Lovingkindness Meditation: Effects on Teacher Burnout, Emotion Regulation, and Teacher-Student Interaction Quality

by

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Abstract

The quality of teacher-student interactions has important implications for students' learning and development. The high demands placed on teachers can contribute to teacher stress and burnout, which have negative consequences on teacher well-being, retention, classroom climate, and instruction, impacting student outcomes. Research suggests that teachers' well-being and social-emotional competence underlie their capacity and ability to effectively facilitate healthy teacher-student interactions and manage the classroom environment. The goal of this study was to test whether a brief and daily practice of lovingkindness meditation could reduce teacher burnout, improve emotion regulation, and enhance the quality of teacher-student interactions.

This study's sample included five elementary school teachers across general education, special education, and specialist contexts. Teachers reported pre- and post- intervention levels of burnout and emotion regulation by responding to items on the Maslach Burnout Inventory and Emotion Regulation Questionnaire. Effects of lovingkindness meditation on these outcomes were assessed with a non-parametric pre-post test. An AB single-case experimental design was used to repeatedly assess teacher-student interaction quality throughout both phases of the study. Two coders conducted observations and scored teacher-student interaction quality using the Classroom Assessment Scoring System. Dimensions related to emotional support, classroom organization, and instructional support were assessed. Visual analysis was applied to assess intervention effects on level and trend across emotional support, classroom organization, and instructional support. Non-overlap and trend analyses were then applied to supplement visual analysis findings.

Results were mixed across the cases and outcomes. One general education case and one special education case appeared to show the greatest improvements in teacher-student interaction quality but also had teachers with the highest reported burnout scores. The two specialist cases demonstrated little to no improvement in this outcome. Emotional support appeared most impacted by the intervention. Though many teachers showed evidence of reduced burnout, the only subscale statistically significantly impacted was personal accomplishment. Within emotion regulation, evidence suggested that teachers' cognitive reappraisal was statistically significantly impacted by the intervention, though three teachers showed increases in expressive suppression, a maladaptive emotion regulation strategy.

This study had mixed results but promising did emerge. Anecdotal evidence also supported teachers' satisfaction with the intervention.

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List of Abbreviations

CARE	Cultivating Awareness and Resiliency in Education
CASEL	Collaborative for Academic, Social, and Emotional Learning
CBI	Copenhagen Burnout Inventory
CCARE	Center for Compassion and Altruism Research and Education
CCT	Compassion Cultivation Training
CEB	Cultivating Emotional Balance
CFA	Confirmatory factor analysis
CFI	Comparative fit index
CLASS	Classroom Assessment Scoring System
CO	Classroom Organization
COS-1	The Classroom Observation System for First Grade
COS-K	Classroom Observation System for Kindergarten
CSRP	Chicago School Readiness Project
DLPFC	Dorsolateral prefrontal cortex
ERQ	Emotion Regulation Questionnaire
ES	Emotional Support
FFMQ	Five Facet Mindfulness Questionnaire
*f*MRI	Functional neuroimaging
GFI	Goodness-of-fit
HEP	Health Enhancement Program
IAT	Implicit Association Task
ILF	Instructional learning formats
IS	Instructional Support
LKM	Lovingkindness meditation
MBEB	Mindfulness-Based Emotional Balance
MBI	Maslach Burnout Inventory - Educators' Survey
MBPI	Mindfulness-based programs and interventions
MBSR	Mindfulness-based stress reduction
mDES	Modified Differential Emotions Scale
MSC	Mindful Self-Compassion
MTS	Mindfulness in Teaching Scale
NAcc	Nucleus accumbens
NAP	Non-Overlap of All Pairs
NCES	National Center for Education Statistics
NFI	Bentler-Bonett normed fit index
NICHD	National Institute of Child Health and Development
PANAS-C	Positive and Negative Affect Scale for Children
PANAS-X	Positive and Negative Affect Schedule

PCM	Prosocial Classroom Model
PSS	Perceived Stress Scale
RCT	Randomized control trial
RMSEA	Root mean square error of approximation
SCED	Single-case experimental design
SCS	Self-Compassion Scale
SEC	Social-emotional competence
SEL	Social-emotional learning
SMART	Stress Management and Relaxation Training
SRMR	Standardized root-mean square residual
STAI	State-Trait Anxiety Inventory
STRS	Student-Teacher Relationship Scale
TCRS	Teacher-Child Rating Scale
TLI	Tucker-Lewis Index
TSIQ	Teacher-student interaction quality
TSR	Teacher-student relationship
TSST	Triar Social Stress Test
WWC	What Works Clearinghouse
ZPG	Zurich Prosocial Game

Between stimulus and response there is a space. In that space is our power to choose our response. In our response lies our growth and our freedom.

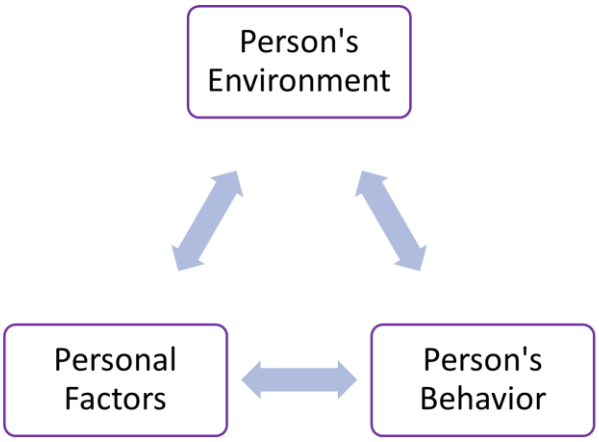
- Viktor E. Frankl

Chapter 1: Introduction

A child's teacher and classroom environment play critical roles in their schooling experiences, learning, and development (Bandura, 1986). Bandura's theory of social learning suggests that students learn from observing elements of their environment, including their teachers and peers. Bandura's social learning theory evolved to become his social-cognitive theory (1986). Bandura's social-cognitive theory is grounded in the concept of triadic reciprocal causation and suggests that human behavior is determined by the interplay of personal factors (e.g., temperament, personality, cognition, emotions), environment (e.g., teachers, parents, peers,) and behavior (e.g., actions, reactions). This triangular model of reciprocity (see Figure 1) has implications for all human behavior, including that of students and teachers.

Figure 1

Bandura's Model of Triadic Reciprocal Causation



In the educational context, if teachers' personal factors can influence their behaviors and environment and that environment is shared with their students, then that environment is a mediating variable between teacher and student. Thus, if the environment can be altered through changes in a teacher's personal and behavioral characteristics, these changes should also lead to effects on students' environments and therefore can influence their personal and behavioral

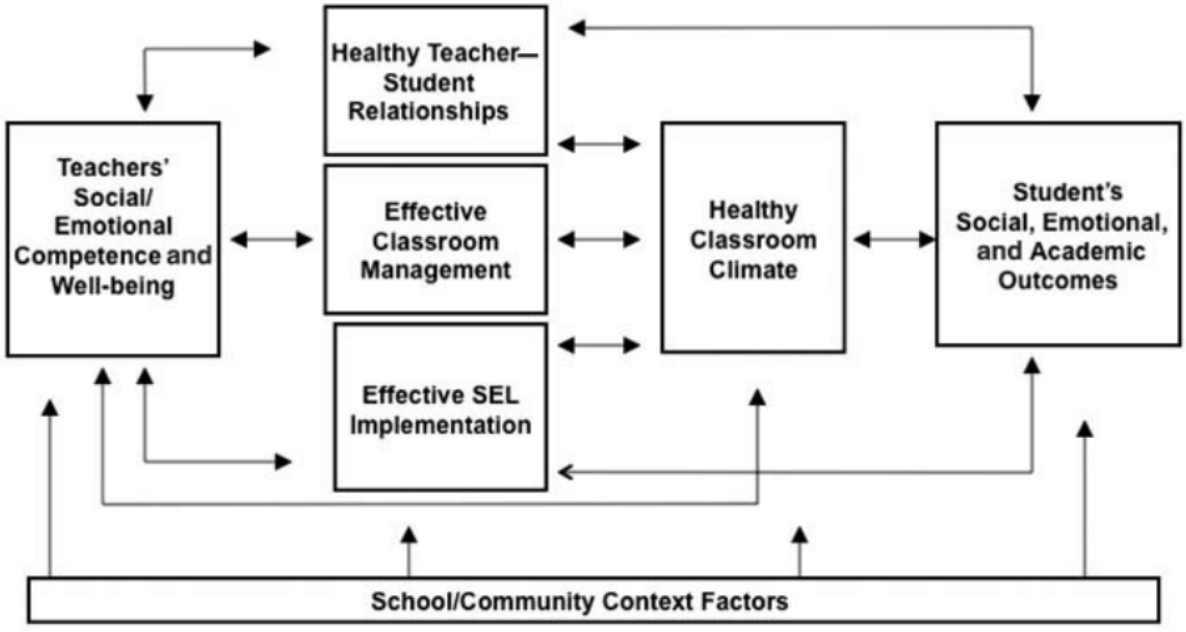
variables, which inevitably contribute to their educational experiences and outcomes. The relationships between teachers' personal and behavioral variables and the classroom environment, and that between classroom environment and student outcomes is supported also by the prosocial classroom model (Jennings & Greenberg, 2009).

The Prosocial Classroom Model and the Classroom Environment

The prosocial classroom model (PCM; Jennings & Greenberg, 2009) depicts a framework for how teachers' social-emotional competencies and well-being interact with teaching practices and the quality of classroom interactions, thereby influencing students' social, emotional, and academic development (see Figure 2).

Figure 2

Prosocial Classroom Model by Jennings and Greenberg (2009, p.494)



This model displays teachers' social-emotional competence (SEC) as the foundation for positive teacher-student relationships, effective classroom management, and effective implementation of social-emotional learning (SEL) curriculum, all of which contribute to a

healthy classroom environment and students' social, emotional, and academic outcomes. According to this model, teacher SEC and well-being have both direct and indirect impacts on the classroom climate, by way of healthy teacher-student relationships, effective classroom management, and effective SEL implementation (Jennings & Greenberg, 2009).

Jennings and Greenberg (2009) suggest that teachers with high levels of SEC can help students resolve conflicts, witness and capitalize on students' strengths, develop positive relationships with students, and model the prosocial behaviors and attributes (e.g., relationship-building, conflict resolution, respectful communication) that are important for students to develop. These teachers are also characterized as having high self-awareness and a realistic understanding of their own emotions, patterns, tendencies, strengths, and weaknesses. Teachers with high SEC are able to engage with and respond to students in a supportive way, contributing to healthy teacher-student interactions. The quality of teacher-student interactions plays an integral role in the teacher-student relationship, which according to the PCM has implications for students' social, emotional, and academic outcomes, both directly and indirectly by contributing to the overall classroom climate.

Although the PCM distinguishes teacher-student relationships, classroom management, and curriculum implementation as contributing factors to the classroom climate, others who also recognize the importance of these variables and emphasize their relationship to student outcomes, conceptualize the relationships between them somewhat differently. For example, Pianta et al. (2008) frame factors of the teacher-student relationship, classroom management, classroom climate, and instructional quality as components of teacher-student interaction quality.

Teacher-Student Interaction Quality

Pianta et al. (2008) developed a framework for understanding the multi-faceted nature of teacher-student interactions in the classroom. According to Pianta et al., these interactions can be classified into three domains: emotional support, classroom organization, and instructional support. Using this framework, Pianta et al. developed the Classroom Assessment Scoring System (CLASS), an observational tool for assessing teacher-student interaction quality (TSIQ). Several versions of the tool are available for assessing TSIQ across all grade levels, though in this study, I implemented the K-3 version.

Many have implemented the CLASS and unveiled significant relationships between TSIQ and teacher and student outcomes. LoCasale-Crouch et al. (2018) found that higher TSIQ in fifth grade classrooms predicted greater student engagement, more positive feelings towards school, and showed better math and reading performance. They also found that consistency of interactions was an important predictor of student engagement and teacher-reported conflict. Levels of teachers' emotional support have also been linked to student stress, indicated by cortisol levels found in student saliva samples (Hatfield et al., 2013).

Teachers' occupational health has also been identified as having important implications for teachers' emotional support, teacher-student interactions, and students' well-being, joining the relationships depicted by the PCM and CLASS framework. Teacher burnout, one indicator of teachers' occupational health (Ingersoll, 2002) has been linked to detrimental outcomes for teachers, students, and the overall quality of their interactions, or TSIQ.

Teacher Burnout

Teacher burnout may be one barrier to building and sustaining teacher SEC and well-being with its implications for both job performance and mental health (Maslach et al., 2001).

Healing teacher burnout is critical for reducing teacher turnover (Ingersoll, 2002) and ensuring that caring teachers are cared for. Reducing teacher burnout is also expected to offset some of its consequences, leading to enhanced TSIQ and improved student outcomes.

Burnout consists of three components that can occur in overlapping phases: (1) emotional exhaustion (2) depersonalization, and (3) reduced personal accomplishment (Maslach, 1998). Emotional exhaustion refers to feeling emotionally overextended and drained, depersonalization is comparable to cynicism or feeling excessively detached from others, and reduced personal accomplishment is a lowered sense of self-efficacy, productivity, and competence (Maslach, 1998).

Interpersonal relationships, Maslach (1998) suggests, are at the heart of burnout, holding the potential to serve as a coping resource, yet too often become collateral damage in the wake of burnout's damaging effects to the individual and their interactions with others. Although relationships are important in any profession, they are especially important in the context of teaching, where relationships and interactions with students have implications for student outcomes such as social and academic competence, school engagement, school dropout, and other behavioral outcomes (Croninger & Lee, 2001; Pianta et al., 2002; Tsai & Cheney, 2011).

Predictors, Correlates, and Consequences of Teacher Burnout

Teachers are particularly at-risk for burnout due to the heavy workload, time constraints, interpersonal demands, and emotional labor required of them while interacting with students (Maslach et al., 2001). Some factors that can lead to teacher burnout are teachers' negative perceptions of student behavior and job-related tasks (Chang, 2009), work-related stress, and personality traits (Kokkinos, 2007). Managing student behavior also appears to play an important

role in at least the first two stages of burnout: emotional exhaustion and depersonalization (e.g., Kokkinos, 2007).

Interestingly, it appears that there may be a bi-directional or reciprocal relationship between teacher burnout and classroom climate as an early study showed that classroom climate predicts the first phase of burnout, emotional exhaustion (Byrne, 1994). This same study found that emotional exhaustion predicted depersonalization, which Jennings and Greenberg (2009) suggested spark what they call a "burnout cascade;" as classroom climate deteriorates, teacher burnout increases, which further reduces the quality of the classroom environment, resulting in increased behavior problems, exacerbating teacher stress and emotional exhaustion in a recursive downward spiral. Teacher burnout has implications for classroom quality (Ansari et al., 2020), program implementation (Han & Weiss, 2005), and student well-being (Oberle & Schonert-Reichl, 2016). Additionally, classes with teachers who have high levels of burnout and few coping skills are reported as having students with lower prosocial behavior and greater disruptive behavior and concentration problems than classes with teachers with lower burnout and better coping skills (Herman et al., 2018).

Improving teacher well-being, which has been shown to have positive effects on teacher-reported stress and implementation of evidence-based practices (Larson et al., 2018), and reducing burnout are important steps in interrupting the burnout cascade to ensure better student and classroom outcomes. Reducing burnout has thus grown as a topic of interest to researchers, leading to the development of teacher well-being interventions and programs, many of which have elements of mindfulness embedded.

Mindfulness

Mindfulness is becoming an increasingly popular competency that is theorized to underlie teacher well-being, reduce teacher burnout, and improve TSIQ, and has been implemented as a practice in schools across grade levels, for both teachers and students (Meiklejohn et al., 2012). Mindfulness is defined by Kabat-Zinn as "the awareness that arises from paying attention on purpose, in the present moment, nonjudgmentally" (Paulson et al., 2013, p. 91). Mindfulness-based interventions and curriculums for teachers have grown in popularity in the last decade, often used with the aim of reducing teacher burnout (e.g., Roeser et al., 2013) and improving teacher well-being (e.g., Tarrasch et al., 2020).

Mindfulness training is theorized to lead to the cultivation of mindfulness and habits of mind that affect teacher occupational health (i.e., burnout and well-being) and classroom outcomes (i.e., climate, classroom management, and teacher-student relationships), which in turn impact student outcomes, which then feed back into teacher occupational health and teacher-student relationships (Roeser et al., 2012). When a person practices mindfulness, they can non-judgmentally observe their own thoughts and emotions, a critical foundation for the self-awareness and self-regulation that are displayed by socially and emotionally competent teachers. Mindfulness programs for teachers then, should help stop the burnout cascade and perhaps even reverse the damaging effects that teacher burnout can have on teachers, classrooms, and student outcomes. If mindfulness is conceptualized as a social-emotional competency, increases in mindfulness should then impact outcomes across the PCM (Jennings & Greenberg, 2009). This includes expected improvements in TSIQ in teacher-student relationships, classroom management, SEL implementation, and the overall classroom climate, all of which lead to enhanced student outcomes.

Empirical Evidence for Teacher Mindfulness Programs and Interventions

A meta-analysis of mindfulness interventions in education suggests that mindfulness practices are effective for positively influencing teachers' emotion regulation, empathy, social connectedness, and resilience, all theorized as facets of social emotional competence (Gomez-Olmedo et al., 2020). Teachers can personally benefit from participating in mindfulness practices to improve brain function, maintain good executive function and reduce physiological stress symptoms (Meiklejohn et al., 2012). Mindfulness programs have also helped teachers improve their sleep quality, mood, and satisfaction with work and life (Crain et al., 2017). Comprehensive mindfulness-based programs such as the Cultivating Awareness and Resiliency in Education (CARE; Jennings et al., 2013), Stress Management and Relaxation Training (SMART) and the Mindfulness-Based Emotional Balance program (Cullen & Brito Pons, 2015), have resulted in numerous positive outcomes for teachers. These include improvements in well-being, burnout, and stress (Jennings et al., 2013), occupational health (Braun, Roeser, & Mashburn, 2020), efficacy (Cook et al., 2017), and mindfulness skills (Braun, Roeser, & Mashburn, 2020).

Teachers' participation in CARE is also associated with long-term impacts for teachers such as increases in emotion regulation and reduced physical and psychological distress (Jennings et al., 2019), which hold potential for meditating effects on student outcomes. Evidence from the SMART program, an early version of the Mindfulness-based Emotional Balance Program (MBEB), supports long-term mediational effects of mindfulness and self-compassion on reductions in teacher stress, burnout, depression, and anxiety symptoms (Roeser et al., 2013).

Improvements resulting from mindfulness programs extend also to changes in teaching practices and TSIQ. Implementation of one mindfulness-based program called the Achiever

Resilience Curriculum has resulted in increased teacher self-efficacy (Cook et al., 2017) and improved implementation of evidence-based practices (Cook et al., 2017; Larson et al., 2018). Participation in CARE also has implications for TSIQ in teacher sensitivity, positive emotional climate, and time for learning dimensions (Jennings et al., 2017).

Limitations of Current Mindfulness Programs

Many current mindfulness-based programs have been successful in improving teaching practices, teacher burnout, and classroom interactions. However, many of the existing programs are multi-component, often involving elements of instruction, practice, and "homework" assignments. Additionally, these programs can last up to eight weeks and may contain long sessions, with some lasting a full day. Although research supports benefits of some of these lengthy multi-component programs, they may be limited by their capacity to fit within the already busy lives of teachers. For example, 33% of teachers reported they were unsure if they would recommend the MBEB program and 16% reported they would not, with most teachers reporting that the program was too long (Braun, Roeser, & Mashburn, 2020). Another disadvantage is that with so many different components in each program, it is difficult to identify a program's active component(s) and thus understand their relative contribution(s) to observed effects. These active components are known as evidence-based kernels (Embry & Biglan, 2008).

Embry and Biglan assert the importance of identifying these kernels in prevention and treatment interventions for clarifying the active ingredients in existing interventions and contributing to the development of more efficient and effective interventions. Identifying kernels in these comprehensive mindfulness-based programs is an important step in delivering more concise, yet equally effective interventions for building teachers' social and emotional competencies. In this way, we can increase teachers' willingness to participate in programs for

improving the quality of classrooms and teacher-student interactions, thus enhancing both teacher and student outcomes.

Mindfulness-based programs for teachers such as CARE, SMART, and MBEB are all consistent with the theoretical underpinnings of the prosocial classroom model and include interpersonal components embedded in the programs. A common thread and potential kernel (Embry & Biglan, 2008) throughout these programs is an element of compassion training, embedded within each. Although compassion is a common component of these interventions, only a few studies that have investigated the effects of a standalone compassion training for teachers, with none investigating the relationship between compassion training and the three subscales of burnout identified by Maslach et al. (2001). Additionally, no compassion interventions for teachers have examined effects on classroom interactions, or TSIQ. Identifying whether compassion training may be an active component, or kernel, of current mindfulness-based teacher programs could allow researchers to develop and test more targeted interventions against outcomes of teacher SEC, burnout, and TSIQ.

A Kernel of Compassion

Compassion is the ability to non-judgmentally and without attachment, witness and understand the suffering of others with motivations and behaviors aimed at alleviating that suffering (Gilbert, 2005). Boellinghaus et al. (2014) emphasized the importance of other-focused professions (e.g., teachers, nurses, therapists) having caring and therapeutic relationships with those who are in their care (e.g., students, patients, clients) and the need for compassion in these spaces. Compassion might be a kernel that is important for reducing burnout in these caring professions (Klimecki & Singer, 2011). Additionally, while mindfulness helps to bring awareness to each present moment, compassion shows additional promise for increasing prosocial

behaviors (e.g., Leiberg et al., 2011; Singer & Engert, 2019) and thus positive interactions in the classroom.

Compassion's Relationship to Burnout

Similar to mindfulness, compassion involves a quality of non-attachment. This non-attachment piece of compassion is what researchers such as Klimecki and Singer (2011) theorize helps to prevent burnout. To better understand the role compassion may play in preventing burnout, it is important to understand the differences between compassion and empathy. Though some may mistakenly use these two terms interchangeably, they differ in fundamental ways, which have important implications for the way they relate to the emotional exhaustion and depersonalization phases of burnout.

Empathy is known to have both cognitive and affective components, which are sometimes referred to as cognitive empathy and emotional empathy (Leppma & Young, 2016). Cognitive empathy can be described as the ability to "put yourself in someone's shoes" to cognitively perceive another's experience without experiencing or feeling their emotions (Miller et al., 1988). Emotional empathy on the other hand, can be described as when a person vicariously experiences another's emotions (Leppma & Young, 2016). Bloom (2016) argues that feeling too much emotional empathy initializes an instinct to close off, which prevents actions that can be taken to alleviate another's suffering. However, to observe and understand another's suffering without emotionally attaching and feeling that suffering, makes it more likely that a person will take action, freed from the suffering that might cause a person to turn away.

Attachment to these feelings of suffering can contribute to the emotional exhaustion phase of burnout, leading to what Klimecki and Singer (2011) refer to as "empathic distress fatigue." Though some commonly refer to this phenomenon as "compassion fatigue," Klimecki

and Singer (2011) argue that this terminology is inaccurate, marking a clear distinction between compassion and empathy. While emotional empathy may contribute to emotional exhaustion and burnout, compassion may protect against it. This healthy non-attachment that may protect against burnout is something that is shared by both mindfulness and compassion. Though mindfulness and compassion share this characteristic, they also differ in important ways.

Compassion's Relationship with Mindfulness

Boellinghaus et al. (2014) tackle the conceptual differences between mindfulness and compassion and Singer and Engert (2019) offer empirical differences based on the different outcomes when interventions were compared. According to Boellinghaus et al (2014), there are three main differences between mindfulness and compassion. First, mindfulness can relate to any experience, while compassion is directed at suffering. Second, mindfulness is directed at a general experience, while compassion is directed at oneself or others. Third, while mindfulness is about bringing awareness and acceptance to the present moment, compassion takes this a step further by bringing care and concern to the suffering. Mindfulness and compassion have a close, intertwined relationship and there are many differing ideas about the exact nature of the relationship. For example, the Dalai Lama suggested that lovingkindness, a compassion practice, is the foundation for mindfulness work (Salzberg, 1995). Compassion has been suggested as both a quality of mindfulness and an outcome (Boellinghaus et al., 2014). Like mindfulness, compassion research provides a theoretical foundation and emerging empirical evidence to support its use for reducing teacher burnout and improving classroom climate and interactions.

Compassion Training as a Potential Teacher Intervention

Through witnessing students' experiences with non-attachment, teachers theoretically should be able to remain present for their students without turning entirely away to avoid

negative feelings that might otherwise be brought on by vicariously experiencing the students' emotions. The desires to assist students and alleviate their suffering, which are specific to compassion, give reason to believe that compassion could be an important social and emotional competency that can be leveraged to improve other elements of the prosocial classroom model, in particular teacher-student relationships. Since compassion also involves awareness of and care for oneself and others, it may also be an important element of establishing a positive classroom climate and enhanced TSIQ, thus positioning itself well as a social and emotional competency with potential to improve subsequent student outcomes.

Research has shown how mindfulness programs for teachers lead to improvements across the prosocial classroom model. The conceptual overlap between compassion and mindfulness suggests that compassion may offer another avenue towards achieving effects produced by mindfulness-based programs. Insights from comparison studies offer more clarity on outcomes that are specific to mindfulness and compassion individually and which are shared between the two. Though research on compassion-specific interventions for teachers is limited, compassion research in the general population provides important insights to consider.

Differential effects of mindfulness and compassion interventions. Singer and Engert (2019) compared three unique 3-month training modules: (1) presence (i.e., mindfulness), (2) affect (i.e., compassion) and (3) perspective (i.e., socio-cognitive). From here on I will refer to these modules as mindfulness, compassion, and socio-cognitive modules. Both the mindfulness and compassion modules led to increases in interoceptive awareness (i.e., related to awareness of the physiological sensations that arise within one's own body) and emotional awareness, attentional facets of mindfulness, compassion-based qualities, and compassion itself. They also resulted in enhanced positive affect, self-reported prosocial behavior, and reduced stress and

thought distraction. These results indicate that both mindfulness and compassion training are suitable for yielding improvements in teacher burnout and social-emotional competence.

Of all three modules, the compassion module produced the strongest effects in compassion and compassion-based qualities. All three modules led to increases in subjective prosociality, though these increases were not related to changes in task-based altruism (Singer & Engert, 2019). Additionally, only the compassion module resulted in increases in positively-valenced thoughts and altruistically motivated prosocial behavior (i.e., task-based altruism). Mindfulness training had no effect on task-based altruism. Weng et al. (2013) also found that short-term compassion training resulted in greater altruistic behavior and was associated with altered brain activation in regions related to social cognition and emotion regulation.

A meta-analysis (Kirby et al., 2017) of compassion-based interventions further supports these findings. In their meta-analysis, Kirby et al. (2017) found significant differences between groups in self-reported measures of compassion, self-compassion, mindfulness, depression, anxiety, psychological distress, and well-being; these findings were also present in some studies that used active control comparison groups. These findings taken with the evidence for compassion in increasing prosocial behavior show promise that it could be a kernel of larger mindfulness programs and may produce similar effects across the prosocial classroom model. One type of compassion practice that requires few resources to implement and is readily accessible to teachers, is lovingkindness meditation.

Lovingkindness Meditation

Lovingkindness meditation (LKM) is a compassion practice that involves bringing attention to the present moment and meeting oneself with non-judgement and compassion through well wishes of health, happiness, peace, etc. (Salzberg, 1995). When practicing LKM, an

individual first directs this lovingkindness towards themselves and then moves out in concentric circles from those they love dearly to neutral parties, and eventually to those whom they consider adversaries. When the practitioner finds it difficult to send lovingkindness to others, they may return to directing the lovingkindness to themselves.

Fredrickson et al. (2008) suggest that this meditation practice has a strong mediational effect, whereby increasing daily positive emotions as a result of LKM produced increases in personal resources, which in turn predicted increased life satisfaction and reduced depressive symptoms, all of which are relevant for teachers' well-being and burnout. Studies of LKM have shown this practice to be effective at improving compassion, mindfulness, positive emotions, and self-compassion (Galante et al., 2014), affect, perceived social connectedness, and well-being (Kok et al., 2013; see also Liu et al., 2020), as well as de-centering and reducing negative reactions to thoughts and self-reported depression (Feldman et al., 2010).

Compassion practices are an important component of many mindfulness-based interventions. However, with the rapid growth of mindfulness as a field of study, the term "mindfulness" has often been used as an all-encompassing term that oversimplifies the differences between various types of practices and their distinct associated outcomes. Compassion cultivation, an element of many mindfulness-based interventions for teachers, has not yet been studied on its own for its effectiveness in reducing teacher burnout or improving teacher SEC and teacher-student interaction quality.

Aim of the Study

This study aimed to determine the effects of a lovingkindness meditation intervention for K–3 teachers. To address this aim, a single-case experimental design was implemented to explore whether LKM can reduce teacher burnout and enhance desirable teaching practices and

classroom interactions, while improving teacher SEC. If the effects resulting from compassion and LKM studies are replicable in teacher populations, then implementing LKM might serve as a simple and efficient alternative to utilizing comprehensive multi-component mindfulness programs. Next, I take a closer look at the literature related to this study's aim and content.

Chapter 2: Literature Review

This chapter provides a review of the literature related to this project's topic: a lovingkindness intervention for reducing teacher burnout, enhancing teachers' social-emotional competencies, and improving the quality of teacher-student interactions. I begin this chapter by defining and discussing teacher-student interaction quality (TSIQ) and its components. Next, I discuss teacher and student outcomes related to TSIQ across three domains: emotional support, classroom organization, and instructional support (Pianta et al., 2008). Then, I examine teacher-related variables that influence these interactions and their quality, followed by a closer look at one of these variables, teacher burnout. More specifically, I discuss the bidirectional relationship between teacher burnout and TSIQ as well as how teacher burnout can impact teacher and student outcomes.

I then review the literature on teacher social-emotional competence (SEC) to describe the construct and explore how developing teacher SEC can contribute to protecting teachers against burnout and enhancing TSIQ. Interventions used to promote teacher social-emotional competence are next reviewed, with a special focus on mindfulness-based interventions. After discussing the advantages and limitations of existing mindfulness-based interventions, I turn to look at a contemplative practice closely related to mindfulness: compassion. I discuss how the literature has defined compassion and review the research outcomes related to compassion training practices, including lovingkindness meditation. Specifically, I review outcomes of

compassion and lovingkindness meditation (LKM) interventions related to occupational burnout, teacher-student interaction quality and social-emotional competence. Finally, I re-state the research problem and study purpose, share my research questions, and discuss how this study contributes to the existing research.

Teacher-Student Interaction Quality

Pianta et al. (2008) categorize classroom interactions at the lower elementary levels (grades K-3) using three overarching domains: emotional support, classroom organization, and instructional support. Each of these domains is composed of several unique dimensions related to the domain, with specific indicators and behavioral markers nested within each dimension. The Classroom Assessment Scoring System (CLASS) is a framework and observational tool developed by Pianta et al. (2008) to assess the quality of teacher-student interactions. In this dissertation, I refer to emotional support, classroom organization, and instructional support domains and their dimensions as components and indicators of TSIQ. Although different versions of the CLASS have been developed across all grade levels, this study is focused on the K-3 version. Next, I describe in detail each of the domains that TSIQ is comprised of, according to the CLASS: a) emotional support, b) classroom organization, and c) instructional support.

Emotional Support

Emotional support relates to teachers' abilities to support social-emotional functioning in the classroom (Pianta et al., 2008). Emotional support (ES) is comprised of four distinct dimensions: positive climate, negative climate, teacher sensitivity, and regard for student perspectives. The first dimension, positive climate, reflects the warmth, respect, and enjoyment shared between teachers and students (Pianta et al., 2008). This may be communicated through verbal and non-verbal interactions and is indicated through relationships, positive affect, positive

communication, and respect (Pianta et al., 2008). Specific behavioral markers allow observers to measure these indicators such as matched affect and physical proximity, smiling or laughter, verbal or physical affection, and eye contact or respectful language (Pianta et al., 2008).

The second dimension of emotional support, negative climate, relates to the frequency, intensity, and quality of negative expression in the classroom (Pianta et al., 2008). Negative climate is indicated through observations related to negative affect (e.g., irritability, harsh voice), punitive control (e.g.., yelling, threats, or harsh punishment), sarcasm or disrespect (i.e., teasing or humiliation), and severe negativity (e.g., victimization or bullying). The third dimension, teacher sensitivity, is indicated through observations of behaviors related to teacher awareness, teacher responsiveness, addressing and resolving student problems, and student comfort. This dimension regards a teacher's awareness and responsive to students' academic or emotional needs (Pianta et al., 2008). Lastly, regard for student perspectives is described as student-centered instruction and interactions. High quality TSIQ in this dimension is characterized by teacher flexibility and student-focused instruction, support for student autonomy and leadership, freedom of student expression, and low restriction of student movement (Pianta et al., 2008).

Classroom Organization

Classroom organization (CO), the second CLASS domain, refers to teachers' use of behavior management practices and their organization and management of time and student attention. The three dimensions that make up classroom organization are behavior management, productivity, and instructional learning formats. Behavior management relates to teachers' effectiveness in monitoring, preventing, and re-directing student behavior (Pianta et al., 2008). Indicators of behavior management include clear and consistent behavioral expectations, use of proactive strategies, effective and subtle redirection of misbehavior, and the quality of student

behavior itself, assessed through observations of student compliance, aggression, and defiance (Pianta et al., 2008).

Productivity, the second CO dimension, assesses the extent to which the teacher maximizes opportunities for students to be involved in learning activities. This includes maximizing learning time and can be observed through teachers' pacing of instruction, activities provided for student learning and early finishers, and few disruptions to learning due to managerial tasks. Other indicators of productivity include clear routines, quick and efficient transitions, and teacher preparation of content and materials. The third CO dimension is instructional learning formats, which Pianta et al. (2008) describe as teachers' facilitation of activities and provision of interesting materials to promote student engagement and maximize learning opportunities. Indicators of this dimension include effective facilitation (e.g., effective questioning, teacher involvement and expanding student involvement), variety of modalities and materials, student interest (e.g., active participation, focused attention), and clarity of learning objectives communicated to students (e.g., advanced organizers, summaries, reorientation statements).

Instructional Support

The third and final domain of the CLASS, instructional support (IS), relates to teachers' implementation of their school or district curriculum and how their implementation supports students' cognitive and language development (Pianta et al., 2008). Three dimensions are included in this domain: concept development, quality of feedback, and language modeling. Concept development relates to how teachers organize their delivery of instruction or promote higher-order thinking skills. This dimension is centered on instructional discussions and activities and includes four indicators: analysis and reasoning (e.g., use of how/why questions,

problem solving, evaluation), creating (e.g., brainstorming, planning, producing), integration (e.g., connecting concepts and integrating with previous knowledge), and connections to the real world (e.g., relatedness to student lives and real-world applications) (Pianta et al., 2008).

The quality of feedback dimension, within the instructional support domain of the CLASS, relates to teachers' use of questioning and commenting in response to student ideas, comments, and work and how the teacher encourages student participation and understanding (Pianta et al., 2008). This includes scaffolding, feedback loops, prompting thought processes, providing information, and encouragement and affirmation. Lastly, language modeling is a dimension of IS that reflects how teachers facilitate and encourage student use of language in the classroom (Pianta et al., 2008). Indicators for this dimension include the presence of frequent conversation, the use of open-ended questions, repeating or extending student responses, and using advanced language with students (Pianta et al., 2008).

