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ORIGINAL PAPER

Middle School Teachers' Mindfulness, Occupational Health and Well-Being, and the Quality of Teacher-Student Interactions

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Abstract

Building upon contemporary models of teaching that suggest that teachers' own well-being is related to their classroom practice and student outcomes, we examined whether middle school teachers' mindfulness skills were related to their concurrent occupational health and well-being (job stress, occupational burnout, and depressive and anxiety symptoms), and quality of their interactions with students in their "most stressful" class during the school day. Multivariate regression analyses of 58 middle school teachers indicated that teacher mindfulness was significantly associated with lower levels of job stress, occupational burnout, and depressive and anxiety symptoms; and higher levels of observers' ratings of teachers' emotionally supportive interactions with students in their most stressful classroom. Occupational burnout, in contrast, was negatively related to observers' ratings of emotional support and organization in the classroom. Results suggest individual differences in middle school teachers' mindfulness may affect their interactions with students in the middle school classroom directly and through reductions in burnout, though longitudinal studies of these relations are needed. Findings are discussed in relation to intervention efforts to improve teacher mindfulness through training in order to support occupational health and well-being, improve the quality of teacher-student interactions in the classroom, and increase student engagement and learning.

Keywords Middle school · Teacher well-being · Mindfulness · Job stress · Burnout · Interaction quality · Emotional support · Classroom organization

Teaching can be a stressful profession. It involves highly demanding, uncertain, and emotional work that requires sustained engagement, focused attention, mental flexibility, emotion regulation, confidence, and resilience (Hargreaves 1998; Roeser et al. 2012). Research shows, for instance, that teachers report higher levels of job stress compared to non-human service professions (Johnson et al. 2005). In this context, research on malleable factors that can reduce teacher stress are desirable.

Mindfulness, the nonjudgmental, present-centered awareness of experience, has emerged as a promising coping mechanism to reduce stress and improve occupational and psychological well-being (e.g., Grossman et al. 2004; Roeser et al. 2012). Recent research examining individual differences in dispositional mindfulness suggests that mindfulness is associated with lower levels of emotional burnout, cynicism, turnover intention, and missed work days, and to higher levels of professional efficacy, job satisfaction, and job performance (Abenavoli et al. 2013; Dane and Brummel 2014; Hülsheger et al. 2013; Taylor and Millear 2016). Mindfulness skills may be particularly important to human service workers—those in health care, social services, and education—who experience disproportionate levels of job stress and related emotional distress as a function of the emotional nature of their work (Hargreaves 1998; Roeser et al. 2012).

Associations between mindfulness skills, teachers' occupational health and well-being, and classroom practices have been found in preschool teachers (Jennings 2015). Evidence suggests that the middle grades are particularly difficult to teach, which highlights the importance of studying these associations in middle school teachers (Klassen and Chiu 2011). In secondary school settings, teachers interact with students at a unique and critical time. Students enter puberty, peer subcultures become stronger, and students experience an increased need for autonomy. At this age, students become

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bigger and more physically mature, and teachers can perceive adolescent students as threats to their authority and respond with more control and discipline (Willower and Lawrence 1979). Stereotypes about adolescents as unruly and out-of-control reinforce the use of controlling strategies in the classroom, and may also contribute to teachers' heightened use of extrinsic motivational practices (Midgley et al. 1988). Finally, interacting with 120–150 students on a daily basis takes enormous cognitive and emotional energy on the part of the teacher and may preclude them from forming close social-emotional bonds with any given student given the numbers (Eccles and Roeser 2010). Combined, these factors make secondary school a particularly stressful context in which to teach, and affect teacher-student interactions in the classroom (Feldlaufer et al. 1988).

Teacher stress can be conceptualized in terms of an interaction between an individual's coping resources and the demands of specific environments—stress is indicative of a situation where perceived demands are evaluated as exceeding personal coping resources (Lazarus and Folkman 1987). This is seen as a dynamic and developmental process, with transactional models of coping positing that efforts to cope involve "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus and Folkman 1984, p. 141). Mindfulness has been identified as a promising coping resource that individuals can learn and that can help them to proactively manage stress, improve occupational health, and improve teacher-student interactions in the classroom. We are aware of only one study that has investigated how individual differences in mindfulness are related to well-being in the secondary school context. This study (Abenavoli et al. 2013) included both middle school teachers (66%) and staff, and found mindfulness to be related to lower levels of all dimensions of burnout.

