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Original Article

Mindfulness in Elementary School Teachers: Effects on Teacher Stress, Mental Health, and Mindfulness in the Classroom

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Abstract

Background: Teachers are under enormous stress and attrition rates of this group are among the highest in the the United States The present study aimed to investigate whether Mindfulness-Based Stress Reduction (MBSR) can be used as an intervention to provide teachers the tools needed to decrease stress and feel more satisfied and effective in their roles as teachers.
Methods: The present study evaluated an MBSR intervention with teachers through a randomized pretest-posttest control group design. The teachers assigned to the treatment group received an 8-week mindfulness-based course. The data were collected in the 2019-2020 academic year. Seven teachers of nine- and 10-year-olds (n=124 students) across three schools were randomly categorized as either the MBSR or control group. Teacher scales of mindfulness, mental health, perceived stress, and student-teacher relationships as well as student scales of mindfulness and student-teacher relationships were completed.
Results: Intervention teachers reported an increased use of mindfulness techniques and reduced stress (24.33±4.04 at pretest vs. 13.67±3.06 at posttest, P=0.001) and anxiety (99.00±13.08 at pretest vs. 59.33±12.34 at posttest, P=0.001). No treatment-related effects were found on student-teacher relationships (89.62±16.90 for the control vs. 78.23±15.04 for the intervention, P=0.49) or student report of mindfulness practice (59.00±7.16 for the control vs. 56.00±7.81 for the intervention, P=0.82).
Conclusion: The results herein confirmed the usefulness of implementing MBSR intervention for teacher well-being, but did not provide evidence that an increase in teacher mindfulness will improve student-teacher relationships.

Keywords: Mindfulness, School teachers, Schools, Job stress

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1. Introduction

The concept of mindfulness has its roots in Buddhist tradition, with the term encompassing a non-judgmental acceptance, curiosity, and awareness of the present moment (1). An accepted and pervasive definition of stress would suggest that stress is triggered once individuals perceive environmental demands as being higher than the resources one has to address those demands (2). The underlying reason behind this transactional model of stress is the reliance on two processes that serve as mediators between the environmental stressors and the physiological response: cognitive appraisal and coping. If the individual perceives the environmental demands as a threat to one's well-being (cognitive appraisal), the individual evaluates whether he or she has the coping mechanisms to manage the stressor. If the perceived demands of the individual exceed one's coping resources, the result would be distress. With the high demands placed on teachers and their reports of chronic stressors within the classroom (3), the skill of mindfulness then would serve to help teachers reappraise events and to build their coping mechanisms through developing their self-compassion and orientation to the present.

Studies on the effect of Mindfulness-Based Interventions (MBIs) in schools have surged over the last decade, particularly owing to the success of standardized mindfulness programs, such as Mindfulness-Based Stress Reduction (MBSR) (1, 4). MBSR is a group-based mindfulness intervention consisting of 2-hour weekly sessions for 8 consecutive weeks. The program also requires participants to have an active home practice for 45 minutes a day, six days a week (1). The formal practice is led by a certified teacher and incorporates techniques, such as sitting meditation, walking meditation, mindful yoga, and the Body Scan. Participants in the MBSR course are also tasked with reflecting on daily activities, practicing mindful eating, and confronting challenging personal situations using an orientation of non-judgmental, curious awareness.

In non-clinical general populations, MBIs have shown medium to large effect sizes on participants' mental health and overall levels of psychological

distress (4-9). Regarding teachers, MBIs have reported to be significantly promising for improving self-compassion, emotional regulation, self-efficacy, and ultimately lowered perceived stress (10). Studies evaluating the effects of MBIs on teacher outcomes have indicated a wide variation in effect sizes (10, 11). Effects of structured MBIs, like the MBSR course on teacher stress and burnout, range from 0.01 to 2.12, with most of the variation across studies being due to small sample sizes, lack of randomization, and inconsistency across intervention components, duration, and mode of delivery (10). Although their effects on student outcomes after teachers' participation in a mindfulness-based intervention have not been well established, a great body of evidence has indicates that teacher mindfulness training may improve student outcomes (11).

The outcomes for students' direct participation in MBI's have been well documented. To date, there have been seven peer-reviewed meta analyses evaluating the effects of mindfulness-based interventions across a variety of student outcomes (11-17). The most comprehensive meta-analysis indicated small positive effects on cognitive and socioemotional outcomes and positive but non-significant effects on children's academic and behavioral outcomes (15). However, meta-analytic studies have indicated a high risk of bias and relatively low methodological quality of studies, suggesting the need for additional research in this area given the lack of heterogeneity and positive effects of MBIs across outcomes (12-14).

Several programs use a combination of indirect and direct approaches to integrate mindfulness within the classroom (11). The direct approach teaches children mindfulness skills through direct instruction and exercises. The indirect approach relies on the teacher to use their personal mindfulness practice as a means of modeling more mindful attitudes and behaviors for students in the classroom. Thus, when using an indirect approach of mindful teaching, students are exposed to the presence of teachers engaging in mindful actions and perspectives, rather than teachers directly instructing students to apply mindfulness skills. Structured programs using an indirect approach have shown mixed results, with some reporting decreased aggression and isolated play but no effect on prosocial behavior (18) and others finding only effects for teacher outcomes, including increased mindfulness, compassion, and reflective listening skills, among others (11).

