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Development of a multidimensional, multi-informant measure of teacher mindfulness as experienced and expressed in the middle school classroom

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Abstract

In response to growing interest in mindfulness as a support for educators, the current study sought to create and test a new multidimensional and multi-informant measure of teacher mindfulness in the classroom. To counter some of the limitations of context-general self-reports, we designed two theoretically based classroom-specific measures that capture the *experience* and *expression* of mindful teacher behavior from the perspective of *teachers* and *students*. Drawing on emerging consensus from experts on mindfulness in education, the measures incorporated three dimensions of mindfulness, namely, Calm, Clear, and Kind teacher behavior in the classroom, as well as their antitheses, namely, Reactive, Distracted, and Critical teacher behavior. Utilizing data from 78 sixth- to eighth-grade teachers and 550 of their students, teacher- and student-report item sets tapping these dimensions were tested for reliability and validity across three time points. Based on confirmatory factor, reliability, structural invariance, and correlational analyses, subscales generally demonstrated satisfactory psychometric properties, cross-year stabilities, convergent and criterion validity with multiple established measures, and some overlap across reporters. In terms of connections to observer ratings from the CLASS-S, teacher subscales showed consistent but modest connections, whereas student subscales showed higher correlations (especially at time 2), suggesting that students and observers converged in their perceptions of teachers' *expressions* of mindfulness. Possible improvements to both measures as well as implications for future research on teacher mindfulness are discussed.

Keywords

Mindfulness, measurement, teacher behavior, student reports, middle school, classrooms

The last decade and a half has witnessed a burgeoning interest in the potential for mindfulness training (MT) for teachers to contribute to efforts to transform the culture of education (see Ergas, 2015; Schonert-Reichl & Roeser, 2016). Studies suggest that MT can be an effective strategy for promoting teachers' mindfulness, well-being, and physical health, and for reducing job stress and burnout (Hwang, Bartlett, Greben, & Hand, 2017). Teachers reporting higher levels of dispositional mindfulness have also been shown to evince lower levels of depressive and anxiety symptoms, job stress, and occupational burnout; and, in their interactions with students, to show greater emotional support, perspective-taking, and sensitivity to discipline (i.e., use of proactive rather than reactive management strategies; Becker, Gallagher, & Whitaker, 2017; Braun, Roeser, Mashburn, & Skinner, 2019; Jennings, 2014).

To date, however, studies focusing on naturally occurring or training-induced teacher mindfulness have captured the construct almost exclusively through the use of teacher self-report surveys of general state or trait mindfulness, such as the Five Factor Mindfulness Questionnaire (FFMQ), which measures five aspects of mindfulness: observing, describing, acting with awareness, non-judgment of inner experience, and nonreactivity to inner experience (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Baer et al., 2008), or the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), which consists of items tapping mindlessness

(e.g., "I find it difficult to stay focused on what's happening in the present") that are then reverse coded in order to capture dispositional mindfulness (Brown & Ryan, 2003). Such domain-general self-report questionnaires have notable limitations with respect to the study of teacher mindfulness. First, they are not focused on how mindfulness manifests in the classroom. To examine questions about teacher mindfulness, such as whether these skills influence the quality of teaching and relationships with students (e.g., Jennings, 2014; Roeser, Skinner, Beers, & Jennings, 2012), it is important to explicitly target teachers' embodiment of mindfulness in the classroom. Second, because they are based on self-reports, these measures are susceptible to well-known methodological limitations. Social desirability is especially problematic in the context of MT interventions, where teachers know that promoting mindfulness is an explicit intervention goal (Davidson & Kaszniak,

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2015; Grossman & Van Dam, 2011). Likewise, common method bias is problematic for studies of the effects of mindfulness, since almost all the constructs typically targeted in this research, such as stress, burnout, and well-being, are also measured using self-reports. These concerns converge with critiques that have targeted the conceptual and methodological shortcomings of such measures more generally. For example, Grossman and Van Dam (2011) argue that these kinds of measures lack (1) content validity (i.e., evidence that measures capture all aspects of mindfulness), (2) convergent validity with other measures of mindfulness, and (3) clear external referents to anchor the characteristics of a mindful person; suffer from response biases (in that previous exposure to mindfulness practices may suggest desirable responses); and, specifically with the MAAS, raise doubts about whether individuals can accurately assess their own mindlessness (Grossman, 2011).

An important first step in the genesis of a context-specific measure of teacher mindfulness was the creation of the Interpersonal Mindfulness in Teaching Questionnaire (IMT; Frank, Jennings, & Greenberg, 2016; Greenberg, Jennings, & Goodman, 2010), developed by researchers with a long history of expertise in mindfulness in education. This 14-item measure was created from an item pool (consisting of items adapted from existing domain general scales as well as some new items) that tapped teacher focus during instruction and daily school activities, emotional awareness, self-regulation, and responsivity and sensitivity during student–teacher interactions. Exploratory factor analysis suggested two dimensions, which were confirmed in subsequent structural analyses on independent samples. One, labeled “Intrapersonal” (9 items), taps mindlessness (e.g., “When I am teaching, I find myself doing things without paying attention”), and one, labeled “Interpersonal” (5 items), taps sensitive responsive interactions with students (e.g., “I listen carefully to my students’ ideas, even when I disagree with them”). Surprisingly, the Intrapersonal subscale is not correlated with any validity indicators; correlations are significant only with the Interpersonal subscale. Work on the IMT suggests at least two important components of teacher mindfulness, one tapping lack of attention (which we refer to subsequently as “Distraction”) and one tapping care for students (which we refer to subsequently as “Kindness”). At the same time, the IMT is subject to many of the same critiques as the domain general measures on which it was based.

Conceptually Based Measures of Teacher Mindfulness

Therefore, an important next step in mindfulness research is to create contextualized measures that overcome some of these shortcomings, that is, that are theory-based, relatively comprehensive, behaviorally specific, comparable to standard assessments, and most importantly, that supplement self-reports with information about teacher mindfulness from other sources, such as second-person reports from students and third-person reports from raters using observational coding systems. Hence, the goal of this study was to develop and test two theoretically based classroom-specific measures that capture teacher mindfulness from the perspective of both teacher and students. The strategy used in the construction and validation of these measures was an iterative theory-driven and confirmatory process rooted in an emerging conceptualization of mindfulness.

Although the field has not yet converged upon a single definition (Lutz, Jha, Dunne, & Saron, 2015), many conceptualizations

characterize mindfulness as an internal phenomenological and psychological state or dispositional trait (e.g., Brown & Ryan, 2003; Davidson & Kaszniak, 2015; Lutz et al., 2015). However, research suggests that mindfulness may not only support teachers themselves through the practice of mindfulness skills but also allow teachers to “transfer” such skills into the classroom setting, thereby potentially shaping teacher–student interactions (e.g., via greater teacher sensitivity) and student outcomes (e.g., a sense of being heard; Flook, Goldberg, Pinger, Bonus, & Davidson, 2013; Jennings et al., 2017). Thus, in the current study, we examined both the subjective phenomenology of mindfulness as a state that teachers *experience* while in the classroom, as well as the potential outward behavioral *expression* of mindfulness. By expression, we were interested in whether mindful teachers might manifest a certain kind of professional presence in the classroom, similar to the concept of teacher “presence” offered by Rodgers and Raider-Roth (2006) as “a state of alert awareness, receptivity, and connectedness to the mental, emotional, and physical workings of both the individual and the group in the context of their learning environments, and the ability to respond with a considered and compassionate best next step” (p. 266).