Recent research has examined the effects of mindfulness-based intervention programs on teacher stress and well-being. Consistent with the larger body of literature on mindfulness in the workplace, results suggest that mindfulness is beneficial for teachers; teachers in these programs show improvements in mindfulness skills, occupational self-compassion and well-being, and reductions in anxiety, depression, stress, and burnout (Jennings et al. 2013; Roeser et al. 2013). In one randomized control trial of elementary and secondary school teachers, teacher mindfulness skills mediated intervention effects, suggesting that mindfulness is one mechanism through which these programs have a positive effect on occupational and psychological health (Roeser et al. 2013).

Mindfulness is theorized to reduce stress and improve teacher-student relationships through several related pathways. First, mindfulness practice can build both the regulation of attention and emotion and thereby reduce emotional reactivity (Hölzel et al. 2011). Mindfulness encourages individuals to focus on remaining nonjudgmental about the experiences around them (Kabat-Zinn 1994). Mindful individuals are hypothesized to employ regulatory resources to remain calm and composed, maintaining their emotional equanimity, even in challenging interactions. As such, rather than feeling overwhelmed, irritable, agitated, impatient, or defensive about current experiences, mindful people are likely to feel relaxed and emotionally well-balanced, ready to soak in experiences as they occur (Howard and Johnson 2004). In teachers, emotional composure is perhaps most noticeable in the classroom during disciplinary encounters, when stressed teachers are more likely to become reactive (Spilt et al. 2011; Sutton and Wheatley 2003).

As stress is reduced through increased attention and emotion regulation resources (e.g., Holzel et al., 2011), the energy an individual previously needed to cope with, suppress, or disguise negative emotions is freed, and can be reinvested in tasks at hand. In the case of teaching, energy no longer required for coping with negative emotions can be invested in classroom instruction, classroom management, and relationships with students. Such renewed energy should allow teachers to engage more fully, and with greater vigor and zest, in their interactions with students and in processes of teaching. For example, mindful teachers are hypothesized to have more energy to devote to the emotional support of students and awareness of their needs during learning (Klusmann et al. 2008).

Mindfulness skills also are theorized to improve social relationships, in part through the adoption of an attitude of kindness towards self and others (Cullen 2011). One of the most worrisome symptoms of stress, and relatedly, burnout, is "depersonalization," in which individuals develop a callous cynical attitude towards others. When exhaustion is reduced and emotional energy is renewed, depersonalization should fade. With respect to teachers, the ability to empathize with students is theorized to be associated with perspective-taking skills, and in turn, kinder and more supportive interactions with students. Because of their own low levels of emotional reactivity and increased energetic resources, mindful teachers are also more psychologically available to students and can be trustworthy sources of emotional and instrumental support (Spilt et al. 2011). As such, beneficial effects of mindfulness are theorized to emerge partially through the strengthening of social relationships.

These theorized pathways are important not only for teacher health and well-being, but also because they can affect the quality of teacher-student interactions in the classroom (Fig. 1; Jennings and Greenberg 2009; Roeser et al. 2012). Schools and teachers are responsible for facilitating the social, organizational, and instructional processes that help adolescents develop appropriate cognitive, social-emotional, and behavioral skills (Eccles and Roeser 1999). However, empirical evidence indicates that stress affects teachers' mental states: highly stressed teachers report lower teacher self-efficacy (Klassen and Chiu 2010) and lower efficacy for classroom

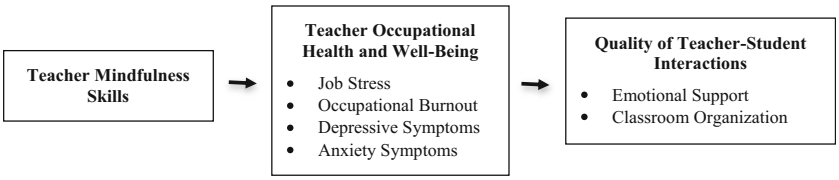

Fig. 1 Adapted logic model of teacher mindfulness on classroom practices (Roeser et al. 2013)

management (Brouwers and Tomic 2000). Stress also can affect teachers relationships with students (Yoon 2002). In a cross-sectional study of preschool teachers, two dimensions of burnout, emotional exhaustion, and depersonalization, were related to less emotionally supportive teacher-student interactions (Jennings 2015).

Teachers' emotional distress is similarly related to poor quality teacher-student interactions: teachers' depressive symptoms are associated with low levels of classroom organization, less effective behavioral management, and lower emotional support, as well as to higher levels of externalizing and internalizing problems in their students (Jeon et al. 2014). Mindfulness and self-compassion, however, are related to more emotionally supportive interactions with students (Jennings 2015).