Teaching mindfulness skills to instructors may result in positive outcomes for their students. There is not yet enough evidence to support this claim; however, as it is not apparent whether teachers who are taught mindfulness skills for their own well-being will organically generalize these skills within the general education classroom setting. Furthermore, it is unclear to what extent teachers applying these skills without explicit instruction indirectly impact students' own mindfulness skills and improve the student-teacher relationship.

MBSR can be utilized as a means to provide teachers the tools they need in order to reduce stress and feel more satisfied and effective in their roles as teachers. When teachers' well-being is enhanced, student-teacher relationships are stronger and students flourish (19). Despite the established evidence base that supports the effectiveness of MBSR on reducing the levels of stress and improving emotional well-being in adults, there are few studies to date examining how teachers' newly- acquired mindfulness strategies manifest in the classroom; whether or not teachers' own mindfulness practice impacts student mindfulness and student-teacher relationship quality still remains unclear. The proposed study answered three questions using a randomized pretest-posttest control group design:

RQ1.) Do the teachers participating in the MBSR course report continued use of these techniques in their own classroom with children?

RQ2.) Do the teachers participating in the MBSR course report higher levels of mindfulness, lower levels of anxiety and depression, lower levels of perceived stressors, and better student-teacher relationships compared to those not participating in this program?

RQ3.) Do students whose teachers have taken the MBSR course report a better student-teacher relationship and higher awareness of the mind-body connection in comparison with those whose teachers have not participated in this course?

2. Methods

The current study is based on a randomized pretest-posttest control group design where teachers were randomly assigned to either the treatment or waitlist control group. All the outcomes were measured twice over time.

2.1. Participants

The participants included a total of seven elementary

school teachers (grades 4-5) across three schools in the Southeastern United States (Kentucky), who were randomly assigned to either the MBSR treatment group or the waitlist control group at the beginning of the academic year in the fall of 2019. Apart from of the 4th and 5th grade teaching requirement, the criteria included not participating in a mindfulness training program prior to the study. No exclusion criteria were applied to the youth in this work.

2.2. Procedures

Institutional Review Board approval at the university and school district and parental consent were obtained before recruiting the participating classrooms. Emails were sent to 12 elementary principals in an urban school district. Among those 12, 10 were eligible to participate as they had not conducted a mindfulness-based training program for their 4th and 5th grade teachers. Among the eligible participants, three opted out due to either not being able to choose whether they wanted to participate in the MBSR training (2) or to the time commitment involved for teachers outside of school hours (1). A total of seven teachers agreed to participate, whose names were listed in Excel and a random number function was used to assign them to either the treatment or waitlist control group before the beginning of the academic year. Following random assignments, all the students were provided with the baseline measures in the fall of 2019 so that mindfulness and student-teacher relationship quality be assessed. Meanwhile, the teachers in both groups were provided with the baseline measures so that we could evaluate mindfulness, mental health, and stress. Teacher measures were completed online at the baseline, post MBSR program (9 weeks from the baseline), and 5 months following that (spring 2020). The student measures were completed in the classroom by university researchers at the baseline and after MBSR program. The 5-month follow-up for students could not be completed as it was scheduled during the COVID-19 pandemic, which resulted in the closure of all the public schools involved in the study.

2.3. Measures
2.3.1. Teacher Measures
2.3.1.1. Mindfulness in the Classroom

Teachers used Ecological Momentary Assessment (EMA) to document their behaviors and thoughts that underlie the dimensions of mindfulness: non-judgmental acceptance, curiosity, and awareness of the present moment. EMA consists of real-time data sampling on respondents' momentary states in their natural environment and is a valid and feasible means of collecting real-time data for teachers (20). The teachers herein completed a 15-item measure using EMA called the Mindfulness in Teaching Scale (MTS) (21). They received reminders at random intervals on their cellphones to complete the survey in real time. MTS uses a five- point Likert scale (1=never true, 5=always true) summed across two scales: intrapersonal mindfulness (α=0.87) and interpersonal mindfulness (α=0.71). The survey items required teachers to examine their thoughts and behaviors in the present moment, making the EMA an appropriate evaluation tool to capture teachers' use of mindfulness across time.

2.3.1.2. Mental Health

Teachers' anxiety and depression symptoms were measured using the State-Trait Anxiety Inventory (STAI) for adults (22) and the Beck Depression Inventory (BDI), which have internal consistencies from 0.86 to 0.95 (23). The STAI is a 40-item measure that evaluates individuals' frequency of experiencing a particular symptom within the last few days on a scale of 1 (not at all) to 4 (very much). The items were summed for a total anxiety scale score within the range of 40 to 160; higher sums indicate greater levels of anxiety. The BDI consists of 21 items. On this measure, participants select a statement out of four, which most accurately describes how often they have experienced that symptom in the past week. The BDI items are presented on a scale of 0 (not at all) to 3 (very much), with a total possible depression score of 63; higher scores represent more frequent experience of depressive symptoms.