Conceptualizing teacher mindfulness as calm, clear, and kind behavior in the classroom. Measurement development efforts were anchored by an emergent conceptualization of mindfulness in teaching developed in a series of interdisciplinary dialogues between contemplative practitioners and scholars sponsored by the Mind and Life Educational Research Network (MLERN; see Mind and Life Institute, 2009; <https://www.mindandlife.org>) and the Garrison Institute (see Schoeberlein & Koffler, 2005). During one MLERN meeting in 2006, Dr. Daniel Goleman suggested that those who embody the fruits of engaging in contemplative practices might be cogently described as “calm in body, clear in mind, kind in heart.”¹ The notion that calmness, clarity, and kindness are essential manifestations of mindfulness offers an expanded conceptualization that is nevertheless consistent with insights from previous definitions (see Table 1). The idea that mindfulness entails calmness and emotional balance echoes definitions that include equanimity (Young, 2006), receptivity (Rodgers & Raider-Roth, 2006), and acceptance (Bishop et al., 2004). The idea that mindfulness entails clarity of thought, word, and deed resonates with definitions that highlight paying attention intentionally (Kabat-Zinn, 1994) and remaining alert and aware (Rodgers & Raider-Roth, 2006) of moment-to-moment experience (Young, 2006). And the element of kindness can be found in definitions suggesting that mindfulness is nonjudgmental (Cullen, 2011; Kabat-Zinn, 1994; Young, 2006), connected, and compassionate (Rodgers & Raider-Roth, 2006).

Thus, mindful teachers would be (1) *calm*, that is, composed, stable, emotionally well regulated, and resilient in the classroom, even in the face of challenges, such as student misbehavior; (2) *clear*, that is, fully present and focused, aware of all that is happening in the classroom, and able to think and communicate clearly with their students, even under challenging circumstances caused by, for example, repeated interruptions; and (3) *kind*, that is, they would show empathy, perspective-taking, forgiveness, and compassion in their interactions with students and in how they deal with themselves, especially when self or others disappoint or make mistakes.

Table 1. Definitions of calm, clear, kind, and their antitheses reactive, distracted, and critical.

Mindfulness	Antithesis	Links to previous definitions
<i>Calm</i>	<i>Reactive</i>	Equanimity (Young, 2006)
Composed, stable, emotionally well regulated, equanimity, resilient.	Emotionally uneven or imbalanced, easily triggered, overreactions, ruminative, slow recovery.	Receptivity (Rodgers & Raider-Roth, 2006) Acceptance
<i>Clear</i>	<i>Distracted</i>	Paying attention (Kabat-Zinn, 1994)
Focused, aware, alert, fully present, easily access and coherently communicate thoughts, strategies, next steps.	Preoccupied, confused, chaotic, suppressed emotions, difficulty formulating thoughts, actions, and coherent communications.	Alert and aware (Rodgers & Raider-Roth, 2006) Awareness of moment-to-moment experience (Young, 2006)
<i>Kind</i>	<i>Critical</i>	Nonjudgmental (Kabat-Zinn, 1994; Young, 2006)
Compassionate, empathic, perspective-taking, forgiving in relation to self and others.	Harsh, derogatory, disparaging, blaming others, self-focused.	Connected and compassionate (Rodgers & Raider-Roth, 2006)

Reactive, distracted, and critical teacher behavior. These three key elements of teacher mindfulness can also be used to derive states that interfere with mindfulness, which we refer to as their theoretical antitheses (also in Table 1). Thus, when teachers are *not* calm, they may feel and show *reactivity*, such as emotional overreactions, rumination, or slow recovery. By the same token, when teachers are *not* clear, they may feel and appear *distracted*, that is, preoccupied and confused, attempting to suppress intense emotions, and they may have difficulty formulating coherent thoughts and plans of action. Finally, when teachers are *not* kind, they may feel and express a *critical* attitude that could include harshness, self-centeredness, and blaming students for their struggles. Construction of six brief subscales for each reporter were tied directly to the three facets of mindfulness and their counterparts summarized in Table 1, with the expectation that this would provide a more theoretically grounded and comprehensive conceptualization of mindfulness upon which to base the current measures.

The Current Study

This study represented first steps in the creation of a multidimensional, multi-informant measure designed to capture the *experience* and *expression* of mindful teacher behavior in the classroom. Measurement development efforts were embedded in a randomized controlled trial (RCT) testing the effects of MT on middle school teachers. For purposes of measurement construction, this design had advantages and disadvantages. On the one hand, the sample

of teachers was relatively small, thereby limiting the statistical tests we could use, and student-report data were available only for times one and two. On the other hand, the study included three time points for data collection—pre-intervention (fall), post-intervention (spring), and follow-up into the next school year (following fall)—and so allowed us to cross-validate the functioning of subscales at multiple time points and to examine the cross-time stabilities of subscales as lower bound estimates of their test–retest reliabilities. Based on the notion that mindfulness plays a particularly important role during stressful transactions in the classroom (Skinner & Beers, 2016), we collected student reports and conducted observations in the class each teacher identified as “most stressful.”

The study aimed to address some of the critiques leveled against other measures of mindfulness. First, the incorporation of multiple reporters ameliorates some of the social desirability biases found in teacher reports. Second, concerns about content validity are reduced because the measures are based on a more comprehensive conceptualization of mindfulness. Third, convergent validity was addressed by examining connections between the new teacher-report measure and a well-established self-report measure of general mindfulness, specifically the FFMQ, as well as measures of occupational stress, burnout, depression, and anxiety. As validity indicators for student reports of teacher mindfulness, we included student reports of their engagement, sense of belonging in the classroom, classroom involvement, class value, and academic self-efficacy; and observer ratings of student engagement.

Finally, to reduce biases due to common method variance and to provide external referents to anchor the characteristics of a mindful person in a specific setting, this study included among its validity indicators a well-established observational measure of teacher–student interactions and student engagement in the classroom (CLASS, Pianta & Hamre, 2009). Based on the notion, articulated in a meeting of the Garrison Institute (see Schoeberlein & Koffler, 2005), that two of the domains of the Classroom Assessment Scoring System (or CLASS; Pianta & Hamre, 2009), namely, emotional support and classroom organization, might already code some of the behaviors most likely to reflect mindfulness in teachers, we used as a validity indicator, the CLASS-S, an adaptation based on developmental theory and research that focuses specifically on secondary schools and incorporates the needs of adolescents (Hafen et al., 2015). Although most previous research has used the CLASS-S to rate classrooms at the domain level, we also utilized the observer-rated dimensions that constitute the higher-order domains of emotional support (i.e., positive climate, teacher sensitivity, and regard for adolescent perspectives) and classroom organization (i.e., behavior management, productivity, and negative climate), in order to focus on teacher behaviors that involve calmness, clarity, and kindness—teacher mindfulness in the classroom (TMC).

Method

Participants

Data were utilized from 78 sixth- to eighth-grade teachers from 24 schools who had been recruited to participate in a MT program. Seventy-three percent were female and 71% were Caucasian. Teachers were on average 40 years old ($SD = 8.66$) and had 9.71 years of teaching experience ($SD = 7.80$). For a subsample of 56 teachers, 550 of their sixth- to eighth-grade students also

participated, averaging 9.82 ($SD = 5.54$) students per teacher (ranging from 1 to 33; approximately 40% of the total students per classroom participated, $SD = 20\%$, range = 5%–97%). Fifty-one percent of students were female, 55% were Caucasian, and students were on average 12.34 years old ($SD = 1.00$).

Procedure and Design

Teachers were recruited through online message boards, word of mouth, e-mail solicitations sent to teacher list-serves by the district, and fliers in teacher mailboxes advertising an intervention program to reduce stress. Teachers understood they would eventually participate in an RCT study in which half of them would be randomly assigned to a wait list control group and half to MT. Teachers received US\$65 for each survey completed. Students were recruited through announcements by teachers and trained research assistants (RAs). In exchange for returning consent forms (whether agreeing to participate or not) and for filling out surveys, students' names were entered into a raffle for a music player. At times 1 (fall) and 2 (spring), teachers completed online surveys, were interviewed by RAs, and had their self-rated "most stressful" classes observed twice by RAs using the CLASS-S; and students' completed surveys (either online or on paper) in the classroom, supervised by teachers or RAs. To ensure confidentiality, paper surveys were placed in sealed envelopes upon completion. At time 3 (following fall), only teacher survey data were collected.

Established Validity Measures

To validate teacher reports of mindfulness, we used teacher reports of their job stress, burnout, anxiety, and depression (collected at all three time points). To validate student reports of teacher mindfulness, we used student reports of their motivation and engagement in the classroom (collected at times 1 and 2); all student survey items were rated on a 5-point scale (1 = *not at all true*, 5 = *totally true*). Classroom observations, collected at times 1 and 2, were used to validate both measures.