Together, this research suggests that poor occupational health and well-being experienced by middle school teachers may prevent them from having high quality teacher-student interactions that are essential to student learning and success. The Classroom Assessment Scoring System for Secondary Settings (CLASS-S, Allen et al. 2013) is an observational measure that captures three theoretically important teacher-student interactions that facilitate students' growth: emotional support, classroom organization, and instructional support. Two dimensions, emotional support and classroom organization, are theorized to be related to teachers' mindfulness skills (Roeser et al. 2012).

Students benefit from emotionally supportive teachers, who are warm, sensitive, and responsive to student needs and perspectives. Emotionally supportive interactions with teachers are associated with: pre-K and elementary students' display of social skills and prosocial behavior (Luckner and Pianta 2011; Mashburn et al. 2008); elementary students' perceptions of close relationships with their teachers (Madill et al. 2014); rates of friendship reciprocity (Gest and Rodkin 2011). In fact, when kindergarten students identified as "at-risk" were put in 1st grade classes with emotionally supportive teachers, these students' achievement scores and teacher-student relationships improved such that they were on par with low-risk peers (Hamre and Pianta 2005). In middle school, emotional support from teachers is associated with students' emotional well-being, academic values, interest, engagement, self-efficacy, and prosocial behavior (Wentzel 2016).

Students also benefit from high levels of classroom organization, that is, when their teachers set clear expectations for classroom behavior, use proactive strategies to manage behavior, maximize learning time, efficiently maneuver transitions, and employ a variety of instructional learning formats to effectively engage students. In elementary classrooms, high quality classroom organization was related to observed positive peer interactions, and lower teacher ratings of aggression (Luckner and Pianta 2011). In secondary school, teachers' classroom organization at the beginning of the year predicted academic achievement at the end of the year (Allen et al. 2013). We are not aware of any studies that have investigated how individual differences in teachers' dispositional mindfulness are related to these aspects of teacher-student interactions in the unique context of secondary school.

The present study focuses on the relationship between middle school teachers' mindfulness skills, occupational health and well-being, and the quality of their interactions with students in their "most stressful" classroom. Following the logic model of Roeser et al. (2013), we assessed theoretically significant predictors: background characteristics, teacher mindfulness skills, job stress, burnout, and depressive and anxiety symptoms. The first aim was to identify how teacher background characteristics and individual differences in teachers' mindfulness skills were associated with their concurrent occupational health and well-being. We hypothesized that mindfulness skills would be associated with greater occupational health and well-being, over and above the effects of teachers' background characteristics. The second aim was to identify how variation in teachers' mindfulness skills and occupational health and well-being is associated with variation in the quality of teacher-student interactions as rated by observers in teachers' self-identified "most stressful class". We hypothesized that teachers' mindfulness skills, and greater occupational health and well-being, would be associated with higher levels of emotional support and classroom organization in this these high stress classes.

Method

Participants

Participants included 58 middle school teachers in the northwestern USA, who were part of a larger mindfulness-based teacher wellness program. Teachers had to meet three criteria to participate: teach 6th, 7th, or 8th grade, have specific classroom assignments (i.e., assigned to teach a specific subject within a classroom that had the same students throughout

the semester or a year), and teach in settings where observing the quality of teacher-student interactions would be appropriate (e.g., excluding physical education, school counseling offices, education specialists who work individually with children). Teachers came from 36 schools. Between enrollment and assessment, two teachers dropped out of the study, and two teachers migrated. Participating teachers were predominantly white (82%) and nearly all had a Master's degree. Sixty percent of teachers taught language arts or social studies, and 40% taught math or science.

Procedure

Information about a free mindfulness-based teacher wellness program was disseminated to all middle school teachers in the participating school district through emails sent by a district administrator and fliers posted in each school. Teachers who were interested in participating contacted the research team for additional details. After teachers provided their informed consent, they reported on their demographics, mindfulness skills, and occupational health and well-being. Data were collected from two cohorts of teachers. The first cohort ($n = 30$ teachers) participated in the fall 2014; the second cohort ($n = 28$ teachers) participated in the fall of 2015. Teachers also indicated their "most stressful" class. Trained observers scheduled to visit this class twice in the fall. Current data were collected at baseline before randomization or intervention to explore the naturally occurring variations in mindfulness skills, occupational health and well-being, and the quality of teacher-student interactions.