Analyzing the teacher-student interactions through the lens of the CLASS elucidates and organizes the complexities inherent in a classroom environment. Due to the many processes and teacher-student interactions that occur within the classroom environment, this context is rich with opportunities for developing students' academic, social-emotional, and behavioral competencies (Wang et al., 2020). Thus, many have sought to study the relationships between TSIQ and student outcomes across grade levels. The next section discusses the impacts of TSIQ on student outcomes, followed by a section reviewing how teacher-related constructs play a role in shaping teacher-student interaction quality.

TSIQ and Student Outcomes

Researchers have linked the overall quality of teacher-student interactions in the classroom to students' academic and social-emotional outcomes (Pianta et al., 2002).

Specifically, teachers' emotional support is linked to students' academic competence as perceived by teachers (Pianta et al., 2002), observed social competence (Pianta et al., 2002), social-emotional distress (Wang et al., 2020), academic achievement, and student-teacher conflict (Hamre & Pianta, 2005).

All three domains of the CLASS have been shown to contribute significantly to students' social-emotional and academic outcomes. For example, within the emotional support domain of the CLASS, Rimm-Kaufman et al. (2002) found that socially bold kindergarten students in classrooms characterized by high teacher sensitivity displayed greater self-reliance, fewer negative behaviors, and less off-task behavior than those in classrooms with low teacher sensitivity. Evidence also suggests that higher quality behavior management, part of the classroom organization domain, may lead to reduced office disciplinary referrals for students, less behavior problems, and more prosocial behaviors. Instructional support quality has also been studied for its significant impact on students' academic outcomes, especially in moderating the relationship between maternal level of education and these outcomes (Hamre & Pianta, 2005). These findings are now discussed in greater depth, beginning with the relationships between TSIQ and students' social and academic competence.

TSIQ and Students' Social, Emotional, Behavioral, and Academic Outcomes

Pianta et al. (2002) studied 223 public school classrooms in suburban and rural areas across three states to understand relationships between classroom climate and child outcomes. They assessed child outcomes through teacher-reports and observations and explored relationships between TSIQ and child outcomes (Pianta et al., 2002). Researchers implemented an observational instrument implemented called the Classroom Observation System for Kindergarten (COS-K; National Center for Early Development and Learning, 1997).

Observers conducted their observations for three hours, using a time sampling procedure to collect data on classroom activities and teacher behaviors. Global ratings of classroom quality (i.e., TSIQ) were calculated based on classroom dimensions similar to the CLASS (e.g., overcontrol, positive emotional climate, negative emotional climate, classroom management, instructional quality, evaluative feedback, literacy instruction, and child responsibility). These dimensions were scored on a 7-point scale from adequate (1) to excellent (7). These classroom dimensions were then analyzed to reveal a two-factor structure, one being child-centered classroom climate (low classroom overcontrol, high positive emotional climate, high quality classroom management, supporting child responsibility) and the other instructional climate (high ratings of literacy instruction, evaluative feedback, and instructional conversation) (Pianta et al., 2002, p. 230). Teacher behaviors were also rated on a 1–7 scale for behaviors including sensitivity or responsivity, intrusiveness or overcontrol, and detachment or disengagement.

Teacher reports of children's social and academic outcomes were obtained through two teacher questionnaires: the Teacher-Child Rating Scale (TCRS; Hightower et al., 1986) and the Early Childhood Longitudinal Study-Academic Competence Rating Scale (National Center for Education Statistics [NCES], 1994). The TCRS is a 38-item measure used to score children's problem behaviors and competencies. The NCES used teacher-reports to assess student literacy and math skills using a 29-item assessment. School and teacher characteristics and family demographics were also collected. Global classroom quality indicators of instructional climate, child-centered climate, and teacher positivity were then studied for their relationships to child outcomes.

Pianta et al. (2002) found that higher ratings of overall TSIQ were positively associated with higher teacher-reported social competence, observed competence, observed on-task

behavior, and teacher-reported academic outcomes in math and literacy. All associations remained significant after maternal education and family income were accounted for, except in the relationship between instructional climate and teacher-reported social and language competencies. Regression analyses were conducted, combining TSIQ indicators, family income, and maternal education as predictors.

Pianta et al. (2002) found that together, these predictors accounted for 9% of variance in teacher-reported social competence, 15% of variance in literacy competence, and 17% of variance in math competence. Teachers rated children as more competent in math and literacy if the mother's level of education was higher; children were also rated as more competent in math in classrooms with higher teacher-positivity scores.

The same model was used to predict on-task behavior and it was found that together, the three quality indicators accounted for 13% of variance in observed on-task behavior. Observed on-task behavior was positively predicted by teacher positivity and negatively by a child-centered climate. It is possible that "on-task" behaviors may look different or be difficult to score in a more child-centered classroom, which may explain these results.

When family income and maternal education level were added to the model, Pianta et al. (2002) found that 16% of variability in observed child competence (e.g., positive affect, negative affect, self-reliance) was explained by the model and that children in a more child-centered climate displayed more social competence.

A recent meta-analysis of classroom climate and TSIQ (Wang et al., 2020) revealed small to medium effect sizes supporting positive associations between overall TSIQ and students' social competence, motivation and engagement, and academic achievement. Small effect sizes supported negative associations between classroom climate and socio-emotional distress and

externalizing student behaviors. The negative associations with socio-emotional distress varied by classroom climate dimensions, with the strongest negative association existing between classroom socio-emotional support and student socio-emotional distress.

Bradshaw et al. (2012) suggest that the use of positive and proactive behavior management strategies can result in significantly lower levels of disruptive behavior, concentration problems and more prosocial behaviors, measured by the Teacher Observation of Classroom Adaptation Checklist (Koth et al., 2009). Positive and proactive behavior management strategies also significantly reduced the likelihood of a student receiving an office discipline referral. Although this study was based on school-wide implementation of Positive Behavioral Interventions and Supports (Sugai & Horner, 2009), I believe that similar student outcomes can be achieved when these strategies are used at the classroom level. These practices correspond to the behavior management dimension of the CO domain of the CLASS, which assesses teachers' use of proactive and reactive strategies for responding to student behavior.

The quality of teacher-student interactions in the classroom has important implications for perceived and observed social-emotional and academic student competencies and behaviors. TSIQ also has important implications for "at-risk" students, discussed next.

Outcomes for "At-Risk" Students Related to TSIQ

In 2005, Hamre and Pianta studied the importance of classroom climate for first-grade students who were considered "at-risk" of school failure, conducting a natural experiment as part of the National Institute of Child Health and Development (NICHD) Study of Early Child Care. The Classroom Observation System for First Grade (COS-1; NICHD Early Child Care Research Network, 2002) was used to measure TSIQ. Students' at-risk status was determined using kindergarten teacher-reports of academic, behavioral, attentional, and social difficulties (i.e.,

functional risks) as well as demographic data on maternal level of education (i.e., demographic risk). Data was collected on these functional and demographic risk factors to determine student "at-risk" status, which was later used to analyze their placement in high- and low- support classrooms as well as the impacts of emotional and instructional support on child outcomes of achievement and student-teacher relationships (Hamre & Pianta, 2005). Based on observations, 827 first-grade classrooms were categorized as high, moderate, and low support.

Hamre and Pianta (2005) assessed whether the quality of classroom support moderated children's risk of school failure. Using ANCOVA models, they evaluated any main effects of TSIQ on student outcomes and then studied moderator influences of TSIQ on the relationship between risk factors and student outcomes. Students with functional and demographic risk factors had lower achievement scores than their low-risk counterparts, after controlling for previous performance (Hamre & Pianta, 2005). The type of risk did not impact student outcomes, though functional risk status independently predicted higher rates of student-teacher conflict, as measured by the Student-Teacher Relationship Scale (STRS; Pianta, 2001). Interestingly, instructional support also played a significant moderating role.

Instructional support moderates academic outcomes for at-risk students. In their moderation analyses, Hamre and Pianta (2005) found that instructional support moderated the relationship between maternal level of education and academic outcomes (measured by Woodcock Johnson Achievement Test for first grade). That is, students whose mothers attained less than a 4-year college degree, placed in classrooms with moderate-high instructional support, performed academically on par with peers whose mothers attained higher education levels (4-year college or higher), compared to their counterparts placed in low-support classrooms who performed significantly below their low-risk counterparts in these classrooms (Hamre & Pianta,

2005). This suggests that teachers' levels of instructional support can significantly contribute to an "at-risk" student's academic performance.

Emotional support moderates outcomes for at-risk students. Emotional support also moderated the relationship between functional risk status and academic achievement. Students with multiple risk factors in high emotional support classrooms achieved academically on level with their low-risk counterparts, whereas high-risk students placed in low and moderate emotional support classrooms scored significantly lower than their low-risk counterparts, after prior achievement was accounted for (Hamre & Pianta, 2005). There were also implications for the role of emotional support in moderating the relationship between functional risk status and teacher-student conflict; high-risk students in classrooms with low emotional support were reported as having higher levels of conflict with teachers, whereas high-risk students in moderate-high emotional support classrooms did not rank significantly higher in teacher-student conflict compared to low-risk students (Hamre & Pianta, 2005).

Other researchers have also found that emotional support has important implications for social-emotional outcomes. Specifically, teacher sensitivity (measured by the COS-K) has implications for students who are considered "socially bold" (Rimm-Kaufman et al., 2002). Rimm-Kaufman et al. (2002) found that socially bold kindergarten students with teachers scoring higher in teacher sensitivity showed behaviors that were more self-reliant and engaged in fewer negative and off-task behaviors.

High quality teacher-student interactions can benefit all students and may be particularly important for improving social and academic outcomes for students who are at greater risk for school failure. Teachers and their interactions with students have the potential to moderate

relationships between student risk factors and academic and behavioral outcomes (Howes, 2000; Hamre & Pianta, 2005; Hamre & Pianta, 2001; Rimm-Kaufman et al., 2002).

I have discussed the implications of overall TSIQ for general students' social and academic outcomes. I also reviewed literature that examines these implications for students "at-risk," and looked closely at how two TSIQ domains, instructional and emotional support, play a role in these students' outcomes. The research shows that the quality of teacher-student interactions can have a significant impact on student outcomes.

Evidence has also accumulated to suggest that some teacher characteristics might predict or influence TSIQ, thereby holding potential to impact subsequent student outcomes. Given the research reviewed here, this may be particularly important for students with emotional, behavioral, academic, and demographic risk factors. Next, I discuss how teachers play a role in shaping the classroom environment and the quality of teacher-student interactions. Teacher factors discussed include a) stress, b) self-efficacy, c) teacher-student relationship quality, d) education levels, e) instructional quality, and f) emotional exhaustion.

Teacher-Related Impacts on TSIQ

In this section, I discuss teacher characteristics and factors that influence TSIQ, which mainly relate to teacher stress. This review includes research on teacher-student relationships (TSRs); the quality of TSRs can be conceptualized as a component of emotional support as assessed by the CLASS. Additionally, the prosocial classroom model positions healthy TSRs as contributing to the classroom climate and student outcomes and influenced by teacher SEC and well-being. First, I start by discussing how teacher stress and self-efficacy impact the TSR. This is important because it contributes to understanding how these constructs may be implicated in TSIQ and therefore influence student outcomes. Second, I review the research regarding how

teachers' education levels, instructional quality, and emotional exhaustion, play a role in shaping the quality of teacher-student interactions.

Teacher Stress, Efficacy, and Teacher-Student Relationship Quality

One study of K–5 teachers (Yoon, 2002) found that teacher stress predicted negative TSRs. Yoon also found significant correlations between teacher stress, negative affect, and negative TSRs. Teacher stress and self-efficacy in behavioral management and relationship building were scored using self-report measures. Three items were used to measure negative affect and teachers reported their TSRs by estimating percentages of students with whom they had "very good" or "good" "negative" or "very negative" relationships. Yoon later converted this data into scores for "good" and "negative" relationships. Significant relationships were found through both correlational and regression analyses.

Significant correlations in the positive direction were detected between teacher stress and negative affect as well as between negative affect and negative relationships. This indicates that higher teacher stress was significantly associated with greater negative affect and more negative relationships. Significant associations were also found in the opposite direction, between teacher stress and self-efficacy as well as between negative affect and teacher self-efficacy. Thus, higher levels of teacher stress and negative affect were each associated with lower teacher self-efficacy. Regression analyses revealed that teacher stress significantly predicted negative relationships, and that together, teacher stress, negative affect, and self-efficacy explained 10% of the variance, although the strongest predicter was teacher stress, with negative affect and self-efficacy not meaningfully contributing to the prediction model (Yoon, 2002).

Teachers' personal and work stressors. In another study, Li Grining et al. (2010) investigated the role of preschool teachers' psychosocial stressors (personal and work-related) in

TSIQ and behavior management. This was a two-part study that took place at Head Start sites in Chicago. Li Grining et al. (2010) examined questions of whether teachers' psychosocial stressors negatively impact TSIQ and whether intervention efforts to improve TSIQ are hindered by these stressors. Teachers and assistant teachers at all study schools were offered the Chicago School Readiness Project (CSRP) training, which is partially based on the findings from Hamre and Pianta (2005). Recruited participants were then randomized into either a CSRP treatment or control group. Teachers who were assigned to the control group condition were offered the CSRP training the following year. Mental health consultants were placed in classrooms with teachers in the treatment condition and to maintain equal teacher-child ratios, teacher-aides were placed in control treatment classrooms (Li Grining et al., 2010).

Teachers in this sample were almost entirely female (97%) and were mostly people of color (71% African American, 20% Latin). Data was collected on teachers' psychosocial risk factors and their psychological well-being. Emotional climate and behavior management in the classroom were measured using two observational measures: the CLASS, Pre-K version (La Paro et al., 2004) and the Early Childhood Environment Rating Scale-Revised (Harms et al., 1998), used for measuring social interactions between teachers and children.

Their results showed that work stressors did not predict TSIQ, but that personal stressors did. Results revealed that having more personal stressors predicted lower quality behavior management and social interactions. Additionally, teacher experience also predicted TSIQ, in that classrooms with greater percentages of low-experience teachers received lower scores for behavior management and social interactions. Another important finding of this study is that teachers' personal stressors were positively linked with attendance in behavior management trainings. Teachers who reported a lack of confidence (i.e., a work stressor) in managing

classroom behaviors were also more likely to attend these trainings, after controlling for personal work stressors (Li Grining et al., 2010).

These findings support the PCM, which suggests that qualities of teacher well-being and SEC, including stress and self-efficacy, have important implications for TSRs and TSIQ. Thus, there is reason to believe that these teacher factors may also play a role in subsequent student outcomes. Understanding these constructs and their impacts can lead to improved prevention and intervention efforts for helping teachers establish and sustain high quality classroom interactions with students. It is also important to examine factors that may impede these efforts or have negative impacts on teacher well-being and SEC, thus impacting TSIQ. One of these factors is teacher burnout, which research demonstrates can negatively impact TSIQ (e.g., Ansari et al., 2020; Hoglund et al., 2015).

The next section provides a review of the literature on teacher burnout and a discussion of its implications for TSIQ, teachers, and students. Following this, I discuss teacher SEC and how enhancing these competencies may offset symptoms of burnout and enhance TSIQ and subsequent student outcomes.

Burnout

Until this point, I have discussed factors and processes in the classroom environment that impact student outcomes. Teacher variables such as stress and self-efficacy have also been discussed for their contributions to TSRs and TSIQ as measured by the CLASS. One prevalent teacher factor with consequences for TSIQ revealed by the literature is burnout. I begin this section by a) defining occupational burnout and discussing some of the associated outcomes, b) specifically defining and discussing *teacher* burnout, and c) reviewing the research regarding impacts of teacher burnout on TSIQ, teacher, and student outcomes.

Defining Occupational Burnout

According to Maslach et al. (2001), job burnout, or occupational burnout, is a psychological syndrome and "a prolonged response to chronic emotional and interpersonal stressors on the job" (p. 397). They suggest there are both individual and social symptoms of burnout in the workplace (e.g., mental health symptoms and effects on interpersonal relationships). The three broad dimensions of burnout are exhaustion, cynicism, and reduced professional efficacy. More specifically, Maslach et al. (2001) identify three dimensions of burnout for jobs in which personal relationships and inter-personal relations are involved (e.g., therapists, doctors, teachers). These three dimensions are: a) emotional exhaustion, b) depersonalization, and c) reduced personal accomplishment.

Emotional exhaustion. Emotional exhaustion is an individual component of burnout that refers to feeling physically and emotionally overextended and drained and is arguably the most visible symptom of burnout (Maslach, 1998). Emotional exhaustion is the feeling of being completely depleted of one's physical and emotional resources. Emotional exhaustion often leads to and predicts (Byrne, 1994; Brouwers & Tomic, 2000) depersonalization, the second dimension of burnout.

Depersonalization. Depersonalization, also sometimes referred to as cynicism, represents an interpersonal dimension of burnout where one feels excessively detached to their job and may respond to others, or to aspects of the job, in a negative or detached manner (Maslach et al., 2001). Depersonalization often functions as a coping mechanism for managing emotional exhaustion (Maslach et al., 2001). Although a compassionate, distanced concern can stave off emotional exhaustion in a way that allows a person to continue working effectively, excessive detachment can lead to a dehumanization of students, patients, or clients, resulting in

negative or callous attitudes and actions (Maslach et al., 2001). As a result of depersonalization, individuals may also begin to feel less effective as they distance themselves from the clients or students who they serve.

Reduced personal accomplishment. The third dimension of burnout, reduced personal accomplishment, or reduced efficacy is the self-evaluative dimension of burnout and refers to a decreased sense of productivity and competence (Maslach, 1998; Maslach et al., 2001). This dimension often manifests due to exhaustion, depersonalization, or a combination of both (Maslach et al., 2001). Individuals may begin feeling less effective at their jobs as their exhaustion increases and if they lack the resources (material or personal) to manage their work demands (Maslach et al., 2001).

Occupational Burnout Consequences

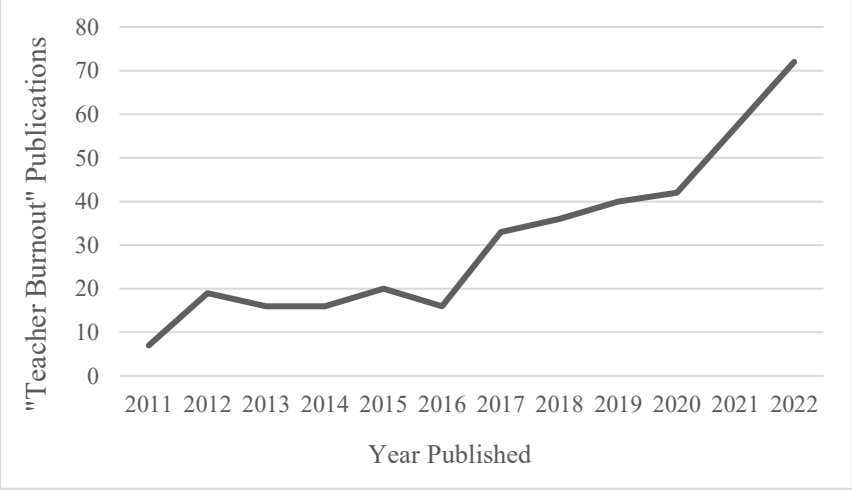
Maslach et al. (2001) outline some of the common consequences of burnout related to job performance including absenteeism, intent to leave the job, turnover, negative impact on colleagues and mental health issues (e.g., anxiety, depression, low self-esteem). They also note job characteristics that are linked to burnout including lack of autonomy, absence of job resources, conflicting and ambiguous roles within the job, lack of feedback, and experienced workload and time pressure. Some personality factors linked to burnout according to Maslach et al. (2001) are external locus of control, poor self-esteem, and neuroticism (i.e., anxiety, hostility, depression, self-consciousness, and vulnerability). Those with type-A behaviors (e.g., competition, time-pressured lifestyle, hostility, and excessive need for control) and individuals who may be considered "feeling types" are also likely to experience burnout (Maslach et al., 2001). Teaching, especially at the early childhood and childhood levels, is a caring profession that is often characterized by burnout (Maslach et al., 2001).

Teacher Burnout

Teacher burnout is a construct of interest that has grown in the last ten years as demands on teachers have risen across the country (Ross et al., 2012). A search of papers with the topic "teacher burnout" in the Web of Science database supports the growing interest of this topic has increased from 19 publications in 2012 to 72 in 2022 (see Figure 3). Searching the term "burnout" reveals that education is one of the top research areas where burnout is studied, among other research areas including public environmental and occupational health, nursing, psychology, general medicine, and psychiatry. In 2015, the American Federation of Teachers reported that 78% of teachers in the United States often feel physically and emotionally exhausted at the end of the day and a similar percentage (i.e., 75%) reported feeling under-resourced in terms of staffing (American Federation of Teachers, 2017).

Figure 3

Number of Teacher Burnout Publications Over Time from the Web of Science Database



Environmental and personality factors both seem to contribute to burnout in the teaching profession. Some factors associated with teacher burnout include a) perceptions of job-related tasks, b) self-efficacy, c) teacher-reported relations with administration, d) student-peer relations,

e) parent-community relations, f) teacher-student relationships, and g) teacher satisfaction. These findings are now discussed.

Factors Associated with Teacher Burnout

Teachers' negative perceptions of job-related tasks and student behaviors (Chang, 2009), as well as work-related stress (Kokkinos, 2007) contribute to teacher burnout. Stress resulting from difficulty in managing classroom behaviors also predicts emotional exhaustion and depersonalization (Kokkinos, 2007). Additionally, lower teacher self-efficacy is associated with higher rates of burnout (Chwalisz et al., 1992).

Grayson et al. (2008) found significant correlations between teachers' emotional exhaustion and teacher-reported student behavioral values, parent-community relations, instructional management, and student activities. Personal accomplishment was positively correlated with TSR, student academic orientation, student behavioral values, student-peer relations, instructional management, and student activities. Depersonalization was negatively correlated with TSR, administration, student academic orientation, student-peer relations, parent-community relations, instructional management and student activities. To identify which variables most strongly impacted the three dimensions of burnout, Grayson et al. (2008) conducted a step-wise regression analysis.

Their findings revealed that student-peer relations and parent-community relations together accounted for the most variance in emotional exhaustion, with teacher satisfaction mediating this relationship. Instructional management was the strongest predicter of personal accomplishment, with no mediation effect of teacher satisfaction. Lastly, TSR, student academic orientation, and administration factors were strongest in predicting depersonalization, which was also mediated by teacher satisfaction. Thus, it appears that teacher satisfaction plays some role in

the relationship between TSR, a component of the emotional support domain of the CLASS, and teacher burnout.

The bi-directional relationship between TSIQ and burnout. Although some TSIQ variables may contribute to burnout such as the TSR, there is evidence to suggest that the relationship between these variables is bi-directional or reciprocal (Byrne, 1994; Kokkinos et al., 2005). Aspects within the classroom climate such as student behavior can lead to teacher burnout (Chang, 2009), and specifically can predict emotional exhaustion (Byrne, 1994), which can cause depersonalization (Byrne, 1994; Maslach et al., 2001). However, emotional exhaustion and depersonalization also have significant implications for TSIQ (e.g., Ansari et al., 2020). The bi-directional relationships between TSIQ, emotional exhaustion, and depersonalization co-create what Jennings and Greenberg (2009) refer to as a "burnout cascade." That is, as the classroom climate deteriorates, teacher stress and burnout increase, further escalating problems related to TSIQ. Inadequate TSIQ then exacerbates teacher burnout. This cycle can continue spiraling downward, further deteriorating classroom interactions, causing negative consequences for both teachers and students.

This phenomenon is supported by research that demonstrates the negative effects of teacher burnout on teachers' well-being, TSIQ, and student outcomes. Next, I discuss how teacher burnout impacts a) teacher outcomes, b) TSIQ, and c) student outcomes. After this literature is reviewed, I begin examining ways to prevent teacher burnout, as a step towards improving TSIQ and subsequent student outcomes.

Teacher Burnout and Teacher Outcomes

As Maslach et al. (2001) have noted, outcomes linked to burnout include absenteeism, intentions of leaving the job, turnover, and mental health issues. Researchers have found

significant links between teacher burnout and depression (Schonfeld & Bianci, 2016), as well as significant negative associations between emotional exhaustion and cynicism (i.e., depersonalization) with self-rated health (Hakanen et al., 2006). Braun et al. (2019) also found significant correlations between teachers' burnout and anxiety and depressive symptoms. Beyond teacher health, evidence suggests that burnout can negatively impact teacher job performance.

Burnout and job performance. Teachers experiencing burnout commonly reported being more exhausted (68%), more easily irritated (76%), less attentive, less careful and putting forth less effort in at work (68%; Huberman, 1993). Additionally, burnout is theorized as negatively impacting teacher program implementation (Han & Weiss, 2005). Evers et al. (2002) conducted research that supported this theory. They found that higher levels of teacher burnout were associated with more negative attitudes about program implementation (Evers et al., 2002). Just as burnout has implications for teacher attitudes towards instruction, it also has consequences for teachers' instruction itself.

Ansari et al. (2020) also found significant interactions of emotional exhaustion and teaching experience, where teachers with higher levels of emotional exhaustion and greater teaching experience taught less rigorous math content than teachers with more experience and less emotional exhaustion (Ansari et al., 2020). It has also been cited that burned out teachers' report becoming more cynical and critical at work, as well as having more depersonalized relations in class (Huberman, 1993).

Counterparts of burnout including teacher well-being and SEC are viewed as foundational components for healthy TSRs and classroom climate, according to the PCM (Jennings & Greenberg, 2009). Thus, it is unsurprising that burnout, often a barrier to these elements, also has implications for TSIQ.

Impact of Teacher Burnout on TSIQ

Studies have shown that teacher burnout is linked with troubling consequences for TSIQ (e.g., Ansari et al., 2020; Braun et al., 2019; Herman et al., 2018). In a study of preschool teachers' burnout, Ansari et al. (2020) found that greater emotional exhaustion was significantly correlated with lower TSIQ across emotional support, classroom organization, and instructional support domains, all of which were measured by the Pre-K version of the CLASS (Pianta et al., 2008). Most of these associations remained significant after factoring in teacher education level and experience as moderating variables (Ansari et al., 2020). There was no significant relationship detected between emotional exhaustion and instructional support, until teacher education level was introduced as a moderator.

This analysis revealed that teachers who were more educated and more emotionally exhausted were less likely to provide student-centered activities and more likely to implement teacher-directed instruction and activities (Ansari et al., 2020). When entering teacher experience as a moderating variable, they found a significant interaction effect, where teachers with higher levels of emotional exhaustion and greater teaching experience taught less rigorous math content than teachers with more experience and less emotional exhaustion (Ansari et al., 2020).

Another CLASS study on preschool teachers found that teachers' emotional exhaustion and depersonalization were negatively associated with emotional support (Jennings, 2015). Impacts of burnout on TSIQ are also found at the secondary level (e.g., Braun et al., 2019). Braun et al. (2019) found that teacher burnout was negatively and significantly correlated with classroom organization. Their results also showed that teacher burnout was a strong and significant predictor of lower levels of emotional support. Their study assessed TSIQ using the

CLASS version for secondary grade levels and implemented the Maslach Burnout Inventory (MBI; Maslach et al., 1998) to assess teacher burnout.

Teacher burnout and TSIQ at the K-3 Level. Hoglund et al. (2015) also measured teacher burnout using the MBI and assessed TSIQ using the K-3 version of the CLASS. Authors took three measurements over the course of their spring term and collected data in three waves during January (baseline data), March-April, and May-June. Parents provided students' demographic data to researchers and students reported on their school engagement and friendship quality. Teachers completed demographic questionnaires and completed assessments for teacher burnout using the MBI, and teacher-student relationship quality, assessed by the STRS. The CLASS was implemented to assess TSIQ and teachers completed reports on children's literacy skills and externalizing behaviors.

Hoglund et al. (2015) reported that levels of teacher burnout maintained stable over the course of one school term. In relation to TSIQ levels, evidence from this study suggested that classroom organization increased, emotional support remained stable, and instructional support decreased over the course of the study. Additionally, overall burnout, and specifically personal accomplishment, significantly and positively co-varied with classroom organization over the year. Moreover, Hoglund et al. (2015) found that greater teacher burnout predicted less improvement in teacher-student relationship quality, an important aspect of emotional support. Their findings suggest that burnout may have heightened implications for the classroom organization domain of the CLASS, including productivity, engagement, and use of effective behavior management strategies.

Teacher burnout and instructional support. Regarding instructional support, some researchers who have sought to understand connections between emotional exhaustion and

instructional quality found no direct link (e.g., Ansari et al., 2020). However, these researchers did find evidence to support an indirect link. Ansari et al. (2020) found that more emotionally exhausted teachers, with more education, were less likely to provide student-centered/selected activities and more likely to implement teacher-directed instruction and activities (Ansari et al., 2020). This corresponds with an interesting finding by Hoglund et al. (2015) who found that more learner-centered pedagogy at the start of the school year was associated with less burnout at the end of the year. This might be reflected in the concept development and quality of feedback dimensions of the instructional support domain of the CLASS. These findings also have implications for the regard for student perspectives dimension of the emotional support domain of TSIQ.

The consequences of teacher burnout on teachers' health, instruction, attitudes, and TSIQ imply inevitable consequences for student outcomes. Next, I discuss how research suggests teacher burnout impacts students' social-emotional and academic outcomes.

Teacher Burnout and Student Outcomes

There is a clear link between burnout and TSIQ, thus evidence to suspect at least a moderating relationship between burnout and student outcomes, given the established relationship between TSIQ and student outcomes. In fact, researchers are finding strong links to support a relationship between teacher burnout and students' a) social-emotional (e.g., Herman et al., 2018; Hoglund et al., 2015) and b) academic (e.g., Arens & Morin, 2016) outcomes.

Teacher burnout and student social-emotional outcomes. Herman et al. (2018) used teachers' stress, burnout, self-efficacy and coping to create teacher profiles (e.g., stressed/low coping, stressed/moderate coping, stressed/high coping, well-adjusted). These profiles were then analyzed for their relationships with student outcomes. They found that teachers with high stress,

burnout, and low coping, were associated with the "worst" student outcomes in terms of concentration, disruptive and prosocial behaviors, as well as math achievement (Herman et al., 2018). Also, Herman et al. (2018) reported that 93% of the teachers in their study experienced high levels of stress, thus implicating burnout and coping as the distinguishing factors of teacher profiles. This finding is unsurprising since burnout is conceptualized as an outcome of prolonged stress (Maslach et al., 2001).

Oberle and Schonert-Reichl (2016) tested the theory of stress-contagion (Milkie & Warner, 2011) by examining whether teacher burnout leads to higher levels of stress in students. To measure this, they collected and analyzed children's saliva samples. Children in their study sample were students from fourth to seventh grade in an urban district in Western Canada. Researchers measured cortisol in saliva by collecting samples at the start of the day, late morning, and in the afternoon. Protocols were taken to account for natural changes in cortisol due to proximity of wake-up time, food intake, and physical activity to sample collection time (Oberle & Schonert-Reichl, 2016). Teacher demographics were reported, and teacher burnout was assessed using a composite burnout score of emotional exhaustion and depersonalization subscales (Oberle & Schonert-Reichl, 2016).

Analyses were conducted using multi-level modeling and revealed the following. Initial analysis, not accounting for student- and classroom-level variables, revealed that teacher burnout was significantly and positively related to morning levels of cortisol. Significant variability existed between student cortisol levels, even after accounting for gender, age, and time between waking and sample collection (Oberle & Schonert-Reichl, 2016). However, even after student-level variables were controlled for, higher levels of teacher burnout significantly predicted higher levels of cortisol in students, indicating that teachers' burnout has a physiological effect on the

students in their care (Oberle & Schonert-Reichl, 2016). At the classroom level, researchers reported 10% unexplained variability between morning cortisol levels (berle & Schonert-Reichl, 2016). Oberle and Schonert-Reichl were able to reduce this variability by introducing teacher burnout to the model, resulting in 4.6% unexplained variability at the classroom level, which was no longer significant (Oberle & Schonert-Reichl, 2016). Thus, authors found a significant reduction in cortisol variability among classrooms after factoring in teacher burnout. This strengthens the support for the link between teacher burnout and students' stress levels. This also suggests a negative relationship between teacher burnout and student well-being.

Hoglund et al. (2015) examined how student behavior problems might influence relationships between teacher burnout and student outcomes in Canada. They found that students' externalizing behavior problems co-varied significantly and positively over the school year with teacher depersonalization and negatively with personal accomplishment, both of which are components of burnout (Hoglund et al., 2015). Interactions emerged in that students with high externalizing behavior problems who had teachers with high levels of burnout had lower school engagement over time, compared to their peers with high externalizing behavior problems, whose teachers had low levels of burnout (Hoglund et al., 2015).

As previously discussed, students' social-emotional well-being has implications for their academic behaviors and success. Since teacher burnout clearly impacts students' social-emotional well-being, it is unsurprising that research is beginning to support the link between teacher burnout and students' academic-related outcomes.

Teacher burnout and students' academic outcomes. A systematic review of 14 studies investigating impacts of teacher burnout on student achievement and student-reported outcomes suggests that teacher burnout is associated with worse student achievement than peers taught by

less burned-out teachers (Madigan & Kim, 2021). Madigan and Kim also found evidence to support that teacher burnout impairs student motivation and reported small to medium effect sizes for both findings. They also hypothesize that the link between teacher burnout and student motivation may be due to impaired TSRs and TSIQ that result from teacher burnout (e.g., Shen et al., 2015).

In Germany, Arens and Morin (2016), found that teachers' emotional exhaustion was a significant predictor in fourth graders' student achievement on standardized achievement scores and student grades, though this effect was stronger for standardized assessments. They also found that teachers' emotional exhaustion predicted lower perceptions of teacher support and school satisfaction.

Teacher burnout negatively impacts teachers' well-being and job performance. Moreover, it also affects the quality of teachers' interactions with students and has negative consequences for students' academic success, motivation, and school engagement. Thus, preventing and treating teacher burnout might be an important step in improving teacher and student well-being and students' social-emotional and academic outcomes. This may be especially important for supporting students with behavioral difficulties.

Jennings and Greenberg (2009) suggest that one possible path towards protecting teachers from burnout is to develop teachers' social emotional competencies. They suggest that through enhancing teachers' SEC, TSIQ can be improved, which leads to better student outcomes. The following section discusses SEC in detail and explains why building teacher SEC may help to not only prevent teacher burnout but also to improve classroom and student outcomes.

Social-Emotional Competence

This section begins by offering several definitions for SEC and discussing its relevance for teachers and TSIQ. Next, I discuss how teacher SEC is implicated in the PCM, making connections between SEC, TSIQ, and student outcomes (Jennings & Greenberg, 2009). From here, I move on to discuss TSIQ, teacher, and student outcomes associated with teacher SEC, leading to the next section, which explores interventions for enhancing teacher SEC. Understanding how to enhance teacher SEC is relevant for promoting higher quality classroom interactions and thus improving student outcomes.