2.3.1.3. Perceived Stress

Teachers' appraisal over their stress levels were assessed using a 10-item Perceived Stress Scale (PSS) (24). The items measured how unpredictable, uncontrollable, and how overwhelmed respondents felt about their lives on a four-point Likert scale (1=almost never to 4=very often). The scale has moderate to high reliability, validity, and sensitivity to change and relatively high internal consistency (α=0.89) (25).

2.3.1.4. Student-Teacher Relationship Quality

A modified version of the Student-Teacher Relationship Scale (STRS) was utilized to evaluate the teachers' global assessment of their classroom (26, 27). They rated the degree to which 15 items applied to their relationships with children in their classroom on a five-point Likert scale (1=definitely does not apply

5=definitely applies). The STRS consists of two subscales: Conflict (α=0.73) and Closeness (α=0.72). The Conflict subscale comprises eight items to evaluate negative, insecure, or hostile perceptions of the student-teacher relationship. The Closeness subscale uses seven items that assess the warmth, security, and openness of the student-teacher relationship. Higher scores indicate higher levels of conflict or closeness with learners.

2.3.2. Student Measures
2.3.2.1. Mindfulness

The Child Adolescent Mindfulness Measure (CAMM) (28) is a 10-item self-report measure for children aged 10 years and older. Children and adolescents reported how well each item describes their experience over the past two weeks on a six-point Likert scale ranging from 0 (never true) to 5 (always true). Higher scores reflect greater mindfulness. Internal consistency is relatively high (α=0.87).

2.3.2.2. Student-Teacher Relationship Quality

The Student Perception of Affective Relationship with Teacher Scale (SPARTS) (29) was used to evaluate students' perceptions of conflict, negative expectations, and closeness with their teacher. The SPARTS Conflict and Closeness scales correspond well to the STRS Conflict and Closeness scales, each of which has moderate internal consistencies (Conflict=0.79; Negative Expectations=0.70; Closeness=0.74). The children answered 34 statements that applied to their relationship with their teacher on a five-point Likert scale (1=No, that is not true to 5=Yes, that is true).

2.4. Statistical Analyses

A series of two (time: pretest vs. posttest) by two (intervention: MBSR vs. control) mixed-design Analysis of Variance were performed to answer research questions 1 and 2. The outcomes used in the mixed-design ANOVA included: the use of mindfulness techniques that teachers used in classrooms with children (RQ1) and four teacher outcomes (RQ2), including perceived stress level, anxiety, depression, and student-teacher relationship quality. For the significant effects, post-hoc analysis using Bonferroni correction was performed. The missing data were handled using listwise deletion in the mixed-design ANOVA.

A series of linear mixed-effects models using Maximum Likelihood Estimation (MLE) method were performed (RQ3). In the mixed-effects models with the intercept randomly varying, in which student (level 1) is nested within teacher (level 2), each student's outcome measured at the posttest was predicted using (1) student-level covariates, including grand-mean centered student outcome measured at the pretest, grade level (grade 5 vs. grade 4), and student gender (female vs. male), as well as (2) teacher-level covariates, namely intervention type (change in teachers' mindfulness practice between the pretest and posttest). The outcomes modeled include students' experience of mindfulness and students' perceived relationship quality with their teachers (conflict, negative expectations, and closeness).

3. Results

3.1. Participants

There were three teachers in the MBSR treatment group and four in the waitlist control group. The teachers' demographics was as follows: four females and three males, all Caucasian with an average teaching experience of 20 years (Min=11, Max=30). Those in the treatment group had slightly more experience (M=23.3, SD=3.5) than the teachers in the control group (M=18.4, SD=8.2), but the difference was not statistically significant ($t(5)=0.96$, $P>0.05$). The students whose parents consented to their participation included a total of 124 children: 53 in the 4th and 5th grades (M_{Age}=10.2 years; n_{female}=20) in the treatment group and 71 in the 4th and 5th grades (M_{Age}=10.4 years; n_{female}=37) in the control group.

3.2. Descriptive Statistics

Table 1 summarizes the descriptive statistics of all the teacher-level outcome measures separately according to groups comparison (MBSR vs. control). Due to the small sample size of each group (n=3 for MBSR; n=4 for the control), a bootstrapping method was employed to compare the means on each outcome between the two groups. All the outcomes include 0 in their bias-corrected bootstrapping confidence intervals, suggesting no differences in any of the teacher-level outcome measures. One exception was found in the MTS at the baseline, showing a higher mean in the control group.

Table 2 summarizes the descriptive statistics of the student outcomes (mindfulness and teacher-student relationship quality) separately for the control and MBSR intervention groups. The results obtained from an independent samples *t*-test showed significant mean differences between the control and MBSR intervention groups concerning the following outcomes: (1) Child Adolescent Mindfulness Measure at the pretest