Teacher dispositional mindfulness. A key validation measure for the new teacher self-report measure was the FFMQ (Baer et al., 2006). The FFMQ consists of 24 items (rated on a 5-point scale: 1 = *almost never*, 5 = *almost always*) assessing five dimensions of dispositional mindfulness: nonreactivity, describing, acting with awareness, nonjudgment, and observing ($\alpha_{T1} = .89$, $\alpha_{T2} = .91$).

Teacher job stress. A second validation scale for the teacher measure assessed job stress (see Lambert, McCarthy, & Abbott-Shim, 2001; Roeser et al., 2013). Teachers indicated how stressed they were at work by rating 7 statements on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*; $\alpha_{T1} = .63$, $\alpha_{T2} = .63$).

Teacher occupational burnout. A third validation scale was the Maslach Burnout Inventory (Maslach, Jackson, & Leiter, 1996). Teachers reported how frequently they experienced occupational burnout by rating 18 statements on a 7-point scale (1 = *never*, 7 = *every day*; $\alpha_{T1} = .86$, $\alpha_{T2} = .87$).

Teacher anxiety. A fourth validation measure was teachers' self-reported state anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). Teachers reported their state anxiety by rating 20

statements on a 4-point scale (1 = *not at all*, 4 = *very much*; $\alpha_{T1} = .93$, $\alpha_{T2} = .95$).

Teacher depression. Teachers also rated how often they experienced symptoms of depression using 12 items from a brief version of the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; $\alpha_{T1} = .84$, $\alpha_{T2} = .80$).

Student engagement. Using 12 items (adapted from Skinner, Kindermann, & Furrer, 2009), students provided information on their behavioral and emotional engagement and disaffection. Disaffection items were reverse-coded and combined with the engagement items to create two scales of behavioral engagement (5 items, $\alpha_{T1} = .56$, $\alpha_{T2} = .82$) and emotional engagement (7 items, $\alpha_{T1} = .89$, $\alpha_{T2} = .90$).

Student sense of belonging. Students reported their sense of fitting in and connection to the class using 6 items (Goodenow, 1993), such as "I don't really belong in this class" (reverse-coded; $\alpha_{T1} = .87$, $\alpha_{T2} = .94$).

Student class value. Based on the work of Wigfield et al. (2015), students rated how much they valued their class using 5 items, including "We are learning important things in this class" ($\alpha_{T1} = .90$, $\alpha_{T2} = .91$).

Student self-efficacy. Students reported their academic self-efficacy with 5 items (Midgley et al., 1995), such as "Even if the work is hard, I can learn it" ($\alpha_{T1} = .93$, $\alpha_{T2} = .90$).

Student class involvement. Students rated the overall engagement of the class using 6 items (Moos & Trickett, 1987), including "Students put a lot of energy into what they do in this class" ($\alpha_{T1} = .79$, $\alpha_{T2} = .94$).

Classroom observations of emotional support, classroom organization, and student engagement. Two observations were conducted using the CLASS-S (Pianta & Hamre, 2009) in teachers' self-selected "most stressful classes." During these observations, RAs completed two measurement occasions, in which they observed the classroom for 15 min and then scored their observations for 10 min. Live raters coded two domains of teachers–student interactions: Emotional support (and its subdimensions of positive climate, teacher sensitivity, and regard for adolescent perspectives) and Classroom organization (and its subdimensions of behavior management, productivity, and negative climate); and student engagement. Each dimension was rated on a 7-point scale (1–2 = *low*, 3–5 = *medium*, 6–7 = *high*). Dimensions were averaged to create overall domain scores. Raters demonstrated an 80–90% agreement inter-rater reliability at time 1 and 81–100% at time 2.

Results

Before conducting analyses, missing data at each time point were imputed using the expectation–maximization technique in SPSS (Little's MCAR test = 1629.74, *ns*). Missing data for each construct ranged from 13.7% to 22.5% for teacher reports (T1: 16.2%; T2: 21.3%–22.5%; T3: 13.7%–17.5%); 16.2% to 41.3% for student reports (T1: 16.2%–41.3%; T2: 21.3%–37.5%); and 22.5% to 33.8% for observer reports (T1: 22.5%; T2: 25.0%; T3: 32.5%–33.8%). All analyses were conducted using the imputed data sets.

Measurement Development Process for Measures of TMC

To generate initial item pools for the six aspects of teacher mindfulness depicted in Table 1, experts in mindfulness and developmental science engaged in an iterative process. For the teacher-report measure, we consulted previous measures of mindfulness (e.g., FFMQ, Baer et al., 2006; Occupational Self-Compassion, Neff, 2003; Roeser et al., 2013), early versions of the IMT (Greenberg et al., 2010), and open-ended interviews conducted with teachers as part of this study (Taylor et al., 2017). For the student survey, we reviewed broader measures of students' perceptions of classroom climate and teacher behaviors (e.g., Learning About Teacher–Student Interactions (LATSI), Downer, 2015; Classroom Environment Scale, Moos & Trickett, 1987) and held discussions focused on how students might experience their teachers' mindful/mindless behaviors in the classroom. A total of 31 teacher-report and 18 student-report items were selected for inclusion during the first two time points.

A multi-step process was used to finalize the six teacher-report and student-report subscales. First, psychometric properties of the full item sets, including their dimensionality and internal consistency, were examined for each subscale separately. More specifically, using data from time 1, separate confirmatory factor analyses (CFAs) were used to test whether a one-factor solution was a good fit to the pool of items for each of the six constructs. Because of the small sample size, we could not rely on standard fit indices, instead we focused on factor loadings. Then, internal consistencies of each item pool were calculated using Cronbach's alpha and McDonald's omega. The results of these analyses, coupled with considerations of face validity and parsimony, were used to select specific items for the finalized teacher and student measures. In a second step, these composites were cross-validated using data from time 2. Third, data from both time points were used to calculate stabilities from time 1 to 2 and to examine whether measures were invariant across the two time points (which, for some teachers, included MT). Because we were also able to collect teacher-report data at time 3, analyses of these subscales included an extra step. Following analyses of the initial teacher-report item sets from times 1 and 2, we created 21 additional new items and tested them at time 3. Finally, after confirming six item sets for the teacher- and student-report measures, correlational analyses were conducted to assess the validity of the new subscales.

Teacher Measure of Experienced Mindfulness in the Classroom

From a pool of 52 items, the final teacher-report measure consisted of 42 items, 21 of which were present at all three time points, rated on 5-point scales (1 = *almost never*, 5 = *almost always*). Items were divided into six 7-item subscales (see Table 2). *Calmness* items tapped teachers' self-reported composure in the face of stress (e.g., "When I am upset with my class, I can still calmly communicate how I am feeling") and quick recovery from negative emotions (e.g., "If I get upset in class, I get over it quickly."). *Clarity* items indicated teachers' ability to maintain focus during stressful situations (e.g., "Even when the classroom seems chaotic, I am able to keep us focused on what we are doing") and lucidity in thought, word, and deed (e.g., "When something or someone upsets me in the classroom, I am able to take a balanced view of the situation").

Kindness items tapped teacher caring and support in the face of student problems (e.g., "When my students are going through a hard time, I try to give them the caring and nurturing they need") and compassionate understanding (e.g., "When dealing with a student's misbehavior, I try to keep the whole person and their life stresses in mind"). *Reactivity* items assessed teachers' self-perceived overreactions to stressful events (e.g., "When something bad happens at school, I tend to blow it out of proportion") and slow emotional recovery (e.g., "When my class upsets me, it takes me a long time to calm down"). *Distraction* items tapped lack of focus while teaching (e.g., "I can get so busy thinking about other things that I am not really listening to my students") and confusion in thought, word, and deed in the face of stress (e.g., "When class is going badly, I find it hard to figure out what is happening"). *Criticalness* items highlighted teachers' self-focused responses to student misbehavior (e.g., "When students are angry or upset, I find it easier to just tune them out") and blaming students for problems (e.g., "If students do not do well in my class, they only have themselves to blame").

