported poorer sleep quality than those with lower stress and strain (Cropley, Dijik, & Stanley, 2007). As demonstrated in a meta-analysis, sleep problems are associated with impaired cognitive functions, including poor memory and attention (Fortier-Brochu, Beaulieu-Bonneau, Ivers, & Morin, 2012), which can be detrimental to the provision of the quality of educator work.

Elevated stress is associated with lowered self-efficacy, educators' belief in their own capacity to be successful in teaching (Gilbert, Adesope, & Schroeder, 2014). Specifically, classroom stress negatively influences educators' self-efficacy with regards to managing the classroom, engaging students in learning, and providing instructional strategies (Klassen & Chiu, 2010) and the use of reactive teaching practices such as punishments, rewards, and threats (Clunies-Ross, Little, & Kienhuis, 2008). Student perception of educator behaviour and practice is influential in student learning and outcomes. For example, student perception of less authoritarian teaching behaviour, along with student motivation to attend school, predicted student wellbeing measured by the wellbeing inventory of secondary education (WISE) (Van Petegem, Aelterman, Rosseel, & Creemers, 2007; Van Petegem, Aelterman, Van Keer, & Rosseel, 2008). Students who feel connected with their teachers engage in fewer incidents of school violence (Volungis & Goodman, 2017), experience fewer depressive symptoms (Shochet, Dadds, Ham, & Montague, 2006), show higher levels of school engagement

(Klem & Connell, 2004), and have higher academic achievement measured by end-of-year grade point average (Niehaus, Rudasill, & Rakes, 2012) than their peers who report lower levels of connectedness.

Research on student-teacher relationships provides further evidence regarding the interconnectedness between educators and students. In Hattie's (2012) synthesis of over 800 meta-analyses investigating the effects of the influences and interventions on student outcomes, student-teacher relationships ($d = .72$) demonstrated much larger effect size than any other educator-related factors, such as teacher education ($d = .11$) and subject matter knowledge ($d = .09$). Educator stress is predictive of negative student-teacher relationships (Yoon, 2002; Whitaker, Dearth-Wesley, & Gooze, 2015) and difficulties in controlling emotions and the experience of negative emotions in the classroom may explain difficult student-teacher relationships (Yoon, 2002; Karabay, 2017). Educators' capacities to regulate emotions can be compromised by stress (Mérida-López et al., 2017), while use of appropriate strategies to regulate emotions is an integral part of educator work (Hargreaves, 2000).

According to emotion regulatory processes (Gross, 1998), emotion regulation strategies can be classified into antecedent-focused regulation that works on regulating precursors of emotions, such as cognitive reappraisal of situations, or response-focused regulation that works on modifying physical or behavioural responses after an emotion has been generated, such as emotional suppression. Students perceived positive emotions in educators who apply cognitive reappraisal to regulate their emotions in the classroom and negative emotions in educators who suppress emotions (Jiang, Vauras, Volet, & Wang, 2016). Regulation of emotional experiences and expressions can induce emotional labour (Kinman et al., 2011), which denotes the deliberate expression or suppression of emotions to achieve organisational goals (Brown et al., 2017). In teaching, emotional labour includes understanding, expressing care and empathy, and providing support for students during teaching (Isenbarger & Zembylas, 2006).

In a study with secondary educators a positive association was found between regulating emotions through adopting antecedent-focused cognitive strategies to modify emotional effects (i.e., cognitive reappraisal) and deep acting in emotional labor (i.e., trying to actually experience emotions that need to be displayed) (Lee et al., 2016). By contrast, expressive suppression as a response-focused emotion regulation strategy was positively associated with surface acting (i.e., pretending to have emotions that need to be displayed). Prolonged use of surface acting can be problematic given the link found among educators between daily use of surface acting and compromised mental health and occupational wellbeing as demonstrated by increased daily burnout and decreased daily job satisfaction (Lavy & Eshet, 2018).

Recent studies have reported positive effects from mindfulness-based interventions for educator wellbeing and teaching practices (e.g., Flook et al., 2013; Frank et al., 2015; Jennings et al., 2017; Taylor et al., 2015). Mindfulness is the practice of bringing awareness to and sustaining attention on one's current experience of thoughts, feelings and sensations, as they arise, with an orientation of curiosity and acceptance (Bishop et al., 2004; Kabat-Zinn, 2003). Self-compassion entails being warm and understanding towards ourselves when faced with personal suffering and consists of self-kindness, a sense of common humanity and mindfulness (Neff, Whittaker, & Karl, 2017). A typical mindfulness-based intervention program provides 6 to 8 weekly group-based training sessions. Reported intervention effects for educator wellbeing include reductions in perceived

stress, burnout and cortisol levels (Flook et al., 2013) along with increases in sleep quality (Frank et al., 2015). Improvements are also reported for teaching practices as demonstrated by the enhancement in teachers' sense of efficacy (Taylor et al., 2015), classroom organisation (Flook et al., 2013), and emotional support for their students in the classroom and use of positive affect words (Taylor et al., 2015).

However, most interventions have been implemented at a single site, away from school settings, which can limit an understanding of the generalizability of intervention effects from intervention sites to schools (Bailey et al., 2018; Sibinga et al., 2013). Although empirical studies suggest links between educator wellbeing and teaching on the one hand and student perception and outcomes on the other, little evidence is available for existing mindfulness-based intervention studies as to whether training educators in mindfulness and self-compassion influences students' sense of connectedness to their teachers. Higher levels of dispositional mindfulness among teachers are associated with higher quality of student-teacher relationships (Becker, Gallagher, & Whitaker, 2017). However, mindfulness-based interventions for educators primarily focus on effects on educator wellbeing, but not on the quality of student-teacher relationships (Becker et al., 2017).

The aim of the present study is to investigate the effectiveness of an 8-week mindfulness-based intervention implemented at multiple school sites and designed for improving educator wellbeing. Based on the links between educator wellbeing, teaching and learning, we hypothesised that educators randomly assigned to the intervention group would show improvement in their wellbeing-related measures (i.e., primary educator measures) compared to educators randomly assigned to the control group. We also hypothesised that educators in the intervention group would demonstrate improvement in teaching efficacy and student-teacher relationships (i.e., secondary educator measures) compared to those in the control group. Lastly, we hypothesised that students of the teachers in the intervention group would show improvement in their sense of connectedness to their teachers compared to those of teachers in the control group. There has been little research examining the effectiveness of MBIs in the school context because most MBIs for educators have been assessed in a research context and demonstrated efficacy (Bailey et al., 2018). The present study will generate evidence concerning the effectiveness of a mindfulness-based intervention implemented in the school context for educator wellbeing and teaching as well as their students' perceptions.

Method

Participants

In the 20 schools, 185 educators participated in the study. The intervention group consisted of 85 participants (M age = 42.34 years, SD = 12.6 years), of which 83.5% were female and 16.5% were male. Eighty-seven percent were in a teaching role and 12.9% were in non-teaching roles but requires interaction with students, such as principals and deputy principals. The mean years of teaching for those who were in a teaching role was 12.3 (SD = 11.01 years). The intervention group reported above neutral and below satisfactory levels of work satisfaction (M = 3.71, SD = 0.95, 1 very dissatisfied and 5 very satisfied). Their average weekly working hours was 46.4 hours (SD = 12.77 hours), which is a combination of paid and non-paid hours spent on fulfilling their role. Of the 100 participants in the control group (M age = 43.7 years, SD = 10.69 years), 89% were female and

72% were in a teaching role with 15.19 mean years of teaching ($SD = 11.96$ years). This group showed similar levels of work satisfaction ($M = 3.73$, $SD = 1.01$) and weekly working hours (M hours = 48.58, $SD = 12.7$ hours) to the intervention group.