Measures

Demographic Characteristics

Teachers reported on their *gender* (69% female), *years teaching* ($M = 9.71$, SD = 7.45), and *school type* (40% 6-8th grades, 60% K-8 school).

Mindfulness Skills

The short form of the Five Factor Mindfulness Questionnaire (Bohlmeijer et al. 2011) assessed five components of *teacher mindfulness skills*: mindful observing, describing, active awareness, nonjudgement, and nonreactivity (24 items; $\alpha = .88$; $M = 3.24$; SD = 0.45). This scale is theoretically related to the self-awareness and self-management components of CASEL's social and emotional competencies (CASEL 2017). Items were scored on a 1 to 5 scale (1 = *Almost Never*; 5 = *Almost Always*). Items included "When I'm walking, I deliberately notice the sensations of my body moving" (observing), "I'm good at finding words to describe my feelings" (describing), "I tell myself I shouldn't be feeling the way I'm feeling" (nonjudgement), and "In difficult situations, I can pause without immediately reacting" (nonreactivity). Items were scored so higher values indicate more mindful practices.

Occupational Health and Well-Being

We assessed teacher job stress and symptoms of occupational burnout, depression, and anxiety as indicators of occupational health and well-being.

Job Stress Seven items assessed teachers' job-related stress (adapted from Lambert et al. 2001; Roeser et al. 2013; $\alpha = .58$; $M = 3.43$; SD = 0.54). Items were scored on a 1 to 5 scale (1 = *Strongly Disagree*; 5 = *Strongly Agree*) and included "Job worries distract me when I am home," and "I find dealing with student motivational and disciplinary problems to be very stressful".

Occupational Burnout Eighteen items from the Maslach Burnout Inventory (Maslach et al. 1996) assessed three components of burnout: emotional exhaustion, personal accomplishment, and depersonalization ($\alpha = .87$; $M = 3.68$; SD = 0.92). Due to space constraints, items 4, 5, 10, and 15 from the original scale were omitted from the present study due to low factor loadings found in the authors' previous work. Teachers scored items on a 1 to 7 scale (1 = *Never*; 7 = *Every Day*); higher values indicate stronger feelings of burnout. Items were averaged for a composite measure of burnout. Items included "How often do you feel emotionally drained from your work?", "How often do you feel exhilarated after working closely with your students?" (reversed).

Depressive Symptoms The Beck Depression Inventory (Beck et al. 1961) assessed teachers' feelings of depression ($\alpha = .85$; $M = 1.53$; SD = 0.39). Teachers were asked 19 items and selected the option (1 to 4) that most accurately described their current state. Higher values indicate stronger symptoms of depressed mood. For example, one item prompted about sleep habits; options included: "I can sleep as well as usual" (1), "I don't sleep as well as I used to" (2), "I wake up 1-2 hours earlier than usual and find it hard to get back to sleep" (3), and "I wake up several hours earlier than usual and cannot get back to sleep" (4).

Anxiety Symptoms The State/Trait Anxiety Inventory (Spielberger et al. 1983) assessed teachers' anxiety ($\alpha = .94$; $M = 2.40$; SD = 0.57). Teachers rated 20 items on a 1–4 scale (1 = *Not at all*, 4 = *Very much*) including "I feel calm", "I feel secure,", and I feel tense." Higher values indicate stronger symptoms of anxiety.

Quality of Teacher-Student Interactions: Emotional Support and Classroom Organization

Teacher-student interaction quality was assessed using the Classroom Assessment Scoring System-Secondary (CLASS-S; Allen et al. 2013). Observations were conducted in teachers' self-identified most challenging classrooms on 2 days. On each observation day, a certified observer entered the classroom before the class period began, started their observation at the beginning of the class period, and observed for 15 min while taking notes about the quality of teacher-student interactions that are relevant for each of six CLASS dimensions: positive climate, teacher sensitivity, regard for student perspectives, behavior management, productivity, and negative climate. Following this 15-min observation occasion, observers then spent 10 min assigning ratings about the quality of interactions for each dimension ($1 = Low$, $7 = High$). After completing this first observation cycle (observing, note taking, and rating), the observer completed a second observation cycle during that class period. Four observations (two collected on each of 2 days) were averaged to create a measure of the quality of teacher-student interactions. Two observers simultaneously and independently rated 20 % of the classroom observations, and the inter-observer reliability was assessed as the percentage of scores that were within one-point of each other on the 1 to 7 rating scales. The percent agreement within one for the six CLASS dimensions ranged from 80–100% across dimensions, which is comparable to the inter-rater agreement from other studies using the CLASS-S.