Psychometric properties of the subscales. Means, standard deviations, and psychometric properties of each of the item sets at each time point are presented in Tables 2 and 3. For five of the six constructs, final item sets had satisfactory internal consistencies on both reliability indicators (ranging from .78 to .89). For critical, not all reliabilities were above .70; as a result, its internal consistency may attenuate its correlations with validity indicators. For all six constructs, item loadings on a single-factor model were above .35 (except for reactive item 5 which loaded at .32 and critical item 1 which loaded at .33). Overall, item loadings averaged .63.

Functioning of subscales across the intervention. To examine whether the functioning of the subscales was the same before and after the intervention, we compared subscales across time 1 (pre-intervention) and time 2 (post-intervention) on their cross-time stabilities and structural measurement invariance. Table 3 shows that all subscales demonstrated moderate to strong cross-time stabilities ranging from .51 to .71. To examine whether subscales showed structural measurement invariance across the intervention, two nested models were compared to test for configural and metric invariance for each of the six constructs: calm ($\Delta\chi^2(5) = 8.76, ns$), reactive ($\Delta\chi^2(5) = 8.11, ns$), clear ($\Delta\chi^2(5) = 1.06, ns$), distracted ($\Delta\chi^2(5) = 5.49, ns$), kind ($\Delta\chi^2(5) = .36, ns$), and critical ($\Delta\chi^2(6) = 4.99, ns$). All $\Delta\chi^2$ tests were nonsignificant, suggesting that the metric models (with constrained factor loadings across time points) did not differ in their fit to the data from the configural models (no constrained loadings). Thus, we concluded that the functioning of the measure was not noticeably affected by the intervention.

Inter-relations among subscales of teacher-report mindfulness. The correlations among the subscales at the three time points also appear in Table 3. As can be seen, all subscales were significantly correlated in the expected directions. To examine whether items from each facet and its antithesis were better considered as two dimensions or as a single bipolar dimension, we tested the difference between nested models in which (1) the covariation between the two factors was constrained to be equal to -1.0 versus (2) an unconstrained model. As can be seen in Table 4, of the nine tests, eight revealed that an unconstrained model provided a significantly better fit. Taken together with the pattern of correlations, this

Table 2. CFAs and internal reliabilities for teacher reports of experienced mindfulness in the classroom.

Construct and items	T1		T2		Final	
	CFA λ		CFA λ		CFA λ	
	α	ω	α	ω	α	ω
Calm	.77	.78	.86	.85	.89	.89
1. When I am upset with my class, I can still calmly communicate how I am feeling.	.79***		.80***		.84***	
2. Even if things get crazy in the classroom, I keep my cool.	—		—		.74***	
3. When students misbehave, I don't let it get under my skin.	—		—		.78***	
4. Even when there is a lot going on in class, I stay calm.	—		—		.88***	
5. If I get upset in class, I get over it quickly.	.73***		.67***		.63***	
6. When things go wrong, I bounce back pretty fast.	.52***		.68***		.72***	
7. When something unexpected happens in class, I can roll with it.	—		—		.58***	
When I am not happy with my class, I calmly talk to students about what I would like to see happen.	.52***		.79***		—	
If I get angry or unhappy about students' behavior, I "step back" and try to see what's going on.	.63***		.76***		—	
Reactive	.73	.73	.79	.77	.82	.80
1. When something bad happens at school, I tend to blow it out of proportion.	.66***		.63***		.86***	
2. When students do something wrong, I tend to overreact.	.53***		.81***		.72***	
3. Once I get angry in class, my temper tends to take over.	.83***		.71***		.67***	
4. When something painful happens at school, I can't stop thinking about it.	.42***		.32*		.52***	
5. When students tell me about their problems, I feel so helpless.	—		—		.32**	
6. When I think about all the things my students have to deal with, I feel completely overwhelmed.	—		—		.47***	
7. When my class upsets me, it takes me a long time to calm down.	.55***		.77***		.78***	
Clear	.62	.62	.68	.69	.79	.78
1. Even when my class is having "one of those days," I can still concentrate on teaching and learning.	—		—		.79***	
2. Even when the classroom seems chaotic, I am able to keep us focused on what we are doing.	—		—		.69***	
3. When we get interrupted in class, I find it easy to start back up where we left off.	—		—		.48***	
4. When something or someone upsets me in the classroom, I am able to take a balanced view of the situation.	.64***		.80***		.69***	
5. When I am unhappy with a student's behavior, I'm good at finding ways to let him or her know what I am thinking and feeling.	.55***		.64***		.36**	
6. When students are out of line, I know how to get things back on track.	—		—		.62***	
7. When class is not going well, I can figure out how to turn it around.	—		—		.51***	
When I am in the classroom, I am fully focused on teaching.	.35*		.32*		—	
While I am listening to one student, I am still aware of the whole class.	.39**		.50***		—	
When class is not going well, I can find the right words to explain to students what is happening.	.53***		.49***		—	
Distracted	.69	.71	.69	.66	.79	.79
1. I can get so busy thinking about other things that I am not really listening to my students.	.30*		.74***		.67***	
2. When I am teaching I seem to be "running on automatic," without much awareness of what I am doing.	.59***		.57***		.70***	
3. When I have a negative reaction to something at school, it takes me a while to figure out what happened and why I got so upset.	—		—		.61***	
4. When class is going badly, I find it hard to figure out what is happening.	.80***		.48***		.60***	
5. When I am upset with students, I have trouble finding the right words to express what I am feeling.	.60***		.68***		.60***	
6. When something painful happens, I try not to think about it.	—		—		.54***	
7. When I am upset with my class, I keep it bottled up.	—		—		.45***	
When something or someone upsets me in class, it takes me some time to come to a less emotional, and more rational, perspective on the situation.	.50***		.31*		—	
Kind	.62	.64	.65	.67	.88	.88
1. When my students are going through a hard time, I try to give them the caring and nurturing they need.	.44**		.46***		.65***	
2. When students are struggling with schoolwork, I show them some extra kindness.	—		—		.54***	
3. When students mess up, I let them know that I am still on their side.	—		—		.60***	
4. Even when I am upset with my students, I still show them that I care.	—		—		.73***	
5. I feel tender toward my students and all they are dealing with.	.75***		.92***		.86***	
6. Even when students are out of line, I try to understand where they are coming from.	—		—		.77***	
7. When dealing with a student's misbehavior, I try to keep the whole person and their life stresses in mind.	—		—		.80***	
When I am working with students, I think about all the struggles that come with this age.	.50***		.45***		—	
I try to be understanding and patient toward those aspects of my class I don't always like.	.44**		.49***		—	
When I see a student being treated unfairly, I want to step in.	.36**		.32*		—	
Critical	.66	.70	.74	.74	.60	.74
1. If students don't listen, I get pretty irritated at them.	.27 [†]		.44**		.33*	
2. If I can't get through my whole lesson, I get frustrated.	.51***		.63***		.51***	
3. When students are angry or upset, I find it easier to just tune them out.	—		—		.69***	
4. If students do not do well in my class, they only have themselves to blame.	.63***		.55***		.74***	

(continued)

Table 2. (continued)

Construct and items	T1		T2		Final
	CFA λ	α	CFA λ	ω	CFA λ
5. When dealing with problem students, I often find myself thinking, “What is wrong with you?”	.58***		.59***		.49***
6. I know that some students think I can be harsh.	—		—		.47***
7. When students don’t understand the material we are covering in class, I assume it’s because they did not do their homework.	.43**		.66***		.49***
Sometimes I feel like students are trying to push my buttons.	.63***		.55***		—

Note. $N_{T1} = 67$, $N_{T2} = 63$, $N_{T3} = 64$. Numbered items are the final items selected at time 3. CFA = confirmatory factor analysis. $^{\dagger}p < .07$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3. Means, standard deviations, intercorrelations, and cross-time stabilities for teacher reports of experienced mindfulness in the classroom at three time points.