Preliminary analysis confirmed that there were no statistically significant differences between the two groups at baseline for age, gender, weekly working hours, work satisfaction, and wellbeing-related outcome variables. However, differences were evident between the two groups in terms of school type. The intervention group had similar frequencies across Primary (35.3%), Secondary (29.4%) and Special school (34.1%) settings whereas the majority of the control group participants came from Primary school settings (76%) with only a small number of participants working in Secondary (9%) and Special school (10%) settings.

Of the 85 participants from the intervention group, 83 completed the post-intervention survey. Of these, 68 attended weekly training sessions more than six times, while 15 attended five times or less (i.e., seven attended five sessions, seven attended four sessions and one attended three sessions). Of the 100 participants from the control group, 83 completed the post-intervention survey. Additional analyses found no differences at baseline on school settings, job satisfaction and wellbeing-related outcome variables between participants who attended 6+ weekly intervention sessions and those who attended 3-5 weekly intervention sessions.

Procedures

The present study used a cluster (i.e., school) randomised controlled design, with a total of 20 schools (i.e., 11 primary schools, four secondary schools, four special schools and one school providing both primary and secondary education) participating in the study. An 8-week mindfulness-based intervention was implemented at 10 schools in the intervention group during the second school term in Australia (April – June 2017). The same intervention was provided at 10 schools in the control group during the third school term (July – September 2017) but this intervention was not evaluated as a part of the present study. During the intervention phase, the control group was “teaching-as-usual” as per the Australian school system, with no additional interventions related to the present study.

This study was conducted in two Australian states where recruitment and randomisation were performed independently. In one state, a regional organisational wellbeing team from Department of Education circulated the information about the study within schools of the region. Of the 17 schools that expressed interest, 10 schools participated in the study, along with two schools subsequently recruited. The 12 schools randomly assigned to either Group 1 (i.e., six schools) or Group 2 (i.e., six schools) were stratified by school levels (e.g., primary school, special school). Of the two groups, one was randomly assigned to an intervention strategy and the other to a control strategy (Figure 1). In the other state a total of 12 schools, six schools each from two regions, were invited to participate in the study, and four and four schools respectively confirmed their participation. The eight schools were regionally grouped and then randomly assigned to either an intervention group (i.e., two special schools, one primary school and one high school) or a control group (i.e., three primary schools and one high school).

As a part of a larger study, all 20 schools participated in educator surveys. Of the 12 schools from the first state, the eight schools (i.e., six primary schools and two special schools) participated in additional data collection activities of student surveys and classroom observations, which enabled investigation of intervention effects based on multiple data sources. The remaining four schools provided secondary education and were excluded from these additional data collection activities because their teaching involves frequent change of students and classrooms, which limits the continuity in their interactions with the same groups of students. The Flanders Interaction Analysis System (FIAS) was administered in the classroom as an observational system for objective analysis of educators' verbal behaviour while interacting with their students (Flanders, 1970). Of educators who participated in classroom observations 10 took part in individual interviews to share their experience and perceived outcomes of learning mindfulness and self-compassion in their school. Findings of classroom observations and interviews suggested positive effects of intervention on educator wellbeing and classroom practices and were reported elsewhere (blind for review). Ethics approval for the study was obtained from the Departments of Education in Queensland and New South Wales, and the human ethics committee of the University. Co-ordinators (e.g., heads of school wellbeing or principals) of the 20 schools distributed information letters and consent forms to their staff and the signed consent forms were subsequently collected. Students' signed assent forms and their parents' consent forms were collected in the eight schools.

[Insert Figure 1. A CONSORT flow diagram around here]

Intervention. *Reconnected* is a mindfulness-based training program developed and delivered by Mind With Heart, an international charity organisation that is independent of the research team. The aim of the program is to provide educators with support for self-management of stress as well as increases in mindfulness, self-awareness and emotional regulation. The program introduces a range of experiential, physical and everyday exercises, such as mindful yoga, walking, eating and breathing, along with empathetic listening, all of which are conducive to the cultivation of mindfulness and compassion and the promotion of self-care. The program adopts individual, didactic and group formats to present theoretical information about stress reaction, relaxation response and emotional intelligence, and link it with experiential activities. An overview of weekly topics, corresponding objectives and example activities are included in Table 1.

[Table 1 about here]

Eight 90-minute weekly training sessions were provided after school hours. A typical session consists of approximately 45 minutes of experiential and physical practice, 15 minutes of debriefing and sharing personal experiences, 10 minutes of reflection activities, 10 minutes of discussion and 10 minutes of facilitator-led didactic activities. At the beginning all participants received a program booklet explaining key concepts (e.g., mindfulness and self-compassion) and practices (e.g., body scan and remembering kindness). During the 8-week training period the participants also received weekly emails that reminded them of what they had learned and practised in previous sessions, along with links to audio recordings of guided meditations and video clips presenting theoretical information. Participants received no compensation for the training.

A total of 13 facilitators implemented the *Reconnected* program at multiple intervention school sites in two states. They were all mindfulness practitioners with more than five years' practice experience, had

previously trained in implementing other mindfulness-based programs (e.g., Mindfulness-Based Stress Reduction) and were working professionally as mindfulness facilitators. Of the 13 facilitators, five were former teachers and five had corporate training backgrounds. In addition, six facilitators were practising or had trained as psychologists, psychotherapists or counsellors.

Prior to the program delivery period, all 13 facilitators who were already working professionally as mindfulness facilitators participated in a three-day training to familiarise themselves with intervention materials concerning facilitator guidelines, resources and practice scripts through demonstration, role play and paired and group discussions. During the program delivery period, the facilitators used the materials to implement the program as planned. They also participated in online weekly debriefing sessions to ensure all participants receive the training in a comparable manner without compromising the flexibility necessary to accommodate the contextual needs of individual participating schools. The debriefing sessions were audio-recorded. Additionally, the eight training sessions of one participating school were video-recorded and rated by the first author, using checklists for mindfulness intervention fidelity with 11 questions (Yes/No) concerning fidelity areas of study design, training treatment delivery, treatment receipt, treatment enactment and effectiveness (Hwang & Kearney, 2015). The completed checklists demonstrated 100% intervention fidelity.

Measures

The below measures were used for data collection that occurred at pre-, post-, and six-week follow-up intervention (T1, 2 and 3) for both intervention and control groups to demonstrate intervention effects for educators and students. Five month-follow-up data collection (T 4) occurred only for the intervention group to examine the sustainability of the intervention effects.

The Perceived Stress Scale (PSS-10; Cohen & Williamson, 1988) was used as a measure of self-report perceptions of stress. The PSS-10 consists of 10 items, which ask participants to rate how often they have experienced particular feelings and thoughts over the previous month. For example, *'In the last month, how often have you felt that you were unable to control the important things in your life?'*. Items are rated on a five-point Likert scale ranging from 0 (*Never*) to 4 (*Very Often*) with higher scores on the total scale indicating greater levels of perceived stress. Numerous studies have supported that the PSS-10 is a reliable and valid measure (e.g., Lee, 2012). Cronbach's alpha for the current study was 0.86.