Table 1: Descriptive statistics for teacher outcomes by intervention groups

Variables	Control Group					MBSR Intervention Group					95% CI	
	n	M	SD	Min	Max	n	M	SD	Min	Max	LL	UL
Perseived Stress Scale: Pretest	4	16.50	7.05	8	25	3	24.33	4.04	22	29	-4.9	0.30
Perseived Stress Scale: Posttest	4	13.50	6.14	9	22	3	13.67	3.06	11	17	-1.33	1.40
Depression: Pretest	4	7.00	12.03	0	25	3	8.00	3.61	5	12	-9.78	15.15
Depression: Posttest	4	4.00	5.42	0	12	3	1.00	1.00	0	2	-0.58	7.92
Student-teacher relationship: Pretest	4	50.25	3.30	47	54	3	47.67	6.66	40	52	-2.5	6.91
Student-teacher relationship: Posttest	4	50.25	3.30	47	54	3	46.33	2.08	44	48	-0.67	6.20
Anxiety: Pretest	4	75.25	25.13	54	110	3	99.00	13.08	90	114	-17.33	3.33
Anxiety: Posttest	4	62.75	24.66	45	99	3	59.33	12.34	49	73	-15.73	5.67
Mindfulness in Teaching: Pretest	4	58.50	6.66	53	68	3	43.67	0.58	43	44	9.90	21.08
Mindfulness in Teaching: Posttest	4	59.00	7.16	52	69	3	56.00	7.81	51	65	-8.64	13.77

Due to small sample size per group, bootstrapping method was used to compare two group means on each outcome. Bias corrected bootstrapping 95% confidence intervals for all outcomes include 0, suggesting no group difference. One exception was found on mindfulness in teaching at the pretest

Table 2: Descriptive statistics for student outcome by intervention groups

Variables	n	Control Group				MBSR Intervention Group					Mean Difference		
		M	SD	Min	Max	n	M	SD	Min	Max	Mdiff	P	d
CAMM: Pretest	65	36.71	5.52	23	50	42	33.43	7.09	9	46	3.28**	0.009	0.53
CAMM: Postest	60	37.58	5.13	24	48	43	34.35	5.72	16	44	3.23**	0.003	0.60
SPARTS: Pretest	65	90.63	13.03	55	114	41	78.17	23.00	1	105	2.12	0.40	0.70
SPARTS: Postest	60	89.62	16.90	3	111	43	78.23	15.04	44	102	-1.56	0.48	0.70
Closeness: Pretest	59	28.63	6.28	10	40	33	24.21	6.98	12	40	4.42**	0.003	0.67
Closeness: Posttest	41	29.49	6.86	13	40	38	20.82	7.66	8	38	8.67**	<0.001	1.18
Conflict: Pretest	54	39.07	3.74	24	44	33	38.15	4.84	28	47	0.92	0.32	0.22
Conflict: Posttest	58	38.81	4.46	20	44	37	36.73	4.65	22	44	2.08*	0.03	0.46
Expectation: Pretest	57	25.82	4.20	10	35	37	23.27	3.65	15	29	2.55**	0.003	0.63
Expectation: Posttest	53	25.38	2.81	18	31	40	22.50	4.47	12	27	2.88**	<.001	0.79

CAMM=Child Adolescent Mindfulness Measure; SPARTS=Student Perception of Affective Relationship with Teacher Scale; *P<0.05; **P<0.01; d=Effect size

(M=36.71, SD=5.51, n=65 for the control group vs. M=33.43, SD=7.09, n=42 for the MBSR intervention group, P=0.009); (2) Child Adolescent Mindfulness Measure at the posttest (M=37.58, SD=5.13, n=60 for the control group vs. M=34.35, SD=5.72, n=43 for the MBSR intervention group, P=0.003), (3) Closeness at the pretest (M=28.63, SD=6.28, n=69 for the control group vs. M=24.21, SD=6.98, n=33 for the MBSR intervention group, P=0.003); (4) Closeness at the posttest (M=29.49, SD=6.86, n=41 for the control group vs. M=20.82, SD=7.66, n=38 for the MBSR intervention group, P<0.001); (5) Negative Expectations at the pretest (M=25.83, SD=4.20, n=57 for the control group vs. M=23.27, SD=3.65, n=37 for the MBSR intervention group, P=0.003); (6) Negative Expectations at the posttest (M=25.38, SD=2.81, n=53 for the control group vs. M=22.50, SD=4.47, n=40 for the MBSR intervention group, P<0.001).

3.3. RQ 1: MBSR Teacher Practice

The results from a series of a two (time: pretest vs. posttest) by two (intervention: MBSR vs. control) mixed-design Analysis of Variance (ANOVA) suggested a statistically significant difference between the control and MBSR intervention group concerning the use of teachers' mindfulness techniques in classroom over time (F (1, 120.02)=10.03, P=0.03; Figure 1). The significant interaction effect between time and the intervention group indicated that the MBSR intervention teachers used mindfulness techniques in their own classroom with children more often with a significant difference with the baseline in the post-intervention (M=24.33 SE=3.48, n=3 for time 1 vs. M=13.67, SE=2.96, n=3 for time 2) (Mdiff=12.33, SE=2.82, P=0.007). As expected, no significant changes in the use of MBSR techniques was found in the control classroom over time (Mdiff=0.50, SE=2.45, P=0.85).