Time 1	Calm	Reactive	Clear	Distracted	Kind	Critical	T1–T2
Calm	—						.71**
Reactive	-.61**	—					.67**
Clear	.65**	-.28**	—				.60**
Distracted	-.56**	.59**	-.52**	—			.51**
Kind	.63**	-.35**	.51**	-.43*	—		.64**
Critical	-.42**	.46**	-.18	.34**	-.34**	—	.67**
M (SD)	3.58 (.59)	2.47 (.59)	3.64 (.53)	2.47 (.62)	4.00 (.49)	2.43 (.53)	
Time 2	Calm	Reactive	Clear	Distracted	Kind	Critical	T2–T3
Calm	—						.80**
Reactive	-.68**	—					.66**
Clear	.68**	-.54**	—				.65**
Distracted	-.51**	.76**	-.58**	—			.53**
Kind	.60**	-.50**	.56**	-.44**	—		.56**
Critical	-.47**	.60**	-.42**	.60**	-.37**	—	.64**
M (SD)	3.80 (.67)	2.28 (.63)	3.79 (.53)	2.31 (.61)	4.12 (.48)	2.34 (.58)	
Time 3	Calm	Reactive	Clear	Distracted	Kind	Critical	T1–T3
Calm	—						.67**
Reactive	-.71**	—					.53**
Clear	.83**	-.55**	—				.57**
Distracted	-.39**	.42**	-.51**	—			.40**
Kind	.67**	-.51**	.70**	-.55**	—		.63**
Critical	-.36**	.52**	-.33**	.38**	-.40**	—	.51**
M (SD)	3.82 (.62)	2.34 (.60)	3.69 (.53)	2.31 (.58)	4.12 (.55)	2.15 (.43)	

Note. $N_{T1} = 67$, $N_{T2} = 63$, $N_{T3} = 64$. Highlighted correlations are between facets of mindfulness and their antitheses. T1–T2 = cross-time stabilities from time 1 to time 2. T2–T3 = cross-time stabilities from time 2 to time 3. T1–T3 = cross-time stabilities from time 1 to time 3. Scales ranged from 1 = almost never to 5 = almost always. ** $p < .01$.

suggests that these pairs tap distinguishable facets of mindfulness that show the expected negative inter-relations.

Convergent and criterion validity. Table 5 contains the concurrent correlations between the six subscales and five validity measures. As expected, scores on the final subscales of TMC converged with scores from the standard measure of general mindfulness (FFMQ) and were correlated in the expected directions with all indicators of stress and well-being. More specifically, teachers who reported higher levels of calmness, clarity, and kindness or who reported lower levels of reactivity, distraction, and criticalness also scored

higher on the total FFMQ and almost all its sub-facets, and also reported lower levels of stress, burnout, depression, and anxiety.

Student Measure of Teacher Expressed Mindfulness in the Classroom

Students were asked to think about their specific teacher and respond to 18 statements (see Table 6), rating 3 items per construct on 5-point scales (1 = not at all true, 5 = totally true). *Calmness* items focused on student perceptions of teachers’ ability to maintain an even disposition in the face of stressful events. *Clarity* items

Table 4. Comparison of models testing whether teacher-report mindfulness–mindlessness components are a better fit for one factor (correlations set to -1) or two factors.

Teacher report	Time	Model	AIC	BIC	$\Delta\chi^2$
Calm-Reactive	T1	Unconstrained	1462.5	1508.8	
		Constrained	1465.5	1509.5	4.90*
	T2	Unconstrained	1354.0	1399.1	
		Constrained	1368.2	1411.0	16.10***
	T3	Unconstrained	1821.6	1884.2	
		Constrained	1839.7	1900.1	20.07***
Clear-Distracted	T1	Unconstrained	1651.5	1697.8	
		Constrained	1651.3	1695.4	1.80
	T2	Unconstrained	1488.4	1533.4	
		Constrained	1492.2	1535.1	5.85*
	T3	Unconstrained	2023.2	2085.8	
		Constrained	2048.6	2109.1	27.39***
Kind-Critical	T1	Unconstrained	1727.0	1777.7	
		Constrained	1739.2	1787.8	14.29***
	T2	Unconstrained	1593.1	1642.4	
		Constrained	1607.5	1654.6	16.36***
	T3	Unconstrained	1953.0	2014.2	
		Constrained	1971.7	2030.8	20.68***

Note. $N_{T1} = 67$, $N_{T2} = 63$, $N_{T3} = 64$.

* $p < .05$. *** $p < .001$.

tapped student perceptions of teachers' awareness of the classroom environment and students' needs. *Kindness* items assessed student perceptions of teachers' interest and affection for students. *Reactivity* assessed student perceptions of teachers' irritability with classroom problems. *Distraction* assessed student perceptions of teachers' inattention to the classroom and materials. *Criticalness* measured student perceptions of teachers' harsh interactions with students. Student responses were examined in two ways. For confirmatory analyses (e.g., factor loadings; analysis of bipolarity) and correlational analyses with student validity measures, we used data from all 550 students. For analyses with teacher and observational data, we aggregated student data within each classroom to create a classroom level indicator. We calculated internal consistencies (alphas and omegas) using both aggregated and unaggregated student data.

Psychometric properties. Means, standard deviations, factor loadings, and internal consistencies for each subscale at times 1 and 2 are presented in Tables 6 and 7. The item pools for the six constructs showed factor loadings on single-factor CFAs at both time points that were greater than .45 for all items on all subscales (average loading = .65; overall fit statistics were not obtainable since models were just-identified). In addition, the internal consistencies for the 3-item scales calculated using student data aggregated by teachers averaged .81 (range .53 to .92), whereas the internal consistencies calculated using the unaggregated student data averaged .69 (range .53 to .81). For the unaggregated data, internal consistencies were also typically higher at time 2 (average = .73) than at time 1 (average = .65). As also shown in Table 7, all subscales demonstrated strong cross-time stabilities ranging from .53 to .58.

Inter-relations among subscales of student-report mindfulness. The correlations among the subscales at both time points also appear in Table 7. As can be seen, all subscales were significantly correlated in the expected directions. To examine whether items

from each facet and its antithesis were better considered as two dimensions or as a single bipolar dimension, we tested the difference between nested models in which (1) the covariation between the two factors was constrained to be equal to -1.0 versus (2) an unconstrained model. As can be seen in Table 8, all six tests revealed that an unconstrained model provided a significantly better fit. Taken together with the pattern of intercorrelations, this suggests that, as with the teacher reports, these pairs tap distinguishable facets of mindfulness that show the expected negative interrelations.

Criterion validity. Concurrent correlations between the six finalized subscales and six validity measures revealed that student reports of TMC correlated in the expected directions with positive student outcomes at both time points (see Table 9). Students' perceptions of their teachers' calmness, clarity, and kindness were positively and significantly correlated with their emotional and behavioral engagement, classroom belonging, class value, academic self-efficacy, and reports of the overall involvement of students in the class. Conversely, student reports of teachers' reactivity, distraction, and criticalness were all significantly and negatively associated with these validity measures. Although a few correlations were not statistically significant at time 1, they were still in the anticipated direction.

Connections Between Teacher Reports of Experienced and Student Reports of Teachers' Expressed Mindfulness in the Classroom

Table 10 presents the concurrent associations between the teacher and student measures of teacher mindfulness at times 1 and 2. Because the teacher measure was not finalized until time 3, correlations between the teacher and student subscales at times 1 and 2 were considered to represent lower bound estimates of cross-reporter convergence. Results showed that these new subscales were consistently, but not strongly, correlated with each other. By time 2, five of the six subscales showed significant or marginally significant positive correlations (average $r = .33$), and the sixth just missed significance ($r = .24$); in addition, the kind subscales also showed significant and positive correlations across reporters at time 1. Overall, these correlations suggest that while the teacher and student measures are connected, especially at time 2, the two measures are not redundant.

Correlations with Classroom Observations

Finally, correlational analyses were conducted to examine associations between the newly created teacher and student measures and the domains and dimensions from the CLASS-S. Of interest were concurrent correlations, but CLASS-S observations were conducted only at times 1 and 2, while the finalized teacher measure was available only at time 3. Hence, concurrent correlations calculated with the CLASS-S at times 1 and 2 were considered to represent lower bound estimates of the validity coefficients for the teacher-report subscales.