Consistent with recent approaches, we created scales for emotional support and classroom organization (Allen et al. 2013). *Emotional support* reflects teachers' positive classroom climate, their sensitivity to students, and regard for adolescent perspective, including supporting student autonomy, ideas, and peer interactions. *Classroom organization* reflects teachers' clear, proactive management of student behavior, productive use of time, and employing a variety of learning formats that encourage students' effective engagement. Table 1 provides descriptive statistics on these variables.

Data Analyses

We first tested whether our variables of interest varied significantly by cohort. There were no significant differences between cohorts in gender composition, number of years teaching, school type, mindfulness, job stress, occupational burnout, depressive symptoms, anxiety symptoms, or emotional support. Classroom organization was significantly higher in Cohort 2 ($M = 6.39$; $SD = 0.38$) than Cohort 1 ($M = 5.85$; $SD = 0.84$; $t(39) = -3.12$, $p = .003$). Due to this finding, we include cohort has a covariate in the model predicting classroom organization.

Table 1 Descriptive statistics for teacher demographics, mindfulness skills, occupational health and well-being, and quality of teacher-student interactions

	N	Mean	SD	Min	Max
Demographics					
Years teaching	52	9.71	7.45	0.25	37.00
Mindfulness skills					
Mindfulness	54	3.24	0.45	2.08	4.42
Occupational health and well-being					
Job stress	54	3.43	0.54	2.00	4.57
Occupational burnout	54	3.68	0.92	1.72	5.61
Depressive symptoms	54	1.53	0.39	1.00	2.67
Anxiety symptoms	54	2.40	0.57	1.20	3.85
Quality of teacher-student interactions					
Emotional support	55	4.35	0.67	2.79	5.92
Classroom organization	55	6.10	0.71	4.04	6.92

To address the first goal of the study, we examined the relations between mindfulness and occupational health and well-being using bivariate correlations. These analyses included all cases where data were available for both variables of interest. After testing that the assumptions of homoscedasticity and uncorrelated errors were met, using the Breusch-Pagan and Durbin-Watson tests in *R*, respectively, these associations were also tested using multivariate ordinary least squares (OLS) regression. Because less than 1% of the data were missing, these analyses include all cases with complete data. Following the theory of change from Roeser et al. (2013), we examined the predictive contribution of demographic variables (teacher gender, years of teaching, and school type) and teacher mindfulness skills on job stress, burnout, and symptoms of depression and anxiety. To address the second goal, we examined bivariate and multivariate relations between these antecedent variables and observed classroom emotional support and organization (CLASS-S).

Results

Mindfulness Skills and Occupational Health and Well-Being

Bivariate correlations are presented in Table 2. As predicted, results showed significant correlations between mindfulness and all dimensions of occupational health and well-being. Higher self-

Table 2 Bivariate correlations among teacher demographics, mindfulness skills, occupational health and well-being, and quality of teacher-student interactions

		1	2	3	4	5	6	7	8	9	10
	Demographics										
1	Female	–									
2	Years teaching	− 0.03	–								
3	School type	− 0.07	− 0.06	–							
	Mindfulness skills										
4	Mindfulness	0.23	− 0.07	− 0.12	–						
	Occupational health and well-being										
5	Job stress	0.13	− 0.15	0.07	− 0.30	–					
6	Occupational burnout	0.06	0.05	0.04	− 0.30	0.53	–				
7	Depressive symptoms	− 0.13	0.06	0.09	− 0.52	0.29	0.30	–			
8	Anxiety symptoms	− 0.12	− 0.04	0.29	− 0.57	0.26	0.45	0.65	–		
	Quality of teacher-student interactions										
9	Emotional support	− 0.06	0.19	− 0.17	0.14	0.16	− 0.17	0.08	− 0.13	–	
10	Classroom organization	0.03	0.28	− 0.08	0.19	− 0.05	− 0.31	− 0.09	− 0.31	0.63	–

Correlations stronger than |.27| are significant at the .05 level

reported mindfulness skills were significantly related to lower levels of job stress ($r = -.30$) and burnout ($r = -.30$), as well as fewer depressive ($r = -.52$) and anxiety symptoms ($r = -.57$).

Table 3 presents unstandardized regression coefficients from the OLS regression models predicting teacher occupational health and well-being in a multivariate framework controlling for demographic factors. Mindfulness negatively predicted job stress ($b = -0.52$, SE = .16, $p = .002$) and burnout ($b = -0.86$, SE = .28, $p = .004$), as well as fewer depressive symptoms (b = −0.42, $SE = .10$, $p < .001$) and anxiety symptoms (b = −0.66, $SE = .15$, $p < .001$). Demographic characteristics were not significantly or consistently associated with occupational health and well-being, although positive betas across all outcomes suggest that female teachers report poorer occupational health and well-being than male teachers.