3.4. RQ 2: MBSR Intervention Effectiveness on Teacher Outcomes

The findings obtained from a series of a two (time:

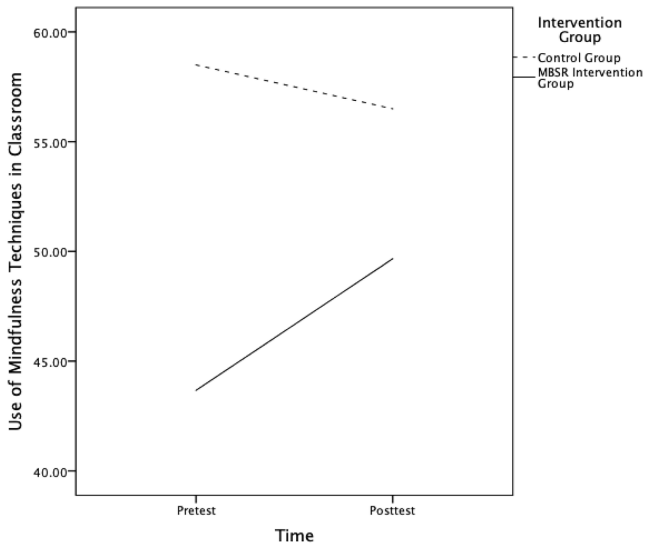

Figure 1: The figure shows the change in MSBR techniques use between MBSR and control groups. *MBSR: Mindfulness-Based Stress Reduction

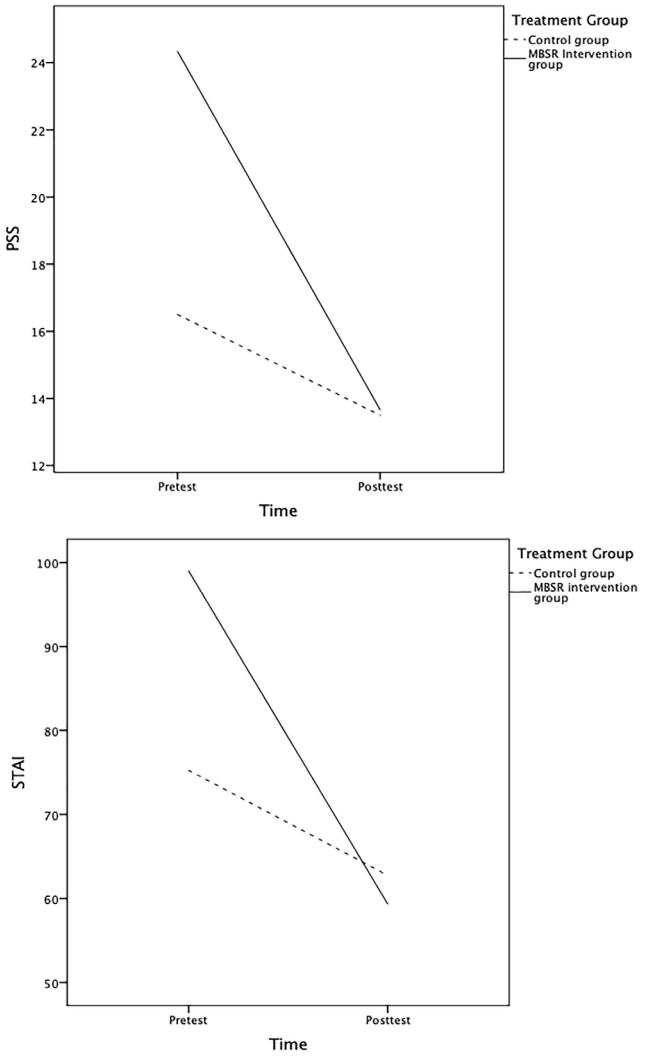

Figure 2: The figure shows the change in PSS and STAI scores between MBSR and control groups. *PSS: Perceived Stress Scale, STAI: State-Trait Anxiety Inventory, MBSR: Mindfulness-Based Stress Reduction

pretest vs. posttest) by two (intervention: MBSR vs. control) mixed-design Analysis of Variance (ANOVA) suggested that the MBSR intervention group statistically and significantly changed over time regarding the PSS (Mdiff=10.67, SE=1.43, P=0.001) and STAI scores (Mdiff=39.67, SE=6.27, P=0.001). There were statistically significant decreases in the teachers' stress (M=24.33 SE=3.48, n=3 for time 1 vs. M=13.67, SE=2.96, n=3 for time 2) and anxiety (M=99.00, SE=12.21, n=3 for time 1 vs. M=59.33, SE=11.92, n=3 for time 2) after the MBSR intervention (Figure 2). No significant changes were found in the control teachers' level of stress and anxiety. Interestingly, no significant treatment effects were found in the change in the scores of teacher depression and their perception of student-teacher relationships. For all the mixed-design ANOVAs, no covariates (age and gender) were included as none of the teacher characteristics were related to the outcome variables.

3.5. RQ 3: MBSR Intervention Effectiveness on Student Outcomes

Significant differences between the control and MBSR intervention groups were observed in students' perceptions of closeness with their teachers at the posttest (F(1, 68)=4.72, P=0.03) and in students' perceptions of negative expectations with their teachers at the posttest (F(1, 82)=4.26, P=0.04), after monitoring all the other student- and teacher-level covariates. Compared to the students in the MBSR intervention group, those in the control group had a significantly higher mean on their perceptions of closeness with their teachers at the posttest (M=29.49, SD=6.86 for the control group vs. M=20.82, SD=7.66 for the MBSR intervention group) as well as lower negative expectations of their teachers at the posttest (M=25.38, SD=2.81 for the control group vs. M=22.50, SD=4.47 for the MBSR intervention group) (Figure 3). None of the student- and teacher-level covariates were found to be statistically significant in terms of student-level outcomes prediction.