Correlations between teacher-reported experienced mindfulness and CLASS-S observations of teacher–student interactions. At both time points, teacher reports of mindfulness were associated with specific aspects of the CLASS-S (see Table 5). Teachers who

Table 5. Concurrent convergent and criterion correlations between teacher reports of experienced mindfulness in the classroom and teacher validity measures.

Construct	Calm			Clear			Kind		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
<i>Convergent validity</i>									
Total FFMQ	.47**	.45**	.63**	.38**	.44**	.49**	.40**	.37**	.53**
Describe	.16	.21 [†]	.28*	.41**	.36**	.18	.21 [†]	.25 [†]	.32**
Aware	.35**	.16	.41**	.33**	.25*	.46**	.29*	.24 [†]	.37**
Observe	.38**	.34**	.43**	.28*	.28*	.29*	.42**	.29*	.43**
Nonreact	.57**	.54**	.67**	.25*	.42**	.43**	.38**	.36**	.50**
Nonjudge	.15	.25*	.49**	.00	.20	.40**	.08	.17	.36**
<i>Criterion validity</i>									
Stress	-.18	-.20	-.45**	-.15	-.18	-.40**	-.23	-.12	-.27**
Burnout	-.36**	-.41**	-.52**	-.29*	-.32*	-.51**	-.36**	-.26*	-.39**
Depression	-.38**	-.28*	-.31*	-.35**	-.28*	-.30*	-.27*	-.09	-.23[†]
Anxiety	-.45**	-.34**	-.41**	-.36**	-.29*	-.40**	-.22 [†]	-.16	-.22[†]
<i>Observational measures</i>									
Emotional Support	.09	.32*	—	.22 [†]	.25 [†]	—	-.13	.27 [†]	—
Positive Climate	.02	.34*	—	.17	.32*	—	-.16	.26 [†]	—
Teacher Sensitivity	.18	.27*	—	.32*	.23 [†]	—	.00	.19	—
Regard for Adolescents	.00	.20	—	.05	.12	—	-.16	-.25 [†]	—
Classroom Organization	.32*	.45**	—	.33**	.29*	—	.10	.32*	—
Behavior Management	.29*	.43**	—	.30*	.29*	—	.07	.26 [†]	—
Productivity	.32*	.39**	—	.32*	.24 [†]	—	.09	.31*	—
Negative Climate	-.25 [†]	-.37**	—	-.29*	-.22	—	-.16	-.35*	—
<i>Convergent validity</i>									
Total FFMQ	-.40**	-.48**	-.68**	-.48**	-.52**	-.56**	-.20 [†]	-.32*	-.40**
Describe	-.05	-.13	-.32*	-.41**	-.28*	-.41**	-.03	-.23 [†]	-.13
Aware	-.29*	-.36**	-.53**	-.54**	-.59**	-.55**	-.14	-.32**	-.39**
Observe	-.26*	-.18	-.34**	-.20 [†]	-.11	-.28*	-.08	-.02	-.09
Nonreact	-.53**	-.41**	-.56**	-.31**	-.32**	-.26*	-.18	-.17	-.31*
Nonjudge	-.21 [†]	-.47**	-.67**	-.15	-.44**	-.52**	-.24 [†]	-.30*	-.45**
<i>Criterion validity</i>									
Stress	.36**	.25*	.55**	.29*	.30*	.38**	.17	.29*	.45**
Burnout	.40**	.43**	.66**	.34**	.53**	.37**	.39**	.41**	.42**
Depression	.30*	.28*	.60**	.25*	.32*	.31**	.19	.09	.31*
Anxiety	.31*	.32*	.60**	.32**	.35**	.37**	.21 [†]	.12	.39**
<i>Observational measures</i>									
Emotional Support	-.13	-.12	—	-.20	-.13	—	-.06	-.09	—
Positive Climate	-.12	-.11	—	-.17	-.09	—	-.04	-.15	—
Teacher Sensitivity	-.18	-.12	—	-.26*	-.16	—	-.11	-.18	—
Regard for Adolescents	-.03	-.10	—	-.06	-.10	—	.00	.06	—
Classroom Organization	-.30*	-.27 [†]	—	-.20	-.21	—	-.09	-.24 [†]	—
Behavior Management	-.32*	-.22	—	-.15	-.18	—	-.04	-.21	—
Productivity	-.25 [†]	-.20	—	-.26*	-.15	—	-.10	-.23 [†]	—
Negative Climate	.22 [†]	.33*	—	.11	.24 [†]	—	.17	.19	—

Note. $N_{T1} = 67$, $N_{T2} = 63$, $N_{T3} = 64$. All correlations are concurrent, between variables measured at the same time point. FFMQ = Five Factor Mindfulness Questionnaire. Boldfaced correlations are with the finalized subscales. Observational measures were not collected at time 3.

[†] $p < .10$. * $p < .05$. ** $p < .01$.

felt they were higher in calm, clear, and kind behaviors were also rated by observers as higher in emotional support, including positive climate and teacher sensitivity; and as higher in classroom organization, including behavior management and productivity, and lower in negative climate (although Kind showed these connections only at time 2). Kind was also the only mindfulness

subscale that was related to regard for adolescent perspectives. In contrast, teachers who reported higher levels of reactivity, distraction, and criticalness, although not rated by observers as lower in emotional support, were rated as lower in classroom organization, including behavior management and productivity, and as higher in negative climate.

Table 6. CFAs and internal reliabilities for student reports of teacher expressed mindfulness in the classroom.

Construct and items	T1 CFA λ		T2 CFA λ	
	α	ω	α	ω
Calm	.90 ^a	.90 ^a	.92 ^a	.92 ^a
	.71	.71	.81	.81
1. I can count on this teacher to be in a good mood.		.78***		.73***
2. Even when we mess up, our teacher deals with us in a calm and fair way.		.66***		.81***
3. No matter what happens in class, our teacher can handle it.		.59***		.76***
Reactive	.87 ^a	.81 ^a	.84 ^a	.85 ^a
	.68	.68	.73	.73
1. My teacher gets irritated pretty easily.		.69***		.70***
2. Some days this teacher is in a good mood, other days—not so much.		.65***		.68***
3. If we don't do what we are supposed to, this teacher gets very upset.		.60***		.69***
Clear	.78 ^a	.83 ^a	.90 ^a	.91 ^a
	.68	.71	.78	.79
1. My teacher treats everyone fairly.		.61***		.72***
2. My teacher knows when I need extra help.		.91***		.87***
3. My teacher notices when I am confused or not paying attention.		.46***		.62***
Distracted	.73 ^a	.73 ^a	.80 ^a	.80 ^a
	.54	.53	.66	.67
1. My teacher just keeps going on with the lesson, whether we are getting it or not.		.51***		.55***
2. My teacher often gets off track and we end up missing part of the lesson.		.53***		.77***
3. Whether or not students can get away with something depends on how the teacher is feeling that day.		.55***		.58***
Kind	.56 ^a	.55 ^a	.90 ^a	.90 ^a
	.65	.66	.77	.73
1. My teacher takes a personal interest in students.		.57***		.61***
2. My teacher goes out of his or her way to help students.		.79***		.85***
3. My teacher seems to genuinely like students.		.52***		.62***
Critical	.79 ^a	.79 ^a	.69 ^a	.74 ^a
	.60	.61	.62	.62
1. My teacher “talks down” to students.		.68***		.57***
2. My teacher does not trust students.		.53***		.62***
3. Some of the things this teacher says can be pretty harsh.		.53***		.61***

Note. $N_{T1} = 518$ students, $N_{T2} = 496$ students. α = Cronbach's alpha internal consistency; ω = McDonald's omega internal consistency; CFA = confirmatory factor analysis.

^aAggregated by teacher, $N_{T1} = 47$ teachers, $N_{T2} = 50$ teachers.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 7. Means, standard deviations, intercorrelations, and cross-time stabilities for student reports of teacher expressed mindfulness in the classroom at two time points.