Defining Social-Emotional Competence

Aldrup et al. (2020) describe SEC as a person's awareness of their own and of others' emotions as well as their own emotion-regulation and relationship management skills and competencies. Elias et al. (1997) describe SEC as a person's knowledge, motivation, and ability needed to effectively navigate social and emotional situations. Collie defines SEC as the "effective management of intrapersonal and interpersonal social and emotional experiences in ways that foster one's own and others' thriving" (2019, p. 2). Managing one's own social and emotional experiences and relationships with others are required skills of teachers that demonstrate high TSIQ. Thus, SEC has important implications for teachers. Further, Jennings and Greenberg (2009) argue that teacher SEC is a necessary skillset for teachers implementing SEL curriculum for students.

The prosocial classroom model provides a theoretical framework that connects teacher SEC to TSIQ and teacher and student outcomes. Next, I review both the theoretical and empirical links between teacher SEC and these outcomes, followed by an introduction to the next section on SEC interventions.

Teacher Social-Emotional Competence

To describe teacher SEC, Jennings and Greenberg (2009) adopted characteristics and competencies from the definition of social-emotional learning developed by the Collaborative for Academic, Social, and Emotional Learning (CASEL). According to CASEL, there are five core competencies of SEL: self-awareness, social awareness, responsible decision making, self-management, and relationship management. Thus, Jennings and Greenberg describe teachers with a high level of SEC as having levels of self-awareness and social awareness, making responsible decisions based on prosocial values, and knowing how to manage their own emotions and behavior along with their relationships with others.

Characteristics of socially emotionally competent teachers. According to Jennings and Greenberg (2009), teachers who are high in self-awareness can recognize their own emotional patterns and tendencies, can self-regulate, and can leverage their own emotions for cultivating motivation in themselves and others. Teachers' prosocial values guide their decision-making, to think about how their actions and decisions will affect others and assist teachers in holding themselves accountable for their choices (Jennings & Greenberg, 2009). Social awareness is exhibited by teachers' understanding of others' emotions and facial expressions as well as an understanding of how their own emotions and expressions may affect others. This social awareness is also characterized by a level of cultural competence and responsiveness. Along with having self-awareness, teachers with SEC know how to manage their emotions in ways that help them build, sustain, and preserve healthy relationships with others. The management of their own emotions extends into their being able to care for others, while also taking care of themselves. For example, they know how to set boundaries while maintaining closeness and respect. These

teachers can teach with a student-centered perspective and allow uncertainty and ambiguity in their classrooms to prioritize student autonomy and empowerment.

Alternative view of teacher SEC. Collie and Perry (2019) also discuss the importance of teacher SEC, adopting the same five competencies as Jennings and Greenberg, but conceptualizing it slightly differently by drawing from self-determination theory (see Ryan & Deci, 2017). Collie and Perry (2019) operationalize teacher SEC as functioning through basic psychological need satisfaction, autonomous motivation, and behaviors which are malleable factors that change and are changed by teachers and their experiences (Collie & Perry, 2019). These authors underscore the importance of motivation in their operationalization as they argue that the ability to be socially and emotionally competent should be paired with a willful application of these competencies (Collie & Perry, 2019).

Collie and Perry (2019) posit that the basic psychological needs essential for teacher SEC are perceived social-emotional autonomy, perceived social-emotional competence, and perceived relatedness. They go on to describe social-emotional autonomous motivation and socially emotionally competent behaviors (e.g., practices of mindfulness, application of cognitive reappraisal, goal-setting, help-seeking, problem-solving, and taking time off to recharge) that contribute to their conceptualization of teacher SEC. Collie and Perry suggest that this is a cyclical process and when teachers engage in socially emotionally competent behaviors, their need satisfaction is positively impacted.

The SEC characteristics of teachers outlined by Jennings and Greenberg (2009) and Collie and Perry (2019) contribute to and align with TSIQ. Next, I discuss the prosocial classroom model (Jennings & Greenberg, 2009), a framework in which teachers' SEC and well-being are theorized to provide a foundation for developing and maintaining supportive TSRs and

effective classroom management (i.e., high TSIQ), and successful SEL program implementation, resulting in positive academic and developmental student outcomes.

The Prosocial Classroom Model

In the PCM, Jennings and Greenberg present a framework for understanding how teacher SEC and well-being impact TSIQ, teachers, and students short- and long-term. Jennings (2016) hypothesizes that teacher SEC and well-being may be reflected in the quality of teacher-student interactions, which go on to affect children's development.

According to Jennings & Greenberg (2009), teacher SEC and well-being have direct and indirect bidirectional relationships with healthy TSIQ. According to Jennings and Greenberg, this relationship can be mediated in both directions by healthy TSRs, effective classroom management, and effective SEL implementation. Teacher SEC directly impacts teachers as it involves their self-awareness, social awareness, and relationship management.

Jennings and Greenberg also describe a "burnout cascade" that occurs when teachers lack the resources to implement effective classroom management and ineffectively manage classroom relationships. These teachers may experience a deterioration of TSIQ and the classroom climate and an increase in disruptive and challenging student behaviors. These arising difficulties can lead to or intensify teachers' emotional exhaustion and eventually lead to depersonalization. Depersonalization in teachers often manifests as a lack of enthusiasm for cultivating caring relationships and less involvement, tolerance, and caring on the teachers' part (Blase, 1982). Additionally, new evidence suggests that students likely notice manifestations of teacher burnout. For example, Oberle et al. (2020) found that higher levels of self-reported teacher burnout were predictive of lower levels of SEC as rated by students, even while controlling for contextual and student-level variables.

Theoretical and empirical evidence support the relationships between teacher SEC and TSIQ in the context of the PCM. Next, I discuss a) theoretical links between teacher SEC and TSIQ, b) empirical evidence supporting relationships between teacher SEC and TSIQ, and c) empirical evidence supporting the relationship between teacher SEC and student outcomes.

Theoretical Links Between Teacher SEC and TSIQ

Many teacher SEC characteristics and PCM components overlap with characteristics of TSIQ as measured by the CLASS (Pianta et al., 2008). For example, the emotional support domain directly aligns with teachers' SEC competencies. Emotional support, including teacher affect, relationships, teacher sensitivity, and regard for student perspectives, aligns with social emotional competencies including self-awareness, social awareness, self-management, and relationship management. Teachers with high SEC and high emotional support allow ambiguity and uncertainty in the classroom, which supports students' social-emotional learning through providing opportunities for problem-solving, and responsible decision-making. This CLASS dimension reflects a student-centered approach to teaching where student responsibility and autonomy are encouraged and students' interests and perspectives are carefully observed and integrated (Pianta et al., 2008).

The classroom organization domain is also related to teacher SEC and plays a role in the PCM. Teachers high in SEC and classroom organization clearly communicate expectations and effectively and proactively manage classroom behaviors. This theoretical overlap gives reason to believe that teacher SEC may be an important factor in TSIQ, especially with regards to emotional support and classroom organization.

Jennings (2016) hypothesizes that teacher SEC and well-being may be reflected in the quality of teacher-student interactions, which go on to affect children's development. Next, I

review the empirical evidence supporting these connections. Empirical evidence is reviewed regarding the relationship between a) teacher SEC and TSIQ and b) teacher SEC and student outcomes.

Empirical Evidence for the Relationship Between Teacher SEC and TSIQ

An empirical study of Pre-K classrooms by Jennings (2015) supported the connection between teacher SEC and TSIQ. In their study, Jennings (2015) used measures of mindfulness, self-compassion, well-being, efficacy, positive and negative affect, depressive symptoms, and burnout to capture teacher SEC and well-being. Reports of teacher mindfulness, self-compassion, personal efficacy, and positive affect were characterized as teacher SEC. Jennings found significant correlations between these SEC variables and teachers' emotional support. Additionally, teacher depression, an aspect of low well-being, was negatively associated with all three CLASS domains (Jennings, 2015). Jennings also reported significant and positive associations of two SEC variables, teachers' mindfulness and efficacy, with their perspective-taking and use of sensitive and proactive management strategies, assessed through interviews. Mindfulness, how it may be considered an indicator of SEC, and its empirical connection to TSIQ are discussed in greater depth and detail in a later section.

Teacher SEC also has important implications for the students in their care. Teacher SEC and student-related outcomes are now discussed by reviewing the empirical evidence.

Empirical Evidence for the Relationship Between Teacher SEC and Student Outcomes

Earlier, I explained how teacher factors such as stress and burnout impact students. Teacher SEC also has implications for student outcomes. Since SEC involves teachers' awareness of and ability to manage their own emotions, it is relevant that Yoon (2002) found connections between teachers' emotional responses and student behavior. Yoon reported

significant associations between emotional negativity and student misbehavior, which have been theorized to exacerbate teacher burnout. These findings are not only important in an immediate context, but also have long-term implications. Lynch and Cicchetti (1992) found that teacher support and sensitive responses to challenging student behaviors may have long-term positive effects on the social and emotional development of students.

Hamre and Pianta (2001) also demonstrated long-term impacts of teachers' negative affect on students' social and academic outcomes. The result of poor quality TSIQ, partly driven by low teacher SEC, can lead to students experiencing feelings of alienation and disengagement (Jennings & Greenberg, 2009). These long-term outcomes places students at risk for emotional and behavioral problems and academic failure (Dwyer et al., 1998). Thus, it is critical that researchers investigate methods and practices for improving teacher SEC.

Improving teacher SEC has the potential to improve TSIQ, teacher burnout, and student outcomes. One area of research being explored for its impact on teacher SEC is the implementation of mindfulness-based interventions. In the next section, I define and discuss mindfulness and review the literature on mindfulness-based interventions, exploring their effects on TSIQ, teacher burnout, and teacher SEC.

Mindfulness-Based Interventions

According to Jennings (2016), relationship skills contributing to teacher SEC include perspective-taking, empathy, and compassion, while self-management requires self-regulation of emotions and behavior. For this reason, mindfulness interventions have been at the forefront of attempts to improve teacher SEC, given the self-awareness and self-regulation inherent in mindfulness practices.

I begin this section by defining mindfulness and briefly discussing some of its general outcomes. Next, I provide an overview of some of the leading mindfulness-based programs or interventions (MBPIs) for teachers. Then, I review the literature exploring the impact of MBPIs on teacher burnout, TSIQ, and teacher SEC. I conclude this section by discussing the advantages and limitations of current MBPIs for teachers and propose an alternative but related practice.

Defining Mindfulness

Mindfulness stems from Buddhist ideology, which originated in the East many centuries ago and has since been widely adopted around the world, gaining much attention over recent years. I acknowledge the history and origins of mindfulness, although for this study I discuss and apply mindfulness in its secular form. An expert in mindfulness, Jon Kabat-Zinn, defines mindfulness as "the awareness that arises from paying attention on purpose, in the present moment, nonjudgmentally" (Paulson et al., 2013, p. 91). Mindfulness involves attending to one's own internal bodily sensations, thoughts, and feelings, as well as to the stimuli in one's external environment (Hooker & Foder, 2008).

Davidson and McEwen (2012) explain that the practice of mindfulness meditation can be conceptualized as a type of mental training. From a neuroscience perspective, some suggest that mindfulness meditation is operated by a neural mode of self- type of referencing that favors the non-judgmental present awareness described above, over "narrative self-focused mentation" (Davidson & McEwen, 2012, p. 693). Mindfulness practice can activate brain regions associated with mind-wandering (Christoff et al., 2009) as practitioners engage in observing the mind and body as their thoughts, emotions, and bodily sensations come and go.

Mindfulness is a practice wherein individuals are instructed to pay attention to incoming thoughts, emotions, and sensations, and to quietly observe them without judgment, rather than

being swept away or consumed by them. When practicing mindfulness, rather than following a thought that arises, one might notice the thought, identify it as a thought, and then let it go, returning to the present moment or sensation of their own breath or heartbeat. In mindfulness, one bears witness to the mind and body with a sense of distance or separation between the self and mind or body. Though mindfulness can be applied to virtually any behavior (e.g., mindful listening, eating, walking, or driving), I specifically review literature related to mindfulness meditation practices for this study.

General Mindfulness Intervention Outcomes

Secularized mindfulness meditation training programs can promote cognitive, affective, and social capacities and can prevent and reduce maladaptive social cognition (Kok & Singer, 2017; Trautwein et al., 2020). For this reason, mindfulness interventions have commonly been used to improve well-being and social-emotional competencies across various populations.

Learning to bring awareness to one's internal and present state through mindfulness practice has potential to enhance SEC through improving the competencies of self-awareness, social awareness, and self-management. Jennings (2016) connected mindfulness to SEC through the cultivation of self-regulated attention and non-judgmental awareness.

Research has shown that mindfulness-based interventions are effective in improving mental health among youth (Carsley et al., 2018) and adults (Virgili, 2015; Spijkerman & Bohlmeijer, 2016), improving performance and stress among teachers (Jennings & DeMauro, 2017) and treating anxiety and depression among adults (Blanck et al., 2018; Wang et al., 2018). Mindfulness has also been shown to improve emotional clarity (Cooper at al., 2018) and well-being among healthcare professionals (Lomas et al., 2019) and teachers (Zarate et al., 2019). MBIs are effective at improving one's own well-being and the intrapersonal skills associated

with SEC. Improving these competencies might help promote enhancement of other SEC competencies such as relationship management and responsible decision-making.

Mindfulness has permeated many industries in the pursuit of fostering better mental health and well-being. I now turn the focus to mindfulness in education. Looking through the lens of the PCM, promoting teacher SEC through mindfulness is expected to result in improved TSIQ and reduced burnout, with distal impacts on student outcomes. I begin by summarizing some evidence-based mindfulness interventions and programs implemented with teachers. Then, I review the research on these mindfulness interventions and discuss their outcomes on TSIQ, teacher SEC, and teacher burnout. I follow this by discussing some of the advantages and limitations of mindfulness interventions for teachers.

Mindfulness Interventions for Teachers

Over the past few decades, researchers and professionals have created and implemented many MBPIs for teachers. A highly utilized program that is the foundation of many of these teacher interventions is Mindfulness-Based Stress Reduction (MBSR, Kabat-Zinn, 1985). Globally, many programs have been developed for teachers that stem from MBSR such as the 10-week program *Atentamente* (de Carvalho et al., 2021) in Portugal, an 8-week program called Mindful Living in the United States (Miller & Brooker, 2017), .b Foundations in the United Kingdom (Beshai et al., 2016) and China (Tsang et al., 2021), and other MBSR programs for teachers in Australia (Carroll et al., 2021), England (Birchinall et al., 2019) and the Netherlands (Lensen et al., 2021). Here, I discuss two evidence-based programs that target teacher well-being and SEC, which are widely documented in the literature, including the MBEB (Cullen & Brito Pons, 2015) and CARE (Jennings, 2016) programs.

As I reviewed the literature on this topic, I discovered several programs that appeared to overlap and intertwine. For example, the Cultivating Emotional Balance (CEB) program, first implemented with teachers in 2005 (Jennings, 2016), seems to have sparked the development and adaptation of other programs including the SMART (Roeser et al., 2013), MBEB (Jennings & DeMauro, 2017), and CARE (Jennings, 2016) programs. The most recent iterations of the CEB program, the MBEB and CARE programs, are discussed next.

The MBEB and CARE programs are two MBPIs for teachers that have been tested for their effectiveness in treating burnout and improving classroom interactions. These two specific programs are now described in detail. After these programs are described, the literature regarding MBPIs and their effects on TSIQ (e.g., emotional support, classroom organization, and instructional support) and teacher burnout are discussed. Following this, I provide a review of MBPI effects on teacher SEC and student outcomes.

The MBEB program. The MBEB program consist of 8 weekly classes lasting 2.5 hours each, daily guided meditation practice lasting 30 minutes each, informal practice, and a full day of silent practice between weeks 6 and 7 (Cullen et al., 2019). During these eight weekly classes, participants of the program are introduced to new themes and skills related to mindfulness, given opportunities for practice, reflect on previous classes and experiences, and are assigned out-of-class formal and informal practices (Cullen et al., 2019). The first half of the program focuses on understanding and cultivating mindfulness skills and the second half involves the application of those skills to one's own emotional awareness and patterns (Cullen et al., 2019). The program covers the following topics: (1) introduction to mindfulness, (2) feelings: pleasant, unpleasant, neutral, (3) mindfulness of thoughts, (4) forgiveness, (5) love and kindness, (6) defensive

emotions: anger and fear, (7) compassion, and (8) integrated practice and continuation (Cullen et al., 2019).

Another program that grew from MBSR and the CEB program is the CARE program (Jennings, 2016). CARE differs slightly from the MBEB program because of its heightened focus on prosocial classrooms and the cultivation of teachers' social-emotional competencies through the PCM.

The CARE for Teachers program. Similar to the MBEB program, CARE involves instructional and experiential components for teachers, including opportunities for practice, discussion, and personal reflection (Jennings, 2016). CARE is offered in two formats: (1) four day-long sessions over 4–5 weeks, with a booster session to follow in later months and (2) a 5-day intensive retreat held over the summer at the Garrison Institute (Jennings, 2016). In order to target teacher SEC, CARE for Teachers focuses on providing instruction in three main domains: emotion skills, mindfulness and stress reduction practices, and listening and compassion exercises (Jennings, 2016). The CARE program is intended to target teacher well-being, efficacy, and mindfulness along with CLASS outcomes of classroom organization, instructional support, and emotional support. Next, I discuss impacts of teacher MBPIs on a) TSIQ, b) teacher SEC, and c) teacher burnout.

Teacher MBPIs and Non-CLASS TSIQ outcomes

TSIQ is an outcome related to the classroom interactions between teachers and students across the three CLASS domains: emotional support, classroom organization, and instructional support. Here I discuss how MBPIs have impacted these outcomes beginning with studies assessing TSIQ with non-CLASS instruments, before the next section, which contains a discussion of research on the effects of MBPIs on TSIQ as measured by the CLASS.

Using their own observation system (i.e., Classroom Observation Grid), developed in consultation with classroom observation experts, de Carvalho et al. (2021) measured teachers' socio-emotional support, student-focused attention and responsiveness to needs, classroom management, and instructional practices. de Carvalho et al. (2021) found significant changes in both their experimental and control groups, including an increase in teacher engagement with students in their experimental group and increase of clarity of learning objectives as well as a decrease in instruction and task adaptation for their control group. Authors suggest the reduction in teachers' adaptation to student needs for the control group may support that their intervention prevented this reduction for their experimental group. They also interpret their results of the control group's increase of learning objectives as a potential demonstration of student autonomy effects that may have been present in their experimental group, resulting in a lesser need for clarification of learning objectives in these classrooms.

A meta-analysis by Klingbeil and Renshaw (2018) assessed the impact of MBPIs on classroom climate and teaching practices. Authors included research in their review that implemented any form of mindfulness intervention for teachers of in grade levels from Pre-K–12. According to their supplemental materials, any study that measured classroom practices or classroom climate were coded as classroom climate and teaching practices (Klingbeil & Renshaw, 2018). This included studies that used observational measures such as the CLASS, as well as studies that used self-reports of teachers' perceptions of climate, relationships, and classroom management practices. Only one study gathering student perspectives was included in their meta-analysis. A small treatment effect was initially detected but not considered significant due to having low degrees of freedom (Klingbeil & Renshaw, 2018). Therefore, Klingbeil and Renshaw adjusted their model, following recommendations of Knapp and Hartung (2003). After

these adjustments, Klingbeil and Renshaw reported the same, small effect size (g = .314) with smaller confidence intervals and a statistically significant effect (95% CI [.202, .426], t (7) = 6.63, p < .001).

MBSR teacher program and CLASS outcomes. A study in Hong Kong implemented the .b foundations mindfulness program (i.e., MBSR-based teacher program) over the course of 8 weeks with 94 participating teachers (Tsang et al., 2021). Although researchers did not implement the CLASS tool, they did measure teachers' positive and negative affect. Since positive and negative affect are indicators classified within the emotional support domain of the CLASS, I include these results in our review. Both types of affect were measured using the expanded version of the Positive and Negative Affect Schedule (PANAS-X; Watson & Clark, 1994). Researchers conducted pre- and post- tests for their mindfulness training and waitlist control groups along with a follow-up assessment 2 months later (Tsang et al., 2021). For both post-test and 2-month follow up, authors reported significantly higher levels of positive affect and lower levels of negative affect for teachers in the intervention group, with medium to large effect sizes (Tsang et al., 2021).

Research investigating impacts of MBPIs on TSIQ largely show clear and consistent findings related to emotional support and its related constructs. These findings are less consistent regarding classroom organization outcomes. Next, I review studies that investigate the effects of MBPIs for teachers on classroom organization outcomes.

Teacher Mindfulness and CLASS Outcomes

A similar 9-week intervention based on MBSR was designed for and implemented with pre-service teachers to assess impacts on TSIQ using the CLASS (Hirshberg et al., 2020). Pre-service teachers were assessed at a 6-month follow-up during their student teaching, and results

showed that the intervention group scored significantly higher across all three class domains (Hirshberg et al., 2020).

CARE outcomes. Jennings et al. (2017) implemented the CARE for Teachers program and assessed classroom quality of interactions using the CLASS. CARE for Teachers had a statistically significant positive effect on emotional support (*ES* = 0.22), with positive effects on its positive climate (*ES* = 0.23) and teacher sensitivity (*ES* = 0.23) dimensions (Jennings et al., 2017). Jennings et al. (2017) also reported that CARE for Teachers had a marginally statistically significant positive effect on classroom organization (*ES* = .19), as well as a statistically significant positive effect its productivity dimensions (*ES* = 0.23). Jennings et al. did not report any significant effects of their intervention on the instructional support domain of the CLASS.

MBEB outcomes. Roeser et al. (2021) implemented the MBEB program and collected TSIQ data at baseline, post-intervention and 4-month follow-up. Researchers used the secondary level of the CLASS (CLASS-S; Pianta, 2012) to collect TSIQ data. Specifically, they measured emotional support and classroom organization domains and reported overall domain scores along with scores for each dimension within their respective domains. However, main effects of the intervention were not found in any emotional support dimensions post-program or at follow-up. The only exception to this is when moderated by teaching experience, significant between-group differences appeared, demonstrating higher levels of teacher sensitivity for newer teachers (i.e., teachers with less than or equal to 5 years of experience).

Overall, studies have examined impacts of MBPIs on TSIQ using various forms of measurement and observation and have reported some promising results for overall TSIQ. Next, I discuss impacts of MBPIs on specific TSIQ domains corresponding to the CLASS (e.g.,

emotional support and classroom organization). No identified studies reported significant impacts on the instructional support domain.

Teacher MBPIs and emotional support. Braun, Roeser, and Mashburn (2020) implemented the MBEB program for lower elementary school teachers, assessing emotional support and classroom organization using the K–3 CLASS with 21 teachers. The MBEB program was implemented for two consecutive years, lasting 8 weeks and totaling 27.5 hours for each year of implementation. Data from the two implementations were combined and analyzed, consisting of data from 13 teachers in the first year, and eight teachers in the second year. Teachers in their sample worked in two elementary schools designated as Title 1 schools. Teachers were paid for their time and encouraged by school leadership to participate, which could present validity issues related to self-selection (Braun, Roeser, & Mashburn, 2020).

Many variables were assessed and examined in this study related to occupational health and teaching practices, including occupational burnout by the MBI and TSIQ by the CLASS. Braun, Roeser, and Mashburn (2020) implemented a pre-post design with no control group, analyzing within-person change. Here, I review outcomes of the MBEB program implementation specifically related to mindfulness in teaching and emotional support.

Mindfulness in teaching was assessed with the Mindfulness in Teaching Scale (MTS), which assesses intrapersonal and interpersonal mindfulness. The interpersonal subscale of the MTS has been shown to predict teacher burnout and teachers' efficacy for working with students' social-emotional and behavioral needs (Frank et al., 2016). Post-program, teachers' mindfulness in teaching increased with a medium effect size (d = .48). The Cohen's d effect size for changes in emotional support from pre- to post- program was small to medium (d = .28). Additionally, using pre-program data, Braun, Roeser, and Mashburn (2020) reported significant positive

correlations between mindfulness skills and both self-compassion and cognitive reappraisal, with negative significant correlations between mindfulness skills and expressive suppression. Interestingly, no significant correlation was obtained between teachers' mindfulness skills and emotional support.

Although implementation of the MBEB program resulted in positive effects on emotional support, the fact that mindfulness skills were not significantly correlated with this domain (r = .07) indicates that perhaps this intervention influenced emotional support by way of some other variable. Another variable, mindful teaching, was not significantly correlated with emotional support, but approached significance at r = .33 (significance is indicated by $|r| > .38$). Thus, the MBEB effect on mindful teaching (d = .48), might have played a role in the observed improvements in teachers' emotional support scores.

Teacher MBPIs and Classroom Organization. Flook et al. (2013) implemented an MBSR-based intervention totaling 26 hours of group practice over 8 weeks of implementation. Teachers also participated in a full-day immersion experience and were encouraged to practice independently for 15–45 minutes, six times per week. Elementary teachers across four schools in the midwestern US participated in this study. Flook et al. (2013) used the CLASS to assess teachers' behavior in the classroom, or what I refer to here as TSIQ. Flook et al. (2013) reported significant increases from pretest to posttest for their intervention group in the classroom organization domain, though no dimension-specific results were reported.

Roeser et al. (2021) reported significant differences for teachers in their MBEB group in overall classroom organization and its behavior management dimension, although this was only observed at four-month follow-up. Significant post-program effects were observed for newer, less experienced teachers in the MBEB group, at both post-program and follow-up times.

Important to note is that data collected by Flook et al. (2013) reported no significant changes in emotional support and instructional support domains after program implementation. Additionally, in Braun, Roeser, and Mashburn's (2020) implementation of the MBEB program, they reported small pre-post program effect size on classroom organization outcomes (d = .15). Moreover, neither mindfulness nor mindful teaching significantly correlated with classroom organization, although the association between mindful teaching and classroom organization approached significance (r = .29). Thus, although evidence supports that MBPIs can impact TSIQ and classroom organization, it is unclear what is driving these changes.

Alternative use of the CLASS in teacher MBPI research. DiCarlo et al. (2020) implemented a mindfulness intervention that included intentional breathing, yoga poses, and guided meditation. The intervention was implemented five times throughout the day for brief periods of time (2–5 minutes each) and data was collected over the course of 14 weeks from November to February. DiCarlo et al. measured positive and negative climate based on CLASS operationalizations of these constructs within the emotional support domain. Percentages of observed behavioral markers relating to these indicators were used to assess these variables. Observations were conducted by analyzing 10-minute video recordings captured with an iPad by one of the observers. Video recordings were also used to establish inter-rater reliability. DiCarlo et al. implemented a single-case experimental design with a multiple baseline design. Percentages for positive and negative climate were calculated by the presence of behavioral markers observed in the video recordings for each variable.

DiCarlo et al. (2020) observed clear positive effects of the program across all three teachers in their positive climate. Intervention effects on negative climate only appeared to decrease substantially for two of the three teachers observed. The third teacher scored an average

of 5% in negative climate throughout the baseline phase, which reduced to 0% during intervention, thus a floor effect may have been present here.

Many MBPIs assess occupational burnout since MBSR has a strong evidence-base for reducing stress and burnout is conceptualized as resulting from prolonged stress. Next, I review impacts of MBPIs on teacher burnout.

Mindfulness Interventions and Teacher Burnout

Braun, Roeser, and Mashburn (2020) investigated within-person effects of the MBEB program on occupational burnout and job stress. Using pre-intervention data, they reported significant correlations between mindfulness skills and personal accomplishment (r = .64) and job stress (r = -.40), indicating that increasing mindfulness skills might improve certain aspects of burnout and job stress. Pre-program values of teacher mindfulness skills not significantly correlated to the other burnout subscales, emotional exhaustion, and depersonalization (Braun, Roeser, & Mashburn, 2020). Mindful teaching was significantly correlated with personal accomplishment (r = .59) and depersonalization (r = -.45), but not emotional exhaustion (r = .29). Their program implementation demonstrated within-person effects that are interesting considering these pre-program correlations. Small effect sizes were detected for personal accomplishment (d = .14), emotional exhaustion (d = .39), and depersonalization (d = -.27). Hence, is reasonable to suggest that the MBEB program can reduce teacher burnout. Other MBPIs have also been observed to reduce teacher burnout.

Using a Portuguese version of the MBI, de Carvalho et al. (2021) found that compared to their control group, teachers participating in their MBSR-based intervention showed significant decreases in emotional exhaustion and depersonalization. Flook et al. (2013) also assessed teacher burnout using the MBI to assess impacts of their MBSR-based teacher intervention and

reported significant reductions in teacher burnout as well. Tsang et al. (2021) analyzed teacher stress, a precursor to burnout, using the Perceived Stress Scale (PSS; Cohen et al., 1983). Authors reported significantly lower levels of perceived stress for teachers in the treatment group, with medium to large effect sizes (Tsang et al., 2021). These effects were evident at post-test and at 2-month follow-up.

Roeser et al. (2013) implemented mindfulness training with teachers and reported reductions in teacher stress and burnout. Their program, an earlier iteration of SMART and MBEB, was eight weeks long. They conducted their studies at two research sites with 58 and 55 Canadian and U.S. public school teachers. Intervention groups received their training in the spring and wait-list control groups received their training in the autumn of the same calendar year, but different school year. For each study, researchers conducted assessments at baseline, post-program, and at a three-month follow-up (Roeser et al., 2013). In order to reduce selection bias, Canadian teachers were excluded from their study if they had previously participated in other school-based mindfulness programs for students.

Roeser et al. (2013) measured burnout using the MBI and assessed teacher stress through self-reports of occupational stress as well as physiological measures (e.g., cortisol level, heart rate, and blood pressure). Here, I review their findings on burnout and occupational stress. Across both sites, teachers in the treatment groups were reported as having significantly less burnout and occupational stress than teachers in the control groups. Large effect sizes were reported at post-treatment and at 3-month follow-up times (Roeser et al., 2013). No interaction effects were detected for occupational stress, though Roeser et al. (2013) reported a significant research site interaction for burnout at post-treatment and follow-up assessments. The interaction

effect revealed that intervention group teachers in the U.S. reported lower burnout than control group teachers, than did Canadian intervention group teachers compared to their control group.

In a later study, Roeser et al. (2021) implemented the MBEB program with teachers of middle school grade levels (i.e., sixth through eighth grade). They randomized 58 teachers into MBEB and wait-list control groups and assessed burnout using the emotional exhaustion subscale of the MBI, along with other measures related to SEC, discussed in the next section. They collected data at three time points: pre-test, post-test, and 4-month follow-up, measuring teachers' emotional exhaustion, job stress, anxiety symptoms, and depressive symptoms. Roeser et al. (2021) reported significant differences with medium-sized effects, for emotional exhaustion between teachers in the MBEB group and teachers in the wait-list control group at post-test and at 4-month follow-up. Interestingly, no group differences of mindfulness were observed at any measurement time (Roeser et al., 2021). These findings demonstrate that some MBPIs may be operating through mechanisms other than mindfulness to produce changes in other outcomes, including burnout.

Carroll et al. (2021) found burnout improvements following an MBEB intervention for teachers in Australia, compared to pre-test burnout. Authors reported that burnout seemed to worsen between post-test and 5-month follow-up, although the 5-month follow-up burnout levels remained lower than pre-test levels (Carroll et al., 2021). The measure Carroll and colleagues used to assess burnout, the Copenhagen Burnout Inventory (CBI; Kristensen et al., 2005) contained a subscale for emotional exhaustion that is specifically attributed to working with students. Compared to personal and work subscales of burnout, teachers did not show improvements in the student burnout subscale, although authors suspect a floor effect resulting from low student burnout scores at pre-test.

MBPI reviews. A systematic review by Lomas et al. (2017) supported the positive effects of MBPIs on stress and burnout in three out of five studies, two reported as having improvement, one as having associations with mindfulness. After controlling for this interaction, authors reported burnout symptoms at post-treatment as significant for U.S. intervention teachers and marginally significant for Canadian intervention teachers at post-treatment but only significant for U.S. intervention teachers at the 3-month follow-up. Although greater improvements were found in the U.S. teacher sample, this study supports the use of MBPIs for reducing burnout in teachers.

A meta-analysis by Zarate et al. (2019) includes 18 studies of teacher MBPIs to assess outcomes related to teacher mindfulness, burnout, stress, anxiety, and depression. Of these studies, eight included assessments of teacher burnout as an outcome using the MBI. Teacher samples receiving interventions in these studies reported reduced burnout symptoms. Zarate et al. (2019) calculated consistent, statistically significant improvements in burnout with medium to large effect sizes.

Research provides evidence to support the use of MBPIs for reducing teacher burnout. Teacher SEC involves competencies and skills that are also hypothesized to offset or reduce burnout. Next, I explore how MBPIs impact these social-emotional competencies, and thus can enhance teacher SEC to improve subsequent classroom interactions and student outcomes.

Mindfulness Interventions and Teacher SEC

Although to date there is no scale or method for directly measuring teacher SEC that is well-validated, teacher SEC can be estimated by examining teacher variables related to the five social-emotional competencies: self-awareness, social awareness, responsible decision making, self-management, and relationship management (CASEL, 2003). Next, I review how

mindfulness interventions have impacted SEC through these competencies, including effects on mindfulness skills, emotion regulation, and compassion.

de Carvalho et al. (2021) found that Portuguese teachers in their experimental group, trained with the *Atentamente* program, showed significant increases in self-compassion, mindfulness, self-efficacy, and cognitive reappraisal, as well as a significant decrease in expressive suppression. This demonstrates improvement of SEC through self-compassion, mindfulness, and emotion regulation, which correspond to the self-awareness and self-management components of SEC. These authors controlled for significant demographic variables and utilized MANCOVAs and follow-up ANCOVAs to reveal group effects. The measures they used for these constructs include the Portuguese versions of the Gross and John (2003) Emotion Regulation Questionnaire (ERQ), the Baer et al. (2006) Five Facets of Mindfulness Questionnaire (FFMQ) adapted by Gregório and Gouveia (2011), and Neff's Self-Compassion Scale (SCS; 2003), adapted by Castilho and Pinto-Gouveia (2011). The FFMQ assesses mindfulness components of describing, non-judging, awareness, observance, and non-reactiveness (Baer et al., 2006). The SCS contains six subscales: self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification, with reverse scoring for self-judgment, isolation, and over-identification (Neff, 2003).

Flook et al. (2013) also measured teacher mindfulness and self-compassion using the original versions of the FFMQ and SCS. Additionally, they measured emotional processing using a task-based assessment. After conducting paired samples *t*-tests, authors found that both their intervention and control groups showed improvements in the observe subscale of the FFMQ, although the control group results [t (7) = 2.40, $p = .047$] were only marginally significant compared to the intervention group results [t (9) = 3.30, $p = .009$] (Flook et al., 2013).

Significant increases were found in the intervention group for the humanity subscale of the SCS as well as the describe subscale of the FFMQ. Burnout significantly improved for the intervention group in the subscales of emotional exhaustion and personal accomplishment. Emotional processing also increased for the intervention group, indicated by performance on the AGN task.

Tsang et al. (2021) assessed teachers' mindfulness, emotion management, and mindfulness in teaching using the Cognitive and Affective Mindfulness Scale-Revised scale (Feldman et al., 2007), Mood Repair subscale of the Trait Meta-Mood Scale; Salovey et al., 1995), and the MTS (Frank et al., 2016). Teachers' mindfulness and mindfulness in teaching scores were significantly higher for the intervention group at post-test and at the 2-month follow-up, with small to medium effect sizes (Tsang et al., 2021). Additionally, these researchers used data on teacher stress and life satisfaction to create a composite score for well-being. They found that posttest scores of emotion management, a component of SEC, mediated the relationship between mindfulness and 2-month follow-up scores of well-being (Tsang et al., 2021).