The Five Facet Mindfulness Questionnaire-Short Form 18 (FFMQ-SF 18; Medvedev, Titkova, Siegert, Hwang, & Krägeloh, 2018) was used as a self-report measure of mindfulness. The FFMQ-SF 18 originated from the FFMQ (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), which consists of 39 items and examines five aspects of mindfulness (i.e., act with awareness, describe, non-judge, non-react, and observe). Validity of the FFMQ-18 was examined by Pearson correlations of Rasch-transformed interval-level scores with the Rasch-transformed scores for the full version of the FFMQ, which demonstrated high correlation with the full version of the scale for all related subscales and the total scale (e.g., .86 for Observe and .95 for total scale). The FFMQ-SF18 consists of 18 items, which are scored on a five-point scale ranging from 1 (*Never*) to 5 (*Very Often or*

Always True) with higher scores indicating higher levels of mindfulness. Cronbach's alpha for the current study was 0.85.

The Self-Compassion Scale Short Form (SCS-SF 12; Raes, Pommier, Neff, & Van Gucht, 2011) was used as a self-report measure of educators' self-compassion. The SCS-SF consists of 12 items scored on a five-point scale that ranges from 1 (*Almost Never*) to 5 (*Almost Always*) with higher scores indicating higher levels of self-compassion. Example items include '*I try to be understanding and patient towards those aspects of my personality I don't like*' and '*I try to see my failings as part of the human condition*'. The SCS-SF was found to be a reliable and valid measure across two Dutch samples and an English sample and also demonstrated high correlation with the original long form of the scale (Raes et al., 2011). Cronbach's alpha for the current study was 0.87.

The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) was used as a self-report measure of how educators regulate their emotions. The ERQ consists of 10 items scored on a seven-point Likert scale ranging from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). Higher scores indicate higher perceived ability in regulating emotions. The ERQ has two subscales: Cognitive Reappraisal (6 items) and Expressive Suppression (4 items). The ERQ has previously demonstrated adequate reliability and validity (Gross & John, 2003). For the current study, Cronbach's alpha for Cognitive Reappraisal was 0.91 and for Expressive Suppression was 0.68.

The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) was used as a self-report measure of sleep quality. The PSQI consists of 19 items, which estimate sleep quality over a month duration. Example items include '*During the past month, how long (in minutes) has it taken you to fall asleep each night?*' and '*During the past month, how often have you had trouble sleeping because you cough or snore loudly*'. Items are used to create 7 component scores, which are then combined into a total score. The total score has a range of 0-21 with better sleep quality indicated by lower scores. Backhaus, Junghanns, Brooks, Riemann and Hohagen (2002) reported acceptable reliability and validity for this tool tested with a clinical sample of primary insomnia patients. Cronbach's alpha for the current study was 0.58.

Educators' perceptions of the quality of their relationship with students were measured through the use of the modified short form of the Student-Teacher Relationship Scale (Modified STRS; Whitaker, Dearth-Wesley, & Gooze, 2015). The original form of the STRS (Pianta, 2001) refers to the relationship between an educator and an individual student and consists of three subscales; Closeness, Conflict and Dependency. The modified STRS (Whitaker et al., 2015) has changed "child" to "children" along with verbs and modifiers as necessary. The STRS short form consists of 15 items which can be used to create two subscales; Closeness (CL, 7 items), '*It is easy to be in tune with what the children are feeling*' and Conflict (CO, 8 items), '*The childrens' feelings toward me can be unpredictable or can change suddenly*'. Items are rated on a five-point Likert scale ranging from 1 (*Definitely does not apply*) to 5 (*Definitely applies*). Higher scores for closeness indicate higher levels of warmth in relationships with students, while higher scores for conflict indicate perception of greater levels of difficulty in relationships with students. For the current study, adequate cronbach's alpha results were estimated for both subscales; Closeness ($\alpha = 0.82$) and Conflict ($\alpha = 0.79$).

The Teachers' Sense of Efficacy Scale-Sort Form (TSES; Tschannen-Moran & Woolfolk Hoy, 2001) was used as a self-report measure of teaching efficacy. The TSES consists of 12 items scored on a nine-point Likert scale ranging from 1 (*Nothing*) to 9 (*A great deal*) and assesses three domains of teacher beliefs; *Efficacy in Student Engagement*, *Efficacy in Instructional Strategies*, and *Efficacy in Classroom Management*. Example items include 'How much can you do to control disruptive behaviour in classroom?' and 'How much can you do to motivate students who show low interest in school work?' It has been found to be a reliable and valid tool for capturing the construct of teacher efficacy (Tschannen-Moran & Woolfolk Hoy, 2001). Cronbach's alpha for the current study was 0.95.

We used four self-report items (e.g., "When I am with my teacher, I feel accepted") to measure students' sense of relatedness to their teachers (Furrer & Skinner, 2003). These items were scored on a four-point scale, ranging from 1 Strongly Disagree to 4 Strongly Agree and used for students who were in Grade 3 and above ($n=39$ intervention group, $n=80$ control group). Principle component analysis conducted with four items using the stacked data (all four times) supported unidimensionality of the construct with loadings on the first principle component ranging from 0.52 to 0.79 that explained over 50% of variance. Cronbach's alpha for the current study was 0.59 at pre-intervention, 0.66 at post-intervention, 0.69 at six-week follow-up intervention, and 0.70 at five-month follow-up intervention. An average score of the four items was used to demonstrate an indicator of overall relatedness (Furrer & Skinner, 2003).

Data Analyses

We used IBM SPSS v.24 for data analyses. Preliminary analyses examined baseline group differences and reported in Participants. Overall, missing data comprised about 6% and were identified mainly at the scale level (e.g. a participant did not complete a particular scale or subscale). In such cases imputation was not possible and participants with missing scale data were excluded from specific scale-related analyses. Preliminary analyses were conducted to examine normality assumptions for all variables. Educator outcome variables were distributed close to normal with no significant outliers and acceptable skewness range from -1.27 to 0.59 and kurtosis range from -0.35 to 2.99 (West, Finch, & Curran, 1995), with exception of the sleep quality measure showing leptokurtic distribution (>7).

To address unequal distributions of school settings between groups, we performed multiple regression analysis that determined school effects on educator measures of the perceived stress, mindfulness, self-compassion, emotion regulation (cognitive reappraisal, emotional suppression) and teaching efficacy (student engagement, instructional strategies and classroom management) at T2 with the school type (i.e., primary school and secondary school settings as dichotomous variables with a special school setting as a reference category) as a predictor after controlling for corresponding variables at T1, age and gender.

We carried out separate sets of multiple linear regression models to determine intervention effects with each of the educator measures at T2 and T3 as an outcome variable. For each set of regression models, we used four basic models. First, we assessed intervention effects on each of the educator measures at T2 as an outcome variable and the intervention (i.e., treatment) as a predictor after controlling for corresponding variables at T1.

Model 2 was identical to Model 1, except for each of educator measures at T3 as an outcome variable. In Model 3, we examined whether educator measures (e.g., perceived stress) at T2 mediated effects of the intervention (i.e., treatment) and educator measures (e.g., perceived stress) at T1 on educator measures (e.g., perceived stress) at T3. Finally we examined whether intervention effects at T2 were modified by educator measures at T1 by adding an interaction term, intervention x each of the educator measures at T1, to Model 4. Five month follow-up effects were explored for the intervention group by reviewing the overall trend of educator measures at T4 compared against educator measures at T1, T2 and T3.