Mindfulness Skills, Occupational Health and Well-Being, and Teacher-Student Interactions

Bivariate correlations (Table 2) indicated that years of teaching experience was positively related to classroom organization ($r = .28$). Occupational burnout ($r = -.31$) and anxiety symptoms ($r = -.31$) were negatively related to classroom organization. No other associations were significant.

Next, we examined the predictors of the quality of teacher-student interactions in a multivariate framework with demographic controls. Unstandardized regression coefficients from the OLS regression models are featured in Table 4. The model explained a significant portion of the variance in emotional support $F(8,43) = 2.43$, $p = .03$. Results indicate that teachers with more experience in the classroom were rated by independent observers as having higher levels of emotionally supportive interactions with students ($b = 0.02$, SE = .01, $p = .04$). Mindfulness was also related to higher levels of observed emotional support ($b = 0.52$, SE = .25, $p = .04$). Occupational burnout was uniquely associated with lower levels of observed emotional support ($b = -0.28$, SE = .13, $p = .03$) over and above the effects of the other aspects of occupational health and well-being. A one standard deviation increase in occupational burnout was associated with 0.40 decrease in emotional support.

Results also showed that in the presence of occupational burnout, higher job stress was related to higher levels of emotional support ($b = 0.60$, SE = .19, $p = .004$). Teacher gender and school type were not associated with emotional support. This model accounted for a significant 18% of the variance in emotional support.

The model predicting classroom organization explained a significant portion of the variance in this construct $F(9,42) = 3.38$, $p = .003$. Teachers' years of experience in the classroom was related to higher levels classroom organization ($b = 0.03$, SE = .01, $p = .05$). Occupational burnout was associated with lower levels of classroom organization ($b = -0.31$, SE = .13, $p = .02$). A one standard deviation increase in occupational burnout was related to 0.39 decrease in classroom organization. No other predictors reached significance, although job stress again had a marginal positive predictive relation with classroom organization after accounting for the other variables in the model. The model accounted for 30% of the variance in classroom organization ($p = .003$).

Table 3 Predicting occupational health and well-being from teacher demographics and mindfulness skills

	Job stress		Occupational burnout		Depressive symptoms		Anxiety symptoms	
	Beta	SE	Beta	SE	Beta	SE	Beta	SE
Intercept	5.03***	0.54	6.08***	0.94	2.79***	0.33	4.44***	0.51
Demographics								
Female (1 = female)	0.27	0.16	0.44	0.27	0.05	0.10	0.04	0.15
Years teaching	− 0.01	0.01	0.00	0.02	0.00	0.01	0.00	0.01
School type (1 = middle school)	0.07	0.14	0.17	0.25	0.05	0.09	0.24	0.13
Mindfulness skills								
Mindfulness	− 0.52**	0.16	− 0.86**	0.28	− 0.42***	0.10	− 0.66***	0.15
DF	47		47		47		47	
Adjusted *R*-squared	0.14*		0.12*		0.23**		0.29***	

Unstandardized betas are reported. *SE*, standard error. * $p < .05$; ** $p < .01$; *** $p < .001$

Discussion

Studies of mindfulness in education at the secondary school level remain rarer than those at the elementary school level. Results of the current study complement those done with preschool and elementary teachers in showing that middle school teachers' mindfulness skills are associated with lower levels of job stress, occupational burnout, and symptoms of depression and anxiety. Results also indicated that the greater middle school teachers' symptoms of occupational burnout, the less likely they are to have developmentally appropriate, high quality teacher-student interactions with adolescents in their most challenging classrooms. As such, enhancing middle school teachers' mindfulness skills may have positive effects on their health and well-being, as well as for improving teachers' interactions with their early adolescent students, especially those who are struggling in school. Longitudinal data is necessary to examine these conjectures and relations naturalistically.