In an MBEB study (Braun, Roeser, & Mashburn, 2020), medium to large effect sizes were found pre- to post- MBEB implementation in the two facets of emotion regulation (cognitive reappraisal d = .57; expressive suppression d = -.30), signifying the MBPIs can impact teachers' emotion regulation, and important aspect of teacher SEC. Roeser et al. (2021) also implemented the MBEB program with teachers and reported significant effects for self-compassion, although no group differences of mindfulness were observed at any measurement time.

A systematic review by Lomas et al. (2017) reported positive changes for emotional intelligence and regulation related to MBPIs in 100% of their relevant studies (n = 3). Results

were indicated by self-report assessments and qualitative interviews. Additionally, a meta-analysis by Zarate et al. (2019) reveals that MBPIs used in their included studies consistently had statistically significant impacts on teacher mindfulness in the positive direction. Their meta-analysis included 18 studies, 11 of which measured mindfulness as an outcome.

Roeser et al. (2013) assessed occupational self-compassion and mindfulness and reported teachers receiving their mindfulness training scored higher in mindfulness and occupational self-compassion compared to the waitlist control group, with large effect sizes. Although this was true for both Canadian and U.S. Teacher samples, Roeser et al. (2013) detected a significant interaction effect based on research location. At the 3-month follow-up time, the difference in mindfulness scores between teachers in the intervention group and control group was greater for the US teacher sample than it was for the Canadian teacher sample (Roeser et al., 2013). A similar significant interaction effect was reported for outcomes of self-compassion at the 3-month follow-up as well. Post-hoc analyses revealed that occupational self-compassion was only greater than the control group for the U.S. intervention group at the 3-month follow-up when compared to the Canadian groups at this assessment time (Roeser et al., 2013).

Jennings et al. (2017) implemented the CARE for Teachers program with 224 teachers across 36 urban elementary schools to study intervention impacts on teachers' SEC and classroom interactions. Teachers in their sample taught grades K–5 in New York City and were split into two cohorts that received the intervention in the Spring of 2012 and 2013 (Jennings et al, 2013). Outcomes included in their study falling within the SEC category were adaptive emotion regulation, measured by the ERQ, teaching efficacy, measured by the Teachers' Sense of Efficacy Questionnaire–Short Form (Tschannen-Moran & Woolfolk Hoy, 2001), and mindfulness, measure by both the FFMQ and the MTS (Frank et al., 2016). The CARE program

had a statistically significant positive effect, with small effect sizes, on teachers' mindfulness scores (p = .007, ES = .28), and on mindfulness factors of observing (p = .001, ES = 0.41) and nonjudging (p = .041, ES = .21). Although no statistically significant effects were found for teaching efficacy, Jennings et al. (2017) reported significant improvements in teachers' adaptive emotion regulation (p = .005, ES = 0.35).

In Australia, Carroll et al. (2021) utilized MBSR to examine impacts on teachers' stress, burnout, emotion regulation, mindfulness, and cognitive function. Researchers collected data using self-report scales, behavioral tasks, and functional neuroimaging (i.e., *f*MRI). They had a sample of 83 teachers who participated in either the MBSR program or the Health Enhancement Program (HEP; MacCoon et al., 2012), the active control condition. Both programs were eight weeks in length and have structural similarities, though the HEP has no components of mindfulness or meditation. After being assigned to the HEP and MBSR groups, participants were matched on age, gender, grade level of instruction, and *f*MRI compatibility (Carroll et al., 2021). Both programs resulted in significant positive effects, with medium to large effect sizes in teachers' self-reported mindfulness and emotion regulation. Interestingly, participants in the HEP group showed greater emotion regulation improvements compared to the MBSR group (Carroll et al., 2021). Moreover, only participants in the MBSR group demonstrated significant effects in the neural activity corresponding to emotion regulation.

Mindfulness-based programs for teachers can produce significant effects in their well-being, emotion regulation and management, and the quality of interactions with their students through expressed emotions and positive affect. Mindfulness programs have also resulted in some enhanced mindfulness skills. Since it is known that teachers and their interactions with

students have a profound impact on student outcomes, it is reasonable to expect that MBPIs for teachers can have effects on students as well.

Teacher MBPIs and Student Outcomes

Although most studies that administer MBPIs to teachers focus on teacher and classroom outcomes, some have also looked at student outcomes. When implementing their mindfulness program, de Carvalho et al. (2021) assessed student perceptions of teachers' classroom behavior using a Portuguese version of the Teacher as Social Context questionnaire (Belmont et al., 1992). Specifically, they assessed student perceptions of teacher's degree of involvement with students, using 8 items scored on a 4-point Likert scale. de Carvalho et al. (2021) also assessed student well-being, positive and negative affect, and emotion regulation. Respective measures for these constructs were Portuguese versions of the Mental Health Continuum— Short Form for adolescents (Keyes, 2006), the Positive and Negative Affect Scale for Children (PANAS-C; Laurent et al., 1999), and the ERQ for Children and Adolescents (Gullone & Taffe, 2012). Findings indicated that their mindfulness program for teachers, *Atentamente*, resulted in significant group effects across all outcomes, after controlling for student age, grade level, and gender (de Carvalho et al., 2021). Authors reported significant increases in students with teachers in the experimental group for positive affect, cognitive reappraisal, well-being, and perceptions of level of teacher involvement (de Carvalho et al., 2021). Post-test data also supported a significant decrease in students' negative affect and expressive suppression when compared to pretest data.

Scientific evidence supporting the use of teacher MBPIs is mounting. Clearly, MBPIs can enhance TSIQ and teacher SEC and reduce teacher burnout. These findings would suggest positive, distal outcomes for students as theorized by the PCM, and though there is some

evidence to support this, more evidence is needed. Additionally, more research is needed to understand the mechanisms through which MBPIs work. I now discuss some of the advantages and limitations of implementing existing mindfulness programs with teachers.

Advantages and Limitations of Current Mindfulness Programs

Zarate et al. (2019) suggest that MBPIs are effective for decreasing teachers' symptoms of stress, anxiety, burnout, and depression. Implications for teachers regarding these effects are especially important for teachers work in high-stress environments (Zarate et al., 2019). Implementing MBPIs may reduce teacher burnout and thereby reduce teacher turnover. For example, Carroll et al. (2021) found that teachers who completed their mindfulness program reported a significant decrease in their intentions to leave the field post-training. However, this effect was also found in their active control group who participated in a general health and well-being program.

Research supports the use of MBPIs to enhance teacher SEC, specifically self-management, and self-awareness, evidenced by effects observed in teachers' emotion regulation and mindfulness skills. It is less clear whether current MBPIs have significant effects on TSIQ. Although some studies reported impacts on emotional support and classroom organization, others found few dimensions impacted by mindfulness programs. Other times, overall domain scores were reported without dimension-level scores. Additionally, no studies found reflected any change in the instructional support domain or any of its dimensions.

Design. Many studies reviewed here relied on group comparisons between intervention and control groups, which although is a rigorous research design, often relies on large samples, requiring many resources to implement, and fails to detect individual-level details and differences in outcomes. Additionally, although some authors took measures to prevent self-

selection bias, it is possible that self-selection may have influenced results in some studies. Davidson and McEwen (2012) suggest that to detect whether observed effects are due to self-selection or other confounding factors, researchers should utilize longitudinal designs with mindfulness and meditation programs. Moreover, many of the studies reviewed here rely on self-report measures, which may be another limitation of current MBPI studies. The MBPI literature reviewed related to teachers was almost entirely quantitative in nature. Only few studies included qualitative elements, and only one used single-case experimental design (e.g., DiCarlo et al., 2019), which is an effective design choice for studying intervention effects in small samples and can be combined to collect qualitative and quantitative data and interpret contextualized results.

Time. Researchers often collected data on program acceptability and often found that teachers reported finding value in the program for their education on mindfulness as well as for their well-being and professional lives. However, at times, teachers reported withdrawing from the study due to time constraints (e.g., Roeser et al., 2021). Most MBPIs reviewed ranged from 6–8 weeks in length and most require time commitments to program participation and at-home practice or "homework," with some including a full-day session. In one study, 6 out of 29 teachers withdrew, reporting reasons for leaving that included pregnancy, scheduling conflicts, or too much of a time commitment (Roeser et al., 2021). In another, Jennings et al. (2017) reported approaching 525 eligible teachers for their study, more than half of whom (i.e., 301) declined to participate. Braun, Roeser, and Mashburn (2020) also reported that teachers provided feedback suggesting the eight-week program be shortened. It appears many of the current MBPIs may require a large time commitment from teachers who are likely already limited in time resources, due to the demands of their personal and professional lives.

Cost. Doyle et al. (2018) conducted a cost analysis for successful implementation of the CARE for Teachers program using data from three studies conducted with this program. They reported that 118 teachers were trained across the three program implementations, adding up to a total cost of $143,549, averaging out to about $1,217 per teacher (Doyle et al., 2018). According to Doyle and colleagues, these costs varied across implementations. To implement the CARE for Teachers program with a group of 25 teachers, it may cost on average $1850 per teacher and the cost per teacher drops to $1522, if in a group of 30 teachers (Doyle et al., 2018). Costs can also be reduced by working with school districts to conduct a portion of the program through contracted professional development days. Estimated costs for the CARE program range from $616 to $1850 per teacher (Doyle et al., 2018). Thus, time and money demands of programs may deter participation in CARE and other MBPIs.

What Makes MBPIs Work?

Although implementation of MBPIs often leads to improvements in burnout and SEC, it is unclear as to what is driving these changes. For example, Carroll et al. (2021) found similar improvements for teachers when comparing a non-mindfulness health intervention to a MBSR intervention. Other studies (e.g., Roeser et al., 2021) reported positive outcomes associated with participation in MBPIs, but no significant changes in mindfulness. One of the drawbacks of multi-component programs like CARE for Teachers, MBEB, and many other MBPIs is their complex and comprehensive nature, which often make it difficult to identify the active components that drive change, also referred to as kernels (Embry & Biglan, 2008).

Identifying the kernels of MBPIs that drive change might help researchers achieve similar effects through simpler, more targeted interventions, while requiring less time and money from teachers and schools. One of the common elements of teacher MBPIs is an element of

compassion instruction, training, or practice. Thus, I now explore the topic of compassion to uncover its potential as a standalone intervention for improving TSIQ, teacher burnout, and teacher SEC.

Compassion

Compassion is a construct related to mindfulness, meditation, and other contemplative practices. According to Davidson et al. (2012), compassion is a prosocial disposition. First, this section defines compassion and clarifies compassion's relationship to mindfulness. Next, I briefly describe interventions used to increase compassion, followed by an exploration of outcomes associated with compassion interventions. I finish this section by discussing potential connections between compassion and TSIQ, teacher burnout, and teacher SEC.

Defining Compassion

Davidson et al. (2012) consider compassion a prosocial disposition. The Dalai Lama (1995) defined compassion as the openness to another's suffering and a commitment to relieve it. Neff and Seppälä define compassion as a caring response to suffering, which can be directed towards the self or others, and "acknowledges the shared human condition of imperfection, and involves turning toward rather than denying or avoiding pain" (2016, p. 2). Kirby et al. (2017) offer several versions of compassion definitions, many of which have two core components in common: (1) awareness and sympathy of another's distress or suffering and (2) desire to alleviate that suffering. These two components represent (1) feeling compassion and (2) showing compassion. Feeling compassion is the openness to and nonjudgmental witness of another's suffering and showing compassion involves the motivations and behaviors for alleviating the suffering (Gilbert, 2005). Goldin and Jazaieri (2017) identify the following four components of compassion: (1) cognitive (e.g., awareness of suffering), (2) affective (e.g., a caring and tender

concern), (3) intentional (e.g., wishing to alleviate suffering) and (4) motivational for altruistic behavioral activation (e.g., responsiveness or readiness to take action). Although these views differ slightly, most agree that compassion involves affective, cognitive, and motivational components (Jazaieri et al., 2014).

What compassion is not. Although many people use the terms compassion and empathy interchangeably, it is important to note the differences here. According to Neff & Seppälä (2016), compassion is distinct from other constructs such as empathy, sympathy, and altruism, which are often confused as synonymous. Ratka (2018) makes important distinctions between cognitive empathy and emotional empathy. Cognitive empathy refers to perspective-taking and emotional, or affective empathy, refers to the mirroring of another's emotions (Ratka, 2018). Someone with emotional empathy might experience emotional or physiological responses to another's circumstances or emotions. Compassion is remaining open to another's suffering with the desire to alleviate it and does not include the emotional mirroring that is present in emotional empathy.

The emotional and physiological arousal of affective empathy imply that there is some emotional attachment or attunement to another's suffering. However, Boellinghaus et al. (2014) make clear that compassion involves non-attachment. This is important to note because people often use the term "compassion fatigue" to refer to something akin to the emotional exhaustion phase of burnout. Klimecki and Singer (2011) argue that "compassion fatigue" should be replaced by "empathetic-distress fatigue." Their argument is that the non-attachment aspect of compassion can help protect against the emotional exhaustion phase of burnout, while empathetic distress fatigue may be a pre-cursor to, or even a symptom of burnout.

Although many mindfulness-based programs are multi-component and often involve compassion-based practices, it is important to understand the differences between these two constructs. Next, I describe how compassion is distinct from mindfulness.

Distinguishing Compassion from Mindfulness

Many MBPIs that are used with teachers include components of compassion. It is important to discuss the intersection of compassion and mindfulness and to clarify what makes compassion unique. Boellinghaus et al. (2014) list three unique features of compassion that distinguish it from mindfulness. First, compassion is directed towards suffering and mindfulness can relate to any experience (e.g., walking, eating, listening). Second, compassion is directed towards oneself (e.g., self-compassion) or others and mindfulness is directed at experience itself. Third, compassion is active in that it brings care and concern to suffering, while mindfulness involves bringing awareness to the present moment.

Although some researchers suggest that compassion is an outcome of mindfulness (e.g., Bishop et al., 2004; Gilbert & Tirch, 2009), studies implementing MBPIs for teachers have not fully investigated this notion. Few MBPI studies examined outcomes of self-compassion but rarely was other-related compassion assessed. Kabat-Zinn contends that compassion practices such as lovingkindness meditation (LKM) lay the foundation for mindfulness (Salzberg, 1995).

Although compassion embedded in many MBPIs for teachers, it has rarely been studied as a standalone intervention with this population. Next, I discuss existing interventions and practices used to cultivate compassion in individuals.

Compassion Interventions

In this section, I discuss several compassion interventions and highlight one, in particular, Compassion Cultivation Training (Jazaieri et al., 2013). This program is discussed in detail and

its effects are reviewed before turning the focus to a specific type of compassion practice called lovingkindness meditation.

In a meta-analysis of compassion interventions, Kirby et al. (2017) reported six empirically supported compassion interventions and identified 21 papers implementing these programs that were included in their review. One of the programs mentioned was the CEB program, although it is classified in here and in other studies as a mindfulness-based intervention. The CEB program has elements of both mindfulness and compassion, as do many of the other MBPIs reviewed in this paper. Also included in their review were studies implementing the 8-week Mindful Self-Compassion program (MSC; Neff & Germer, 2012), which combines elements of MBSR and compassion. Since the purpose here is to identify the unique contributions of compassion training, it is important that I specifically review interventions using compassion cultivation as the primary focus.

Kirby et al. (2017) identified six studies implementing compassion meditation and lovingkindness meditation. The Compassion Cultivation Training program (CCT; Jazaieri et al., 2013) is one program identified by Kirby et al. and was implemented in two of their studies. Another compassion practice identified in their meta-analysis is LKM. Research, especially from the fields of neuroscience and medicine, are starting to uncover effects of LKM interventions.

I begin the next section by describing the CCT program and summarizing its findings. Then, I discuss LKM, the intervention used in this study, and its associated outcomes.

The Compassion Cultivation Training Program

The CCT was first implemented as a 9-week intervention (Jazaieri et al., 2013) but has since been reduced to an 8-week program. The CCT was developed at The Center for Compassion and Altruism Research and Education (CCARE) at Stanford University, School of

Medicine. The CCT program consists of two-hour weekly classes that include lecture, discussion, and in-class exercise components. Recommended class sizes for CCT are 20–30 participants (Goldin & Jazaieri, 2017). The program recommends daily meditation practices of 25–35 minutes per day and includes homework assignments to encourage participants to apply compassion practices to real-world settings. Audiotaped meditations are also provided to participants to assist them with their meditation practices outside of class.

The CCT program is aimed at helping individuals increase their compassion for themselves and for others and follows six steps to achieve this effect: 1) settling the mind, 2) lovingkindness and compassion for a loved one, 3) lovingkindness and compassion for oneself, 4) embracing common humanity, 5) cultivating compassion for others, 6) active compassion practice (Goldin & Jazaieri, 2017). The CCT program is now offered around the world and can be accessed online through the Compassion Institute (https://www.compassioninstitute.com/cct/), a nonprofit organization supported by organizations including the CCARE at Stanford University, where it was first developed.

CCT program effects. Jazaieri et al. (2013) implemented the CCT program in a randomized control trial with an intervention group and wait-list control group. They used a community sample of 100 adults in California, aged 21–68, who were randomly assigned to either condition. Although 60 participants were assigned to the CCT intervention group, and 40 to the control, researchers analyzed data from 50 CCT and 30 control group participants. Of participants who withdrew from the study (i.e., 20), majority of them (i.e., 17) reported scheduling conflicts, time, or money restraints. Using the collected data, Jazaieri et al. (2013) investigated effects of the CCT program on fear of compassion for others, from others, and for

self, using the Fear of Compassion Scale (Gilbert et al. 2010). They also examined effects on self-reported self-compassion using the SCS.

Jazaieri et al. (2013) reported significant changes across all examined outcomes. Significant reductions in fear of compassion were reported for the CCT group across all subscales and data supported significant improvements in self-compassion for this group. The largest effect size was reported for the fear of compassion *for* others (.44), and the smallest effect size was for fear of compassion *from* others (.29). This is relevant because reducing fear of compassion might promote positive affect and can allow individuals to be more sensitive to compassion training. A follow-up study (Jazaieri et al., 2014) examined impacts of this program implementation on participants mindfulness, affect, and emotion regulation.

Jazaieri et al. (2014) used self-reports to assess impacts of CCT on participants' mindfulness, affect, and emotion regulation. Mindfulness data was collected using the Kentucky Inventory of Mindfulness Skills (Baer et al., 2004) and with a questionnaire for rumination and decentering. Affect was assessed using various measures for perceived stress, worry, and happiness, and emotion regulation was measured using the ERQ. Significant improvements were found for the CCT group on mindfulness, worry, and expressive suppression, indicating that the program can help promote self-awareness and emotion regulation.

Findings here support the idea that mindfulness can be improved through compassion training, even though this is not the intent of the CCT program. To examine how mindfulness and compassion interventions uniquely contribute to outcomes, Sansó et al. (2019) studied the differential impacts of MBSR and CCT training on health care professionals. They found significant improvements in mindfulness, self-compassion, and professional quality of life across programs. They reported significant interaction effects that suggested differential impacts on

awareness and non-reactive dimensions of mindfulness, as well as the burnout subscale of their quality-of-life measure. These interaction effects showed intervention effectiveness varied by type of training. All significant interaction effects favored the MBSR group (Sansó et al., 2019). Although the CCT can enhance outcome variables relevant for teacher SEC and burnout, their effects, aside from compassion, largely resemble some of the effects from MBPI implementations.

Evidence for the CCT is still accumulating but it appears to be promising for increasing mindfulness and self-compassion. More research is needed to determine effectiveness, feasibility, and acceptability of this program. Similar to many MBPIs, the CCT is a comprehensive program spanning many weeks, which may deter program participation or completion. I turn now to examine LKM, a practice that can have powerful effects, even after brief implementation. Lovingkindness meditation utilizes a structured and easily replicated format, making it a suitable intervention to use in experimental research.

Lovingkindness Meditation

According to Sharon Salzberg (1995), lovingkindness, also called *metta* in the Buddhist language Pali, is a word synonymous to love. Lovingkindnes*s* can support and extend states of compassion, sympathetic joy, and equanimity (Salzberg, 1995). It is described as an unconditional love and acceptance of self and others and encourages the release of personal expectations (Salzberg, 1995). As with mindfulness, secular training of lovingkindness, has been adopted and studied across diverse samples and professional fields. Practicing LKM can promote compassion for oneself and others (Salzberg, 1995).

LKM is a structured practice that is often implemented in interventions using scripts and guided audio or video clips. Due to the structured nature of this practice, it can be easily adopted

by those who wish to practice or implement LKM. To begin practicing LKM, one first finds a quiet and comfortable seating position, takes a moment to breathe, relax, and set their intentions. A person may choose to close their eyes or soften their gaze and may place a hand over their heart when repeating a set of phrases. An LKM practitioner could either adopt the phrases below or generate similar phrases, which are then silently repeated to oneself. Sharon Salzberg, an expert in LKM, suggests using three to four phrases such as:

> "May I be free from danger.
>
> May I have mental happiness.
>
> May I have physical happiness.
>
> May I have ease of well-being" (1995, p. 28)

Practitioners start by repeating these phrases to themselves and then slowly transition to sending these wishes of lovingkindness to others (e.g., May *you* be free from danger, May *all beings* be free from danger).

Practitioners are encouraged to treat themselves with kindness if their attention starts to wander and to gently bring themselves back to the present moment (Salzberg, 1995). When practicing LKM, a person begins by sending lovingkindness to themselves, then slowly progresses to include a beloved friend, a neutral person, a difficult person, and finally to include all beings in their practice (Salzberg, 1995). Although sometimes it may feel difficult to send lovingkindness towards another, Salzberg suggests not to force these phrases and instead to refocus on sending lovingkindness to oneself. After some time, practitioners can try again to repeat these phrases towards others. Visualizations of white light enveloping oneself or being sent outward from the heart can also support LKM practice.

LKM follows a traditional structure and therefore provides a general template for studies implementing LKM as a treatment or intervention. Over the past 20 years, secularized adaptations and implementations of LKM are becoming more widespread in the literature. Although studies on LKM and compassion are not as plentiful as general mindfulness studies, evidence for them has been mounting. Next, I discuss intervention effects related to LKM.

LKM Intervention Effects

Studies implementing LKM report results such as increased compassion, social connectedness, well-being, positive affect, emotion regulation, de-centering, altruism, prosocial behavior, and the promotion of positive interpersonal relationships. Evidence also shows LKM to reduce implicit and racial bias, occupational burnout, and negative reactions to repetitive thoughts. Studies reporting these findings are reviewed next. Then, I discuss why LKM may be an effective intervention for treating burnout, enhancing teachers' social-emotional competencies, and improving TSIQ across the three CLASS domains.

LKM and Compassion. In their doctoral dissertation, Weibel (2007) found evidence supporting that LKM can increase both self- and other-focused compassion in an undergraduate college sample. They implemented an LKM intervention, briefly utilizing mindfulness exercises at the start of the first two sessions. In the first session the mindfulness instruction and exercise accounted for 15 out of 82 total session minutes, and in the second session 20 out of 90 total minutes. It appears mindfulness was used to center and settle the mind and to encourage presence during LKM instruction, education, and practice.

Weibel (2007) compared the effects of the intervention group to a control group at pre- and post- intervention and at a two-month follow-up. Self-compassion, compassion, and trait anxiety were measured. To measure these outcomes variables, Weibel utilized the SCS, the

Compassionate Love Scale–Humanity Version (Spreecher & Fehr, 2005), and the State-Trait Anxiety Inventory–Trait Form (STAI; Skapinakis, 2014). Additionally, participants were asked to log their out-of-session LKM practice and to rate their success of implementing the learned practices to their daily lives.

Results from this study showed that the LKM group reported greater effects across all dependent variables than did the control group. Weibel (2007) used repeated measures MANOVA analyses and found significant interactions between time and group across self-compassion, compassion, and trait anxiety. I specifically review their findings related to self-compassion and compassion for this section.

Weibel (2007) reported significantly greater increases for the LKM group from pre- to post-treatment in levels of self-compassion and compassion with medium to large Cohen's *d* effect sizes between and within group (.45 and .46 for self-compassion; .45 and .67 for compassion). Comparing pre-intervention and two-month follow-up levels, Weibel found the LKM group to maintain significantly greater increases in self-compassion only.

This study supports the use of LKM for increasing self- and other-focused compassion. Although Weibel's findings did not support maintenance of compassion effects longitudinally, these preliminary findings are promising, especially with the consideration that the intervention was only carried out over four sessions. It is also promising that 33 of the 36 participants completed the study, with only few choosing to withdraw.

LKM and Social Connectedness. Hutcherson et al. (2008) reported increased social connectedness following LKM meditation and other reports also emphasize LKM benefits for interpersonal interactions and relationships (e.g., He et al., 2015; Seppälä et al., 2013; Yarnell & Neff, 2013). Hutcherson et al. recruited 93 participants for their experiment, excluding

participants who meditated > 30 minutes per day. Eight participants included in the analysis reported some prior experience with LKM or similar practices, but results were unaffected when excluding them from analysis (Hutcherson et al., 2008). This study explored effects of LKM by comparing an LKM intervention group to a neural imagery induction (i.e., IMAGERY) group.

Hutcherson et al. (2008) compared the LKM and IMAGERY group across mood and social connectedness outcomes using self-reports and task assessments. For each condition, equal time was spent administering instructions to participants over audio speakers. Participants in both groups were instructed to close their eyes and take a few deep breaths to relax. Following this, four minutes were spent administering either the LKM or IMAGERY intervention.

LKM participants were asked to send lovingkindness, via wishes for good health, happiness, and well-being, to two loved ones. These participants were told to imagine their loved ones standing by their side as they sent love and compassion to them. After four minutes, participants opened their eyes and were told to direct this lovingkindness to a neutral stranger, shown in a photograph on a screen. IMAGERY group participants, on the other hand, were asked to spend four minutes visualizing two neutral strangers standing by their side. Rather than directing lovingkindness to these strangers, they were asked to focus on the physical appearance of these individuals. Following this, IMAGERY participants were directed towards the photo of a neutral stranger and were asked to focus on facial and physical details and to imagine other details, such as the clothes they might be wearing (Hutcherson et al., 2008).

Following the 7-minute visualization procedures, LKM and IMAGERY participants completed assessments and demographic questionnaires. Participants' self-reported moods were coded as positive or negative. Explicit evaluative responses were measured through participant reports of how positive they felt on a scale of 1–7 towards photos of unknown, neutral faces.

Implicit responses were assessed through a priming task involving photos of faces, repeatedly shown to participants in random sequences, with each photo followed by either a positive or negative word (Hutcherson et al., 2008). For the implicit evaluative task, participants were asked to quickly determine whether the word shown was positive or negative. Responding faster to positive words and slower to negative words reflected an implicit positive response (Hutcherson et al., 2008).

Social connectedness results. Significant interactions were found for group and time for both positive and negative mood. Reported mood of the LKM participants became more positive and less negative following the meditation intervention and no significant changes were detected for the IMAGERY group. After analyzing results from the explicit evaluative response task, Hutcherson et al. reported that participants from both groups became more positive towards faces of neutral strangers but detected a stronger positive response from the LKM group. Results also showed that LKM had significant effects toward implicit positivity towards the target photo but not the photo of a neutral stranger. Hutcherson et al. (2008) also detected changes in the LKM group's implicit positivity towards photos of themselves. Significant positive correlations were found between mood change and explicit responses, but no significant associations were detected for mood change and implicit responses (Hutcherson et al., 2008).

Results from this study support that LKM can produce positive changes in mood and positive responses towards the self and others, even with seven minutes of meditation practice. Hutcherson et al. (2008) suggest these findings to have implications for social connectedness. If LKM can increase positive responses towards others, this may be beneficial for improving connectedness and relationships with others. He et al. (2015) also reported significant effects of LKM on interpersonal interactions and positive emotions.

Effects in a university sample. He et al. (2015) studied the effects of 30-minute LKM practice, when used three times a week, for 4 weeks. They conducted their study on an undergraduate university sample in China with participants who had no prior training in meditation. They sought to learn how LKM impacts positive emotions, understanding of others, and interpersonal interactions and reported significant effects across all outcomes. The 30-minute meditation was practiced with video clips, each with breath and relaxation, physical exercise, and meditation practice components. Their analyses revealed significant effects for the LKM group in all outcome variables when compared to the control group. The LKM group experienced increased positive emotions, decreased negative emotions, and increased interpersonal interactions and understanding of others (He et al., 2015). He et al. reported Cohen's *d* effect sizes greater than .80 for all outcomes, indicating strong effects. Many other studies also report effects of LKM on positive emotions.

LKM and positive emotions. A meta-analytic review by Zeng et al. (2015) identified 25 studies that used LKM as an intervention and measured positive emotions or affect as outcome variables. Their collected studies used a mix of research designs including 17 studies assessing the effect of LKM on positive emotions (10 randomized control trial (RCT) studies and seven non-RCT studies), and eight studies assessing effects of ongoing LKM practice (six RCT studies, two non-RCT studies). Most of the studies used self-reports to measure positive emotions (e.g., Positive and Negative Affect Scale, Subjective Happiness Scale, Fordyce Emotions Questionnaire, and Modified Differential Emotions Scale).

Zeng et al. distinguished between studies that used compassion interventions and those that used LKM interventions and found no significant differences between effects on positive emotions. They did, however, detect higher effect sizes for studies using LKM ($g = 0.42$) than for

studies using compassion training (g = 0.26). Zeng and colleagues also assessed whether length of intervention played any role but found no significant effects of intervention length on effect sizes. All studies in their meta-analysis either used self-guided scripts or weekly courses. Zeng et al. also reported that 3 out of 4 studies they analyzed that used an active control group reported no significant differences between LKM and the active control groups on positive emotions. In their non-RCT studies, Zeng et al. reported larger effect sizes for the five studies using weekly courses (g = 0.45) than the two studies not including weekly courses (g = 0.12).

Overall, this meta-analysis supports the use of LKM interventions for increasing positive emotions and affect. The evidence suggests that LKM may be more effective for cultivating positive emotions than general compassion interventions. Zeng et al. theorize that this may be due to the link between compassion and suffering, which may actually hinder efforts to cultivate positive emotions. Next, I take a closer look at one of the studies reviewed by Zeng et al. (2015), examining the ongoing effect of LKM practice through the building of personal resources.

Ongoing and longitudinal effects of LKM. Fredrickson et al. (2008) tested the *build hypothesis* from Fredrickson's Broaden-and-Build Theory of Positive Emotions (1998, 2001) to examine whether increasing daily positive emotions through LKM could build consequential personal resources over time. Later, Cohn and Fredrickson (2010) conducted a 15-month follow-up study to investigate longitudinal effects of the intervention.

Broaden-and-build theory. According to Fredrickson et al., the broaden-and-build theory is comprised of two hypotheses. First, the *broaden hypothesis*, supported by empirical research, suggests that positive emotions can expand one's attention and thinking. Second, the *build hypothesis*, tested in these two studies being reviewed, proposes that positive emotions compound over time and build consequential personal resources that are durable over time

(Fredrickson et al., 2008). These consequential and lasting resources may include mindfulness, mental-health, and close inter-personal relationships (Fredrickson et al., 2008). Fredrickson et al. (2008) suggest that LKM might produce such long-term effects, which is partly based on findings from Davidson et al. (2003) who linked mental training practices such as LKM to altered personality traits.

Testing the Hypothesis. Fredrickson et al. recruited employees from a large software and information technology company in Detroit, Michigan for their study. Participants were recruited via email inviting them to participate in a meditation-based stress-reduction program. Participants completed questionnaires to collect demographic, depression, life satisfaction, and personal resource data and then were randomly assigned to experimental and wait-list control groups. This data was collected again two weeks after the program ended. Using a web-based program, participants also completed daily reports on their emotions and reported their time spent meditating for the day. These daily reports were collected for nine total weeks including one week before and after the 7-week program. Automated email reminders were also sent to participants if they missed three consecutive daily reports. Due to attrition and exclusion, 139 of the 202 volunteer employees were included in the data analysis. The two main reasons for exclusion were failing to complete the post-program questionnaire (n = 27) and completing less than half of the 61 daily emotion reports (n = 24). The final sample consisted of 67 participants in the LKM group and 72 in the wait-list control group.

Personal Resources. Fredrickson et al. (2008) collected personal resource data in four domains: cognitive (mindfulness and awareness, agency thinking and pathways thinking, savoring beliefs), psychological (optimism, ego-resilience, psychological well-being), social (social and emotional support, positive relations with others), and physical (illness and sleep

duration). The Modified Differential Emotions Scale (mDES; Fredrickson et al., 2003) was used to assess participants' moods and with this assessment, participants indicated whether they had engaged in some form of meditation since their most recent daily report. Along with the mDES, participants were asked to recount their morning, from wake-up to lunch, and divide it into 10 "episodes," which they created labels for. Emotions from the mDES were then presented to participants and they were asked to rate their emotions for each episode from 0–4 (not at all-extremely). Participants also reported what they were doing during each episode by completing a checklist that listed various activities including meditation and inter-personal interactions (Fredricks et al., 2008).

Implementation. The LKM intervention consisted of six 1-hour sessions, delivered to groups of 20–30 participants during their lunch hours. Participants were also given audio-recordings of guided meditations related to their sessions. They began the intervention by sending lovingkindness towards themselves, then progressed to loved ones, acquaintances, strangers, and all living beings (Fredrickson et al., 2008). Of the 60-minutes in the session, meditations lasted from 15–22 minutes. Other time in the session was spent discussing participant progress and presenting educational content about meditation and the session topic. Participants were also directed to practice meditation five times per week on their own.

Positive emotion results. On average, LKM participants reported spending about 80 minutes practicing meditation on their own per week, significantly more than control group participants. Fredrickson et al. reported no significant effects of LKM on positive emotions by time or condition on their own. However, they detected a significant time and condition interaction effect for the LKM group, where a significant difference in positive emotions emerged over time between LKM and control groups (Fredrickson et al., 2008). Following this

finding, a moderation analysis revealed that time predicted positive emotions for the LKM group when they used condition as the moderator. This effect was not found for the control group. Fredrickson et al. reported no significant effects for negative emotions or compassion. They found a significant effect of time spent meditating on positive emotions.

In their study, meditating during an "episode" predicted higher positive emotions, indicating that meditating produced positive emotions during the practice. Meditating at all during the morning produced more positive emotions throughout the morning as well. Fredrickson et al. (2008) also reported a cumulative effect, wherein LKM practice produced an increase in positive emotions on the days that followed meditation practice, regardless of whether the participant meditated on the day of the report.

Personal resource results. In terms of personal resources, path analyses revealed significant effects from changes in positive emotions to changes in resources to changes in life satisfaction. These effects were significant for nine of the 18 personal resources tested, including but not limited to mindfulness, pathways thinking, self-acceptance, social support received, purpose in life, positive relations with others, and illness symptoms (Fredrickson et al., 2008). Additionally, changes in six other personal resources, including autonomy, personal growth, optimism, and agency thinking, significantly influenced life satisfaction, but not due to changes in positive emotions. Fredrickson et al. (2008) also reported that positive emotions did not predict life satisfaction.

Overall, this study made an excellent case that LKM can produce short-term effects in positive emotions, which can lead to the building of positive personal resources. Additionally, it appears that participation in the intervention led to growth of these personal resources, not by way of positive emotions, but perhaps some other mediating variable.