Time 1	Calm	Reactive	Clear	Distracted	Kind	Critical	T1–T2
Calm	—						.53**
Reactive	-.58**	—					.58**
Clear	.59**	-.35**	—				.53**
Distracted	-.48**	.44**	-.47**	—			.54**
Kind	.56**	-.32**	.55**	-.42**	—		.55**
Critical	-.60**	.55**	-.49**	.51**	-.39**	—	.53**
M (SD)	4.07 (.82)	2.38 (.90)	4.05 (.82)	2.07 (.83)	3.85 (.87)	1.66 (.73)	
Time 2	Calm	Reactive	Clear	Distracted	Kind	Critical	
Calm	—						
Reactive	-.60**	—					
Clear	.74**	-.40**	—				
Distracted	-.60**	.55**	-.55**	—			
Kind	.70**	-.41**	.71**	-.44**	—		
Critical	-.64**	.56**	-.55**	.54**	-.51**	—	
M (SD)	3.81 (.99)	2.65 (.98)	3.89 (.98)	2.21 (.95)	3.71 (.97)	1.76 (.77)	

Note. $N_{T1} = 518$, $N_{T2} = 496$. Highlighted correlations are between facets of mindfulness and their antitheses. T1–T2 = cross-time stabilities from time 1 to time 2.

Scales ranged from 1 = not at all true to 5 = totally true.

** $p < .01$.

Table 8. Comparison of models testing whether student-report mindfulness–mindlessness components are a better fit for one factor (correlations set to -1) or two factors.

Student report	Time	Model	AIC	BIC	$\Delta\chi^2$
Calm-Reactive	T1	Unconstrained	8610.70	8666.00	
		Constrained	8628.10	8679.10	19.40***
	T2	Unconstrained	8465.40	8520.10	
		Constrained	8521.50	8572.00	58.15***
Clear-Distracted	T1	Unconstrained	8852.40	8907.60	
		Constrained	8868.60	8919.60	18.20***
	T2	Unconstrained	8714.30	8769.00	
		Constrained	8760.40	8810.90	48.08***
Kind-Critical	T1	Unconstrained	8602.20	8657.40	
		Constrained	8632.60	8683.60	32.48***
	T2	Unconstrained	8398.10	8452.80	
		Constrained	8422.30	8472.80	26.23***

Note. $N_{T1} = 518$, $N_{T2} = 496$.

*** $p < .001$.

Table 9. Concurrent correlations between student reports of teacher expressed mindfulness in the classroom and observational validity measures.

Construct	Calm		Clear		Kind	
	T1	T2	T1	T2	T1	T2
Emotional engagement	.52**	.64**	.56**	.64**	.49**	.60**
Behavioral engagement	.45**	.49**	.51**	.53**	.44**	.46**
Classroom belonging	.50**	.63**	.56**	.65**	.50**	.57**
Classroom involvement	.53**	.68**	.56**	.63**	.52**	.60**
Class value	.54**	.65**	.59**	.64**	.47**	.60**
Academic self-efficacy	.34**	.38**	.38**	.41**	.37**	.43**

Construct	Reactive		Distracted		Critical	
	T1	T2	T1	T2	T1	T2
Emotional engagement	-.46**	-.47**	-.47**	-.51**	-.50**	-.52**
Behavioral engagement	-.31**	-.30**	-.45**	-.40**	-.38**	-.39**
Classroom belonging	-.36**	-.40**	-.41**	-.46**	-.46**	-.49**
Classroom involvement	-.42**	-.49**	-.49**	-.59**	-.41**	-.54**
Class value	-.31**	-.43**	-.48**	-.52**	-.43**	-.54**
Academic self-efficacy	-.24**	-.30**	-.25**	-.25**	-.29**	-.30**

Note. $N_{T1} = 518$, $N_{T2} = 496$. All correlations are concurrent, calculated between variables measured at the same time point.

** $p < .01$.

Correlations between student reports of teachers' expressed mindfulness and CLASS-S observations of teacher–student interactions. For student reports of teacher mindfulness, several significant correlations with observations were found at time 1 ($|r| = .29$ to $.42$), but many more appeared by time 2 ($|r| = .30$ to $.62$; see Table 11), perhaps reflecting the fact that students had more experience with their teachers by the second data collection. At time 2, all six student subscales were correlated significantly and

in the expected directions with observer reports of both of the overarching domains, namely, emotional support (as well as all its dimensions) and classroom organization (and the dimensions of behavior management and sometimes with productivity). The dimension of negative climate was correlated significantly only with student reports of reactive and critical teacher behavior.

Discussion

In response to growing interest in mindfulness as a support for educators in the challenging work of teaching, the goal of the current study was to create two new reliable and valid measures of TMC. Through a series of confirmatory, reliability, structural invariance, and correlational analyses, we found that five of the six subscales of the finalized teacher-report measure showed satisfactory psychometric properties, and all six demonstrated high cross-year stabilities, structural invariance, and convergent validity with established measures. Although the subscale assessing teacher reports of their critical behavior did not reach standard levels of internal consistency, this did not seem to interfere with its test–retest reliability (as indicated by a high cross-time stability) or its functioning—it demonstrated strong convergent and criterion validity. Similarly, all six subscales of the new student-report measure of teacher mindfulness had adequate internal consistency reliabilities and cross-year stabilities, as well as strong criterion validity with indicators of student academic functioning. Thus, we concluded there is good preliminary evidence that these two new assessments are reliable and valid measures of TMC.

Complementary Teacher and Student Perspectives

An examination of the connections between the teacher- and student-report subscales, as well as between both of these new measures and the CLASS-S observations, revealed a pattern of consistent but modest correlations between corresponding constructs. Of the six possible target correlations between teacher and student reports of mindfulness at time 2 (after students had a chance to become well-acquainted with teachers), three were significant (kind, distracted, and critical), two were marginally significant (calm and reactive), and one fell just short of significance (clear). Teacher and student reports seemed to converge most strongly on kind, which was significantly correlated across reporters even at time one. Several other correlations *across* constructs and their antitheses also added to evidence for convergent validity. For example, teachers who felt they were relatively calm were seen by their students not only as calmer but also as less reactive; teachers who reported higher levels of distraction were seen by their students not only as more distracted but also as less clear; and teachers who reported being more critical were also seen by students as more critical and less kind. However, a few cross-construct correlations suggested that students do not always discriminate the internal states of teachers that give rise to the behaviors they observe.

In terms of connections with classroom observations, teachers' internal experiences of mindfulness (calm, clear, and kind behavior) were correlated with observer ratings of both emotional support and classroom organization, whereas teacher experiences of mindlessness (reactive, distracted, and critical behavior) were connected only to observer ratings of lower levels of classroom organization. In comparison, students' ratings of teachers' expressions

Table 10. Correlations for teacher and student reports of teacher mindfulness in the classroom.

		Student scale											
		Calm		Reactive		Clear		Distracted		Kind		Critical	
		T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
Teacher scale	Calm	-.11	.29[†]	.07	-.30*	.08	.24	.04	-.15	.11	.28[†]	.00	-.17
	Reactive	.04	-.12	.15	.25[†]	.05	-.09	.01	.09	-.01	-.04	.12	.11
	Clear	.01	.31*	.24	-.31*	.12	.24	-.03	-.25 [†]	.15	.30*	.09	-.28 [†]
	Distracted	-.04	-.22	-.09	.27[†]	-.19	-.26 [†]	.15	.39**	-.18	-.23	-.04	.26[†]
	Kind	-.12	.28[†]	.06	-.28 [†]	.11	.26[†]	.13	-.21	.34*	.34*	.05	-.17
	Critical	.13	-.17	-.04	.19	.01	-.12	-.23	.33*	-.26 [†]	-.17	.04	.36*

Note. $N_{T1} = 46, N_{T2} = 46$. Student reports were aggregated to the teacher level. Bolded correlations indicate corresponding constructs across reporters.
[†] $p < .10$. * $p < .05$. ** $p < .01$.

Table 11. Concurrent correlations between student reports of teacher expressed mindfulness in the classroom and observational validity measures.