Mindfulness: A Point of Leverage to Alleviate Middle School Teachers' Distress

We hypothesized that middle school teachers' mindfulness skills would be associated with fewer symptoms of job stress,

Table 4 Predicting the quality of teacher-student interactions from teacher demographics, mindfulness skills, and occupational health and well-being

	Emotional support		Classroom organization	
	Beta	SE	Beta	SE
Intercept	0.78	1.35	4.20**	1.42
Demographics				
Female (1 = female)	− 0.15	0.20	0.10	0.21
Years teaching	0.02*	0.01	0.03*	0.01
School type (1 = middle school)	− 0.18	0.18	0.09	0.18
Mindfulness skills				
Mindfulness	0.52*	0.25	0.26	0.26
Occupational health and well-being				
Job stress	0.60**	0.19	0.26	0.21
Occupational burnout	− 0.28*	0.13	− 0.31*	0.13
Depressive symptoms	0.65	0.33	0.56	0.35
Anxiety symptoms	− 0.08	0.23	− 0.32	0.24
DF	43		42	
Adjusted *R*-squared	0.18*		0.30**	

Due to the significant cohort difference in classroom organization scores, the model predicting classroom organization controls for cohort. Unstandardized betas are reported. *SE*, standard error. * $p < .05$; ** $p < .01$

occupational burnout, depression, and anxiety. Results supported these hypotheses and complement Jennings' (2015) work with preschool teachers and similar variables, and Abenavoli et al.'s (2013) study of mindfulness and burnout in middle school teachers and staff. While our cross-sectional data do not allow us to draw causal conclusions, results are consistent with the theory of mindfulness as a coping mechanism for teachers' stress, and results from randomized controlled trials that show mindfulness training for teachers can enhance their occupational health and well-being (Jennings et al. 2013; Roeser et al. 2013). Present results suggest that teachers who are more mindful may be able to identify, regulate, and manage their cognitive and emotional experiences such that they feel less stressed, depressed, and anxious. Less stress has been hypothesized to lead to newfound energy that teachers can use to cultivate positive relationships with students. The findings of this study provide some support for these hypotheses, and thus also support contemporary work that targets teacher mindfulness as a malleable factor in professional development programs for reducing teacher stress and improving teacher-student interactions in the classroom. (Jennings et al. 2017; Roeser et al. 2013).

Occupational Burnout: A Risk for Poor Quality Teacher-Student Interactions

A second key focus of this study was our hypothesis that higher mindfulness skills and greater occupational health would predict the quality of teacher-student interactions with adolescents in middle school teachers' most stressful classrooms. Unlike previous work with preschool teachers (Jennings 2015), we did not find such bivariate relations in this study. However, in our multivariate analyses, we found partial support for our hypothesis, with mindfulness, job stress, and occupational burnout uniquely related to the quality of teacher-student interactions. More mindful teachers were observed to have higher levels of emotionally supportive teacher-student interactions. Consistent with the model of the prosocial classroom (Jennings and Greenberg 2009), higher occupational burnout was associated with lower quality teacher-student interactions, both emotional support and classroom organization. These results suggest that teachers who are overwhelmed by the demands of their job are less able to positively manage classroom behavior, establish strong relationships with students, and tailor their interactions in response to student needs. Previous research found that emotional exhaustion, a component of burnout, was related to reduced self-efficacy for classroom management in secondary school teachers (Brouwers and Tomic 2000). The current study contributes to this growing body of literature that suggests occupational burnout is detrimental not only to teachers' personal well-being, but also their objective ability to create developmentally appropriate learning environments for early adolescent students (Brouwers and Tomic 2000; Jennings and Greenberg 2009; Roeser et al. 2013; Taylor and Millear 2016).

Contrary to our hypotheses, job stress had a positive effect on emotional support in the multivariate analyses, which also included levels of occupational burnout. Stress researchers have articulated the "toughness concept" whereby physiological arousal to moderately stressful situations corresponds with positive performance in complex tasks and emotional stability (Dienstbier 1989). Recent research supports this theory, with results indicating that individuals who face moderate adversity, relative to no or high levels of adversity perform better in stressful situations (Seery et al. 2013). We posit that after controlling for the overlap between job stress and occupational burnout, the residual amount of stress that is positively related to emotionally supportive teacher-student interactions indicates teachers' continued and active engagement in, and commitment to students' learning. Perhaps teacher stress is not necessarily detrimental to classroom interactions unless it is too high and tending towards burnout.

Limitations

The current study has some notable limitations. First, although the sample size of the present study was relatively large for this type of research—for instance, a comparable study investigating similar associations included 35 preschool teachers (Jennings 2015)—these findings are still based on a small sample of teachers. Further, the participants in the present study self-selected to be part of a free mindfulness-based teacher wellness program. It is possible that the teachers who volunteered to participate in the study differ from the general population of teachers. Naturalistic, longitudinal studies of teachers that include larger samples are necessary to extend and generalize the results found here.