Follow-up study. A follow-up study 15 months later showed that participants, whether they continued to meditate or not, maintained their personal resources from post-intervention to follow-up (Cohen & Fredrickson, 2010). Participants who continued meditating in the time between intervention and follow-up also showed an increase in positive emotions. Lastly, Cohen and Fredrickson observed that participants who reported higher positive emotions early in the intervention were more likely to continue meditation practices. Using logistic regression analyses, they found that participants experiencing high increases in positive emotions (1 *SD* above the mean) at week 5, described as early positive emotion reactivity, were twice as likely to continue their meditation practices after the end of the intervention than those with average reactivity (Cohen & Fredrickson, 2010). Moreover, they were more than 4 times more likely to continue meditating than those one *SD* below the average.

These findings suggest that LKM can result in an increase of positive emotions, which can lead to increased personal resources that influence well-being and interpersonal relationships. Additionally, person-level variables may be at play in the relationships between LKM and these outcomes. Next, I discuss how LKM can reduce implicit bias and increase prosocial behaviors, both of which are relevant in teacher-student interactions.

LKM and Implicit Bias

Stell and Farsides (2016) tested a brief LKM intervention and found that approximately 10 minutes of LKM (7 minutes of instructions and 4 minutes of practice) produced significant effects in positive emotions and racial bias. Stell and Farsides used a similar study design to Hutcherson et al. (2008), assigning participants to either an LKM or IMAGERY active control condition. However, for this experiment, participants in the LKM group spent 4 minutes sending lovingkindness to two loved ones imagined to be standing next to them. The IMAGERY group

was instructed to spend 4 minutes picturing neutral acquaintances and thinking about their physical characteristics. Then, participants in the LKM group were presented with an image of gender-matched Black person and were instructed to send lovingkindness to the person in the photo. Participants in the IMAGERY group were presented with the same stimulus but were told instead to pay close attention to the physical features of the person's face.

Stell and Farsides collected racial bias data by conducting an implicit bias test (Implicit Association Task; IAT) and collected data on emotion locus. The mDES was used to measure other-regarding positive emotions (e.g., graititude, love, awe) and positive emotions not regarding others (e.g., happiness, pride, hope, curiosity, amusement). A 2×2 ANOVA (treatment×emotion locus) analysis showed LKM to increase other-regarding and non-other-regarding positive emotions when compared to the IMAGERY group. A paired *t*-test revealed that participants in the LKM group reported experiencing more other-regarding positive emotions than non-other-regarding positive emotions, though the opposite was true for the IMAGERY group. These results suggest that a brief LKM intervention can lead to more positive affect for others.

The IAT administered to participants assessed implicit responses toward Asian and Black people. This was done to see if sending lovingkindness towards a person from one out-group might transfer to a person from a different out-group. A significant decrease in bias was found for the LKM group when images of Black people were presented as the out-group compared to the IMAGERY group (Stell & Farsides, 2016). No significant reductions of bias toward Asian people were detected.

Mediation analyses revealed a significant indirect effect of LKM on implicit bias with other-regarding positive emotions as the mediator. No significant indirect effects were found for

self-focused positive emotions. Additional analyses, using automaticity data obtained from the IAT, showed that LKM was significantly associated with decreases in automatic processing and increases in controlled processing. They also found that automatic processing was associated with increases in bias, suggesting another mediational relationship between LKM and bias via the reduction of automatic processing. These results echo earlier findings from Kang et al. (2014).

A group who practiced LKM for 6 weeks reported significant reductions in psychological stress as measured by the PSS and showed significant reductions in implicit bias (Kang et al., 2014). The LKM practice group was compared to an active control group, and a wait-list control group. Lovingkindness was not sent towards members in either out-group (i.e., Black people or homeless people) used in the IAT for this study. A significant indirect effect was reported between LKM practice and implicit bias towards homeless people, mediated by reductions in psychological stress. No significant reductions in bias towards Black people was found, although Stell and Farsides provide evidence to suggest this may be possible through targeted LKM. Important to note is that only white people participated in the study by Stell and Farsides, and only non-Black and non-homeless people participated in the study by Kang et al. (2014).

LKM shows promise for increasing compassion, social connectedness, improving the quality of interpersonal interactions, and reducing implicit bias through reductions in stress and automatic processing. Next, I examine effects of LKM on prosocial behaviors, with a special note on altruism. Once the effects of LKM are properly reviewed, connections can be made for supporting LKM as an intervention for improving teachers' SEC, reducing teacher burnout, and enhancing the quality of teacher-student interactions.

LKM and prosocial behavior. Prosocial behavior can be described as one's cooperation with others and the help one offers to others when they are in need (Leiberg et al., 2011). Leiberg et al. (2011) assessed the effects of short-term compassion training (i.e., LKM practice) on prosocial behavior using a task they developed called the Zurich Prosocial Game (ZPG). The ZPG allows repeated assessment of prosocial behavior within one participant (Leiberg et al., 2011). Since prosocial behavior is influenced by reciprocity, the cost of helping, and encountered distress cues (Leiberg et al., 2011), the ZPG first was tested for its sensitivity to these variables. Following this, Leiberg et al. investigated the effects of short-term LKM on prosocial behavior, as measured by the ZPG.

Their first analysis revealed that the ZPG was sensitive to the variables of reciprocity, cost, and distress. That is, participants helped significantly more in reciprocity trials, when cost was low, and when their virtual co-player signaled distress. Interaction effects suggested that reciprocity could offset the cost of helping when cost was high, resulting in greater prosocial behavior, although this effect was only present in distress trials (Leiberg et al., 2011).

Their second experiment tested the effects of LKM on prosocial behavior in 69 right-handed females aged 18–35, a sample similar to that used in their first experiment. Volunteers for the study were first screened for depression and alexithymia and were only able to participate if they had no prior experience with mental compassion training and the memory-training method (i.e., method of loci) used by Leiberg et al. Participants were also screened for psychiatric illnesses and excluded if any were detected. Participants were assigned to either the LKM or memory training condition based on their availability and the time slots available. Due to withdrawal from the study, their final sample consisted of 28 participants in the LKM group and 32 participants in the memory-training group.

Leiberg et al. trained the intervention group in compassion using the traditional structure of LKM and the active control group received memory training. Each training lasted one day for a total of six hours. Participants were asked to keep a log and diary of their practice, invited to join daily 1-hour evening trainings or practice at home, and asked to practice during the days that preceded their scheduled post-test. Participants played the ZPG about a week before and a few days after training completion to assess pre- and post- training prosocial behavior.

How ZPG works. During nine trials of the ZPG, participants navigated through a virtual maze in pursuit of treasure (Leiberg et al., 2011). Participants were told that their virtual co-players were real people from nearby universities and that they receive a new co-player for each trial. While playing their own game, they can see progress of their co-player who is navigating their own maze in pursuit of their own treasure. The game involves different colored gates and keys, and stars that can be collected for small monetary value. Participants are able to help their co-player by using their own keys to open a co-player's gates for them. Distress was indicated by the appearance of the virtual character sweating and sounds of crying, played over headphones, when their path was blocked. The participants were given opportunities to help the other player by opening gates for them by sharing their own keys. Time limits for the game were set on an individual basis, based on participants' average time taken to complete four earlier practice trials.

ZPG results. Leiberg et al. (2011) found participants in their intervention and active control groups to engage in significantly more helping behavior in reciprocity trials and when cost of helping was low, confirming their earlier findings. These results found no significant effect of distress but suggested an interaction effect between reciprocity and distress, where distress signals influenced helping behavior in non-reciprocity trials but not in the reciprocity trials.

LKM training resulted in a significant increase in compassionate feelings and significant decreases in negative affect. Interestingly, negative mood significantly increased in the memory-training group. The analysis on prosocial behavior revealed a significant interaction of time and training for the LKM group, which produced significant changes in helping behavior following the training, whereas no such effects were found for the memory training group. Between-group differences were also found in helping behaviors during low and high-cost trials post-treatment, although these differences were not observed pre-treatment.

Insights gleamed from this study suggest that even one day of LKM training can have significant implications on a person's prosocial behaviors, such as helping others. This is notable because many interventions, both mindfulness-based and LKM-based, are carried out over several weeks. If desirable effects can be achieved with just one day of training, this holds promise for other brief LKM intervention studies. Other studies have also explored the effects of LKM on prosocial behaviors and altruistic behavior, terms sometimes used interchangeably.

Galante et al. (2016) implemented a web based LKM intervention to assess impacts on well-being and altruistic behavior for adults. Using RCT design, Galante et al. (2016) randomized 809 adults from the UK and the US into either the LKM condition or a light exercise condition, which served as their active control group. They also conducted a qualitative analysis based on participants' electronic diaries, forum entries, and responses for withdrawing from the study (Galante et al., 2016). Participants were offered compensation for their participation.

Galante et al. measured altruism by analyzing whether participants decided to keep their full compensation (i.e., $10) or to donate half or all of it to charity. Galante et al. did not define altruism in their paper, though others (e.g., Oakley et al., 2011) define altruism as a behavior or tendency to promote the welfare of another or others. Although Galante et al. classified the act of

donating partial or full compensation to charity as an indicator of altruism, they later coded participants' decisions as a "helping behavior variable" (p. 328). Leiberg et al. (2011) describe prosocial behavior as our cooperation with others and the help we offer others when they are in need. Since altruism in some forms (e.g., pathological altruism) can be related to personality disorders (Widiger & Presnall, 2011), I interpret this experiment to measure a prosocial behavior – offering monetary help to others in need.

Many of the recruited participants in Galante et al. (2016) study dropped out prior to completing the course. A total of 666 of the 809 randomized participants withdrew between baseline data collection and completion (337 withdrew from the light exercise group and 329 from the LKM group). Thus, about 18% of participants from each group completed the course. Analyzing their attrition rates, Galante et al. found that about 75% of dropouts occurred before the third session. Although half of participants reported using some type of meditation in their past, 77% reported not having meditated regularly and only 2% reported ever practicing LKM. The program lasted 4 weeks and involved watching a 10-minute video, 5 days per week, for a total of 20 sessions.

The intervention and results from Galante et al. (2016). Participants watched and followed along with a 10-minute video to practice either LKM or light exercise. The LKM participants were instructed in brief relaxation and mindfulness exercises to help settle the mind, followed by the traditional structure of LKM practice. The light exercise participants practiced stretching, light aerobic, and balance exercises. An unmoderated forum and private diary were available online and participants were encouraged to document and discuss their experiences through these methods. Following intervention manipulation, participants were offered their

compensation in the form of an Amazon gift card, or to donate all or half of the value to any charity of their choosing in the UK or US.

Galante et al. (2016) conducted mediation analyses assessing intervention effects on emotions, well-being, and other variables but I focus here on the prosocial behavior results. Findings from this study revealed that LKM participants were more likely to donate half of their compensation than light exercise participants, though this only bordered on statistical significance ($p = .09$). Almost half of LKM participants (44%) donated at least half their compensation compared to 33% of light exercise participants, although this difference was not statistically significant.

One interesting finding from this study is that participants who used the diary and forum options were significantly older and more likely to have participated in past meditation activities than those who did not use these options. Additionally, diary/forum users reported less depression at course completion and had a higher rate of course completion. Another important question is whether these effects would remain unchanged if the compensation was offered in cash rather than an Amazon voucher, or whether leaving the charity choice open made a difference as opposed to providing participants with a list to choose from.

Prosocial behavior is often assessed using game-based tasks (e.g., Leiberg et al., 2011). Weng et al. (2013) also chose to use this route for assessing prosocial behavior, but from a neuroscience perspective.

LKM and prosocial behavior findings from neuroscience. Weng et al. (2013) implemented a game-based task after participants underwent either a compassion training (other-focused) or cognitive reappraisal training (self-focused). The game involved three participants: a dictator, a victim, and the participant. The dictator in the game distributes funds to a victim,

resulting in an unequal amount of funds between victim ($1), participant ($5), and dictator ($10). The participant is then given the opportunity to redistribute their own funds to the victim, which results in the dictator distributing twice that amount to the victim (Weng et al., 2013).

This study found that participants who received compassion training redistributed significantly more funds to the victim than reappraisal trainees (Weng et al., 2013). Authors also investigated psychophysiological interactions using data from fMRI imaging examining the dorsolateral prefrontal cortex (DLPFC), which is a brain region associated with executive function, including memory and attention processes (Curtis & D'Esposito, 2003). Weng et al. (2013) also studied other brain regions related to emotion regulation, which are influenced by the prefrontal cortex. These brain regions include the amygdala, insula, and nucleus accumbens (NAcc) (Weng et al., 2013). According to Weng et al. (2013), the NAcc is associated with charitable giving and positive appraisal of negative or aversive stimuli.

Their analysis revealed greater activation of mirror neuron networks resulting from training was significantly associated with greater wealth redistribution in the LKM group. The same effect was found with greater activation of the DLPFC in the LKM group, although neither of these effects were detected in the reappraisal group. Additionally, significant interaction effects were detected where LKM trainees, who showed increased DLPFC-NAcc connectivity redistributed significantly more funds to game victims post-training. On the other hand, reappraisal trainees who showed increased DLPFC-NAcc connectivity redistributed less money after training (Weng et al., 2013).

Lastly, Weng et al. (2013) found a significant and negative correlation between arousal and redistribution for the LKM group. That is, decreases in arousal were associated with greater redistribution. These effects were not observed for the reappraisal group. They also found a

significant and negative relationship between DLPFC-NAcc connectivity and arousal, being that greater DLPFC-NAcc connectivity correlated with decreases in arousal. This effect was only present in the LKM group.

These results suggest that compassion training through LKM practices may increase prosocial behavior by decreasing arousal evoked by witnessing suffering. This aligns with Klimecki and Singer (2011), who posit that compassion may decrease the personal distress often experienced by individuals who observe suffering and the idea that compassion training such as LKM may increase prosocial or altruistic behavior by decreasing personal distress often evoked by suffering (Batson, 1991; Eisenberg et al., 2006).

An important note on altruism. Many studies have found LKM effective for increasing altruism and prosocial behavior. Altruism is the behavior or tendency to promote the welfare of another or others (Oakley et al., 2011). Oakley et al. (2011) warn that altruism can also have a dark side they refer to as pathological altruism. They cite findings from Knafo (2006), which show pathologically altruistic children to display positive traits, which in turn can cause difficulties such as feeling a high sense of responsibility that may cause anxiety, worry, and unhappiness (p. 7). O'Connor et al. (2011) discuss how empathy can lead to empathy-based guilt, which can lead to pathological altruism. Someone who experiences empathy-based guilt may act out of the need to relieve their own guilt and suffering (i.e., a self-oriented response) and cause unintended consequences for those they intend on helping.

Compassion fatigue, Klimecki and Singer (2011) argue, is a form of pathological altruism, and should be renamed "empathic distress fatigue." They argue that empathizing with others can lead a person to experience distress (Klimecki & Singer, 2011), which in turn can lead to emotional exhaustion, or burnout. In their model, Klimecki and Singer argue that compassion

can lead to other-related emotions, positive feelings, and good health, and signifies prosocial motivation; empathic distress on the other hand, may lead to self-related emotions, negative feelings, poor health, burnout, and withdrawal (2011, p. 377). They maintain that practices such as compassion training, which guide individuals away from over-identification, can prevent personal distress associated with empathy and thereby prevent burnout.

LKM and burnout. Klimecki and Singer (2011) argue that cultivating compassion for others may protect against burnout. However, since research on LKM is limited and no studies found have investigated the effects of LKM on occupational burnout, I discuss how LKM impacts stress, a precursor to burnout.

Differential effects from 3 types of training. Engert et al. (2017) assessed stress in 313 participants who participated in one of three types of mental training practices: attentional, socio-affective, and socio-cognitive. Participants from this study were part of the larger ReSource Project (Singer et al., 2016) and received training in one of three modules: presence, perspective, or affect. The presence module (i.e., mindfulness module) focused on attention and interoceptive awareness and used breathing meditation and body scan practices. The perspective module was aimed at increasing meta-cognition and perspective taking on self and others. The perspective module used observing-thought meditation and a perspective dyad. Lastly, the affect module (i.e., compassion module) focused on cultivating care, compassion, and gratitude, prosocial motivations, and enhancing how to deal with difficult emotions. Participants in the compassion module practiced LKM and participated in an affect dyad (Engert et al., 2017).

Participants engaged in each of the 3-month modules for a total of 9 months, though the order of the modules varied. Each participant had their stress levels assessed once throughout the study but the time they were tested varied (i.e., one person might be tested prior to any training

and another person might be tested after 3 months of affect training, or after s6 months of presence and perspective training, and so on). Participants underwent the Trier Social Stress Test (TSST; Kirschbaum et al., 1993), in which they had to give a mock job talk and engage in challenging mental arithmetic in front of a critical audience (Engert et al., 2017). Participants were verbally probed and evaluated by two individuals they believed were behavior analysts. Participants were then assessed for stress levels through the collection of saliva and blood samples and other physiological assessments such as heart rate. Subjective stress experience was also assessed using the STAI.

Engert et al. (2017) matched their participants on demographics and on other variables that can impact stress levels, to conduct their analysis. After determining that the TSST was successful for inducing stress, evidenced by cortisol levels, Engert et al. (2017) analyzed the participant stress responses. Stress reactivity was defined as the change in stress level from baseline to peak and recovery was defined as the post-peak decline.

Module results. Participants in all modules showed significant reductions in self-reported stress with no between-group differences. Participants tested after the 3-month mindfulness module showed no significant differences in cortisol levels compared to participants with no training. Engert et al. (2017) also reported that the compassion module, which used LKM, produced reductions in cortisol levels that were significantly different from participants with no training. Six months of training in mindfulness followed by either compassion or perspective training also showed significantly different cortisol levels than individuals with no-training. Participants who completed the compassion module only also exhibited significantly lower stress reactivity (measured by cortisol) than participants in the mindfulness module, although no differences were detected between compassion and perspective modules (Engert et al., 2017).

Evidence from this study suggests that compassion and mindfulness may cause differential effects on physiological markers of stress. This indicates that LKM may also be able to reduce or prevent emotional exhaustion, and that it may be more effective than mindfulness alone. Next, I close this section by reviewing and synthesizing LKM outcomes related to social-emotional competence.

LKM and SEC. Compassion practices such as LKM are sometimes viewed as emotion regulation strategies (Weng et al., 2013). Thus, in addition to increasing prosocial behaviors, LKM interventions may also be suitable for enhancing social-emotional competencies related to emotion regulation.

Weng et al. (2013) employed LKM and cognitive reappraisal training to two groups and studied the differential impacts of these trainings on participants' neural responses to suffering. Using fMRI technology, participants were scanned before and after their training while presented with neutral images of non-suffering and images of human suffering. They were instructed to employ the training they received (i.e., LKM or reappraisal) while looking at the images and being scanned. Participants in the LKM group were instructed to evoke feelings of compassion while silently repeating the LKM phrases. Cognitive reappraisal trainees were instructed to silently re-interpret the emotional meaning of the images. This task was applied for three blocks, in which 12 images (suffering and non-suffering) were presented to participants for 12 seconds each, with 5–11 seconds between images. Following each block, participants were asked to rate each image from least to most arousing on a 1–7 scale, while viewing each image for two seconds. Each block of images was pseudo-randomized to avoid presenting repeats of either condition more than two times in a row (Weng et al., 2013).

Evidence from Weng et al. (2013) suggest that LKM can enhance SEC, as their findings indicate that LKM can increase neural activity that is related to executive, emotional control (i.e., emotion regulation), and one's understanding of another's suffering. This implies that LKM might affect SEC through the enhancement of self-management, social awareness, and responsible decision-making.

Stell and Farsides (2016) also found that brief LKM practice resulted in significant effects including a reduction in automatic processing and an increase in controlled processing, as measured by the IAT This indicates the LKM may be useful in increasing the social-emotional competencies of self-management or responsible decision-making, both of which require controlled processing and awareness. Additionally, findings from Leiberg et al. suggest that LKM can increase prosocial behaviors, which in turn could promote better interpersonal relationships, reflecting the relationship management component of SEC.

LKM Intervention Summary

The findings discussed in this review show that when LKM is directed towards specific individuals or groups, bias can be reduced, but that this bias reduction may not necessarily transfer to others. These findings also support the use of a brief LKM intervention to produce significant effects in positive emotions experienced towards others. Further, increasing positive affect may build consequential personal resources, which could in turn lead to greater engagement of prosocial behaviors. One potential mechanism through which LKM may be operating is through reducing automatic processing and increasing controlled processing, which played important roles for reducing bias.

This holds promise for enhancing teachers' SEC through self-management and self-awareness competencies including emotion regulation. Findings that suggest LKM to increase

prosocial behaviors also give reason to believe this may be an effective practice for improving the quality of teacher-student interactions across all three CLASS domains. Considering these effects, LKM may lead to improvements in all emotional support dimensions, the behavior management dimension of classroom organization, and the concept development and quality of feedback dimensions of instructional support.

Problem Statement

Teaching is a profession that is particularly susceptible to burnout. Given the constant change and uncertainty brought on by a recent pandemic, ever-changing educational policies and social and political climates, teachers are particularly susceptible to experiencing high levels of stress, which can lead to burnout when left untreated. As demonstrated, teacher burnout can lead to negative outcomes for teachers, students, and the quality of their classroom interactions. Polizzi et al. (2020) state the importance of decreasing teacher stress and promoting resilience and recovery through coping strategies such as mindfulness and lovingkindness practice.

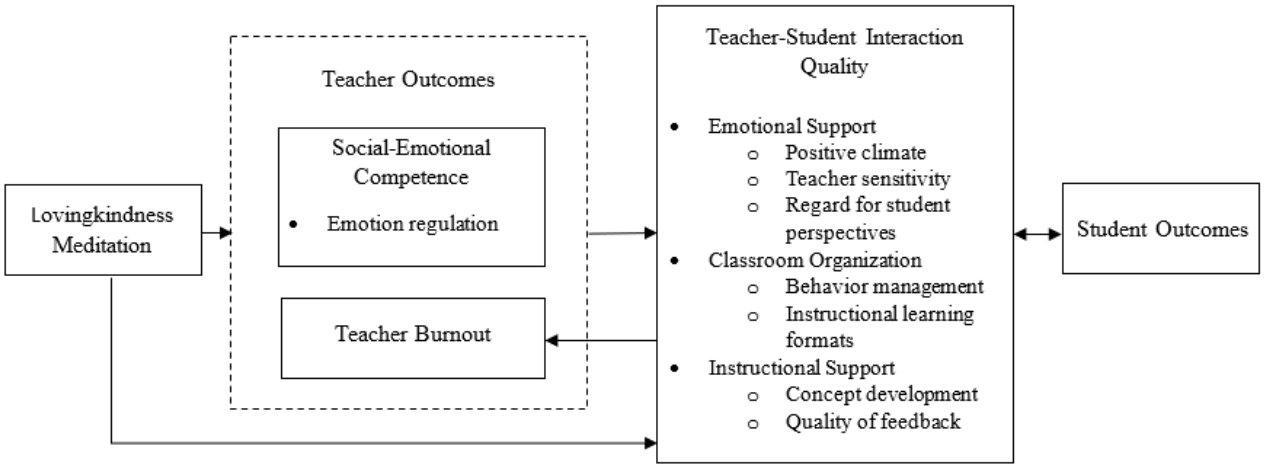
Although mindfulness-based programs have been at the forefront of teacher burnout reduction and teacher SEC improvement efforts, they are often costly and require a large time investment from teachers. One of the most valuable resources to teachers is time. It is my belief that teachers who might benefit the most from these types of interventions may decline to participate, or withdraw from interventions, due to their many other responsibilities and time constraints. Thus, I present an alternative but related practice for reducing burnout and enhancing teacher SEC and TSIQ: lovingkindness meditation, which research shows can produce significant effects, even with less than 10 minutes of practice.

Research Purpose

The purpose of this study is to examine the effects of LKM practice in teachers and analyze its effects on teacher burnout, social-emotional competence, and teacher-student interaction quality across the three CLASS domains: emotional support, classroom organization, and instructional support. As discussed, teacher burnout and SEC have significant implications for TSIQ. Hence, promoting teacher SEC presents one path towards offsetting risk of burnout and thus improving teacher-student interaction quality and subsequent student outcomes. Lovingkindness meditation, a practice that might reduce burnout and enhance teacher SEC by increasing prosocial behaviors and enhancing emotion regulation skills, is a promising approach for improving the quality of teacher-student interactions. This study explores the effects of a brief and daily practice of lovingkindness meditation on teachers and their classroom interactions. Figure 4 presents my theory of change, demonstrating how LKM might produce effects in teacher burnout, SEC, and TSIQ.

Figure 4

Theoretical Model for Improving TSIQ through LKM



This Study's Contributions

This study contributes to the broader literature by extending the LKM research to analyze effects in a teacher sample. In the present study, I examine the direct relationship between LKM and teacher burnout, which has not yet been studied. Additionally, the existing literature regarding enhancing teacher SEC, TSIQ, and preventing teacher burnout through mindfulness-based interventions is comprised mostly of studies using RCT designs and other pre-post between group designs. With this study, I take a different approach, utilizing a single-case experimental design. With this design, I examine within- and across- case effects, observing changes over time. Although DiCarlo et al. (2019) adapted the CLASS in a single-case experimental design, there was little evidence to support the validity and reliability of this adaptation. Additionally, only qualitative results were reported. This study expands the literature by using the CLASS in a single-case experimental design and analyzing results with visual and non-overlap analyses and regression-based statistics.

Chapter 3: Method

This chapter contains a discussion of the study's research design, participants, instruments, and procedures used to apply the intervention and collect the data for the study. I explain how the data were analyzed to answer three research questions:

1. Can lovingkindness meditation significantly reduce teacher burnout?
2. How does lovingkindness meditation influence teachers' emotion regulation?
3. What effects does lovingkindness meditation have on teacher-student interaction quality (TSIQ), across the three Classroom Assessment Scoring System (CLASS) domains?

Research Design

Single-case experimental design (SCED) was used to document intervention effects of lovingkindness mediation (LKM) on several outcomes, including the quality of teacher-student interactions in the classroom, teacher burnout, and teacher social-emotional competence (SEC). Single-case experiments are used to assess the functional relationship between independent and dependent variables and provide evidence needed when determining causal relationships (Kratochwill et al., 2010).

What Works Clearinghouse (WWC, 2022) requires three key features of single-case design studies to be eligible for review through their standards. The first feature is that an individual case (e.g., a participant, classroom, or school) serves as the unit of intervention manipulation and data analysis (WWC, 2022). Second, the individual case, or unit of analysis (i.e., classroom), serves as its own control for the sake of comparison (WWC, 2022). Thus, for each case, measurements of the outcome variable may be collected before, during, and after intervention implementation. In this way, each case's intervention data can be directly compared to its pre-intervention data (WWC, 2022). Third, measurements of the outcome variable are repeatedly collected within and across structured phases where different conditions are present (WWC, 2022).

In the present study, each classroom represented an individual case, or unit of analysis. Outcome measurements of teacher-student interaction quality (TSIQ) were collected for each case, both before and during intervention implementation. TSIQ was measured repeatedly throughout both phases of the study, enabling each case to serve as its own control and experimental conditions, allowing for a direct comparison to be drawn between phases, for each

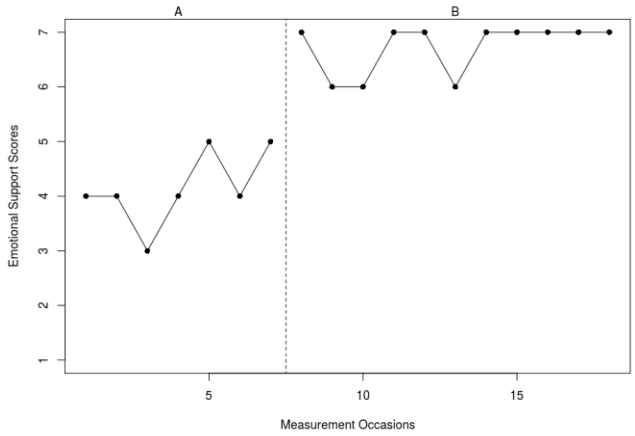
case. Many design choices are available when selecting a SCED. In this study, I implemented a basic single-case design, commonly known as an AB design (WWC, 2022)

AB Design

I implemented an AB design to examine the effects of lovingkindness meditation on teacher-student interaction quality. An AB design consists of the outcome variable being repeatedly measured within and across two structured phases representing different conditions. Repeated measurement of the outcome variable should occur prior to intervention implementation during the baseline phase (i.e., phase A) as well as throughout intervention implementation during the intervention phase (i.e., phase B). Additionally, when implementing an AB design, it is recommended to measure the dependent variable at least six times during baseline (WWC, 2022). An example of this design is provided in Figure 5. Therefore, using an AB design, I measured TSIQ throughout baseline and intervention phases to analyze the impacts of LKM on this outcome.

Figure 5

Example of the AB design



**Note.* Graphical display was created with https://tamalkd.shinyapps.io/scda/ (De et al., 2020)

In the present study, three dependent variables were assessed including teacher burnout, emotion regulation, and TSIQ. Teacher burnout and emotion regulation were measured once during baseline and once at the end of the intervention phase. These were analyzed with a non-parametric pre- post- test and could be used to help explain patterns and trends appearing within and across cases. TSIQ was measured repeatedly throughout baseline and intervention phases. Repeatedly measuring TSIQ throughout both phases of this study allowed me to assess patterns within and between phases including changes in level, trend, and nonoverlap (Kazdin, 2021; Kratochwill, 2010). These are further discussed in the analysis section.

Participants

Participants for this study were K–3 teachers sampled from an urban elementary school in the Northeastern United States. Teachers of any grade level from kindergarten-third were invited to participate in the program. They were told that the program requires 15–30 minutes of their time, daily, and that with their consent to participate, they also agreed to allow classroom observations for approximately 1 hour per day. Teachers were informed that the meditation series would last three school weeks (i.e., approximately 15 days) and that the practice sessions would occur each morning before school. The final sample consisted of five teacher participants who taught general education, special education, math instruction, and English as a New Language (ENL). For clarity, I refer to this study's participants as "teachers," when discussing individual-level variables such as burnout and emotion regulation. Each teacher is also associated with a "case," which takes into consideration the contextual factors related to their classrooms and the teacher-student interactions within. All five teachers reported their gender as female. Four teachers reported having Caucasian or White (non-Hispanic) ethnicities and one teacher reported herself as Caucasian-Hispanic.

Teachers were also asked to report on their prior experience with mindfulness or meditation practices. All participants reported at least some experience with mindfulness meditation, and only one teacher reported having some experience with the meditation used in this study, lovingkindness meditation (LKM). Additional details regarding teaching position and years of experience are displayed in Table 1.

Table 1

Sample Demographics

Teacher	Teaching position	Years in current position	Total years of teaching experience
A	General education, grade 2	7	29
B	General education, grade 2	11	31
C	Special education (self-contained), grades 3-4	21	21
D	ENL, grades K-3	2	17
E	Math, grades 3-5	4	22

Case Context

Cases A and B are two second-grade general education settings. Teachers in cases A and B are also matched in their years of reported teaching experience and reported race and gender. Case C is a self-contained special education setting with students in grades 3–5, who are characterized by their teacher as having diverse needs and presenting developmentally lower than their age in years. This case is also characterized as a setting with other adults in the room, including several teaching assistants to support the diverse needs of students. Cases D and E are both specialist contexts in which instruction is delivered in small-group settings. In case D, the teacher pulled students out to a separate room for English language instruction for 40-minute lessons. In case E, the teacher worked with students at a small table in the general education teacher's classroom to deliver thirty-minute lessons in math instruction. Teachers in both cases D

and E are similar in their years of overall teaching experience and experience in their current positions.

Instruments

The dependent variables burnout, emotion regulation, and TSIQ were measured in a variety of ways including the use of self-report and observational instruments. The instruments used to measure these outcomes and their psychometric properties are described next.

Teacher Burnout

One of the most widely used instruments for measuring teacher burnout that appeared when conducting the literature review for this study, was the Maslach Burnout Inventory (Maslach et al., 1996). The MBI-Educators Survey, referred to here as the MBI, is composed of 22 items for emotional exhaustion (9 items), depersonalization (5 items), and personal accomplishment (8 items). The emotional exhaustion subscale of the MBI–ES has achieved the highest internal consistency rating of the three subscales (α = .90), with depersonalization (α = .76) and personal accomplishment (α = .76) also achieving acceptable values (Maslach et al., 2018). The MBI asks individuals to rate the frequency of burnout symptoms in emotional exhaustion (e.g., “I feel emotionally drained from my work” or “I feel used up at the end of the workday”), depersonalization (e.g., “I worry that this job is hardening me emotionally” or “I don’t really care what happens to some students”), and personal accomplishment (e.g., “I have accomplished many worthwhile things at this job” or “I deal very effectively with the problems of my students”) on a 7-point frequency scale from 0 (Never) to 6 (Every Day).

Although there are no specific cut-off scores for determining burnout, Maslach et al. (2018) report means and standard deviations for a sample of over 4,000 primary and secondary teachers in the three subscales: emotional exhaustion (M = 21.25, *SD* = 11.01), depersonalization

(M =11.00, *SD* = 6.19), personal accomplishment (M = 33.54, *SD* = 6.89). Higher scores indicate higher burnout, except for personal accomplishment, where a lower score indicates higher burnout. These values provide norm-based comparisons for outcomes of each burnout subscale when scores are summed. It is also possible to calculate subscale means, which can be interpreted by summing the item responses in each category and then dividing by the number of items to determine the average frequency those burnout qualities are experienced. For example, if a respondent's mean for emotional exhaustion is equal to 4, then it can be interpreted that the participant felt emotionally exhausted about "once a week", which corresponds to the scale point of 4 on the 7-point scale. Averaged scores can be useful for communicating MBI results with participants, however, for in this study, I use the summed score method to interpret teachers' levels of burnout and analyze intervention effects, which is recommended for comparing results with existing research and burnout reports (Maslach et al., 2018).

Factor Structure of the MBI. Researchers conducted a CFA of the MBI in a sample of 211 elementary and secondary teachers in Hungary, evaluating eight different models using χ^2, RMSEA, CFI, TLI, and SRMR fit indices (Szigeti et al., 2017). Their best-fitting model included 3 specific factors for each subscale (emotional exhaustion, depersonalization, and personal accomplishment) and a global burnout factor. Their CFA for this model yielded the following results: (χ^2 (df = 189) = 302, $p < .001$, RMSEA = .053, CFI = .90, TLI = .86, SRMR = .058).

A meta-analysis of confirmatory and exploratory factor-analytic studies of the MBI reviewed 45 studies that analyzed the factor structure of the MBI, specifically the human services and educators' versions (Worley et al., 2008). Although some studies they reviewed demonstrated better-fitting models when making modifications such as removing items or allowing residual covariance between some items, their meta-analysis only included studies that

used all 22 MBI items. Results of a principal component analysis identified three components with eigenvalues greater than one, which accounted for 86.7% of the variance (Worley et al., 2008). A varimax rotation demonstrated that the three components corresponded with the original three-factor structure of the MBI.

Emotion Regulation

Many LKM studies and studies implementing mindfulness-based interventions on teacher SEC measure emotion regulation as an intervention outcome. Emotion regulation is related to the self-management and self-awareness aspects of SEC. One tool for measuring this outcome that demonstrates strong validity and reliability evidence is 10-item ERQ (Gross & John, 2003).