4. Discussion

The current study investigated the effects of MBSR, a group-based mindfulness intervention, on both teacher well-being and student-teacher relationships. The intervention teachers reported an increased use of mindfulness techniques and reduced stress (P=0.001) as well as anxiety (P=0.001). However, no treatment effects were found on student-teacher relationships (P=0.49) or student report of mindfulness practice (P=0.82).

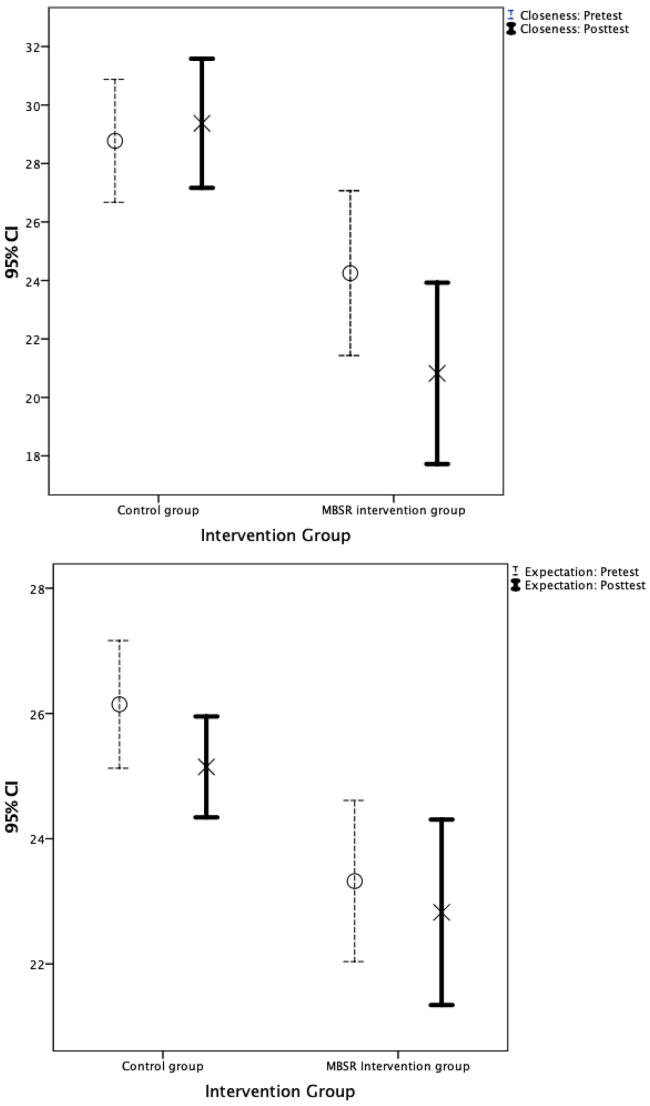

Figure 3: The figure shows the students' pretest and posttest outcomes between MBSR and control groups. *MBSR: Mindfulness-Based Stress Reduction

Teachers generally are experiencing increasing demands and high stress levels, leading to adverse job performance and even burnout (19). Increased teacher stress levels affect student outcomes, with poor student behaviors associated with higher levels of teacher stress (30). The implementation of MBIs have been previously moderately effective in reducing teacher stress and promoting teacher social and emotional well-being, which is supported in this study (10, 31).

The teachers in the control group used more mindfulness techniques in their classrooms than the treatment teachers, during both pretest and posttest. Although the teachers were randomly assigned to either the control or treatment groups, those in the control group might have already had a higher understanding of mindfulness techniques. The teachers in the treatment group significantly increased their use of mindfulness techniques in their classrooms, but still applied fewer mindfulness techniques than those in the control group. Teaching mindfulness does not necessarily provide teachers the motivation or desire to use mindfulness techniques 100% of the times. There was a significant decrease in anxiety and stress of the teachers in the treatment group after participating in MBSR. This is consistent with the findings of other studies, showing MBIs result in decreased teacher perceived stress levels as well as physical and psychological symptoms of stress (10, 18). Nevertheless, the teachers in the control group began with lower levels of stress and adverse mental health compared to the treatment teachers. Therefore, even though the treatment teachers decreased their stress levels significantly, postintervention stress levels were similar in the two groups. When controlling for these baseline differences, the teachers who participated in the mindfulness treatment made significant gains in mental health, particularly in lowered levels of stress and anxiety.

The students of both groups had fairly high levels of mindfulness at the baseline and throughout the duration of the intervention with the control group levels being slightly higher than the intervention group. The availability of MBIs in schools has dramatically increased over the past decade, and many educational systems have incorporated MBI teacher training initiatives and MBI student trainings (11). Given how popular mindfulness training has become in public schools, the level of mindfulness was fairly high in both groups of students. The students in the control group reported higher levels of closeness and lower negative expectations of their teachers at the posttest than those whose teachers participated in the mindfulness intervention, indicating that MBSR did not impact student-teacher relationships. However, the students in the control group started off with higher levels of closeness and better student-teacher relationships. Even so, those in the control group increased their closeness whereas in the treatment group, a decreased level of closeness with their teacher was observed. It is unclear why this is the case and may be a limitation as we did not collect other school climate variables that may have impacted the level of intimacy students feel towards their teacher.