Linear regression was also used to analyse students' sense of connectedness to their teachers from all assessments (stacked data) as an outcome variable, while mindfulness-based intervention (pre-intervention vs post intervention) was used as a dichotomous predictor variable. We present values of R^2 , following general definitions of R^2 of 0.02 as small, 0.15 as medium, and 0.26 as large (Cohen, 1988).

Results

Prior to the main analyses, we tested for school effects on intervention and educator wellbeing-related variables, which were not statistically significant (Table 2) and therefore two-level models were not required to be fitted. However, school effects were significant for two sub-scales of teaching-related variables, closeness in student-teacher relationship and teaching efficacy in instructional strategies (Table 2). The special school setting (i.e., a reference group), compared to the primary and secondary school settings, predicted higher levels of closeness in student-teacher relationship at T2 after controlling for closeness in student-teacher relationship at T1, age and gender. The primary school setting, showed significant effect on teaching efficacy in instructional strategies at T2 after controlling for teaching efficacy in instructional strategies at T1, age and gender. We also found gender effects with female educators rather than male counterparts predicting higher levels of teaching efficacy in classroom management at T2 after controlling for teaching efficacy in classroom management at T1, age and gender (Table 2). The school setting and gender identified as significant were included in the proceeding analyses. For example, gender was entered as an additional predictor only when examining intervention effects on teaching efficacy in classroom management.

[Table 2 about here]

Table 3 presents immediate post-intervention effects on educator measures after controlling for effects of educator measures at pre-intervention. Intervention was effective on wellbeing-related variables that were explicitly taught during the intervention period, i.e., mindfulness, self-compassion, perceived stress and emotion regulation (cognitive reappraisal), as well as sleep quality that was closely aligned with educator wellbeing, with small to medium R^2 effect size. After controlling for effects of perceived stress at T1, intervention predicted lower levels of perceived stress at T2. Similarly, intervention predicted higher levels of mindfulness and self-compassion at T2 after controlling for effects of mindfulness at T1. Intervention also had significant effects on using cognitive reappraisal for emotion regulation and reducing sleep difficulty at T2 (Table 3). However, no intervention effects were found for teaching-related variables (Table 3).

[Table 3 about here]

Table 4 shows six-week post-intervention effects (i.e., T3) after controlling for each of the educator measures at T1. Similar to findings of immediate post-intervention effects, intervention significantly predicted lower levels of perceived stress and higher levels of mindfulness and self-compassion at T3 after estimating contribution of corresponding variables at T1. Notably, intervention predicted significantly lower levels of emotional suppression for emotion regulation at T3 after controlling for the same variable at T1, whereas no intervention effects were found on emotional suppression for emotion regulation ($\beta = -0.97, p = 0.14$) at T2. Intervention effects on cognitive reappraisal for emotion regulation and sleep difficulty at T3 were no longer significant ($p > 0.05$) six weeks following intervention. Consistent with immediate post-intervention findings, intervention did not predict teaching-related variables at Time 3.

[Table 4 about here]

Table 5 shows that effects of intervention ($\beta = -0.123, p = 0.059$) and perceived stress ($\beta = 0.412, p < 0.001$) at T1 on perceived stress at T3 were reduced but still remained significant when including perceived stress ($\beta = 0.418, p < 0.001$) at T2 in the model. This indicates that the effects of intervention and perceived stress at T1 on perceived stress at T3 were only partially mediated by perceived stress at T2. Intervention effects ($\beta = 0.104, p = 0.09$) on self-compassion at T3 were also reduced after adding self-compassion ($\beta = 0.590, p < 0.01$) at T2. However, no intervention effect was found on mindfulness ($\beta = 0.093, p > 0.10$) and cognitive reappraisal in emotion regulation ($\beta = 0.072, p > 0.10$) at T3, which shows intervention effects on mindfulness and cognitive reappraisal in emotion regulation at T3 were fully mediated by corresponding variables at T2.

[Table 5 about here]

There was no evidence of an interaction between intervention and teacher measure variables at T1, except for emotional suppression in emotion regulation and teaching efficacy in student engagement that previously demonstrated no immediate post-intervention effects (Table 6). When we included an interaction term (Intervention x teaching efficacy in student engagement T1), the coefficient became significant for the interaction term ($\beta = -0.910, p < 0.05$) and intervention ($\beta = 0.898, p < 0.05$). With an interaction term (Intervention x emotional suppression T1) added, the coefficient for the interaction term became significant ($\beta = -0.517, p < 0.05$) but not intervention ($\beta = 0.371, p > 0.10$). For educators with higher levels of teaching efficacy in student engagement at T1, the relationship between intervention and teaching efficacy in student engagement at T2 was less strong than educators with lower levels of teaching efficacy in student engagement at T1. Similarly, the relationship between intervention and emotional suppression at T2 was less strong for educators with higher levels of emotional suppression at T1 than educators with lower levels of emotional suppression at T1.

[Table 6 about here]

Table 7 presents means and standard deviations of wellbeing and teaching related educator outcome variables at T1, T2 and T3 for both groups and those at T4 (i.e., five months following intervention) for the intervention group only. Levels of perceived stress and sleep difficulty remained lower (i.e., positive) in the intervention group at Time 4 compared to Times 1, 2 and 3. Levels of mindfulness, self-compassion and cognitive reappraisal in emotion regulation remained higher (i.e., positive) at T4 compared to the previous

times. Teaching related variables showed similar patterns. Levels of teaching variables remained higher (i.e., positive) at T4 compared to T1, except for conflict in student-teacher relationships that showed the largest reductions (i.e., positive) at T4 compared to previous times. With regard to student outcomes, the intervention was associated with higher levels of students' sense of connectedness to their teachers ($R^2=0.02$, $\beta=0.15$, $p<0.01$).

[Table 7 about here]

Discussion

The present study investigated the effectiveness of an 8-week mindfulness-based intervention implemented for educators at multiple school sites. The intervention program is designed to work on mindfulness, self-compassion, perceived stress and emotion regulation. We hypothesised that the intervention would improve educator wellbeing while improved educator wellbeing would accompany improvements in the quality of student-teacher relationships, teaching efficacy and student perception, based on the interconnectedness between educators and students as documented in the literature (e.g., Van Petegem et al., 2007, 2008; Volungis & Goodman, 2017).

Results showed the intervention was effective on improving educators' self-reported wellbeing-related outcomes but not teaching-related outcomes. Improvements in educator wellbeing, as demonstrated by decreases in perceived stress and increases in mindfulness and self-compassion, are in line with those of previous mindfulness-based intervention studies (Flook et al., 2013; Frank et al., 2015; Jennings et al., 2017; Kemeny et al., 2012; Taylor et al., 2015). Intervention effects on educator wellbeing largely remained significant six weeks following the intervention. Directions of change noted in educator outcomes remained stable five-months following the intervention.

The intervention was particularly effective for reducing educators' perceived stress to the degree intervention effects on perceived stress at six-week follow-up intervention were only partially mediated by perceived stress at immediate post-intervention. Intervention effects on mindfulness, self-compassion and cognitive reappraisal in emotion regulation at six-week follow-up intervention were however fully mediated by mindfulness, self-compassion and emotion regulation at immediate post-intervention. Although sleep quality was not specifically targeted during the intervention period, results also suggested decreases in sleep difficulties at the conclusion of the intervention. This finding supports a negative association between sleep quality and perceived stress reported for educators (Kottwitz et al., 2018) as well as a possibility of enhancing educators' sleep quality through reductions in perceived stress and increases in mindfulness and self-compassion.