Emotion Regulation Questionnaire. The ERQ contains two subscales that measure cognitive reappraisal and expressive suppression, which are described as antecedent- and response- focused processes for managing one's experienced and expressed emotions (Gross & John, 2003). There are 10 items on the ERQ that participants respond to on a scale of 1–7 where 1 is "Strongly Disagree," 4 is "Neutral" and 7 is "Strongly Agree." Items on the cognitive reappraisal subscale of the ERQ include "When I want to feel less *negative* emotion, I *change the way I'm thinking* about the situation" and "I control my emotions by *changing the way I think* about the situation I'm in." Across four samples, Gross and John established high internal consistency alpha values with an average of 0.79 (α range = 0.75–0.82). Gross and John (2003) also established acceptable internal consistency alpha values for expressive suppression ranging from 0.68 to 0.76. Items on the expressive suppression subscale include "When I am feeling positive emotions, I am careful not to express them" and "When I am feeling negative emotions, I make sure not to express them" (Gross & John, 2003). Gross and John found significant gender and ethnic differences in the two subscales, where men scored significantly higher in suppression

than women and European Americans reported using suppression skills significantly less than people with other ethnicities (e.g., Asian, African American, Hispanic). Overall, the ERQ achieved test-retest reliability of .69 (Gross & John, 2003).

Melka et al. (2011) conducted a confirmatory factor analysis (CFA) to evaluate the bi-factor model using data from a large undergraduate university sample. Their two-factor model included cognitive reappraisal and expressive suppression as factors and they measured fit using chi-square, CFI, RMSEA, and Tucker-Lewis Index (TLI) indices. Results obtained from their analysis strongly supported the fit of a bi-factor model (CFI = .96, TLI = .95, RMSEA = .050), though they caution interpretation of the chi-square value (χ^2 (34) = 227.58, $p < .05$) due to the study's large sample size. Preece et al. (2019) also examined the factor structure of the ERQ in a general community sample in Australia. Their results also supported the bi-factor model as an excellent fit. Thus, this instrument has demonstrated sufficient validity and reliability evidence supporting its use for measuring individuals' perceptions of their emotion regulation.

Teacher-Student Interaction Quality

The K–3 version of the Classroom Assessment Scoring System (CLASS; Pianta et al., 2008) was used to measure the outcome variable TSIQ by assessing the quality of interactions between teachers and students in the classroom. The CLASS is an observational tool for measuring TSIQ and has three distinct domains: emotional support, classroom organization, and instructional support, each of which is comprised of several dimensions, summarized in the literature review.

Factor structure of the CLASS. Sandilos et al. (2014) conducted a confirmatory factor analysis of the K–3 version of the CLASS in 417 kindergarten classrooms in the US. They assessed fit using standardized root-mean-square residual (SRMR), root mean square error of

approximation (RMSEA), goodness-of-fit index (GFI) indices as well as the Bentler-Bonett normed fit index (NFI) and Tucker-Lewis index (TLI). They tested multiple models including the original 3-factor structure and a revised model. Sandilos et al. did not find the original 3-factor structure of the CLASS to have good fit (SRMR =.087, RMSEA = .157, GFI = .841, CFI = .851, NFI = .839, TLI = .790). After several revisions were made to the CLASS structure, a revised model appeared to have better fit (SRMR = .060, RMSEA = .097, GFI = .936, CFI = .948, NFI = .936, TLI = .920).

The revised model included the correlation of residuals between dimensions within and across domains. These residuals were correlated between the productivity and behavior management dimensions in the classroom organization domain, the behavior management and negative climate dimensions in the classroom organization and emotional support domains, as well as the regard for student perspectives and concept development dimensions from the emotional support and instructional support domains. Additionally, Sandilos et al. found that the best-fitting model included moving the behavior management dimension from the classroom organization domain, and instead correlating it to the emotional support domain. Once these modifications were made, Sandilos found the weight of the pathway between classroom organization and behavior management negligible and thus removed the pathway.

Others have also tested and reviewed the factor structure of the CLASS to determine the best fitting model. Li et al. (2019) conducted a meta-analysis of factor analyses to assess the factor structure of the CLASS. They analyzed data from correlation matrices across 26 studies that implemented several versions of the CLASS. They noted that some have argued for a bi-factor model where emotional support and classroom organization are combined to create a "social support" factor, due to high correlations between these two domains. The bi-factor model

and three-factor model were both tested and found to have an adequate fit. Although Li et al. (2019) discovered a high correlation between Emotional Support (ES) and Classroom Organization (CO) (r = .90), they argued that the literature supports these two factors as theoretically distinct. Overall, Li et al. asserted that the three-factor model had better fit, RMSEA = .041, 90% CI [.037, .045], CFI and TLI values > .95, SRMR = .076.

Although many psychometric studies support the three-factor model of the CLASS, findings from Sandilos et al. and Li et al. reveal that significant relationships sometimes exist across domains. Insights gleamed from these studies might suggest that take caution when averaging dimensions to produce an overall domain score and when interpreting these results. For the purpose of this study, CLASS scores were interpreted both independently at the dimension level and wholistically at the domain level, with caution as to not oversimplify the results.

Scoring interactions with the CLASS. After each cycle of observation, coders scored each of the ten dimensions of the CLASS. Coders assigned each dimension a score from 1–7, using the CLASS manual to guide their choices. Scores are categorized as: low (1–2), middle (3–5), and high (6–7) teacher-student interaction quality. The coding manual for the CLASS provides descriptions for each range in the coding manual, along with detailed examples for each dimension.

The 10 dimension scores were then averaged across the two cycles to obtain 10 final dimension scores for each measurement occasion, within each case. Domain scores for each measurement occasion were also calculated by averaging the dimension scores within each domain. For example, positive climate, negative climate, teacher sensitivity, and regard for student perspectives are four dimensions belonging to the emotional support domain, which were

scored at each measurement occasion. Therefore, the domain score for emotional support was not based on direct observations, but rather was a calculated score based on the scores of its dimensions.

Scoring interactions with the CLASS generally requires four 30-minute cycles of observations (20 minutes to observe and take notes, 10 minutes to score dimensions) over the course of two hours (Pianta et al., 2008). Although four cycles of 20-minute observations are optimal, 10 minutes of observations are also considered sufficient for scoring one cycle of interactions. Observations can be conducted live in the classroom or can be videotaped by the teacher or another individual. After multiple cycles of observation are completed, an average score can be calculated for each dimension. A composite score for the overarching domain can also be obtained by dividing the sum of the dimensions by the number of dimensions.

Internal consistency has been well established for all domains and dimensions of the CLASS. Pianta et al. (2008) reported internal consistency data from five studies implementing the CLASS in grades pre-k to fifth grade (see Table 2). Cronbach's *alpha* values were reported, with emotional support ranging from $\alpha = .85$ to $= .94$, classroom organization from $\alpha = .76$ to $\alpha = .89$, and instructional support from $\alpha = .79$ to $\alpha = .90$. Although internal consistency values from two cycles were not as high as with four cycles, they were still acceptable. Moreover, Pianta et al. (2008) reported that almost all dimension scores obtained from two cycles of observation were highly correlated with scores obtained from four cycles ($r > .90$). The only exception to this was with the productivity dimension, where $r = .87$.

In the present study, two coders used the CLASS to obtain TSIQ values by averaging dimension-level scores across two cycles of observation. In cases A, B, and C, each cycle lasted about 25 minutes, with 15 minutes observing interactions and recording notes, followed by 10

minutes scoring each of the 10 dimensions. Due to the shorter lesson lengths in the specialist contexts, observations for case E typically lasted about 10 minutes per cycle, and ranged from 10–15 minutes for case D.

Table 2

Internal Consistency Values from the CLASS with a Third Grade Sample

	Across 2 cycles (α)	Across 4 cycles (α)
Emotional support	.88	.91
Positive climate	.87	.89
Negative climate	.84	.86
Teacher sensitivity	.79	.90
Regard for student perspectives	.73	.80
Classroom organization	.80	.89
Behavior management	.77	.87
Productivity	.71	.76
Instructional learning formats	.77	.82
Instructional support	.73	.84
Concept development	.63	.81
Quality of feedback	.75	.83

Note. Table adapted from Pianta et al. (2008) CLASS Manual, K-3 Technical Appendix.

Observations occurred 13–15 times for each case throughout this study, including observations during both baseline and intervention phases. Two trained and CLASS-certified observers independently collected all TSIQ data using the CLASS, K-3 instrument. Coder 1 refers to the author of this study and coder 2 refers to the second coder, who assisted in collecting TSIQ. Coders 1 and 2 were randomly assigned to conduct observations for all cases except for case C, where observations were based on time availability of coders. Cases A and B were observed simultaneously by Coders 1 and 2, respectively, except on days where inter-rater reliability data was collected. This was also true for cases D and E. Both coders shared the responsibility of observing case C. Observations typically began at 9:05 for cases A and B, at approximately 10:30 for cases D and E, and either at 11:20 or 12:10 for case C. Being that

observations for case C began at a later time that did not conflict with other case observations, both coders were able to participate in most observations, resulting in a high percentage of data that was assessed for inter-rater reliability.

Consistent with CLASS reliability training, agreement was considered met if the two observers scored each dimension within one point of each other for at least 8 out of 10 dimensions. If agreement was met, coders' scores were averaged. If agreement was not met, the observers referred to the CLASS training manual to reach a consensus. Details about inter-rater reliability assessment and results in this study are discussed next.

Inter-Rater Reliability

Inter-rater reliability was assessed in at least 20% of each case's observations during each phase of the study. On average, about 55% of case observations were assessed for inter-rater reliability during baseline, with an average of about 45% of case observations assessed during intervention. Table 3 contains the exact number of observations coded for inter-rater reliability by phase and case.

Table 3

Inter-Rater Reliability Summary

	Baseline			Intervention		
Case	Number of assessed occasions assessed	Percent of total observations assessed	Reliably assessed observations	Number of assessed occasions assessed	Percent of total observations assessed	Reliably assessed observations
A	4	57	75%	3	38	100%
B	3	50	100%	3	38	67%
C	5	83	60%	6	75	83%
D	2	33	100%	3	38	100%
E	3	60	67%	3	38	100%

In each instance where less than eight dimensions were reliably coded (i.e., coder scores within one point of each other), the coders reviewed and compared notes and adjusted their scores based on their discussion. Often, exemplars from observations were compared to exemplars in the manual to substantiate scoring. Dimensions that proved difficult to score or come to agreement on were studied by reviewing exemplar videos and re-reading the manual before the next observation occasion.

Inter-rater reliability ranged from 60–100% during baseline and from 67% to 100% during intervention. CLASS dimension scores in cases B and D were reliably coded in 100% of baseline observations. Also in baseline, 75% of case A observations, 60% of case C observations, and 67% of case E observations met reliability criteria. Three out of four baseline observations assessed for inter-rater reliability were reliably scored for case A, with three out of five of these observations in case C and two out of three observations in case E. The baseline observations that did not meet reliability criteria were observation 1 in case A, observations 1 and 2 in case C, and observation 1 in case E. Three of these four observations were coded on the same day including observation 1 in case A and E and observation 2 in case E. On this day, coders used the "dimension overview" to score observations, rather than the manual, attempting to save time between cycles. However, it is likely that this impacted the scoring reliability. Coders then re-scored the dimensions, using the full manual, and came to agreement about scores.

In case A, three scored dimensions did not meet reliability at observation 1. These dimensions included regard for student perspectives in the ES domain, instructional learning formats in the CO domain, and language modeling in the IS domain. In case C, at observation 1, five dimensions did not meet reliability criteria including positive climate, regard for student perspectives, behavior management, productivity, and language modeling. Differences between

coders ranged from 1.5 to 2.0 in these dimensions. At observation 2 for this case, four of the ten dimensions did not meet reliability criteria in the ES and IS domains, including teacher sensitivity, regard for student perspectives, quality of feedback, and language modeling. Dimensions were scored with differences between 2.0 and 2.5 in these dimensions. Observation 2 in case E did not meet reliability criteria in seven of ten dimensions across the three domains. In this case, the only dimensions meeting reliability were negative climate, behavior management, and productivity. Differences between coder scores ranged from 1.5 to 2.5 for the remaining seven dimensions.

During intervention, CLASS scores in cases A, D, and E were reliably coded 100% of the time, with scores in case C reliably coded in 83% of observations. Only observations in case B did not meet reliability criteria at least 80% of the time. In this case, inter-rater reliability was assessed in three intervention observations, one of which (i.e., observation 18) was not considered reliable due to three dimensions being scored with greater than a one-point difference between coders. The three dimensions not meeting inter-rater reliability criteria were regard for student perspectives, concept development, and language modeling. In each instance there was a 1.5 score difference between the two coders after averaging the two cycles.

Research Procedures

Teachers of K–3 students were recruited from a public elementary school in an urban school district in the northeast region of the United States. Teachers were invited to participate in our study, which was advertised as a short-term daily meditation series for reducing stress and improving well-being. I recruited teachers to participate by distributing a flyer and letter to teachers through. As part of recruitment, I also orally presented a 5-minute overview of the project at a school staff meeting during the following month. Interested teachers were invited to

provide their contact information and best method of contact. I aimed to recruit six K–3 teachers for the study.

Two teachers expressed interest after the initial recruitment email and flyer were shared, one of whom completed the interest form, and another who emailed me directly to inquire whether they were eligible to participate, given their status as a specialist teacher. Three additional teachers expressed interest after the staff meeting. I scheduled to meet with each potential participant for 10–15 minutes to provide them with details and review consent information. One teacher was able to meet in-person at the school, prior to the start of the school day. The other four teachers requested to meet to discuss details over the phone. Per teachers' individual requests, these phone calls occurred either during a teacher's prep period, lunch, after school, or on their day off. During these informational meetings, I shared study details with teachers, including information about survey participation, classroom observations, and meditation duration as well as all consent information including potential benefits and risks. I emphasized the importance of fulfilling participation responsibilities to maintain the integrity of the study and avoid issues related to missing data. I also assured teachers that the study was designed with clear intentions of maximizing their potential benefits and minimizing the time and effort that their participation would involve.

I offered teachers incentives for study completion including a $15 gift card, redeemable at Amazon, Starbucks, Target, or Walmart. Additionally, teachers were informed that study completion earned them a chance to win a $150 gift card to a local spa, which would be granted to a randomly selected teacher at the end of the study. Eligibility requirements for these incentives were also discussed. I also offered to review observation results with teachers if they were interested in learning about the data collected during this time. Teachers were informed that

their participation in the study was completely voluntary and that they could withdraw at any time. I then shared the consent letter with teachers and allowed time for questions to be asked and answered. All five interested teachers provided their consent and became participants of the study. Talking points used for this meeting can be found in Appendix A.

Participant Privacy

Maintaining participant privacy was important due to the individualized nature of this study's design. To ensure privacy of participating teachers, they were each assigned a random codename after signing consent forms. Participants used their unique codenames for completing all surveys. This allowed us to collect and analyze individual-level data without risking the identification and privacy of participants. Surveys were also administered online using a secure university-sponsored platform.

Precautions for participant privacy were also taken with the observational component of this study. Observations were conducted live and in-person by two doctoral students, including myself, both trained and certified by the Collaborative Institutional Training Initiative for research, ethics, compliance and safety in human subject research. Observational data was collected using physical score sheets. At the end of each day, I collected all score sheets and entered the de-identified data into an excel document on an external hard drive. When not in use, the paper score sheets and hard drive were kept in a locked storage cabinet in a private home location. Providing participants with codenames and utilizing these codenames throughout the study allowed us to collect and document participant-level data without attaching personal names to any observational records or survey responses. Student privacy was also protected throughout the study as no identifying information on students was collected or analyzed. Observers did not interact with students at any point throughout the study.

Intervention Implementation

The intervention followed the traditional structure of lovingkindness meditation. I purchased guided meditation audio clips from Sharon Salzberg, a leading expert in LKM. I requested and received permission from the creator to share the recordings with participating teachers for this study. Three total recordings were used, each practiced daily for five days. I met with the participants each morning prior to the start of the school day in an unoccupied school classroom to administer the intervention. Each day, prior to sharing the guided meditation with participants, I read a script aloud where I provided guidance for how to work with the meditations. I also informed participants that at certain points, the meditation may suggest that practitioners call to mind an individual during their practice. Participants were encouraged to visualize individuals with whom they work (e.g., students, colleagues, administrators, staff members, or other school personnel) when these opportunities arose during the meditations (see script in Appendix B).

Group meditation was generally held in the school's multi-purpose room, except on occasions when this room was occupied. On these other occasions, a smaller conference room was used. The conference room was much smaller, with seats for up to six people, and was subject to more distractions due to its location in a high-traffic area, whereas the multi-purpose room was larger (i.e., seats for more than 20 people) and in a location with less walk-by traffic. Additionally, during the first week of intervention, some teachers mentioned feeling distracted by a loud ticking clock in the conference room and the background noise. Thus, the clock was unplugged on the third day of the intervention, and ambient noise was introduced in the background. Teachers reported that this made it easier for them to maintain their focus on the meditation.

If teachers could not attend the group meditation in-person, I provided them with a link to practice the meditation independently at home or at school. Teachers verified their participation by notifying me of their meditation completion by email, text, or by completing an online exit ticket (i.e., intervention fidelity instrument).

Three meditations. Prior to playing the guided audio clip, I instructed teachers to sit up tall in a chair with both feet planted on the ground. I also instructed teachers to take either option of softly closing their eyes for the meditation, or leaving their eyes slightly open, with a downward gaze. Participants were encouraged to bring in any objects from home that could provide comfort during the meditation, such as yoga mats, pillows, or cushions. Meditation 1 (Days 1–5) consisted of a 15-minute LKM guided audio that was focused strongly on cultivating lovingkindness and compassion towards the self, using suggested or self-selected phrases such as "May I be well" "May I be at ease" "May I be free of mental and physical suffering." These phrases were also used throughout the following two meditations. Meditation 2 (Days 6–10) consisted of a 20-minute LKM guided audio that progressed from sending lovingkindness towards the self to others in the traditional format explained in chapter 2 (self, benefactor, neutral person, difficult person, all beings). Meditation 3 (Days 11–15) was a 10-minute audio focused on sending lovingkindness towards a difficult person, perhaps a student with challenging behaviors or a colleague they struggle to get along with.

Data Collection

Teachers (n = 5) were invited to complete an online survey at the start of the study, consisting of 32 total items. This survey combined items of the MBI and ERQ to assess participants' burnout and emotion regulation levels at baseline. Participants were instructed to complete the survey within a week of receiving the notification. Email or text reminders were

sent to participants if needed, to ensure measurement of these outcome variables prior to intervention implementation. Participants also provided their teaching schedules for observers to design an observation schedule that facilitated the necessary data collection. Ideally, data was collected in each classroom during the first half of the school day, based on recommendations for using the CLASS (Pianta et al., 2008). However, on a few occasions when this was not possible due to unforeseen events or scheduling conflicts, data was collected in the afternoon rather than missing data collection altogether.

During baseline, which lasted 2 weeks, TSIQ was assessed at a minimum of six measurement occasions for most cases, except for case E, where TSIQ was only assessed five times, due to an unexpected scheduling conflict. One coder was present at each measurement occasion to collect data, except on occasions when both coders conducted observations for inter-rater reliability assessment. Baseline data on TSIQ was collected for each dimension by conducting two cycles of 10- to 15- minute observations per measurement occasion. Dimension scores were averaged across cycles to calculate an outcome score. Composite scores for each domain were then calculated for each measurement occasion, by averaging dimension scores within each domain. Procedures for collecting TSIQ data during the intervention phase followed the same procedures during baseline data collection. Over a 3-week duration, coders 1 and 2 collected TSIQ data at eight measurement occasions for each case, some independent and some together for inter-rater reliability. Participants were also asked to complete the survey containing MBI and ERQ items once at the end of the study.

Data Analysis

To answer the first two research questions, “Can lovingkindness meditation significantly reduce teacher burnout?” and “How does lovingkindness meditation influence teachers’ emotion

regulation?", changes in teacher burnout and emotion regulation were assessed from baseline to post-intervention with a nonparametric test called the Wilcoxon signed-rank test (Wilcoxon, 1945). To answer the third research question, "What effects does lovingkindness meditation have on teacher-student interaction quality, across the three CLASS domains?" data was analyzed to determine intervention effects on TSIQ through visual analysis and non-overlap analysis. If evidence from these analyses supported a causal relationship, a regression analysis was also conducted. Next, each of these analyses are described in greater detail.

Analyzing Intervention Effects on Teacher Burnout and Emotion Regulation

The Wilcoxon signed-rank test (Wilcoxon, 1945) is a nonparametric test that can serve as an alternative to the paired samples *t*-test in cases like ours where normal distribution assumptions cannot be met due to small sample sizes. To conduct this test, a test-statistic *W* was first obtained and then tested against the null hypothesis; H_0: The median difference equals zero (Woolson, 2008). This test can be conducted as one- or two- tailed test. In the cases of personal accomplishment, a component of burnout, and cognitive reappraisal, a component of emotion regulation, I was testing to determine whether increases occurred as a result of the intervention. Therefore, I chose to conduct a one-tailed test with the following hypotheses: H_0: The median difference is greater than or equal to zero, H_A: the median difference is less than zero, $\alpha = .05$. Emotional exhaustion and depersonalization (i.e., burnout) and expressive suppression (i.e., emotion regulation) were hypothesized to decrease, so the hypotheses for these outcomes were: H_0: The median difference is less than or equal to zero and H_A: the median difference is greater than zero, $\alpha = .05$. After a test statistic *W* was calculated, it was compared to a critical value (see Appendix C). The obtained *W* was compared to the critical value of 1 for a one-tailed test where

$\alpha = .05$. To reach statistical significance where $p < .05$ and reject H_0 in favor of H_{A1} or H_{A2}, the obtained W had to be less than the critical value (i.e., $W < 1$).

Calculating the *W* Test Statistic. To calculate the test statistic W for the Wilcoxon signed-rank test, the difference between baseline and post-intervention scores for each participant were calculated by subtracting the baseline score from the post-intervention score for expected increases, and subtracting intervention scores from baseline scores for expected decreases. Absolute values were then taken for each difference and ranked from smallest (1) to largest (5). After the differences were ranked, each rank was assigned a negative or positive sign, depending on the difference calculated prior to taking the absolute value. Ranks were then summed for negative and positive differences. The obtained W used is the lower sum obtained through this process. The obtained W was then compared to the critical value to determine whether to reject or fail to reject the null hypothesis and determine whether emotion regulation and burnout improved as a result of the lovingkindness meditation intervention.

Visual Analysis

Intervention effects of LKM on TSIQ were visually analyzed by examining graphed data within and between phases and participants. Within each phase, the data was examined to determine consistency or patterns in level and trend. Level refers to the dependent variable score or mean and trend refers to the slope of the best-fitting line of the phase data (Kratochwill et al., 2010). Assessing overlap between phases is also recommended (WWC, 2022). Approaches for assessing non-overlap generally entail calculating a percentage of non-overlapping between data points in the A and B phases. Interventions demonstrating effects should result in a small percentage of overlapping data points between the baseline and intervention phases. The selected non-overlap index for this study is discussed in greater detail in an upcoming section. Another

criterion for demonstrating evidence of a causal relationship is to assess the consistency of observations in similar phases by comparing patterns observed in baseline and intervention phases across participants. Patterns across cases or participants should appear consistent to demonstrate a causal relationship and outliers within phases should be examined for any changes that may be due to external factors.

Using visual analysis, I explored whether changes in TSIQ were observed in teachers' daily emotional support, classroom organization, and instructional support. I plotted overall domain scores as well as dimension scores, both calculated using the CLASS, to assess whether there were specific changes in dimensions that might not have been reflected in the overall domain scores. Visual analysis also allowed for the interpretation of changes in teachers' emotion regulation and burnout over time by examining data at two time-points. If differences were observed between teachers' TSIQ in response to the intervention, then visual analysis of emotion regulation and burnout levels might be used to help explain some of the observed individual-level differences. Visual analysis was also used to determine effects that warranted further investigation by non-overlap or trend analyses. The procedures used to conduct visual analysis are described next.

Visual Analysis Procedures

Although visual analysis is no longer a recommended feature of single-case experiments in the latest version of the WWC procedures and standards handbook (2022), I chose to apply this analysis in order to gain a deeper understanding of the collected data within each case and as a means for examining patterns within and across cases. Kratochwill et al. (2010) list six features of visual analysis: 1) level, 2) trend, 3) variability, 4) immediacy of effect, 5) overlap, and 6) consistency of data patterns across similar phases. I chose to focus my visual analysis on level

and trend. Immediacy of effect and variability were not analyzed due to the generally stable nature of the outcome variables investigated. Additionally, several teachers commented on having difficulty adjusting to the stillness and silence of meditation at the beginning of the intervention, which could delay the onset of intervention effects. Nonoverlap was not considered in the visual analysis stage because it was addressed later when estimating effect sizes using the NAP index; the sixth feature was not applicable due to the simple AB design, implemented in each case.

Matrix. I created a matrix and a color-coded check mark system to track all apparent changes in level and trend gleaned from visual analysis, which would later be used to inform further analyses and conclusions. If I determined through visual analysis that a change in level was demonstrated for a domain within a given case, I assigned this cross-section a blue check mark on the matrix. If I determined that trend was demonstrated, I placed a yellow check mark and if it appeared that both trend and level were demonstrated, I placed a green check mark. The visual analysis matrix is available in Appendix D.

The process I used for determining changes in level and trend, which informed the development of the matrix, was aligned with the steps for visual analysis outlined by Kratochwill et al. (2010). I began by analyzing the baseline data for each case to estimate an overall level and pattern, taking note of any emerging trends. After analyzing baseline data for each domain and case, I followed the same procedure with the intervention data. I then compared each case's phase B data to its phase A data for each of the domains to determine whether changes in level or trend may have occurred.

Change in level. First, I calculated the baseline mean for each domain. Change in level was determined by comparing intervention data points to the baseline mean and considering the

practical significance of scores. Change in level was supported if at least three data points in phase B were above the phase A mean. However, since an immediate effect was not anticipated, three demonstrations of a level-change by this criterion would be very restrictive, with only seven to eight data points in each intervention phase. Therefore, other criteria were used to determine change in level, including consideration of the practical meanings indicated by outcome scores as well as trend differences.

The CLASS identifies three different levels of TSIQ for each of its domains and dimensions: low (1–2), middle (3.00–5.00), and high (6.00–7.00). Due to the restrictive nature of a 1–7 scale, these categories were used when interpreting levels within phases as well as changes in level from phase A to phase B, in addition to considering points in phase B above the phase A mean. For example, if most baseline points in a domain were scored within one quality category (e.g., low, middle, high) for a given case, but scored above that category in the intervention phase, this would also qualify the case and domain to receive a blue check mark, representing a change in level.

Trend. Cases were marked for follow-up trend analyses if domain-level data in phase B appeared to trend in the direction of the intended effect, with the condition that no similar trend in the same direction appeared in phase B. If a trend in the expected direction appeared during the intervention phase with no trend in baseline or a trend in the opposite direction of the intended effect, then the respective domain and case were marked with a yellow check mark as demonstrating a change in trend only.

In instances where visual analysis supported changes in both trend and level, a green check mark was placed. Additionally, any observed changes in level, trend, or both that appeared in the opposite direction of the desired effect were marked on a separate matrix as potential

unintended effects (see Appendix E). Cases where intervention effects on TSIQ were marked as demonstrating change in level or intervention trend were supplemented with non-overlap and trend analyses.

Non-Overlap of All Pairs

Generally, non-overlap in single-case research refers to the percentage of non-overlapping data points between A and B phases (Parker et al., 2014). Non-overlap analyses help researchers determine whether evidence suggests an intervention effect occurred, by establishing whether the data points between phases are distinct from one another. No overlap can imply an intervention effect, whereas much overlap would reflect the opposite. One benefit of some of these indices such as the TauU (Parker et al., 2011) is that they can account for any trend that may occur in the baseline phase and can be measured with a significance test. Parker et al. (2014) suggest that more recent and advanced approaches, such as the TauU and Non-Overlap of All Pairs (NAP; Parker & Vannest, 2009) may be the strongest methods for obtaining effect sizes in single-case research. The WWC (2022) recommends that researchers employ NAP procedures when analyzing and interpreting SCED data. Therefore, in this study, we assessed non-overlap primarily with the NAP procedure, which is appropriate for small studies, can be integrated with visual analysis, and has strong precision-power (Parker et al., 2014).

NAP refers to the proportion of AB pairs showing improvement out of all pairwise comparisons between A and B phases (Parker et al., 2014). Although online calculators and tools have been developed that can provide NAP scores for a dataset (e.g., Pustejovsky et al., 2023), hand-calculations are discussed here to give a conceptual overview of this metric.

The first step in calculating a NAP value for a given case is to multiply the number of A data points by the number of B data points ($n_A \times n_B$) to obtain the number of all pairwise

comparisons between A and B phases (Parker et al., 2014). Next, each pair is assessed for whether the B-phase data point improved, deteriorated, or remained the same over time when compared to its paired A-phase data point. These pairs are then labeled Pos for improvement, Neg for deterioration, and Tie for unchanged pairs (Parker et al., 2014). Once each pair is labeled, NAP can be calculated using the following equation:

$$NAP = \frac{Pos+(.5 \times Tie)}{\#Pairs}. \quad (1)$$

Once a NAP value is calculated, it is re-scaled as a score between 0–1 or as a percentage, making it more easily interpretable. This is done by multiplying the value by 2 and subtracting the product from 1, which can then be multiplied by 100 to obtain a percentage. In this study, I used a single-case effect size calculator, developed by Pustejovsky et al., (2023), to calculate NAP values and interpret effect sizes regarding effects of LKM on TSIQ outcomes.

Trend

In cases demonstrating trend in the direction of intended effect during intervention, with no trend in baseline or with an opposite baseline trend, a single-level regression analysis was used. The regression model was used to estimate whether increases in TSIQ were improving throughout the intervention phase, and to supplement trend observations in visual analysis. I used a simple linear regression model to test the fit and significance of the observed trend. The equation for this model is $y = \beta_0 + \beta_1 X + e$, where y represents the outcome value, β_0 represents the intercept and β_1 is the slope of the line and *e* represents error. Interpretations of the resulting regression statistics were limited due to the unequal time intervals between measurement occasions, and the scale of the dependent variable, which did not include zero. Instead, I calculated the regression statistics to interpret the fit of the model by testing its significance and examining the percentage of variation in the outcome values that could be

explained by the model (i.e., R^2). This was used to supplement visual analysis interpretations of trend during the intervention phase. Models with R^2 values greater than .50 and a p-value less than .05 were considered evidence of intervention trend in the direction of the desired effect, influenced by teachers' participation in the LKM intervention.

Next, I report the results of my study, beginning with the effects of LKM on teacher burnout and emotion regulation, assessed by a non-parametric test. Then, I convey the effects of LKM on TSIQ by reporting the results of visual, non-overlap, and trend analyses.

Chapter 4: Results

This section addresses the impacts of a lovingkindness meditation (LKM) intervention on teacher-student interaction quality (TSIQ), by answering the three research questions of this study, drawing special attention to significant effects and observed patterns. These questions are: 1) Can LKM significantly reduce teacher burnout? 2) How does LKM influence teachers' emotion regulation? and 3) What effects does lovingkindness meditation have on TSIQ across the three Classroom Assessment Scoring System (CLASS) domains?

I address the first research question by reporting descriptive statistics of teacher burnout using pre- and post- intervention data from participants' responses on the Maslach Burnout Inventory–Educators Survey (MBI). I discuss how I applied the Wilcoxon signed-rank test, a non-parametric test, to analyze three subscales of teacher burnout. I report the results of this analysis and determine whether any statistically significant effects on burnout emerged as a result of the LKM intervention. Following this same format, I address the second research question, applying the same procedures and analysis to emotion regulation; I analyze participants' responses on the two Emotion Regulation Questionnaire (ERQ) subscales and report whether LKM was effective in enhancing teachers' self-reported emotion regulation.

I answer the third and final research question of this study by discussing results from applied visual analysis, non-overlap procedures, and regression analyses. Using these results, I discuss the impacts of LKM on teacher-student interaction quality, focusing on the three CLASS domains and briefly summarizing dimension-level effects. I conclude this section by providing anecdotal evidence related to this study's aim and research questions.

Research Question 1: Can Lovingkindness Meditation Significantly Reduce Teacher Burnout?

At the start of the study (i.e., during the first week of baseline data collection), teachers responded to items on the educators' version of the MBI. Shortly after the intervention concluded (i.e., within one week from the end of the intervention), teachers completed this questionnaire for a second time. Responses to items on the MBI yielded estimates of teacher burnout across three subscales: emotional exhaustion, depersonalization, and personal accomplishment. Estimated levels of teacher burnout are reported in Table 4, with Time 1 representing teachers' pre-intervention burnout scores and Time 2 representing their post-intervention scores. Descriptive statistics along with national norms based on a sample of over 4,000 primary and secondary teachers (Maslach, 1996) are displayed in Table 5.

Table 4

Levels of Teacher Burnout Before and After the Intervention

	Emotional exhaustion		Depersonalization		Personal accomplishment	
Case	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
A	48	50	12	16	28	34
B	25	24	10	14	28	35
C	29	27	2	0	39	37
D	38	32	4	6	40	45
E	29	17	5	2	34	43

An emotional exhaustion score of 32.26 or higher represents a score that is ≥ 1 *SD* above the normative mean. The mean for teachers at Time 1 was 1.14 *SD* above the normative mean. At Time 1, teachers A and D reported levels of emotional exhaustion that were higher than one standard deviation above the mean. Specifically, emotional exhaustion values were 2.43 *SD* and 1.52 *SD* above the normative mean for teachers A and D, respectively. Teacher B demonstrated little change in this subscale, reducing their emotional exhaustion by only one point. Emotional exhaustion cores at Time 1 and Time 2 for teacher B were each reported as less than .5 *SD* above the mean. Additionally, teachers C and E reported emotional exhaustion levels .71 *SD* above the mean at Time 1. Surprisingly, this value slightly increased for teacher A at Time 2. Although this value decreased for teacher D, the reduced value at Time 2 still exceeded the normative mean by .98 *SD*. The emotional exhaustion of teacher E decreased by about 40% from Time 1 to Time 2, resulting in a value that was .39 *SD* lower than the normative mean at Time 2.

Table 5

Descriptive Statistics for Three Subscales of Teacher Burnout

		Emotional exhaustion			Depersonalization			Personal accomplishment		
	n	*M*	*Mdn*	*SD*	*M*	*Mdn*	*SD*	*M*	*Mdn*	*SD*
Study sample										
Time 1	5	33.80	29	9.26	6.60	5	4.22	33.80	34	5.76
Time 2	5	30.00	27	12.4	7.60	6	7.13	38.80	37	4.92
Normative Sample	4163	21.25		11.01	11		6.19	33.54		6.89

Note. Median for normative sample was unavailable.

The mean of teachers' depersonalization scores at Time 1 and Time 2 were less than 1 *SD* below the normative sample mean, with a smaller *SD* at Time 1 and a larger *SD* at Time 2.

Depersonalization scores for teachers A, B, and E were within 1*SD* of the normative mean at Time 1, with values above the mean for teachers B and E and below the mean for teacher A. Surprisingly, teacher C and D reported levels of depersonalization that were 1.45 and 1.13 *SD* below the mean at Time 1. Additionally, depersonalization appeared to increase for teachers A, B, and D from Time 1 to Time 2, though all values remained within 1*SD* of the mean. Increases in depersonalization were not expected to result from this intervention and are therefore addressed later, in the discussion section.