Observational measures	Calm		Clear		Kind	
	T1	T2	T1	T2	T1	T2
CLASS student engagement	.28[†]	.57**	.32*	.52**	.26[†]	.45**
Emotional support	.30*	.61**	.28[†]	.57**	.31*	.48**
Positive climate	.27[†]	.55**	.20	.47**	.24[†]	.41**
Teacher sensitivity	.29[†]	.62**	.40**	.55**	.36*	.45**
Regard for adolescents	.19	.39**	.09	.42**	.19	.35*
Classroom organization	.24[†]	.49**	.21	.40**	.12	.37*
Behavior management	.23	.56**	.13	.47**	.06	.42**
Productivity	.20	.34*	.25[†]	.27[†]	.12	.26[†]
Negative climate	-.20	-.23	-.17	-.18	-.20	-.20

Observational measures	Reactive		Distracted		Critical	
	T1	T2	T1	T2	T1	T2
CLASS student engagement	-.20	-.43**	-.32*	-.43**	-.36*	-.50**
Emotional support	-.24	.46**	-.33*	-.48**	-.28[†]	-.47**
Positive climate	-.22	.47**	-.25[†]	-.43**	-.29*	-.45**
Teacher sensitivity	.19	-.36*	-.42**	-.51**	-.35*	-.50**
Regard for adolescents	-.17	-.32*	-.12	-.32*	-.04	-.29*
Classroom organization	-.32*	-.36*	-.33*	-.39**	-.27[†]	-.46**
Behavior management	-.32*	-.38**	-.24[†]	-.43**	-.25[†]	-.46**
Productivity	-.20	-.26[†]	-.40**	-.30*	-.20	-.33*
Negative climate	.35*	.25[†]	.18	.21	.30*	.38**

Note. $N_{T1} = 47, N_{T2} = 50$. Student reports were aggregated to the teacher level. All correlations are concurrent, calculated between variables measured at the same time point.
[†] $p < .10$. * $p < .05$. ** $p < .01$.

of mindfulness were more strongly connected to observer ratings of both CLASS-S domains and all their more specific dimensions, especially at time 2—although observer ratings of negative climate were higher only for teachers whom students rated as more critical and reactive. These findings indicate that students and observers, both of whom were focused on the behaviors teachers expressed,

converged in their perceptions of teacher behavior, whereas teachers’ self-reports of their mindful experiences were not as strongly aligned with their outward expressions of these behaviors (at least as captured by students and trained raters).

Two possible reasons for this pattern of findings can be suggested. First, lack of strong overlap between teacher and student reports could be due to explicit decisions made during the measurement development process. Although items from both measures focused on the same dimensions of mindfulness, we decided not to generate “duplicate” items that were strictly parallel across reporters. Instead, the goal was to maximize validity for each reporter individually, by creating items that were pertinent and understandable from each reporter’s specific perspective. The decision to focus on reporter-appropriate items may have reduced the comparability between reporters somewhat, but the resultant benefit in terms of validity for each reporter separately seemed to us a reasonable trade-off.

Second, lack of strong overlap between teacher reports and observations (provided by either students or trained raters) could be considered initial empirical evidence suggesting that the *experience* and the *expression* of mindfulness are not identical, but instead are complementary. For example, as suggested by the open-ended interviews conducted with teachers as part of this study (Taylor et al., 2017), educators did not always feel internally as if they were actually attaining mindfulness, despite the fact that outwardly, they exuded calmness, clarity, and kindness in their external behaviors in front of students and observers. In fact, teachers may intentionally mask their inner states when they are feeling reactive, distracted, critical, or otherwise distressed, effectively preventing such emotions from becoming visible to others. Indeed, research on “emotional labor” suggests that teachers’ efforts at emotional suppression are among the reasons why teaching can be such a draining activity (Chang, 2009; Keller, Chang, Becker, Goetz, & Frenzel, 2014; Näring, Vlerick, & Van de Ven, 2012). Conversely, it is also possible that some teachers who reported *feeling* calm, clear, and kind were not always as mindful as they imagined, if those experiences were not realized externally nor registered by their students.

Perhaps the highest levels of mindfulness are reached when teachers not only *act* calm, clear, and kind, but when they also *experience* those feelings internally—that is, perhaps true mindfulness involves a coherence or harmony among thought, feeling, word, and deed. If so, discrepancies between teachers’ experiences and expressions of mindfulness may be a fruitful area for future

research, following up on the idea that gaps (in either direction) may indicate a lack of alignment. If that proves to be the case, then optimal levels of mindfulness would be characterized not only by high levels of the experience and expression of mindfulness but also by an authentic and seamless coherence between them.

If it turns out that teacher experience and expression of mindfulness are partially overlapping and complementary, rather than redundant constructs, then it would be important to include indicators of both in future studies of naturally occurring or training-induced teacher mindfulness, especially ones that aim to link mindfulness to classroom climate, student–teacher interactions, or student academic experiences. As found in this and other studies, teacher *experiences* of mindfulness (as reported by teachers) are negatively associated with their own stress, burnout, depression, and anxiety (Hwang et al., 2017). This study also suggests that teacher *expressions* of mindfulness (as reported by students) are positively associated with students' emotional and behavioral engagement, classroom belonging, involvement, value, and academic self-efficacy. Examining both experiences *and* expressions of TMC might help create an empirical bridge between teachers' well-being and students' academic functioning, perhaps via supportive student–teacher interactions and warm, well-managed classrooms (Roeser et al., 2012). Thus, both of these measures have important uses in future studies designed to map the processes through which teachers' mindfulness impacts their well-being, work, classrooms, and students.

Limitations and Future Directions

The current study had several limitations that should be addressed in future studies. First, the sample of teachers was relatively small. Although 78 teachers is a reasonable size for an intervention study, it is small for a measurement development study; and for some validity analyses, sample sizes were even smaller, since not all teachers had complete data for classroom observations or student surveys at every time point. A small sample size made it difficult to interpret findings on the overall fit of the CFAs (which is why we relied instead on the magnitude and significance of factor loadings, although some did not meet recommended cut-off criteria given the small sample size; Hair, Anderson, Tatham, & Black, 1998), and the study may also have been underpowered for detecting significant correlations. The small number of students providing information on some teachers also made it impossible to use analyses appropriate for the nesting of students within classrooms. Future studies that systematically recruit a more uniform number of students per teacher would allow the use of hierarchical analyses. A second limitation was that participants were predominately White and female (as is the teaching force more generally), thereby limiting generalizability of the findings. Selection biases in the teachers who participated were also likely. Our previous experience suggests that teachers who volunteer for MT are likely to be moderately stressed—stressed enough to seek relief in a program like MT, but not so stressed as to be overwhelmed by the idea of taking on another activity. In addition, while structural invariance suggests that MT did not change the functioning of the items across measures, it is possible that teachers' interpretations of their experiences of calmness, clarity, and kindness might change as a result of MT. Future studies should continue to look at the relations between the teacher measure, student measure, and CLASS-S with

a larger, more diverse sample of teachers, both within and outside of a mindfulness intervention setting.

A third important direction for future research would be the systematic construction of an observational assessment explicitly designed to capture teacher mindful behaviors in the classroom (Rickert et al., 2016). Although the many associations between teacher mindfulness (especially as tapped by student reports) and ratings from the CLASS-S indicate that more mindful teachers also seem to provide higher quality emotional support and classroom management, future studies can work to create new observational measures of teacher mindfulness, as part of the larger quest to find alternatives to self-reports (see Mind and Life Institute, 2009; Schoeberlein & Koffler, 2005). As a measure of classroom quality, the CLASS-S served as a useful first step in validating measures of teacher mindfulness with observational assessments. However, future research may benefit from new observational measures that more precisely target calm, clear, kind, reactive, distracted, and critical teacher behaviors in the classroom. Together, a suite of measures that combine conceptually rich and psychometrically sound assessments of mindfulness from all three perspectives—first person (teacher report), second person (student report), and third person (observer ratings)—may help both naturalistic and intervention studies more fully describe, explain, and optimize the positive impacts of TMC.



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Note

1. Meeting was attended by third author who helped coordinate the network for the Mind and Life Institute.

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