With regard to emotion regulation, only cognitive reappraisal significantly increased at immediate post-intervention, while no intervention effects were found for expressive suppression. This is consistent with the findings of a previous study (Jennings, Frank, Snowberg, Coccia, & Greenberg, 2013) and is educationally important. According to a recent study, students in grades 7-9 perceived positive emotions in their teachers who adopt cognitive reappraisal, regulating precursors of emotions, rather than suppression of emotional expression after they have been generated (Jiang et al., 2016). Cognitive reappraisal is also related to educators' ability to actually experience emotions that need to be displayed in the classroom, whereas expressive suppression is

related to pretending to have such emotions (Lee et al., 2016). Pretending to have organizationally desirable emotions on a daily basis can be detrimental to wellbeing and teaching because it is positively associated with an increase in educators' daily burnout and a decrease in daily job satisfaction (Lavy & Eshet, 2018).

However, intervention effects on cognitive reappraisal were no longer significant six weeks following the intervention. Intervention instead predicted lower levels of emotional suppression after the six-week time interval. This finding raises the possibility that it may take longer for the intervention to be effective in reducing educators' use of emotional suppression as an emotion regulation strategy. Given a lack of research evidence concerning follow-up intervention effects on use of different emotion regulation strategies, future research is required to determine whether this is the case.

Based on associations between educator wellbeing, teaching and learning (Brown et al., 2017; Clunies-Ross et al., 2008; Gilbert et al., 2014), we hypothesised that the intervention designed to enhance educator wellbeing would improve teaching efficacy and student-teacher relationships. We also hypothesised the intervention would improve students' sense of connectedness to their teachers. The current study found no intervention effects on teaching efficacy and this is consistent with findings of previous studies (i.e., Jennings et al., 2017; Jennings, Snowberg, Coccia, & Greenberg, 2011). Despite a positive association between higher levels of educators' mindfulness and higher quality of student-teacher relationships (Becker et al., 2017), educator-report data did not support that training educators in mindfulness and self-compassion was effective for improving student-teacher relationships, for either closeness or conflict. These findings did not support that the enhancement of educator wellbeing would improve teaching efficacy and student-teacher relationships. However, improvements were demonstrated on measures of students' sense of connectedness to teachers at post-intervention. This finding is noteworthy because the overall levels of students' sense of connectedness to their teachers were high at baseline. They were higher than the levels reported in another study using the same four items (Furrer & Skinner, 2003).

The inconsistency in the findings between students' sense of connectedness to their teachers (i.e., improvements) and these teachers' perceptions concerning relationships with their students (i.e., no improvements) warrant further exploration. It is possible that students' sense of connectedness to their teachers might be less aligned with improvements in educators' perceptions of their relationships than with improvements in educators' levels of perceived stress and their use of cognitive reappraisal for emotion regulation. Previously reported associations among educator stress, educator difficulties in emotion regulation in the classroom and negative student-teacher relationships (Karabay, 2017; Whitaker et al., 2015; Yoon, 2002) make this plausible. Positive emotions perceived by students in educators who apply cognitive reappraisal, along with negative emotions in educators who suppress their emotions to regulate them in the classroom (Jiang et al., 2016), also lend support for this possibility.

It is also possible that while educators did not perceive changes in their relationship with students in the classroom, changes in their interaction practice may have affected their students' sense of connectedness. Inconsistencies between educators' perceptions/beliefs and actual practices are not unknown phenomena (Cunningham, Zibulsky, Stanovich & Stanovich, 2009). Previous MBI studies for educators found significant

increases in educators' use of positive affect words (Taylor et al., 2015), which may contribute to the connectedness between students and educators. Analysis of classroom observations concerning educators' verbal behaviour while interacting with their students and individual educator interviews conducted as part of a larger study (blind for review) indicates improvements in interpersonal teaching behaviours and support the possibility of a gap between educators' practice and their perceptions about practice.

Alternatively, the discrepancy may simply mean that educators and their students had different perceptions about the overall student-teacher relationship. A body of literature has highlighted differences between educators' and their students' perceptions of educator behaviour, although educators in general have a more favourable perception of their own behaviour and/or practice than their students do (Brok, Levy, Rodriguez, & Wubbels, 2002). Regardless of these possibilities, the current findings suggest that improvement in educator wellbeing may lead to the enhancement of student-teacher connectedness as perceived by students.

Regarding the role of individual educator characteristics for intervention effects, results did not provide evidence of an interaction between intervention and the levels of educator wellbeing at pre-intervention. This suggests the levels of perceived stress, mindfulness, self-compassion and emotion regulation experienced by educators prior to the intervention may not influence intervention effects. Moderating effects were, however, found on teaching efficacy in student engagement and emotional suppression and indicated this type of intervention might be more beneficial for educators with lower levels of teaching efficacy in student engagement and emotional suppression than those with higher levels.

Strengths, Limitations and Implications for Future Studies

This study has strengths and limitations. The present study extended the scope of inquiry into the effects of a mindfulness-based intervention for educators on students' perception. This study is one of the few that provides mindfulness-based intervention at multiple school sites with various school settings. This enables examination of the effectiveness of the intervention in the school context (Bailey et al., 2018) and provides information about the generalizability of intervention effects from intervention sites to schools (Sibinga et al., 2013). The provision of a school-based intervention creates a condition within which educators to learn and practise mindfulness and self-compassion at their workplace with their colleagues. Future research may investigate whether the provision of a school-based intervention contributes to the continuation of practising mindfulness at school levels upon the completion of the intervention.

This study also has a number of limitations. The high attrition rate and absence of an active control group reduced the power of analysis. Randomisation of schools rather than individual educators resulted in unequal sample sizes. School-based cluster-randomisation conducted differently in two states also provided more special schools assigned to the intervention group than to the control group. Although we examined the effects of school settings and found no effects on wellbeing-related intervention outcomes, limited comparability between the two groups should be acknowledged. Little is known about the role of individual participant characteristics and organisational features for mindfulness-based intervention effects. Although findings provide information about the role of individual educators' characteristics (e.g., pre-emotional

suppression levels) and organisational features (e.g., school settings) for intervention effects, future studies need to further investigate these issues with larger samples. Finally, we were unable to provide inter-rater reliability data for the video-recorded data, which is a limitation that needs to be addressed in future research.

Thirteen facilitators who were independent of the research team delivered the intervention program. A number of approaches were adopted to ensure the implementation of the program as planned including using facilitator guidelines, resources and practice scripts, weekly debriefing sessions, recording intervention sessions and using an intervention fidelity checklist. The quality of delivery across facilitators may have played a role in the intervention effects. A growing literature has documented the centrality of the role of the mindfulness facilitator in stimulating positive effects of mindfulness practice in their students (e.g., Crane et al., 2013). It is important to investigate mindfulness teacher effects in any future endeavours to explore what constitutes successful delivery of mindfulness interventions for educators.

Findings of this cluster-based randomised controlled study highlight what a mindfulness-based intervention for educators can do as well as what it cannot do. The findings support the current understanding about the potential of mindfulness-based interventions for improving educator stress, emotion regulation, sleep quality, mindfulness and self-compassion. The findings also support the potential benefit of training educators in mindfulness and self-compassion for their students, with the possibility that this may increase students' sense of connectedness to teachers without themselves undergoing any intervention. However, no evidence of improvements in teaching efficacy and student-teacher relationships was found as a result of this intervention. To advance knowledge in this field, further research with an active control group and a larger sample is required to examine the potentials as well as the limitations of mindfulness-based interventions implemented for educators and to investigate the contributors and inhibitors of successful intervention delivery.