All teachers reported levels of personal accomplishment within one standard deviation of the mean at Time 1. The sample mean was about the same as the normative mean at Time 1, though it was higher than the normative mean by .76 *SD* at Time 2. Additionally, all teachers, with the exception of teacher C, reported increased levels of personal accomplishment at Time 2, with levels reported by teachers D and E exceeding the normative mean by 1.66 and 1.37 *SD*. Teacher C reported a decreased level of personal accomplishment by two points but was still within one standard deviation of the mean at Time 2.

Wilcoxon Signed-Rank Test: Teacher Burnout

The Wilcoxon signed-rank test (Wilcoxon, 1945) is a non-parametric test that can be used to test the statistical significance of intervention effects through the analysis of paired scores (see Table 6). To analyze whether teacher burnout was significantly reduced, I applied the Wilcoxon signed-rank test to determine the statistical significance of observed changes within each subscale of teacher burnout resulting from the intervention. A *W* test statistic was calculated for each subscale of teacher burnout by calculating differences between Time 1 and Time 2, ranking their absolute differences, and assigning a positive or negative sign to each value based on their original differences. The positively signed and negatively signed ranks were then summed and

the lower of the two sums was compared to the critical value, $W = 1$ for a one-tailed test, where $\alpha = .05$. Calculations used to obtain these results are available in Appendix F.

Table 6

Results of the Wilcoxon Signed-Rank Test for Assessing Change in Teacher Burnout

Outcome Variable	Sum (+)	Sum (-)	Obtained W
Emotional exhaustion	12.5	2.5	2.5
Depersonalization	4.5	10.5	4.5
Personal accomplishment	14.0	1.0	1.0*

*$p = 0.05$

Emotional exhaustion and depersonalization. I expected that emotional exhaustion and depersonalization would decrease as a result of the intervention. The hypotheses for these subscales were as follows: H_{01}: the median difference is less than or equal to zero, $\alpha = .05$, and H_{A1}: the median difference is greater than zero, $\alpha = .05$. Since calculating W involves signing and ranking differences, a rejection of the null hypothesis in these cases indicates more higher-valued and positive differences between Time 1 and Time 2 (i.e., greater, and more frequent reductions). A one-tailed test was conducted to determine whether significant decreases in emotional exhaustion or depersonalization occurred as a result of the intervention.

I performed the Wilcoxon signed-rank test and applied the average rank procedure (Pratt, 1959) for one pair of tied rankings in emotional exhaustion and two pairs of tied rankings in depersonalization (see Appendix F for details). That is, in instances where the absolute differences between Time 1 and Time 2 scores were the same, their ranks were averaged. The average rank was then applied to each tied difference and assigned as either positive or negative based on the original difference. After these adjustments, test statistics were calculated for each subscale (see Appendix F). The obtained test statistics for emotional exhaustion ($W = 2.5$) and depersonalization ($W = 10.5$) were then compared to the critical value $W^* = 1$. The null

hypothesis (i.e., that there is no effect or an effect in the opposite direction of the expected change) in each of these cases was only rejected if the obtained value was less than or equal to the critical value. Thus, the evidence was in favor of failing to reject the null hypothesis in each of these cases, suggesting that no significant reductions in teacher burnout occurred within the emotional exhaustion or depersonalization subscale.

Personal accomplishment. Teacher burnout is also marked by a reduced sense of personal accomplishment. The MBI measures the inverse of this, teachers' reported feelings of personal accomplishment. Therefore, reduced burnout in this subscale is characterized by an increase in scores, as higher levels of personal accomplishment indicate lower levels of burnout. Thus, when conducting the Wilcoxon signed-rank test for this subscale, the hypotheses are: H_{02}: The median difference is greater than or equal to zero, $\alpha = .05$, and H_{A2}: the median difference is less than zero, $\alpha = .05$. In this case, desired increases from Time 1 to Time 2 are represented by negatively signed differences. A one-tailed test was conducted to determine whether statistically significant increases in personal accomplishment occurred as a result of the intervention. The calculated test statistic was equal to the critical value ($W^* = 1$). This evidence was in favor of rejecting the null hypothesis. These results suggest that significant increases in personal accomplishment occurred due to LKM, marking a reduction of burnout in this subscale.

Research Question 2: How does lovingkindness meditation influence teachers' emotion regulation?

Participating teachers responded to items from the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) once during baseline (i.e., Time 1) and once after the intervention concluded (i.e., Time 2). Summed subscale scores for each teacher are displayed in Table 7, with descriptive statistics shown in Table 8.

Table 7

Levels of Teacher Emotion Regulation Before and After the LKM Intervention

	Cognitive reappraisal		Expressive suppression	
Case	Time 1	Time 2	Time 1	Time 2
A	24	24	18	17
B	26	31	19	15
C	28	29	4	6
D	12	23	21	13
E	24	26	20	15

Teachers' levels of emotion regulation were estimated by calculating their levels of cognitive reappraisal and expressive suppression, the two subscales of the ERQ. I acquired matched-pair data of these two subscales for the five participating teachers and used this data to perform the Wilcoxon signed-rank test (Wilcoxon, 1945), using the same procedures as were used to answer the previous research question.

The ERQ measured teachers' reported use of the two emotion regulation strategies, cognitive reappraisal and expressive suppression, with higher scores indicating higher likelihood of use. The intervention in this study aimed to increase teachers' cognitive reappraisal and reduce their expressive suppression.

Table 8

Descriptive Statistics for Emotional Regulation

		Time 1			Time 2		
	n	*M*	*Mdn*	*SD*	*M*	*Mdn*	*SD*
Cognitive reappraisal	5	22.80	24	6.26	26.6	26	3.36
Expressive suppression	5	16.4	19	7.02	13.2	15	4.27

Wilcoxon Signed-Rank Test: Emotion Regulation

I applied the Wilcoxon signed-rank test (Wilcoxon, 1945) to analyze whether the LKM intervention impacted teachers' emotion regulation. I calculated *W* test statistics for cognitive reappraisal and expressive suppression, the two subscales of emotion regulation (see Appendix G for calculations). To calculate *W* for each subscale, I subtracted Time 2 values from Time 1 values for each participant, ranked the absolute differences, and assigned a positive or negative sign to each rank based on the sign of the original difference. The positively-signed and negatively-signed ranks were then summed and the lower of the two sums was compared to the critical value, $W^* = 1$. For each subscale, I performed a one-tailed test, where $n = 5$ and $\alpha = .05$. In each of these tests, the null hypothesis was rejected if $W \leq 1$. Results of these tests are displayed in Table 9.

Cognitive reappraisal. I expected that cognitive reappraisal would increase as a result of the intervention. The hypothesis for this emotion regulation subscale was: H_{02}: The median difference is greater than or equal to zero, $\alpha = .05$, and H_{A2}: the median difference is less than zero, $\alpha = .05$, as increases from Time 1 to Time 2 are marked by negative differences. A one-tailed test was conducted to determine whether a significant increase in cognitive reappraisal occurred as a result of the intervention. Test statistics were calculated following the procedures of the Wilcoxon signed-rank test previously described, with details and calculations available in Appendix G.

Table 9

Results of the Wilcoxon Signed-Rank Test for Assessing Change in Emotion Regulation

Outcome Variable	Sum (+)	Sum (-)	Obtained W
Cognitive reappraisal	14	0	0*
Expressive suppression	13	2	2

*$p < 0.05$

In one case, a teacher reported equal levels of cognitive reappraisal level at Time 1 and Time 2. Therefore, subtracting these two scores resulted in a difference of zero. In the case of zero-differences, the recommendation is to rank all differences, including the zero, and then drop the zero-difference rank, after ranking all remaining differences (Pratt, 1959). The positive and negative ranks can then be summed to obtain *W.* In this analysis, there were no observed positive differences (i.e., $W = 0$). That is, teachers in cases B, C, D, and E all reported increased use of cognitive reappraisal after the intervention; cognitive reappraisal did not decrease for any teacher from Time 1 to Time 2.

Results for the analysis of cognitive reappraisal yielded a W less than the critical value, indicating to reject the null hypothesis in favor of the alternative hypothesis, that the median difference is less than zero. This suggests that the LKM intervention had statistically significant, positive effects on teachers' reported emotion regulation in their use of cognitive reappraisal strategies.

Expressive suppression. I expected that expressive suppression would decrease as a result of the LKM intervention. The hypothesis for this emotion regulation subscale was: H_{01}: the median difference is less than or equal to zero, $\alpha = .05$, and H_{A1}: the median difference is greater than zero, $\alpha = .05$. A one-tailed test was conducted to determine whether significant reductions in expressive suppression occurred as a result of the intervention. I applied the Wilcoxon signed-rank test, calculating differences between Time 1 and Time 2 and then ranking and signing each absolute difference. The calculated test statistic in this subscale ($W = 2$) was greater than the critical value ($W^* = 1$). Therefore, evidence indicated to fail to reject the null hypothesis, suggesting that significant reductions in expressive suppression did not occur as a result of the LKM intervention.

Research Question 3: What effects does lovingkindness meditation have on teacher-student interaction quality, across the three CLASS domains?

The third research question of this study was answered using a muti-step process. First, I created an interactive dashboard to display all domain- and dimension- level TSIQ data for the five participating teachers. Graphical displays were created for all cases and TSIQ outcomes using Tableau (2023). Single-case graphs of dimension-level outcomes are available in Appendix H. Next, I used visual analysis to investigate changes in level and trend by comparing each participant's intervention data to their baseline data for each of the three CLASS domain scores and their dimensions. Due to the high number of outcome variables, I created a matrix to track and visualize the suspected changes in level and trend across all cases and outcome variables. Then, I used the preliminary visual analysis results to guide my decisions in determining whether to calculate a NAP value or intervention trend for each of the outcome variables collected in this study. Results from the combined use of visual analysis, non-overlap, and trend calculations were then inspected for patterns and synthesized.

The results that follow address how this study's LKM intervention impacted TSIQ across the three CLASS domains. As a reminder, each domain represents a different aspect of TSIQ and is comprised of several dimensions. Dimension scores reflect teachers' and students' behavioral and verbal expressions and the interactions between them and are rated as low (1–2), middle (3–5) or high (6–7) quality. Dimension scores at each measurement occasion represent averages from two consecutive cycles of observation at each measurement occasion. Therefore, domain scores were calculated by averaging their dimension scores at each measurement occasion.

I now report the visual analysis results for each case in this study, organized by CLASS domain. I report each case's level and trend during baseline and intervention phases (see Table 10 for case means).

Table 10

Baseline and Intervention Means for TSIQ Outcomes

	Baseline		Intervention	
	n	*M*	*n*	*M*
Emotional support	30	4.71	40	5.10
Case A	7	4.09	8	4.96
Case B	6	5.15	8	5.46
Case C	6	4.47	8	4.98
Case D	6	4.59	8	5.05
Case E	5	5.28	8	5.06
Classroom organization	30	5.28	40	5.56
Case A	7	5.11	8	5.54
Case B	6	5.46	8	5.70
Case C	6	4.61	8	5.29
Case D	6	5.47	8	5.55
Case E	5	5.75	8	5.73
Instructional support	30	2.86	40	3.23
Case A	7	2.33	8	3.25
Case B	6	2.79	8	3.56
Case C	6	2.86	8	3.25
Case D	6	3.51	8	3.24
Case E	5	2.78	8	2.82

Note. n represents the number of observations.

Adhering to the visual analysis procedures explained in the previous chapter, I then compare each case's intervention and baseline data, and discuss whether visual analysis results supported changes in TSIQ due to the LKM intervention. I then provide a summary of these results, which were used to develop the matrix and informed subsequent effect size and trend calculations. I report effect size estimates and trend statistics in cases where visual analysis results suggested domain-level effects and conclude by summarizing results related to dimension-level TSIQ outcomes.

Visual Analysis: Emotional Support

Emotional Support (ES) is one of three CLASS domains and is comprised of four dimensions: positive climate, negative climate, teacher sensitivity, and regard for student perspectives. Negative climate was reverse scored when calculating domain levels. Graphical displays of emotional support data for all five cases are displayed in Figure 6.

Baseline. The ES levels for cases A and B at baseline were in the middle range, with data points consistently in this range, although the first two data points for case B were above the middle range and approaching the high range. The baseline mean of case B reflects this as it is slightly higher than the upper limit of the middle range ($M = 5.15$). Levels of ES for cases C and D were also in the middle range. Additionally, a negative trend was observed for case C, with the first data point between middle and high ranges (ES = 5.69) and all other data points in the middle range. Baseline ES data for case D ranged from 3.31–5.38, with most points clustered around the upper limit of the middle range. Case E demonstrated a stable pattern in baseline with all points from 5.00–5.50, with a level situated between middle and high qualities of ES.

Intervention. The ES level during the intervention phase of case A indicated that the average level of ES quality was near the upper limit of the middle range. Only the first two data

points in phase B for this case were below 5.00, with the rest at or above this level. Case A also appeared to demonstrate a positive trend in that ES scores generally increased throughout the intervention phase with the first observation occasion being the lowest of this phase (ES = 3.88) and generally increasing throughout the remaining observation occasions. Case A achieved the highest score at observation occasion 14 (ES = 5.75) nearly reaching the lower limit of the high range in the ES domain. The ES level during intervention for case B was between the middle and high ranges, with only one data point in the middle range, at observation 10 (ES = 4.88), which was slightly below the upper limit of this range. No trend was present for case B, as the ES scores were relatively stable throughout the intervention phase.

Case C demonstrated an ES quality at the high end of the middle range during intervention. Three data points in this phase were in the middle range (e.g., observations 7, 8, and 10), with all other data points exceeding the middle range. There was an apparent positive trend in phase B for this case, trending in the direction of intended effect with the first two ES scores in the middle range, and generally trending upwards, with the exception of observation 10.

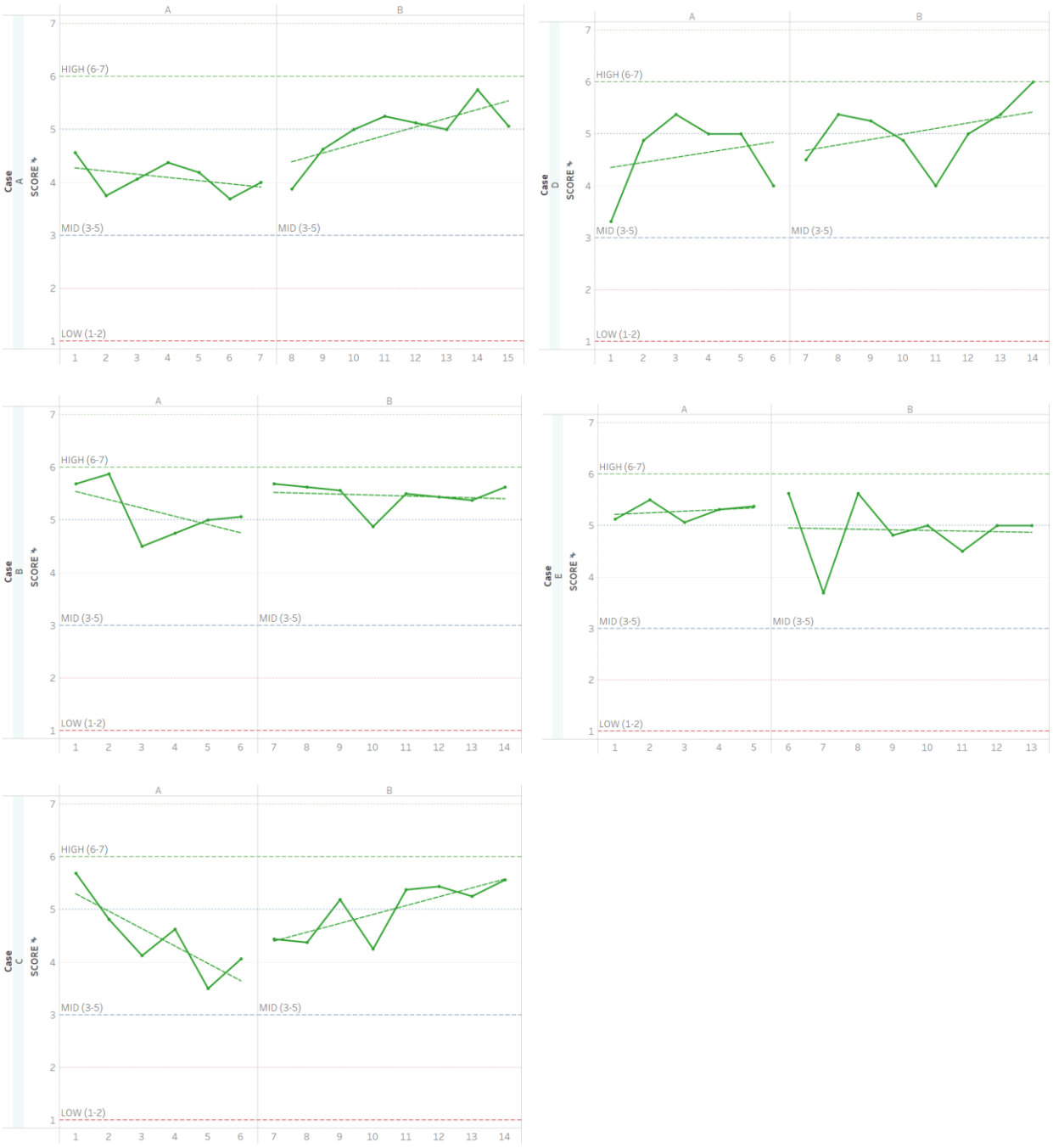
The ES intervention level for case D was at the upper limit of the middle range, with most points clustered in the range between middle and high ranges (e.g., 5.00–6.00), except at observation 11, where ES = 4.00, indicating a middle level quality. A positive trend also appeared to emerge for case D, especially towards the end of data collection, where ES levels increased, reaching 6.00 at the last observation occasion, indicating a high level of ES quality.

Most data points for case E were near the higher end of the middle range throughout the intervention phase, with a level between middle- and high-quality ES. The first two intervention data points in this case exceeded the middle range, where ES for observation numbers 6 and 7

were each equal to 5.63. The mean for this phase also indicates an ES level between the middle and high ranges.

Figure 6

Single-Case Experiment Graphs for Emotional Support



Note. *x*-axes represent measurement occasions; *y*-axes represent domain scores

Visual Analysis: Classroom Organization

Classroom organization (CO) is a domain comprised of three dimensions: behavior management, productivity, and instructional learning formats. Behavior management accounts for student behavior independent of and together with teaching practices used and instructional learning formats regards students' interest, engagement, and ability to learn from observed activities (Pianta et al., 2008). Graphical displays of emotional support data for all five cases are displayed in Figure 7. **Figure 7**

Single-Case Experiment Graphs for Classroom Organization

Note. *x*-axes represent measurement occasions; *y*-axes represent domain scores

Baseline. Case A demonstrated a stable baseline in this domain with most points clustered around the upper limit of the middle range. Baseline scores in this domain for case B ranged from 4.83–6.00, indicating baseline CO between middle and high levels, with no apparent trend. Case C demonstrated a baseline CO level at the middle range, with only the first data point of the phase exceeding this level. Aside from the first data point in this phase, the baseline CO level is relatively stable for case C. Case D demonstrated a CO baseline level between middle and high ranges, with only the first data point in the middle range. Aside from the first baseline data point (CO = 3.83), the CO levels remained stable, ranging between 5.33 and 6.17. Case E also demonstrated a CO level between middle and high ranges, with a slight positive trend.

Intervention. During intervention, case A had an overall CO level that was considered between middle and high quality. All CO data points for case A were between the middle and high ranges during intervention, with one data point at the upper limit of the middle range (e.g., observation 9; CO = 5.00) and one data point at the lower limit of the high range (e.g., observation 14; CO = 6.00). A positive trend also appeared during the intervention phase for case A in this domain, where points at the beginning of this phase were scored closer to the middle quality levels and approached the high-quality range towards the end of the phase. Case B also demonstrated a consistent pattern in the CO domain with an overall level between the middle and

high ranges, and CO scores reaching the high-quality range at observations 8, 9, and 13. The data appeared stable with no visible trend. The CO level during intervention for case C was between middle and high-quality ranges, with most data points near or above the upper limit of the middle range and only two points in the middle range, at observations 8 (CO = 4.83) and 10 (CO = 4.83). Case C also demonstrated a positive trend during this phase, with the first two observations near the upper limit of the middle range and the last two observations nearly reaching the high range.

Classroom organization scores during intervention for case D fluctuated between the high end of the middle range and the low end of the high range, with an overall level between these two ranges. No clear trend appeared during this phase for case D in the CO domain. Most of the CO scores for case E were also between middle and high ranges during intervention, with two data points in the high-quality range at observations 6 (CO = 6.17) and 8 (CO = 6.33). Case E displayed a slight negative trend during the intervention phase, indicating a possible change in trend in the opposite direction of the desired effect.

Visual Analysis: Instructional Support

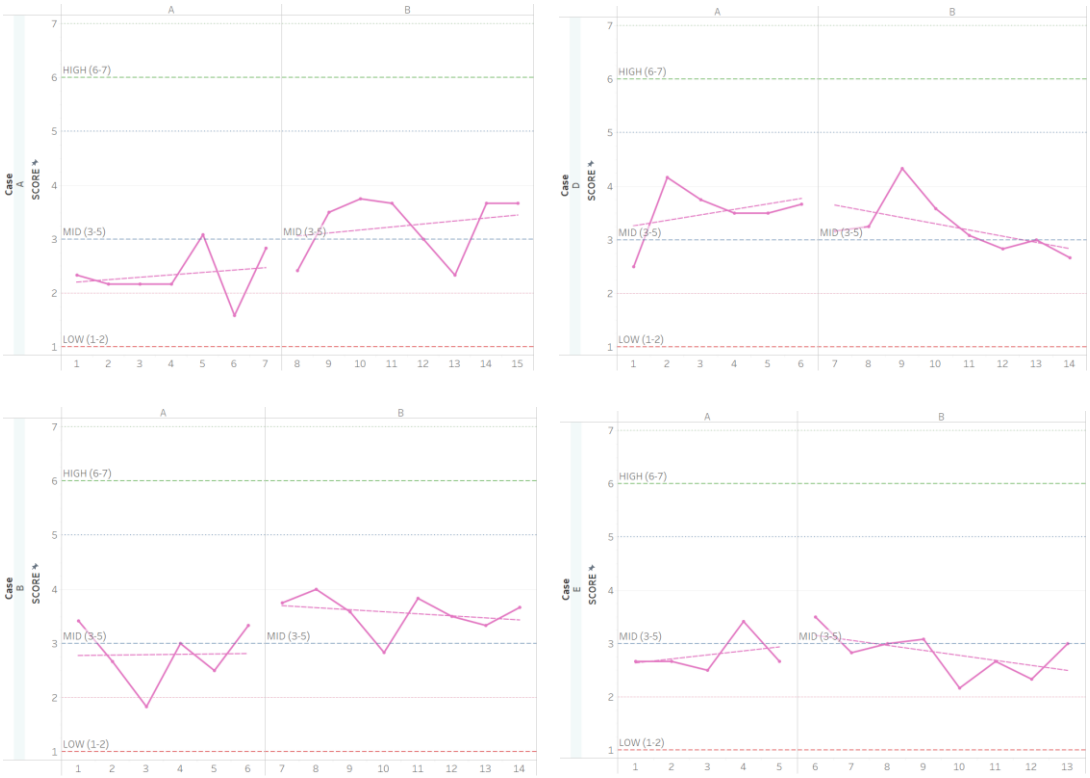
Instructional support (IS) is comprised of three dimensions: concept development, quality of feedback, and language modeling. Scores of the IS domain are generally lower than ES and CO scores (Pianta et al., 2008). Graphical displays of emotional support data for all five cases are displayed in Figure 8.

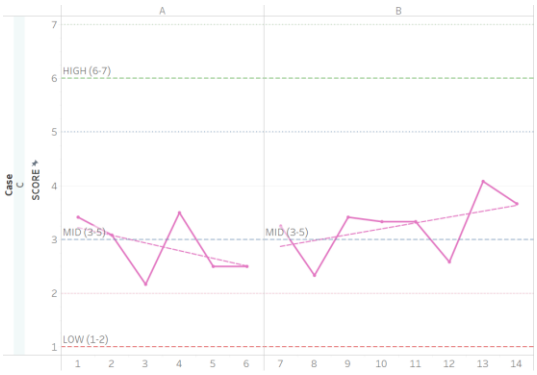
Baseline. All cases demonstrated levels between low and middle ranges of IS quality during baseline, except for Case D, which demonstrated a middle-quality level of IS during this phase. No trends in IS were observed for any of the cases during baseline. The IS level for case A was between the low and middle ranges, with one data point in the low-quality range (e.g.,

observation 6, IS = 1.58) and two data points near the low end of the middle range at observations 5 (IS = 3.08) and 6 (IS = 2.83). The level of IS at baseline for case B (i.e., 2.79) was between low and middle ranges but closer to the middle range, with most points clustered around 3.00, except for observation occasion 3, which was scored in the low range (IS = 1.83). Case C also demonstrated an IS level between low and middle-quality ranges, with three data points in the low range (e.g., observations 3, 5, and 6) and three data points in the low end of the middle range (observations 1, 2, and 4). The IS level for case D was middle-quality at baseline, with IS scores consistently in the middle range throughout, except for the first observation occasion, which was scored between the low and middle ranges (IS = 2.50). Case E demonstrated an IS level between low and middle-quality, with scores consistently between these ranges, except at observation 4, where ES = 3.42, indicating a middle-level quality of IS on this occasion.

Figure 8

Single-Case Experiment Graphs for Instructional Support





Note. *x*-axes represent measurement occasions; *y*-axes represent domain scores

Intervention. During intervention, IS levels for all cases were in the lower end of the middle-quality range, except for case E, which had an IS level at the high end of the low-quality range during intervention. All intervention observations for case A in the IS domain were scored in the middle-quality range, except for observations 8 (IS = 2.42) and 13 (IS = 2.33), which were considered low-quality IS scores. This case did not demonstrate any apparent trend.

Case B consistently received IS scores within the middle-quality range, except at observation 10 (IS = 2.83), which was scored between the low and middle ranges. No apparent trend was observed in the intervention phase for this case in the IS domain. The intervention IS scores for case C ranged between low and middle levels of quality (2.33–4.08). Additionally, a slight positive trend appeared during intervention for Case C, with IS scores in this phase starting near the lower limit of the middle range (i.e., 3.00) and reaching levels near 4.00 towards the end of the intervention phase.

Case D received IS scores during intervention that were consistently near the lower limit of the middle-quality range, with exceptions of observations 9 (IS = 4.33) and 10 (IS = 3.58), although these scores also indicated middle-quality levels of IS. Case D also appeared to have a negative trend in IS during intervention, which was in the opposite direction of the desired effect. The intervention level of IS for case E was between the low- and middle- quality ranges, with two data points (observation occasions 6 and 8) exceeding the lower limit of the middle range. A

slight negative trend also appeared for this case during intervention, as the IS scores initially were closer to 3.00 but started to vary between 2.00 and 3.00 between observations 10–13.

Visual Analysis Summary

Teacher-student interaction quality appeared to be most influenced by the LKM intervention in the emotional support domain. Four cases demonstrated change in this domain, three that demonstrated change in both level and trend and one that demonstrated level-only change. Three cases also demonstrated changes in instructional support, two of which demonstrated a change in level and one of which demonstrated a positive trend during intervention. Classroom organization appeared to be the least widely impacted domain, with only two cases demonstrating change in level and trend. Cases A and C were the only two cases to demonstrate change across all three domains, suggesting that teachers in these cases were the most influenced by the LKM intervention. Teacher B demonstrated change in two domains (i.e., ES and IS) and teacher D demonstrated change in one domain (i.e., ES). The intervention appeared to have no effect on teacher E. Next, I describe these results in detail.

Emotional Support. Visual analysis supported changes in both level and trend for cases A, C, and D. Three intervention scores in the ES domain were at least one point above the baseline mean for case A at occasions 11 (ES = 5.25), 12 (ES = 5.13), and 14 (ES = 5.75). Additionally, during baseline, case A consistently scored within the middle range of the ES domain but surpassed this range during intervention, with majority points in the middle range. In case C, only one intervention data point exceeded the baseline mean by more than one point (observation 14, ES = 5.56). However, practical significance considerations supported a change in level, since most baseline data points were in the middle range, whereas most intervention data points surpassed this range, indicating that more of the dimension scores averaged to

achieve the domain score were in the high range than during intervention. Case C also demonstrated a positive trend during intervention, in the direction desired, which was opposite to the direction of the trend that appeared for this case during baseline. Case D was also considered to demonstrate a change in level within the ES domain, even though only one intervention data point exceeded the baseline mean in this domain (e.g., observation 14, ES = 6.00). Level-change was supported for case D within the ES domain because during baseline, most data points indicated a middle-quality level, whereas most points during intervention indicated ES quality above this level, between the middle- and high-quality ranges. A positive trend also appeared towards the end of the intervention phase for this case and domain, though no clear trend was identified during baseline.

Change in level was also supported through visual analysis for case B. Although no intervention points in case B were one point above the mean of the baseline phase, a change of level was supported due to the practical significance of changes that appeared. That is, during intervention, ES scores consistently exceeded the middle range, with the exception of observation occasion 10 (ES = 4.88), whereas most ES scores during baseline for this case were near or below the upper limit of this range, with the exceptions of the first two baseline data points (e.g., observation 1, ES = 5.69; observation 2, ES = 5.88).

Classroom organization. Visual analysis supported changes in both trend and level for cases A and C. A positive trend appeared during the intervention phase for case A in this domain, where the first two intervention observations were scored closer to the range of middle-quality and approached the high-quality range towards the end of this phase. This aligns with the observation that most CO scores for case A were clustered around 5.00 during baseline, with a wider range of scores and more data points nearing the high-quality range during intervention.

Thus, although no data points during intervention exceeded the baseline mean for case A, the practical significance of these changes supported a change in level.

Case C demonstrated a positive trend in the intervention phase, which did not exist during the baseline phase for this case. The first two observations were near the upper limit of the middle range and the last two observations nearly reached the high range. Although the numeric difference between baseline and intervention phase means does not seem large, CO scores at observations 13 (CO = 5.67) and 14 (CO = 5.92) exceeded the baseline mean by more than one point. Practical significance also supported a change in CO level for case C since most baseline data points were in the middle range, whereas only two intervention data points were in the middle range during intervention (e.g., observations 8 and 10), both of which were close to the upper limit of this range, each receiving CO scores equal to 4.88.

No change in level or trend were supported for cases B, D, and E, based on the outlined visual analysis criteria. Case B did not demonstrate any change in level, with intervention data points in this domain remaining between the middle and high ranges. Classroom organization data in the intervention phase for case D looked very similar to its phase A data in that most data points were in the middle-high range. Case E displayed a negative trend in the intervention phase, opposite of the direction the trend was observed during baseline, indicating a change in trend in the opposite direction of the desired effect. No change in level was observed for this case, with levels of CO mostly in the middle-high range throughout the intervention phase.

Instructional Support. Visual analysis supported changes in level for cases A and B and a change in trend for case C. During the intervention phase, case A scored at least one point above the baseline mean on five different observation occasions, suggesting that a change in level did occur. Additionally, nearly all IS intervention scores for this case were in the middle

range, with nearly all scores in baseline below this level. Thus, the comparison of intervention data points to the baseline mean, in addition to IS scores during intervention indicating a higher quality level of IS than in baseline, support that a change in level occurred for case A.

The level of IS for case B was considered at the middle-quality level during baseline, with only one point falling just below this range at observation 10 (IS = 2.83). During intervention, IS scores for case B exceeded the IS baseline mean by more than one point at observation occasion 12 (IS = 3.83) and nearly reached one point above the mean at observation occasion 7 (3.75). Additionally, three data points were below the middle-quality range during baseline, whereas only one intervention data point was below this range (e.g., observation 10, IS = 2.83). This signified a practically meaningful change in level.

The level of IS during intervention for case C ranged between low-quality and middle-quality ranges, similar to the range of IS scores achieved in baseline. Although no change in level was suspected, the slight positive trend that appeared during intervention was opposite to the negative trend observed during baseline, supporting a change in IS trend for case C.

No expected changes in trend or level occurred within cases D and E. However, case D appeared to have a negative trend in IS during the intervention phase, which was opposite of the direction desired. No change in level was observed as the IS level in both phases A and B appeared to be mostly in the middle range. Levels of IS in both baseline and intervention for case E were between the low and middle ranges. Additionally, a slight negative trend appeared for this case during intervention, though no trend was observed during baseline for case E.

Non-Overlap of All Pairs

Non-overlap of all pairs (Parker & Vannest, 2009) is an effect size index that is recommended for demonstrating change in single-case experiments (WWC, 2022). NAP values

estimate the probability that a data point randomly drawn from the intervention phase will exceed the score of a data point randomly drawn from the baseline phase (Parker & Vannest, 2009). NAP values can also be converted to percentages and interpreted as the percent of non-overlapping data between phases. Effect size estimates using NAP are now reported for each instance where a change of level was supported by visual analysis results. Effect sizes derived from NAP are classified into the following magnitudes: weak (.31), medium (.32 – .84), and strong or large (≥ .85) (Parker & Vannest, 2009). The NAP values in this study were calculated using a single-case effect size calculator (Pustejovsky et al., 2023) and are displayed in Table 11.

Visual analysis supported changes in emotional support quality for cases A, B, C, and D. However, only case A demonstrated an effect size of large magnitude (*NAP* = .91). Cases B, C, and D demonstrated medium-sized effects. Additionally, visual analysis results supported LKM effects on classroom organization within cases A and C. The NAP calculations supported these results, indicating strong effects on classroom organization in both these cases. Lastly, visual analysis indicated that instructional support quality was impacted as a result of the LKM intervention, within cases A and B. The NAP calculations yielded large effect sizes for each of these cases, further supporting this result. Next, I report the results of intervention trend calculations.

Trend Analyses

A simple linear regression model was used to test the statistical significance of apparent intervention trends, which represented changes in TSIQ over time during the intervention phase of this study. Intervention trends were only analyzed if trends in baseline either did not appear or were observed in the opposite direction of the intended effect. I now report the results of

intervention trends to assess whether TSIQ outcomes increased throughout the intervention phase of the study. Results from these analyses are reported in Table 11 and summarized next.

Table 11

Domain-Level Effect Sizes and Trend Results

		Effect Size Estimates			Trend Analyses		
Domain	Case	*NAP*	*SE*	95%CI	R^2	Equation	*p*
Emotional support	A	**.91**	.09	[.62, .98]	.56	y = 3.07 + .16x	.03
	B	.64	.20	[.34, .85]			
	C	.71	.17	[.40, .89]	.59	$y = 3.22 + .17x$	.03
	D	.67	.15	[.36, .87]	.18	$y = 3.94 + .11x$	.29
Classroom organization	A	**.85**	.10	[.55, .96]	.55	$y = 4.40 + .10x$	.03
	C	**.88**	.12	[.56, .97]	.57	$y = 4.08 + .12x$	.03
Instructional support	A	**.90**	.07	[.61, .98]			
	B	**.91**	.07	[.60, .98]			
	C				0.23	$y = 2.10 + .11x$	.23

Note. Bold NAP values indicate large effect sizes.