Current results suggest that in the presence of burnout, job stress is associated with more emotionally supportive interactions in the classroom. Together with past research (Dienstbier 1989), we posit that small amounts of stress are beneficial for teachers. However, it is also important to note that the measure of job stress used in the current study had low reliability. If this measure is, in fact, a weak representation of job stress, this may account for the unhypothesized findings with regard to this construct. Studies employing reliable and valid measures of job stress will help to clarify these relationships.

The cross-sectional nature of these data do not allow for causal conclusions. Our theoretical background suggests that job stress and burnout cause differences in the quality of teacher-student interactions. However, the reverse is also true—interactions cause stress (Montgomery and Rupp 2005). Future research might examine these associations

using longitudinal data and techniques that test for bi-directional causal associations.

A fourth important element to highlight is that we focused on the quality of teacher-student interactions in middle school teachers' most challenging class; this element of the study may limit the generalizability of these findings. We can only postulate how these interactions may differ from their average or least challenging class. It may be that teachers are more attentive to these interactions when the class is challenging, such that their scores are higher in these classes. It may also be that teachers' scores are lowest in these classes, as the demands on them are greater in these settings and thus overtax mental and physical resources. It is possible that teachers' mindfulness skills and reported levels of occupational health and well-being may be more related to their interaction quality according to different levels of "challenge" presented by the class. Future research at the secondary level could address this.

Finally, we did not examine student-level data in the present study. To fully test the model of the prosocial classroom (Jennings and Greenberg 2009) and the logic model used to guide many studies of mindfulness-based programs for teachers (e.g., Roeser et al. 2013), including student-level data in the future is important.

Implications for Future Research

Occupational burnout is a significant issue in the realm of education, with half of new teachers leaving the profession within their first 5 years in the classroom (Greenberg et al. 2016; Ingersoll and Smith 2003). In addition to its negative effects on teacher well-being, the institutional and day-to-day stress and burnout experienced by teachers takes a toll on school budgets that are currently strained to fund teacher healthcare (Costrell and Dean 2013). Present results suggest that mindfulness may be an important resource to help teachers cope with the immense daily stress of their profession, which may improve occupational and psychological health, retention, and even lower healthcare costs.

Recent conceptualizations of teacher influence emphasize the importance of teacher well-being in their ability to effectively manage the class and establish healthy relationships with students (Jennings and Greenberg 2009). Jennings (2015, p. 741) declared that the empirical "research on teachers' social and emotional characteristics in relation to classroom quality… is scant". The present study helps to address this issue by extending Jennings' study of preschool teachers to investigating these associations in middle school teachers, who interact with students in the challenging period of induction into adolescence. The present study identifies mindfulness as a factor associated with improved occupational health and well-being in middle school teachers. In addition, results also showed that teacher mindfulness was directly associated with high quality, emotionally supportive teacher-student interactions in middle school teachers' most stressful classrooms.

Situated in the extant literature that indicates that mindfulness is malleable factor (e.g., Kirby et al. 2017), the present study suggests that improving mindfulness skills is one promising way to support teacher well-being and likely improve the quality of teacher-student interactions. Indeed, findings by Jennings and colleages (2017) show that mindfulness training can improve teachers' emotionally supportive interactions in the elementary school classroom. Intervention results on classroom outcomes from the present study will be forthcoming, and we hope to see more research in the future on mindfulness in secondary school settings with the aim of improving these settings for adolescent students, and understanding the processes that underlie the association between mindfulness, well-being, and classroom practice.

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Author Contributions SSB: Together with RWR, conceptualized the study. Completed data analyses, interpretation, and manuscript preparation.

RWR: Project Principal Investigator. Together with SSB, conceptualized the study. Collaborated with data analyses, interpretation, and manuscript preparation.

AJM: Project Co-Investigator, collaborated in the writing, and editing of the final manuscript.

ES: Project Co-Investigator, collaborated in the writing, and editing of the final manuscript.

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Compliance with Ethical Standards

Conflict of Interest Robert Roeser (PI), and Andrew Mashburn and Ellen Skinner (CO-PIs) received research grants from the William T. Grant Foundation (10942) and the Spencer Foundation (201400182) to conduct this research. The first author was supported by a predoctoral training grant from the Institute of Educational Sciences (R305B090007), and second author was supported by the Bennett Pierce Chair in Care and Compassion, during the preparation of this manuscript.

Ethical Approval All procedures were in accordance with the ethical standards of the Portland State University institutional review board and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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