Compliance with Ethical Standards

Conflict of Interest: The authors declare no conflict of interest and they do not work for, consult to, own shares in or receive funding from any company or organization that would benefit from this article.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants.

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Table 1 Weekly intervention topics, objectives and activities

Weekly topic	Objectives	Activities
W 1. Introduction to Mindfulness	To understand stress and its impact on health and wellbeing To understand and experience mindfulness To practice an informal way to return to the present	Body, Breath, Being Progressive muscle relaxation into mindfulness of body and breath Qualities of mind: Relaxation
W 2. Coming to senses	To identify sensations of tension and relaxation in the body, mind-wandering and commentary To explore five senses as ways to return to the present To understand distraction, autopilot, how the senses can help become present	Previously learned activities Common practice problems Mindful yoga/walking Mindfulness of sounds The senses, presence and mental wellbeing Qualities of mindfulness: Presence Mindful eating
W 3. Noticing reactions	To define and identify positive, negative and neutral feelings as reactions to stimuli To explore how holding onto or avoiding feelings increases challenges in life To understand awareness as a key quality of mind To accept and let go of feelings	Previously learned activities Mind in the jar Feelings: when do they affect stress reactivity? Noticing reactions Breathing in, breathing out How to continue
W 4. Who's the boss? Me or my thoughts?	To define and identify thoughts and how they come and go in awareness To identify sensations, feelings and thoughts in the body and mind To understand how thoughts trigger the stress reaction To practice noticing and labeling thoughts as an aide to non-identification To deliberately cultivate positive thoughts	Previously learned activities Defining and identifying thoughts How thoughts affect stress reactivity Metaphors for thoughts Mindfulness of thoughts Remembering kindness How to continue
W 5. Developing emotional intelligence	To identify sensations, feelings and thoughts when moving and still To define emotions and explore how emotions arise To reflect on how stress is felt and the sensations, feelings, thoughts and emotions that accompany stress To notice, accept, investigate and non-identifying with emotions	Previously learned activities What are emotions? What do I notice, in body and mind, when I feel stressed? We are not our thoughts and emotions R.A.I.N What is my emotional timeline?
W 6. Being a friend to myself	To reflect on the qualities of good friend and when we are self-critical To practice cultivating positive emotions To reflect on and share when we nourish and deplete ourselves	Previously learned activities Being a friend to myself Love for myself and others What nourishes and depletes me? Mindful listening Quality of mind: Kindness

W 7. Emotional intelligence in action	To listen with mindfulness and understanding To understand empathy, compassion and emotional intelligence To practice self-awareness and gentleness with our bodies To identify and strengthen kindness and love for ourselves and others To reflect on how intention, empathy and mutuality affect communication and relationships To communicate with empathy and emotional intelligence	Previously learned activities Introducing empathy, compassion and emotional intelligence Mindful yoga into love for myself and others Emotional intelligence Role-play with emotions Just like me
W 8. Continuing in awareness	To understand spaciousness as a quality of mind To explore self-guided body work and practice open awareness To celebrate and cultivate appreciation and gratitude To decide how to continue to practice	Previously learned activities Quality of mind: spacious Mindful stretching into simply being Self-review and mindful listening Cultivating gratitude How to continue

Table 2 Summary of the multiple linear regression analyses examining school effects on educator wellbeing- and teaching-related variables at immediate post-intervention (T2) after controlling for corresponding variables at pre-intervention (T1) and demographic variables of age and gender. The reference category for dichotomous (dummy) variables Primary and Secondary school is a Special school.

Model	Predictor	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²	<i>R</i> ² change
<u>Outcome: Perceived stress T2</u>						
Model 1	Constant	4.113	3.138		0.401***	0.401***
	Perceived stress T1	0.757***	0.077	0.651		
	Age	0.052	0.036	0.094		
	Female	-1.481	1.267	-0.075		
Model 2	Constant	6.709	3.239		0.451*	0.050**
	Intervention	-3.280**	0.912	-0.261**		
	Primary setting	-1.539	1.041	-0.122		
	Secondary setting	-0.606	1.359	-0.032		
<u>Outcome: Mindfulness T2</u>						
Model 1	Constant	17.728	3.596		0.574***	0.574***
	Mindfulness T1	0.740***	0.056	0.769		
	Age	-0.029	0.044	-0.039		
	Female	0.034	1.526	0.001		
Model 2	Constant	13.210	3.672		0.655***	0.081***
	Intervention	4.267***	1.052	0.247		
	Primary	-0.258	1.117	-0.015		
	Secondary	2.830†	1.574	0.103		
<u>Outcome: Self-compassion T2</u>						
Model 1	Constant	0.983	0.231		0.544***	0.544
	Self-compassion T1	0.736***	0.059	0.742		
	Age	-0.001	0.004	-0.018		
	Female	0.006	0.13	0.003		
Model 2	Constant	0.766	0.261		0.587**	0.043**
	Intervention	0.289**	0.091	0.211		
	Primary	-0.002	0.104	-0.001		
	Secondary	-0.022	0.137	-0.010		
<u>Outcome: Emotion regulation cognitive reappraisal (ER_CR) T2</u>						
Model 1	Constant	13.967	2.842		0.278***	0.278***
	ER_CR T1	0.514***	0.073	0.517		
	Age	0.026	0.044	0.043		
	Female	0.266	1.536	0.012		
Model 2	Constant	11.002	3.237		0.308***	0.030*
	Intervention	2.586*	1.152	0.187		
	Primary	1.241	1.304	0.089		
	Secondary	0.626	1.711	0.030		
<u>Outcome: Emotion regulation emotional suppression (ER_ES) T2</u>						
Model 1	Constant	7.874	1.804		0.312***	0.312***
	ER_ES T1	0.563***	0.073	0.540		
	Age	-0.009	0.029	-0.021		
	Female	-1.960	1.014	-0.135		
Model 2	Constant	9.048	2.012		0.329***	0.018
	Intervention	-1.429†	0.763	-0.153		
	Primary	-0.614	0.862	-0.065		
	Secondary	-0.231	1.141	-0.016		
<u>Outcome: Sleep difficulty T2</u>						
Model 1	Constant	2.649	4.567		0.097**	0.097**
	Sleep difficulty T1	0.528***	0.145	0.291		
	Age	0.073	0.080	0.073		
	Female	0.921	2.918	0.025		