4.1. Limitations and Future Directions

Although there were two groups of control and treatment groups in this research, only seven teachers participated herein. There were 124 student participants for the student measures, but the treatment group

only included three teachers who completed the teacher measures. The small sample size restricts the generalizability of the results; future studies should attempt to recruit a larger sample for both control and treatment groups. Another limitation is that teachers volunteered to participate, which means they may have previous knowledge of or experience with mindfulness techniques, being more open-minded to alternative approaches to education, and/or more willing to participate in research-based initiatives. Therefore, using a small number of volunteers may not generalize to a larger-scale application of MBI implementation, and larger-scale initiatives should be conducted. Furthermore, the students were not asked about their prior level of mindfulness training. The use of mindfulness techniques, such as meditation and yoga, has grown substantially in the past several years in both adults and children. It is possible that students are learning mindfulness techniques not only at school, but also within the home setting. Thus, prior experience with mindfulness training should be investigated in future studies that implement MBIs.

The current study did not investigate the treatment fidelity of the implementation of the MBSR program. The program also requires participants to practice at home for 45 minutes a day. Even though the teachers participated in the weekly sessions and attendance was 100% in these sessions, the fidelity of the home-based component was not evaluated. Further research should ensure that both the home and group intervention components are completed with fidelity.

Finally, due to the COVID-19 pandemic, the follow-up data were not collected for the students neither reported for teacher outcomes in view of the interruption of classroom instruction and potential confounding variables of home-based instruction. Hence, the pandemic prevented the collection and analysis of the follow-up data 5 months following MBSR intervention and probably impacted the results obtained herein. These results confirmed the usefulness of implementing MBSR intervention for teacher well-being, but did not provide evidence that an increase in teacher mindfulness will improve student-teacher relationships.

5. Conclusion

The current study examined whether teachers who participated in the MBSR course use mindfulness techniques in their classroom and report higher levels of well-being, and whether the teacher's mindfulness practice carries over to student-teacher relationships. Although teachers who completed the MBSR course did increase their use of mindfulness techniques and reported lower levels of stress and anxiety, this did not impact student-teacher relationships or student understanding of mindfulness. However, the occurance of the COVID-19 pandemic prevented the collection and analysis of follow-up data five months post-MBSR intervention and likely impacted the results of the current study. These results confirm the usefulness of implementing MBSR intervention for teacher well-being, but does not provide evidence that an increase in teacher mindfulness will improve student-teacher relationships.

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Ethical Approval

Institutional Review Board approval at the university and school district and parental consent were obtained before recruiting the participating classrooms.

Conflict of interest: None declared.

References

1. Kabat-Zinn J. Full Catastrophe Living (Revised Edition): Using the wisdom of your body and mind to face stress, pain, and illness. New York: Bantom Books; 2013.
2. Lazarus, RS & Folkman, S. Stress, appraisal and coping. New York: Springer Publishing Company; 1984.
3. Ingersoll R, Merrill L, May H. What are the effects of teacher education and preparation on beginning teacher attrition?. Research Report (#RR-82). Philadelphia: Consortium for Policy Research in Education, University of Pennsylvania; 2014.
4. Baer RA. Mindfulness training as clinical intervention: a conceptual and empirical review. Clinical Psychology Science and Practice. 2003;10(2):125-43. doi: 10.1093/clipsy.bpg015.
5. Carmody J, Baer RA. How long does a mindfulness-based stress reduction program need to be? A review of class contact hours and effect sizes for psychological distress. J Clin Psychol. 2009;65(6):627-38. doi: 10.1002/jclp.20555. PubMed PMID: 19309694.
6. Chiesa A, Serretti A. Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. J Altern Complement