Model 2	Constant	5.058	5.195		0.127**	0.030
	Intervention	-3.531†	2.113	-0.154		
	Primary	0.612	2.397	0.027		
	Secondary	-0.447	3.177	-0.013		
Outcome: Student-teacher relationship closeness (STRS_CL) T2						
Model 1	Constant	8.684	2.020		0.593***	0.593***
	STRS_CL T1	0.735***	0.063	0.744		
	Age	-0.023	0.019	-0.073		
	Female	0.953	0.749	0.081		
Model 2	Constant	11.814	2.364		0.634***	0.041**
	Intervention	-0.748	0.504	-0.102		
	Primary	-1.182*	0.559	-0.161		
	Secondary	-2.385**	0.757	-0.216		
Outcome: Student-teacher relationship conflict (STRS_CO) T2						
Model 1	Constant	5.535	2.213		0.580***	0.580***
	STRS_CO T1	0.750***	0.066	0.742		
	Age	-0.015	0.028	-0.035		
	Female	-0.946	1.043	-0.057		
Model 2	Constant	6.177	2.542		0.586	0.006
	Intervention	0.285	0.730	0.028		
	Primary	-0.783	0.856	-0.076		
	Secondary	-0.245	1.131	-0.016		
Outcome: Teaching efficacy student engagement (TE_SE) T2						
Model 1	Constant	1.679	0.563		0.524***	0.524***
	TE_SE T1	0.745***	0.072	0.707		
	Age	0.002	0.007	0.707		
	Female	0.226	0.257	0.060		
Model 2	Constant	1.905	0.634		0.540***	0.016
	Intervention	-0.134	0.177	-0.057		
	Primary	-0.360†	0.201	-0.153		
	Secondary	-0.104	0.272	-0.029		
Outcome: Teaching efficacy instructional strategy (TE_IS) T2						
Model 1	Constant	2.484	0.531		0.515***	0.515***
	TE_IS T1	0.694***	0.066	0.718		
	Age	-0.004	0.006	-0.042		
	Female	0.205	0.222	0.062		
Model 2	Constant	2.935	0.544		0.561***	0.046**
	Intervention	-0.230	0.150	-0.112		
	Primary	-0.557**	0.171	-0.270		
	Secondary	-0.370	0.231	-0.120		
Outcome: Teaching efficacy classroom management (TE_CM) T2						
Model 1	Constant	1.756	0.558		0.543***	0.543***
	TE_CM T1	0.713***	0.065	0.725		
	Age	0.002	0.007	0.018		
	Female	0.420†	0.252	0.109		
Model 2	Constant	1.982	0.608		0.532***	0.019
	Intervention	-0.186	0.176	-0.078		
	Primary	-0.345†	0.200	-0.143		
	Secondary	-0.075	0.269	-0.021		

† $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .0001$

Table 3 Summary of the multiple linear regression analyses predicting educator wellbeing- and teaching-related variables at immediate post-intervention (T2) after controlling for corresponding variables at pre-intervention (T1).

Model	Predictor	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²	<i>R</i> ² change
Outcome: Perceived stress T2						
Model 1	Constant	6.013	2.168		0.388***	0.388***
	Perceived stress T1	0.724***	0.074	0.623***		
Model 2	Constant	7.078**	2.133		0.427**	0.038**
	Intervention	-2.459**	0.782	-0.196**		
Outcome: Mindfulness T2						
Model 1	Constant	17.160	3.127		0.573***	0.573
	Mindfulness T1	0.728***	0.053	0.757***		
Model 2	Constant	13.223***	3.009		0.635***	0.063***
	Intervention	4.358***	0.889	0.252***		
Outcome: Self-compassion T2						
Model 1	Constant	0.955	0.117		0.543***	0.543
	Self-compassion T1	0.731***	0.056	0.737***		
Model 2	Constant	0.780***	0.169		0.586***	0.043***
	Intervention	0.284***	0.075	0.207***		
Outcome: Emotion regulation cognitive reappraisal (ER_CR) T2						
Model 1	Constant	15.123	1.968		0.276***	0.276
	ER_CR T1	0.522***	0.071	0.525***		
Model 2	Constant	13.774	2.041		0.299***	0.023*
	Intervention	2.107*	0.972	0.152		
Outcome: Emotion regulation emotional suppression (ER_ES) T2						
Model 1	Constant	5.744	1.087		0.293***	0.293***
	ER_ES T1	0.564***	0.073	0.541***		
Model 2	Constant	6.200***	1.125		0.303***	0.011
	Intervention	-0.968	0.653	-0.104		
Outcome: Sleep difficulty T2						
Model 1	Constant	6.462	2.081		0.091***	0.091***
	Sleep difficulty T1	0.546***	0.143	0.301***		
Model 2	Constant	8.680***	2.282		0.121***	0.030*
	Intervention	-3.996*	1.791	-0.175*		

†*p* < .10 *p < .05 **p < .01 ***p < .0001

Table 4 Summary of the multiple linear regression analyses predicting educator wellbeing- and teaching-related variables at six weeks post-intervention (T3) with corresponding variables at pre-intervention (T1) and intervention as predictors.

Model	Predictor	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²
Outcome: Perceived stress T3					
	Constant	8.238	2.093		0.490***
	Perceived stress T1	0.726***	0.071	0.664***	
	Intervention	-2.886**	0.816	-0.230**	
Outcome: Mindfulness T3					
	Constant	8.002	4.069		0.590***
	Mindfulness T1	0.833***	0.066	0.764***	
	Intervention	5.083***	1.239	0.250***	
Outcome: Self-compassion T3					
	Constant	0.908	0.206		0.528***
	Self-compassion T1	0.706***	0.063	0.725***	
	Intervention	0.284**	0.090	0.206**	
Outcome: Emotion regulation cognitive reappraisal (ER_CR) T3					
	Constant	15.351	2.192		0.281***
	ER_CR T1	0.487***	0.073	0.537***	
	Intervention	1.206	1.069	0.090	
Outcome: Emotion regulation emotional suppression (ER_ES) T3					
	Constant	6.447	1.150		0.357***
	ER_ES T1	0.576***	0.074	0.581***	
	Intervention†	-1.312	0.703	-0.140	
Outcome: Sleep difficulty T3					
	Constant	3.351	1.019		0.569***
	Sleep difficulty T1	0.776***	0.065	0.749***	
	Intervention	-0.410	0.783	-0.033	

† $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .0001$

Table 5 Summary of the multiple linear regression analyses examining the effects of intervention and educator wellbeing- and teaching-related variables at pre-intervention (T1) on corresponding educator wellbeing- and teaching-related variables at six weeks post-intervention (T3) mediated by corresponding educator wellbeing- and teaching-related variables at immediate post-intervention (T2).

Model	Predictor	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²
Outcome: Perceived stress T3					
	Constant	4.002	2.142		0.588***
	Perceived stress T1	0.456***	0.088	0.412***	
	Intervention	-1.538†	0.807	-0.123	
	Perceived stress T2	0.422***	0.082	0.418***	
Outcome: Mindfulness T3					
	Constant	-1.677	4.088		0.695***
	Mindfulness T1	0.264*	0.106	0.238*	
	Intervention	1.896	1.244	0.093	
	Mindfulness T2	0.747***	0.112	0.629***	
Outcome: Self-compassion T3					
	Constant	0.445	0.198		0.656***
	Self-compassion T1	0.258***	0.076	0.278***	
	Intervention	0.134†	0.079	0.104	
	Self-compassion T2	0.589***	0.081	0.590***	
Outcome: Emotion regulation cognitive reappraisal (ER_CR) T3					
	Constant	7.286	2.412		0.460***
	ER_CR T1	0.254**	0.084	0.268***	
	Intervention	0.948	0.982	0.072	
	ER_CR T2	0.488***	0.086	0.493***	
Outcome: Emotion regulation emotional suppression (ER_ES) T3					
	Constant	3.467	1.142		0.515***
	ER_ES T1	0.255**	0.087	0.256**	
	Intervention	-0.434	0.649	-0.046	
	ER_ES T2	0.516***	0.085	0.528***	
Outcome: Sleep difficulty T3					
	Constant	2.394	1.129		0.588***
	Sleep difficulty T1	0.734***	0.069	0.697***	
	Intervention	-0.103	0.814	-0.008	
	Sleep difficulty T2	0.094**	0.032	0.193**	
Outcome: Student-teacher relationship closeness (STRS_CL) T3					
	Constant	1.537	2.830		0.694***
	STRS_CL T1	0.417***	0.113	0.397***	
	Intervention	0.007	0.586	0.001	
	Primary	0.947	0.603	0.119	
	Secondary	1.22	0.98	0.094	
	STRS_CL T2	0.51***	0.12	0.466***	
Outcome: Student-teacher relationship conflict (STRS_CO) T3					
	Constant	2.888	2.108		0.451***
	STRS_CO T1	0.371*	0.153	0.329*	
	Intervention	1.365	1.009	0.119	

STRS_CO T2	0.441**	0.168	0.358**	
Outcome: Teaching efficacy student engagement (TE_SE) T3				
Constant	0.849	0.549		0.677***
TE_SE T1	0.306**	0.106	0.288**	
Intervention	-0.096	0.160	-0.041	
TE_SE T2	0.578***	0.101	0.578***	
Outcome: Teaching efficacy instructional strategy (TE_IS) T3				
Constant	-0.409	0.589		0.713***
TE_IS T1	0.304**	0.103	0.278**	
Intervention	0.061	0.162	0.025	
Primary	0.409*	0.170	0.167*	
TE_IS T2	0.710***	0.108	0.623***	
Outcome: Teaching efficacy classroom management (TE_CM) T3				
Constant	-0.055	0.587		0.756***
TE_CM T1	0.246	0.089	0.241	
Intervention	0.040	0.153	0.015	
Female	-0.018	0.248	-0.004	
TE_CM T2	0.769	0.099	0.678	

† $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .0001$

Table 6 Summary of the multiple linear regression analyses examining interaction effects between intervention and educator wellbeing- and teaching-related variables at pre-intervention (T1) on corresponding educator wellbeing- and teaching-related variables at immediate post-intervention (T2).

Model	Predictor	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²
Outcome: Perceived stress T2					
	Constant	8.045	2.904		0.428***
	Intervention	-4.504	4.230	-0.359	
	Perceived stress T1	0.692***	0.100	0.595***	
	Intervention_Perceived stress T1	0.071	0.145	0.168	
Outcome: Mindfulness T2					
	Constant	15.420	4.070		0.637***
	Intervention	-0.290	5.859	-0.017	
	Mindfulness T1	0.723***	0.068	0.752***	
	Intervention_Mindfulness T1	0.080	0.099	0.270	
Outcome: Self-compassion T2					
	Constant	0.621	0.225		0.590***
	Intervention	0.626†	0.327	0.457	
	Self-compassion T1	0.798***	0.073	0.804***	
	Intervention_ Self-compassion T1	-0.116	0.108	-0.258	
Outcome: Emotion regulation cognitive reappraisal (ER_CR) T2					
	Constant	12.581	2.771		0.301***
	Intervention	4.518	3.905	0.327	
	ER_CR T1	0.579***	0.097	0.582***	
	Intervention_ER_CR T1	-0.089	0.140	-0.182	
Outcome: Emotion regulation emotional suppression (ER_ES) T2					
	Constant	4.117	1.467		0.326***
	Intervention	3.470	2.142	0.371	
	ER_ES T1	0.710***	0.099	0.681***	
	Intervention_ ER_ES T1	-0.313*	0.144	-0.517*	
Outcome: Sleep difficulty T2					
	Constant	9.211	2.649		0.122***
	Intervention	-5.556	4.309	-0.243	
	Sleep difficulty T1	0.476**	0.172	0.263**	
	Intervention_ Sleep difficulty T1	0.121	0.305	0.076	
Outcome: Student-teacher relationship closeness (STRS_CL) T2					
	Constant	12.897	3.728		0.618***
	Primary	-0.866	0.548	-0.118	
	Secondary	-2.036**	0.738	-0.184**	
	Intervention	-4.970	4.330	-0.680	
	STRS_CL T1	0.632***	0.118	0.640***	
	Intervention_STRS_CL T1	0.140	0.139	0.567	
Outcome: Student-teacher relationship conflict (STRS_CO) T2					
	Constant	2.079	1.745		0.584***

Intervention	3.558	2.508	0.348	
STRS_CO T1	0.841***	0.091	0.831***	
Intervention_STRS_CO T1	-0.156	0.127	-0.322	
Outcome: Teaching efficacy student engagement (TE_SE) T2				
Constant	0.706	0.747		0.540***
Intervention	2.103*	0.998	0.898*	
TE_SE T1	0.920***	0.102	0.872***	
Intervention_TE_SE T1	-0.303*	0.140	-0.910*	
Outcome: Teaching efficacy instructional strategy (TE_IS) T2				
Constant	2.330	0.633		0.544***
Primary	-0.383*	0.149	-0.186*	
Intervention	0.812	0.919	0.396	
TE_IS T1	0.763***	0.086	0.789***	
Intervention_TE_IS T1	-0.141	0.127	-0.505	
Outcome: Teaching efficacy classroom management (TE_CM) T2				
Constant	1.420†	0.689		0.547***
Female	0.439	0.254	0.113	
Intervention	0.965	0.990	0.404	
TE_CM T1	0.767***	0.083	0.781***	
Intervention_TE_CM T1	-0.135	0.133	-0.416	

† $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .0001$

Table 7 Means and standard deviations (SD) of educator outcome variables.

Outcome Measures	Time 1 Mean (SD)	Time 2 Mean (SD)	Time 3 Mean (SD)	Time 4 Mean (SD)
Perceived Stress				
Intervention	31.22(3.46)	28.96(4.75)	29.59(3.81)	28.24(4.48)
Control	31.16(3.22)	30.67(3.69)	31.33(3.90)	
Mindfulness				
Intervention	52.89(4.14)	54.75(4.60)	54.66(4.89)	54.65(4.53)
Control	54.08(4.48)	53.48(3.62)	53.35(4.45)	
Self-Compassion				
Intervention	2.90(0.68)	3.22(0.70)	3.24(0.61)	3.34(0.67)
Control	2.89(0.70)	3.01(0.66)	3.09(0.75)	
ER_CR				
Intervention	26.36(7.08)	30.01(6.36)	29.30(6.28)	31.38(6.83)
Control	27.61(6.84)	28.58(7.35)	29.23(7.04)	
ER_ES				
Intervention	14.18(4.52)	13.22(3.99)	13.28(3.89)	14.28(3.11)
Control	14.21(4.49)	14.21(5.19)	14.58(5.25)	
Sleep difficulty				
Intervention	12.45(5.29)	11.09(5.42)	12.00(5.66)	10.75(4.81)
Control	13.52(6.82)	15.73(14.35)	13.84(6.67)	
STRS_CL				
Intervention	29.03(4.15)	29.71(4.09)	29.05(4.32)	29.38(4.29)
Control	31.74(2.66)	32.11(2.77)	31.87(2.97)	
STRS_CO				
Intervention	19.84(5.19)	19.22(4.62)	19.77(5.79)	18.20(4.77)
Control	18.44(4.90)	17.58(5.51)	17.44(5.40)	
TS_SE				
Intervention	6.84(1.15)	7.03(1.07)	6.77(1.13)	7.02(1.09)
Control	7.22(1.06)	7.35(1.26)	7.23(1.28)	
TS_IS				
Intervention	6.64(1.90)	7.47(1.01)	7.12(1.31)	7.45(0.93)
Control	7.15(1.03)	7.61(1.23)	7.51(1.36)	
TS_CM				
Intervention	7.08(1.05)	7.32(1.15)	7.15(1.23)	7.34(1.14)

Control	7.54(1.33)	7.61(1.23)	7.51(1.36)

Figure 1. A CONSORT flow diagram.