Med. 2009;15(5):593-600. doi: 10.1089/acm.2008.0495. PubMed PMID: 19432513.
7. de Vibe M, Bjørndal A, Tipton E, Hammerstrøm K, Kowalski K. Mindfulness based stress reduction (MBSR) for improving health, quality of life and social functioning in adults. Systematic Reviews. 2012;8(1):1-127. doi: 10.4073/csr.2012.3.
8. Grossman P, Niemann L, Schmidt S, Walach H. Mindfulness-based stress reduction and health benefits: A meta-analysis. J Psychosom Res. 2004;57(1):35-43. doi: 10.1016/S0022-3999(03)00573-7. PubMed PMID: 15256293.
9. Virgili M. Mindfulness-based interventions reduce psychological distress in working adults: A meta-analysis of intervention studies. Mindfulness. 2013;6(2):326-37. doi: 10.1007/s12671-013-0264-0.
10. Emerson L, Leyland A, Hudson H, Rowse G, Hanley P, Hugh-Jones S. Teaching mindfulness to teachers: A systematic review and narrative synthesis. Mindfulness. 2017;8(5):1136-1149. doi: 10.1007/s12671-017-0691-4. PubMed PMID: 28989547; PubMed Central PMCID: PMC5605579.
11. Meiklejohn J, Phillips C, Freedman ML, Griffin ML, Biegel G, Roach A et al. Integrating mindfulness training into k-12 education: Fostering the resilience of teachers and students. Mindfulness. 2012;3(4):291–307. doi: 10.1007/s12671-012-0094-5
12. Kallaparin K, Siew K, Kirubakaran R, Hancock, K. Review: Effectiveness of
13. mindfulness in improving mental health symptoms of children and adolescents: A meta-analysis. Child Adolesc Ment Health. 2015;20(4):182-194. doi: 10.1111/camh.12113. PubMed PMID: 32680348.
14. Klingbeil DA, Fisher AJ, Renshaw TL, Bloomfield BS, Polakoff B, Willenbrink JB, et al. Effects of mindfulness-based interventions on disruptive behavior: A meta-analysis of single-case research. Psychology in the Schools. 2017;54(1):70-87. doi: 10.1002/pits.21982.
15. Klingbeil DA, Renshaw TL, Willenbrink JB, Copek RA, Chan KT, Haddock A, et al. Mindfulness-based interventions with youth: A comprehensive meta-analysis of group design studies. J Sch Psychol. 2017;63:77-103. doi: 10.1016/j.jsp.2017.03.006. PubMed PMID: 28633940.
16. Maynard BR, Solis MR, Miller VL, Brendel KE. Mindfulness-based interventions for improving cognition, academic achievement, behavior, and socioemotional functioning of primary and secondary school students. Systematic Reviews. 2017;13(1):1-144. doi: 10.4073/csr2017.5.
17. Zenner C, Herrnleben-Kurz S, Walach H. Mindfulness-based interventions in schools: A systemic review and meta-analysis. Front Psychol. 2014;5:603. doi: 10.3389/fpsyg.2014.00603. PubMed PMID: 25071620; PubMed Central PMCID: PMC4075476.
18. Zoogman S, Goldberg SB, Hoyt WT, Miller L. Mindfulness interventions in youth: A meta-analysis. Mindfulness. 2015;6(2):290-302. doi: 10.1007/s12671-013-0260-4.
19. Singh NN, Lancioni GE, Winton ASW, Karazsia BT. Mindfulness training for teachers changes the behavior of their preschool students. Research in Human Development. 2013;10(3):211-33. doi: 10.1080/15427609.2013.818484.
20. Jennings PA, Greenberg M. The prosocial classroom: Teacher social and emotional competence in relation to child and classroom outcomes. Review of Educational Research. 2009;79(1):491-525. doi: 10.3102/0034654308325693.
21. McIntyre TM, McIntyre SE, Bar CD, Woodward PS, Francis DJ, Durand AC, et al. Longitudinal study of the feasibility of using ecological momentary assessment to study teacher stress: Objective and self-reported measures. J Occup Health Psychol. 2015;21(4):403-414. doi: 10.1037/a0039966. PubMed PMID: 26652265.
22. Frank J, Jennings PA, Greenberg MT. Validation of the Mindfulness in Teaching Scale. Mindfulness. 2016;7(1). doi: 10.1007/s1267-015-0461-0.
23. Kendall PC, Finch Jr AJ, Auerbach SM, Hooke JF, Mikulka PJ. The State–Trait Anxiety Inventory: A systematic evaluation. J Consult Psychol. 1976;44(3):406-12. doi: 10.1037/0022-006X.44.3.406. PubMed PMID: 932270.
24. Beck AT, Steer RA, Brown GK. Manual for the Beck Depression Inventory–II. San Antonio, TX: Psychological Corporation; 1996.
25. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983;24(4):385–96. PubMed PMID: 6668417.
26. Hewitt PL, Flett GL, Mosher SW. The Perceived Stress Scale: Factor structure and relation to depression symptoms in a psychiatric sample. J Psychopathol Behav Assess. 1992;14(3):247-57.
27. Pianta RC. Student-Teacher Relationships Scale. Professional Manual, Odessa, FL: Psychological Assessment Resources; 2001.
28. Whitaker RC, Dearth-Wesley T, Gooze RA. Workplace stress and the quality of
29. teacher–children relationships in Head Start. Early Childhood Research Quarterly. 2015;30:57-69. doi: 10.1016/j.ecresq.2014.08.008.
30. Greco LA, Baer RA, Smith GT. Assessing mindfulness in children and adolescents: Development and validation of the child and adolescent mindfulness measure (CAMM). Psychol Assess. 2011;23(3):606-14. doi: 10.1037/a0022819. PubMed PMID: 21480722.

31. Koomen HMY, Jellesma FC. Can closeness, conflict and dependency be used to
32. characterize students' perceptions of the affective relationship with their teachers? Testing a new measure in middle childhood. Br J Educ Psychol. 2015;85(4):479-97. doi: 10.1111/bjep.12094. PubMed PMID: 26407806.
33. Yoon JS. Teacher characteristics as predictors of student-teacher relationships: Stress,
34. negative affect, and self-efficacy. Social Behavior and Personality: An International Journal. 2002;30(5):485-93. doi: 10.2224/sbp.2002.30.5.485.
35. Klingbeil DA, Renshaw TL Mindfulness-based interventions for teachers: A meta-analysis of the emerging evidence base. Sch Psychol Q. 2018;33(4):501-511. doi: 10.1037/spq0000291. PubMed PMID: 30507235.