During intervention, positive trends in emotional support quality were supported by visual analysis in cases A, C, and D. Regression analyses further supported the relationship between time in intervention and levels of emotional support quality in cases A (R^2 = .56, b = .16, p = .03) and C (R^2 = .59, b = .17, p = .03). Visual analysis suggested that positive trends in the direction of desired effect occurred in the classroom organization domain for cases A and C. Results of regression analyses confirmed this for both case A (R^2 = 0.55, b = .10, p = 0.03) and C (R^2 = 0.57, b = .12, p = 0.03). In the instructional support domain, trend was observed in case C during intervention, though the regression analysis did not yield results in support of this trend. It

is important to note that the slopes reported here should be interpreted with caution, as time between measurement occasions do not represent equal intervals; data was generally collected three times per week, for each case.

Dimension-Level Results

Visual analysis was also conducted at the dimension-level for the 10 dimensions comprising the three domains of the CLASS. Results are reported here in order to interpret any emerging patterns within the data. NAP and regression analyses were also conducted, where visual analysis supported changes in level or trend. These can be found in Appendix I.

Overall, cases A and C appeared to be most sensitive to the intervention, demonstrating change in nine of the ten dimensions, with case C demonstrating more evidence of trend in the intervention phase. Positive climate appeared to be the dimension most affected by the intervention implementation, demonstrating changes in level and trend for three cases. This was followed by teacher sensitivity and instructional learning formats, where two cases demonstrated changes in level and trend, and one case demonstrated change in level. Other dimensions that showed patterns of change across three cases were negative climate, regard for student perspectives, quality of feedback, and language modeling.

Positive climate appeared to be the ES dimension most strongly affected by the meditation intervention in that cases A, C, and D demonstrated positive changes in both level and trend. Teacher sensitivity also appeared to be largely affected by the intervention in that cases A and C demonstrated changes in level and trend, with case B demonstrating an increased level in this dimension. Cases A and B also demonstrated changes in level for both negative climate and regard for student perspectives with case C also demonstrating these changes, in addition to demonstrating a positive trend for both dimensions.

Instructional learning formats was the CO dimension most affected by the intervention. In this dimension, cases A and C demonstrated changes in level and trend and case D demonstrated change in level. Cases A and C also demonstrated changes in level and trend in the productivity dimension, with Case C demonstrating changes in the behavior management dimension as well. Three out of five cases demonstrated changes in language modeling and quality of feedback. Case C demonstrated changes in both level and trend, whereas cases A and B demonstrated level-changes only. Cases A and B also demonstrated level-change in the concept development dimension.

Anecdotal Evidence

In addition to the quantitative measures used to assess outcomes related to the intervention implementation, teachers were also encouraged to document any changes or reflections in narrative form, using an online "journal." Throughout the intervention, four teachers took the opportunity to record their thoughts in the journal at least once, with teachers in cases B and C recording two journal entries each. In total, six journal entries were recorded. One common theme reflected the difficulties teachers experienced in adjusting to the stillness of a meditation practice. One of the teachers, who initially expressed difficulty being "calm" during meditation, expressed feeling improvements by the end of the first week. This teacher later reported that the 10-minute meditation used in the last week seemed too short. At the conclusion of the study, she reported that the meditations helped her notice how difficult it was for her to turn her brain "off" and to focus *on* her thoughts rather than *experiencing* the racing thoughts that she described as typical for her.

Two teachers expressed having had initial concerns about giving up portions of their morning to participate in the meditation but followed those thoughts with expressions of

gratitude for having participated. Another teacher reported being glad that the morning meditation did not impact her daily preparedness for teaching. One teacher reported that she enjoyed the meditations and felt the most success with the practice that she had ever felt but also questioned whether this practice would have been more beneficial for her at the end of the day, before returning to her life outside of school.

One teacher stated that she was experiencing fewer stressors at work in her current position than she had experienced as a classroom teacher. She commented that the change in work alone had started improving her well-being, family life, and work enjoyment prior to the start of the intervention. This teacher also commented that although this experience was out of her comfort zone, she was generally pleased with the experience.

Lastly, related to SEC, one teacher reported two instances of how she noticed her own negative emotions and made behavioral changes as a result of having practiced the meditation. For example, this teacher reported that she was able to re-center herself after noticing that she was "feeling cranky" and was able to re-center herself rather than "snapping" at someone. In another instance, this teacher reported that she applied the practice of the meditation in the midst of a work-related conflict to adjust her own behaviors, which helped resolve a teacher-parent conflict. When she was met with anger from another adult, this teacher said she spent a few minutes "sending [the person] health, happiness, and peace" and was later able to respond to the adult with clarifying information, providing a solution and resolving the other person's anger.

Chapter 5: Discussion

I designed this study to learn whether a brief and daily practice of lovingkindness meditation (LKM) could effectively reduce teachers' burnout, enhance teachers' social-emotional competencies, including their emotion regulation skills, and improve the quality of teacher-

student interactions. Many studies have already discovered significant relationships between mindfulness-based programs and interventions (MBPIs) and the dependent variables in this study (i.e., burnout, emotion regulation, teacher-student interaction quality). However, the existing MBPIs are often complex and multi-component. With this study, I explored whether LKM, a simple, structured, compassion-based practice, could produce positive effects on teachers' burnout, social-emotional competence (SEC) and teacher-student interaction quality (TSIQ) when implemented on its own. To explore this question, I implemented a 3-week LKM intervention with a sample of five elementary school teachers in diverse classroom settings. I measured their burnout and emotion regulation before and after the intervention, using self-report questionnaires. I also observed and scored their interactions with students prior to and during the intervention utilizing a single-case experimental design. I performed several analyses (e.g., non-parametric test, visual analysis, non-overlap procedure, regression analysis) to estimate the impacts of LKM on this study's outcome variables and reported the results of these analyses in the preceding section. In this section, I discuss these results and explain how they relate to the extant literature. I elucidate areas for future research, implications for practice, and discuss the contributions and limitations of the present study.

Impacts of LKM on Teacher Burnout

In recent decades, researchers have begun exploring the impacts of MBPIs on teacher burnout. Interventions implemented in these studies are often multi-component (e.g., Braun, Roeser, & Mashburn, 2020; Jazaeiri et al., 2013; Roeser et al., 2021). Many researchers in this field study MBPI impacts on teacher burnout, selecting the Maslach Burnout Inventory (MBI) as their outcome measure, though others have also chosen to implement other instruments entirely (e.g., Carroll et al., 2021).

When investigating impacts of MBPIs on teacher burnout, some have analyzed the three MBI subscales (i.e., emotional exhaustion, depersonalization, and personal accomplishment) as individual outcomes (e.g., Braun, Roeser, & Mashburn, 2020; Flook et al., 2013), though others have analyzed these effects using composite scores of teacher burnout (Jennings et al., 2017; Zarate et al., 2019). Additionally, some researchers in this field give special attention to the emotional exhaustion subscale of the MBI (e.g., Ansari et al., 2020) or combine this subscale with other teacher outcomes including stress, anxiety, and depression symptoms, to estimate teachers' occupational health and well-being (e.g., Roeser et al., 2021). Compassion practices, such as LKM, are a common component of existing MBPIs (e.g., Compassion Cultivation Training, Goldin & Jazaieri, 2017; Mindfulness-Based Emotional Balance, Cullen et al., 2019), which when implemented have been linked to reductions in teacher burnout (e.g., Braun, Roeser, & Mashburn, 2020; Roeser et al., 2021).

Although MBPIs are generally aimed at reducing teacher stress and burnout, they often require a large time investment from teachers and are costly to implement. Additionally, when MBPIs are comprised of various elements, it becomes difficult to identify components that are contributing to observed effects (i.e., active components), or the magnitude of their impacts. The present study extends the research of MBPIs in teacher populations by examining the effects of LKM, a single-component intervention, on teacher burnout. Specifically, with this study, I gathered evidence to understand whether LKM, when implemented for three weeks, with sessions lasting from 15–25 minutes daily (i.e., Monday-Friday), could reduce teacher burnout. I explored this question by analyzing LKM intervention effects across the three MBI subscales.

My study included a small sample size of five teachers, limiting the types of analyses appropriate for testing the relationship between LKM and teacher burnout. Therefore, I utilized a

non-parametric test to analyze the effects of the LKM intervention on teachers' reported levels of emotional exhaustion, depersonalization, and personal accomplishment. Results of this test indicated that the LKM intervention did not have any statistically significant effects on teachers' emotional exhaustion or depersonalization. However, the results did reveal a statistically significant effect of LKM on teachers' personal accomplishment. I now discuss my results in detail and relate them to the extant literature, beginning with findings related to personal accomplishment.

Personal Accomplishment

The only significant effect that was supported by the Wilcoxon signed-rank test was on teachers' levels of personal accomplishment. Four out of five teachers showed improved scores in this burnout subscale, with increases ranging from 5–9 points, though one teacher's reports signaled a reduced sense of personal accomplishment from Time 1 to Time 2, marked by a 2-point decrease. However, the analysis still yielded significant results since the only difference in the unintended direction was the lowest ranked difference (i.e., smallest absolute difference) of the five cases, which resulted in $W = 1$. The obtained W was equal to the critical value, which provided evidence to suggest that the LKM intervention increased teachers' reported levels of personal accomplishment in this study.

These findings are consistent with previous research investigating relationships between mindfulness and burnout. For example, in a randomized controlled pilot trial, Flook et al. (2013) found that an eight-week MBSR-based course, which included a full-day immersion experience, resulted in significant improvements on teachers' personal accomplishment. Additionally, Braun, Roeser, and Mashburn (2020) reported small effect sizes in personal accomplishment, resulting

from their implementation of the MBEB program, which occurred over 8 weeks, with nine sessions, for a total of 27.5 hours.

Teachers in this study reported increased levels of personal accomplishment after 12–14 days of LKM, which they practiced for 10–20 minutes per day, over a 3-week duration. Thus, the present study gathered preliminary evidence to support the use of a brief, daily lovingkindness meditation practice, to enhance teachers' sense of personal accomplishment. Therefore, teachers experiencing burnout, with limited time to spare, may consider engaging in LKM. However, the results of this study cannot provide any evidence for long-term impacts of LKM, as follow-up data has not been collected. Future research may wish to explore the long-term effects of a brief, short-term LKM intervention on teachers' personal accomplishment.

Emotional Exhaustion

Four out of five teachers demonstrated reduced scores in the emotional exhaustion subscale, two of whom reported lower emotional exhaustion by greater than 10 points. However, results of the Wilcoxon signed-rank test did not support any statistically significant reductions of emotional exhaustion, resulting from the LKM intervention. This result occurred due to an observed 2-point increase in one teacher's emotional exhaustion score at Time 2. The increased score led to a negative difference, contributing to a negative-rank sum greater than the critical value. In this case, although some of the teachers' raw scores appear promising, I failed to reject the null hypothesis. This result contradicts findings from other studies demonstrating significant effects of MBPIs on emotional exhaustion.

Flook et al., (2013) found significant effects of an MBSR-based intervention on emotional exhaustion in a group of 10 teachers. Emotional exhaustion averages for their intervention group were 25.90 at pretest and 19.20 at posttest, indicating about a 7-point

reduction (p = .038). Thus, it is reasonable to suspect that with a larger sample, similar effects might also be detected using the LKM intervention used in this study, when considering some of the within-person reductions that occurred in this study, especially for teachers D and E who respectively reported lower emotional exhaustion by 16 and 12 points. It is also important to note that the mean emotional exhaustion for participants in my study at Time 1 (i.e., 33.8) was higher than the pre-test average of participants in the study by Flook et al. (2013) and greater than the normative mean (Maslach et al., 1996) by more than 1 *SD*.

Other studies have also found significant effects of MBPIs on emotional exhaustion. For example, Braun, Roeser, and Mashburn (2020) detected small-sized within person effects in emotional exhaustion following implementation of their version of the MBEB program. Another study also found significant effects of the MBEB program on emotional exhaustion, detecting medium-sized effects in the differences between the intervention group and a wait-list control group (Roeser et al., 2021). However, it is important to note that it appears that when measuring burnout, Roeser et al. (2021) used burnout subscale averages, thereby measuring the frequency of experienced burnout. Whereas in the current study, I conducted analyses using the summed scores for each subscale. Additionally, although Braun, Roeser, and Mashburn (2020) found significant effects of MBEB on emotional exhaustion, they found no relationship between mindfulness skills and emotional exhaustion nor any improvements in mindfulness skills resulting from the intervention. Thus, although the MBEB program seems to reduce emotional exhaustion, it remains unclear what the driving factor of change is when this program is implemented. Future studies could investigate how individual components in MBPIs contribute to these findings. Additionally, there may be mechanisms at work that are undetectable through self-reports. Researchers may wish to utilize instruments that capture neural and physiological

variables subject to change through MBPIs and meditation practices, in order to better understand the mechanisms through which change is enacted.

Although no statistically significant effects were detected on teachers' emotional exhaustion, it is promising that most teachers showed some level of reduction in this outcome following the intervention. Due to these improvements, it is reasonable to recommend that researchers further examine the relationship between LKM and emotional exhaustion. Future research may wish to replicate the present study with a larger sample and greater power to detect statistically significant changes. Researchers may also investigate how LKM and multi-component MBPIs, such as the MBEB, differentially impact emotional exhaustion. Additional analyses are also needed to understand the mechanisms through which effects are influenced, or made possible, related to several factors of burnout, also including depersonalization.

Depersonalization

Depersonalization in teachers may involve feeling callous towards those with whom they work, including their students. Depersonalization may also involve distancing oneself from the people in their care. Thus, I expected that practicing a compassion meditation such as LKM, which encourages practitioners to embrace and tend to suffering rather than to turn away from it, would decrease teachers' depersonalization towards their students. However, results of the Wilcoxon signed-rank test did not support any significant reductions of depersonalization, resulting from the LKM intervention. At Time 1, teachers reported average to low levels of depersonalization when compared to the normative means established by Maslach et al. (1996). Prior to intervention, teachers C and D scored more than one standard deviation below the normative mean. Interestingly, only these two teachers showed reductions in depersonalization, while the remaining three teachers showed increases that ranged from 2–4 points in this subscale.

The depersonalization subscale contains five items, which are scored on a 0–6 scale, where 0 = "never" and 6 = "every day." Thus, scores on this subscale can range from 0–30. At Time 1, teacher C reported an overall depersonalization score of 2, responding to all items as "never" with the exception of item 10, "I've become more callous towards people since I took this job," where she reported a score of 2 (i.e., feeling this way "once a month"). This teacher's depersonalization score reduced to 0 at Time 2, indicating "never" responses to all items on this subscale, the lowest possible subscale score. Teacher E also had a low depersonalization score at Time 1 (i.e., 5) but showed a 3-point reduction at Time 2. Thus, although the results were not statistically significant, it could be considered practically meaningful that two teachers were able to reduce their feelings of depersonalization in this study.

It is also important to discuss the unexpected observed increases in depersonalization that occurred within three of the teachers' survey responses. The MBI presents depersonalization items to participants that relate to teachers' callous or impersonal attitude towards others, including their students. Therefore, teachers may be reluctant to admit to experiencing these feelings when responding to items related to depersonalization. Lovingkindness meditation is a compassion practice that encourages practitioners to bring awareness and non-judgment to the suffering of themselves and others, while generating positive phrases of wellness. This practice also aims to reduce the feelings of shame or guilt that often pair with negative emotions or thoughts related to oneself and others. It is possible then, that participating in the LKM intervention allowed teachers to become more aware of and/or more likely to report their experienced symptoms of depersonalization, which could potentially explain the observed increases in depersonalization scores for three out of the five participants. Measuring other personal factors of teachers, including their social-emotional competencies such as self-

awareness, may help us better understand how LKM impacts teacher burnout, especially within the depersonalization subscale. Additionally, if LKM were found to increase depersonalization by way of self-awareness, it would be reasonable to suspect that initial increases in depersonalization might be followed by decreases, given more time in the intervention phase. Research is needed to better understand the relationship between LKM and depersonalization. Moreover, Worley et al. (2008) found the depersonalization subscale as demonstrating the lowest reliability estimates of the MBI. Thus, another potential research avenue is to improve the measurement of depersonalization.

The small sample size and mixed depersonalization outcomes in this study make it difficult to interpret how LKM impacted this aspect of teacher burnout. Research implementing other mindfulness-based interventions offer little clarity in relation to impacts on depersonalization. Although the MBPI literature is growing, further research is needed to understand impacts on depersonalization, as well as the general relationship between mindfulness, compassion, and depersonalization.

Overall, this study provides preliminary evidence to support the use of a brief, daily LKM practice to increase teachers' personal accomplishment, thereby improving one factor of burnout. More research, with larger samples and greater statistical power, is needed to understand how LKM can impact the various factors of teacher burnout and well-being. If teacher SEC and well-being are truly the foundational element for a healthy classroom climate and teacher-student relationships, and can lead to improved outcomes for teachers and students (Jennings & Greenberg, 2009), then it is essential that researchers develop studies aimed at understanding these relationships and how LKM may influence teachers' social-emotional competence, at the

holistic and individual levels. The present study assessed the impacts of LKM on one factor related to teacher SEC, emotion regulation.

Lovingkindness Meditation and Emotion Regulation

Emotion regulation is a skill or competency related to self-management, one of the SECs described by Jennings and Greenberg (2009) and derived from research on students' social-emotional learning (CASEL, 2003). Researchers implementing LKM as an intervention frequently assess emotion regulation outcomes, and studies demonstrate a wide range of measurement methods including task assessments, brain imaging (*f*MRI), and self-report instruments. Results of these studies are often based on general population or university samples. Alternatively, studies implementing mindfulness-based interventions with teacher samples typically utilize multi-component MBPIs, that often include elements of compassion practices similar to LKM. One of the instruments commonly used for measuring emotion regulation in these studies is the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003).

The ERQ measures emotion regulation by assessing individuals' use of strategies and their perceived effectiveness in two areas: cognitive reappraisal (i.e., re-framing one's thoughts to feel differently about a situation) and expressive suppression (i.e., concealing the expression of experienced emotions). Cognitive reappraisal is considered an adaptive emotion regulation strategy (Jennings & DeMauro, 2017) that contributes to teachers' overall SEC (Collie & Perry, 2019). Some have found cognitive reappraisal as having a significant, positive correlation to mindfulness skills (Braun, Schonert-Reichl, & Roeser, 2020). Although expressive suppression is also considered an emotion regulation strategy, it is often considered a maladaptive strategy (Braun, Roeser et al., 2020) due to its links with undesirable outcomes (Preece et al., 2019), including increased teacher burnout (e.g., Brotheridge & Grandey, 2002), higher levels of

negative affect and lower levels of positive affect (Haga et al., 2009). Moreover, increases in cognitive reappraisal and reductions in expressive suppression are commonly reported outcomes of studies implementing MBPIs in teacher samples. In my study, I wanted to examine whether LKM could positively influence teachers' emotion regulation, thereby producing similar effects as studies implementing multi-component MBPIs, or as those implementing LKM in non-teacher samples.

Intervention Effects of Lovingkindness Meditation on Emotion Regulation

The LKM intervention was applied in this study to examine effects on teachers' cognitive reappraisal and expressive suppression, as measured by the 10-item ERQ. The teachers in this study were given a set of 10 items and indicated their degree of agreement with each statement by selecting numbers on a 1–7 scale, where 1 = strongly disagree, 4 = neutral, and 7 = strongly agree. Emotion regulation was measured before and after the LKM intervention. I then applied the non-parametric Wilcoxon signed-rank test to analyze effects of the LKM intervention on teachers' reported use of the two emotion regulation strategies.

Results of my analysis suggested that the LKM intervention was effective in increasing teachers' cognitive reappraisal. Self-report data indicated that four of the five teachers increased their use of cognitive reappraisal from Time 1 to Time 2, with increases ranging from 1–11 points on the six-item subscale. The remaining teacher showed no change in cognitive reappraisal. Four of the five teachers also demonstrated decreased levels of expressive suppression at Time 2, with reductions ranging from 1–8 points from their Time 1 scores. However, one teacher reported an increase in expressive suppression. Therefore, the test did not support any statistically significant effects of LKM on expressive suppression. Although no statistically significant effects were detected in this subscale, it is reasonable to consider these

results practically meaningful, given that four of the five teachers reported reduced expressive suppression after participating in the LKM intervention.

The findings of the present study align with findings from Braun, Roeser, and Mashburn (2020) and de Carvalho et al. (2021) in that my analysis detected statistically significant increases in cognitive reappraisal. Braun, Roeser, and Mashburn detected medium effect sizes in cognitive reappraisal (d = .57) resulting from their implementation of the MBEB program. de Carvalho et al. also reported statistically significant increases in cognitive reappraisal following their three-component mindfulness-based intervention. The version of the MBEB program piloted in the study of Braun, Roeser, and Mashburn was an 8-week program, involving nine sessions and 27.5 hours of teacher participation. Similarly, the 10-week program implemented by de Carvalho et al. required 30 hours of teacher participation and included a 5-hour follow-up session. The present study implemented a single-component LKM intervention over a 3-week duration, which required about 3.5 hours of teacher participation. Thus, the findings of this study suggest that increases in cognitive reappraisal that have been demonstrated in multi-component MBPI implementation studies, might also be achieved through a brief, daily LKM intervention, demanding less time from teachers and requiring fewer resources to implement. Researchers have also demonstrated effects of MBPIs on expressive suppression.

In a Portuguese teacher sample, de Carvalho et al. (2021) reported statistically significant effects of their mindfulness-based intervention on teachers' reported expressive suppression scores, where teachers' average expressive suppression reduced from 4.23 to 3.28 following the intervention. Though it is not specified in their study, it appears that de Carvalho et al. (2021) averaged item scores on the expressive suppression subscale to calculate teachers' overall scores, whereas data analysis in the present study was performed on summed subscale scores. Braun,

Roeser, and Mashburn (2020) also examined the effects of their intervention on expressive suppression and reported small effect sizes.

Self-reported emotion regulation has also been studied at a holistic level, combining teacher reports of cognitive reappraisal and expressive suppression. For example, Jennings et al. (2017) measured teachers' adaptive emotion regulation by reverse-scoring items on the expressive suppression subscale of the ERQ and averaging these subscale scores with cognitive reappraisal scores. Their study demonstrated that teachers who participated in their mindfulness-based intervention (i.e., CARE), reported increased use of adaptive emotion regulation strategies. Others have reported conflicting findings related to emotion regulation, indicating that some MBPIs may not impact emotion regulation strategies such as expressive suppression and cognitive reappraisal (e.g., Harris et al., 2016). More research is needed to understand the direct impact of MBPI and LKM implementation on teachers' expressive suppression.

The present study yielded mixed results regarding impacts of LKM on teachers' emotion regulation strategies, measured through self-reports. Although LKM did appear to produce some effects on teachers' emotion regulation with respect to their cognitive reappraisal, no statistically significant effects emerged in relation to their expressive suppression. It is also important to note that in the present study, I performed a one-tailed test on both subscales of emotion regulation, using summed scores. However, performing a two-tailed test might be more appropriate here, given the limited research on the relationship between LKM and cognitive reappraisal. Performing a two-tailed test would result in a *p*-value twice as large and therefore, the effects of LKM on cognitive reappraisal should be interpreted with caution. Additionally, non-effects present in this study may be explained by Fredrickson et al. (2008), who suggest that changes in emotion may take more time to build. Thus, future research may consider utilizing a longer-

spanning LKM intervention if impacts on teachers' self-reported emotions and emotion regulation are desired. However, it is also worth mentioning that statistically significant improvements in self-reported emotion regulation may not have practically significant implications for other teacher outcomes such as prosocial behaviors related to SEC.

Jennings and Greenberg (2009) suggested that teacher SEC and well-being serve as the foundation for the prosocial classroom model, influencing classroom climate, teacher-student relationships, and students' academic, social-emotional, and behavioral outcomes. However, some investigating impacts of LKM and mindfulness interventions on emotion regulation and prosocial behaviors have demonstrated changes in neural mechanisms related to emotion regulation, arousal, executive function, and prosocial behaviors (e.g., Carroll et al., 2021; Weng et al., 2013). Evidence from these studies suggest that active control conditions can produce similar effects in self-reported emotion regulation as mindfulness and LKM interventions. However, in an Australian teacher sample, Caroll et al. found that only their mindfulness group demonstrated changes in brain regions and neural mechanisms associated emotion regulation.

Given these findings, it is possible that self-reports of emotion regulation are impacted even when neural mechanisms involved in emotion regulation are not. Yet changes in neural activity appear to be associated with greater engagement in prosocial behaviors than changes in self-reports of emotion regulation (Weng et al., 2013). This may indicate that LKM can alter individuals' perceptions or behavioral responses through neural mechanisms. This finding also suggests that cognitive reappraisal may not play a mediating role in the relationship between LKM and prosocial action. Therefore, although I detected statistically significant changes in cognitive reappraisal through self-reports of emotion regulation, these changes do not necessarily

indicate meaningful practical implications for outcomes such as teacher well-being, classroom climate and teacher-student relationships.

These findings have implications for the way researchers work to understand relationships between MBPIs, including LKM, and observations and self-reports of teachers' SECs and prosocial behaviors, including the observed quality of teacher-student interactions. If emotion regulation is conceptualized as a SEC strategy, the prosocial classroom model would suggest that enhancing teachers' emotion regulation can lead to improvements in TSIQ. However, whether improvements in TSIQ are observed or deemed statistically significant may depend on how emotion regulation is measured. Thus, researchers should take caution when relating self-reported emotion regulation to classroom climate, TSIQ, or teacher-student relationships. Further, when measuring intervention effects on self-reported emotion regulation, experiments should be carefully controlled, as this outcome may be susceptible to change by a variety of factors. Although it is possible that LKM may impact TSIQ through changes in neural mechanisms responsible for affect and behavior, I did not collect any brain imaging data. Therefore, I can only discuss the directly observed impacts of LKM on teacher-student interaction quality.

Lovingkindness Meditation Impacts on Teacher-Student Interaction Quality

This study found that LKM was effective in enhancing some aspects of TSIQ, though outcomes were inconsistent across the five cases. Visual analysis results indicated that cases A and C were the only two cases to demonstrate domain-level improvements across emotional support (ES), classroom organization (CO), and instructional support (IS). Similarly, these two cases presented the most improvements of all cases at the dimension-level, where the only

dimension that did not improve in case A was behavior management, a CO dimension, and in case C was concept development, an IS dimension.

When implementing single-case experimental designs, it is important to document whether outcomes at baseline demonstrate the need for an intervention. Cases in which low TSIQ outcomes were observed during baseline demonstrated this need and therefore had a greater opportunity to demonstrate improvements in this outcome during intervention. For example, classroom observations of case A during baseline demonstrated the lowest levels of TSIQ among the cases, in each domain of the CLASS. This case demonstrated the highest intervention need at baseline and also appeared to be the most influenced by the LKM intervention, demonstrating change in nine of the ten dimensions assessed. This was also the only case to demonstrate a NAP value greater than .85 in each of the three domains, indicating strong effect sizes. Significant relationships also emerged for this case in the ES and CO domains, indicating that the improvements in TSIQ showed continued growth throughout the intervention phase. Interestingly, the teacher in case A also reported the highest level of burnout when compared to other teachers. This was true for each burnout subscale and at both measurement times. Specifically, this teacher's emotional exhaustion was greater than 2 *SD* above the normative mean at both measurement times. Moreover, this teacher reported increased levels of emotional exhaustion and depersonalization at Time 2, only showing improvements in personal accomplishment. In some ways, the findings related to this case contradict expectations that reducing teacher burnout is a necessary step towards improving TSIQ.

In case A, the fact that TSIQ improved in many aspects, despite the teacher in this case reporting high and relatively stable levels of burnout, may be explained by several factors. It is possible that LKM was responsible for improvements in TSIQ, through mechanisms that were

not measured in this study. Supporting this explanation is the study by Weng et al. (2013), where neural mechanisms corresponding to arousal were impacted by LKM, which predicted greater prosocial behaviors in a game-based task. However, since I did not collect any neural-imaging data, it is not possible to interpret whether changes in the brain occurred at all nor whether they mediated the relationship between LKM and TSIQ. Future research exploring the impacts of LKM or MBPIs on teacher-student interaction quality may wish to measure teachers' neurophysiological or physiological outcomes to better understand these relationships.

In case A, an interesting relationship emerged where teacher burnout appeared to have a negative association with TSIQ during baseline, though this relationship appeared to weaken during intervention as TSIQ improved and burnout remained high. In other words, the teacher in case A reported high levels of burnout during baseline and demonstrated virtually no reductions in burnout resulting from the LKM intervention. However, observations of this teacher's interactions with students depict low TSIQ during baseline and demonstrate the greatest observed changes in TSIQ of all cases. This has important implications for teachers experiencing high levels of burnout and researchers wishing to offset the effects of teacher burnout on TSIQ.

Teachers who are experiencing high levels of burnout may be able to improve the quality of their interactions with students by engaging in daily lovingkindness meditation. Improving TSIQ can have beneficial effects on student outcomes and over time, may help reduce burnout by improving the classroom climate (Jennings & Greenberg, 2009). Though the teacher in case A did not demonstrate reductions in teacher burnout over the course of the study, given the high levels of burnout they reported, it is possible that more time is needed for changes in burnout to emerge. It is promising that the teacher with the highest level of burnout demonstrated significant improvements in TSIQ. These findings suggest that teachers reporting high levels of burnout,

who are associated with classrooms marked as low in TSIQ, may be prime candidates for LKM interventions. Teacher C also demonstrated little improvement in teacher burnout and among the greatest improvements in TSIQ, also demonstrating change in nine of the ten CLASS dimensions.

Examining personal accomplishment more closely may offer another explanation for this finding. Personal accomplishment was also the only subscale in which teacher A showed improvements. Thus, it is possible that personal accomplishment may have a stronger influence on TSIQ outcomes than overall burnout, emotional exhaustion, or depersonalization. Researchers should continue to examine the relationship between burnout and TSIQ at the subscale levels to better understand this relationship. Understanding burnout at the subscale level is also essential for learning how different aspects of teacher burnout impact students, both directly and through changes in TSIQ.

Another potential reason for this finding may be related to time. It is possible that teachers experiencing high levels of burnout require more time to demonstrate a change as measured by the MBI, though more time may be needed to demonstrate changes in burnout regardless of burnout level. That is, the MBI measures teacher burnout on a frequency scale, which may limit the amount of change teachers are able to express or experience within a five-week study.. For example, at Time 1, the teacher in case A assigned values of 5 and 6 to numerous MBI items. These values correspond to experiencing what the given item indicates “a few times a week” and “every day.” A value of 4 corresponds to “once a week.” Given the short duration of the intervention phase (i.e., three weeks), it would be very unlikely that a teacher reporting burnout symptoms as occurring “every day” would report them as occurring “once a week” just five weeks later, after only three weeks of LKM practice. Even if this did occur, it

would only result in a 2-point decrease, impacting the likelihood of detecting a statistically significant effect, especially in a small sample. If changes in teacher burnout take longer to appear than changes in TSIQ, then this could explain the reason for improvements in TSIQ in cases where teacher burnout did not appear to improve. Therefore, measuring burnout in a small sample or within a short-term study such as this one, may necessitate an adaptation of the MBI wherein respondents report on the intensity they experience each item rather than on the frequency. This may be a reasonable approach as Worley et al. (2008) suggested that this adaptation does not interfere with the factor structure of the instrument.

These findings imply that although LKM may not demonstrate improvements in teacher burnout, it may still be an effective intervention to use in studies aimed at enhancing teacher-student interactions and subsequent student outcomes. However, these findings also raise questions about the relationship between teacher burnout and TSIQ. More research is needed to clarify the relationship between teacher burnout and TSIQ and how these relationships are impacted by LKM. Researchers may also wish to compare intervention effects of LKM and multi-component MBPIs on TSIQ and explore whether teacher burnout plays a differential role in these relationships. Additionally, although some MBPIs have investigated impacts on student outcomes independently and in relation to TSIQ, researchers should consider conducting similar studies using LKM as an independent variable. in studies aimed at enhancing teacher-student interactions and subsequent student outcomes in studies aimed at enhancing teacher-student interactions and subsequent student outcomes.

Classroom Organization, Student Behavior Problems, and Teacher Burnout

Researchers have established a relationship between teacher burnout and student outcomes. Specifically, when teachers' levels of emotional exhaustion and depersonalization

were combined, burnout had implications for physiological markers of student stress levels (Oberle & Schonert-Reichl, 2016). Personal accomplishment, as well as depersonalization, have also been found to significantly covary with students' externalizing behavior problems (Hoglund et al., 2015). Findings from Hoglund et al. (2015) suggest that improvements in personal accomplishment and overall burnout are linked to increased classroom organization but the findings of my study present conflicting evidence when case E is examined. Although the teacher in case E demonstrated improvements in emotional exhaustion (12-point reduction) and personal accomplishment (9-point increase) at Time 2, no effects on TSIQ were observed across any of the CLASS domains and dimensions, including CO. One possible explanation for this contradiction is that levels of CO for this case were between middle- and high- quality ranges during baseline and intervention, which could present a ceiling effect, making it more difficult to interpret how changes in burnout relate to changes in CO. Or, it is possible that the lower number of observation minutes per cycle in this case influenced estimates of TSIQ, weakening the validity of results related to this outcome.

Although Hoglund et al. (2015) found that instructional support decreased throughout the school year, several cases in this study demonstrated increases in instructional support during intervention. If findings from Hoglund et al. (2015) are generalizable to the sample in my study, it is reasonable to expect observed decreases in instructional support throughout baseline (i.e., a negative trend). However, this was not observed across four of the five cases, when examining the IS data across baseline. One potential reason for relatively stable baseline levels of instructional support in the other cases is the short length of the baseline phase (i.e., two weeks), compared to the aforementioned study, which measured TSIQ throughout the entire school year.

The only teacher whose baseline instructional support data is aligned with findings of Hoglund et al. was teacher C. In this case, visual analysis supported a negative trend in baseline and a positive trend during intervention. This case also demonstrated the lowest levels of classroom organization, with observational notes reflecting the most instances of externalized student behavior problems of all cases. This may provide context for understanding why levels of burnout for this teacher were the most stable, with scores in each subscale only fluctuating by two points from Time 1 to Time 2. Conversely, the teacher in case A, who reported experiencing little to no student behavior problems demonstrated increased burnout in emotional exhaustion and depersonalization. Additionally, this case demonstrated an improved level of classroom organization quality during intervention with a large effect size (*NAP* = .85).

Teacher C also demonstrated an improved classroom organization level during intervention (*NAP* = .88). Interestingly, this teacher reported students as having difficulties with emotional regulation, social awareness skills, verbal outbursts, and physical aggression. Some of these behaviors were also observed during data collection and impacted scores in the behavior management dimension of the classroom organization domain, though this case demonstrated improved classroom organization at the domain-level during intervention. Thus, student behavior problems may have different effects on teacher burnout, given different contexts. Specifically, factors related to teaching context and/or working conditions may play a more important role in teacher burnout than student behavior problems. Future research should explore other factors that contribute to teacher burnout.

Extending the research of Maslach et al. (2001), Chang (2009) suggested that factors contributing to burnout can be classified into three categories: individual factors (e.g., age, years of teaching experience, coping strategies, self-concept), organizational factors (e.g., class size,

work demands, teacher preparation, school culture), and transactional factors (e.g., teachers' attributions of student misbehaviors, perceived support, norms of student-teacher interactions, professional satisfaction). Thus, although LKM and MBPIs may be able to influence change at the individual level, this may not be sufficient to reduce burnout if organizational or transactional factors are also in need of improvement. Future research should examine the ways in which LKM and mindfulness-based interventions can impact these other sources of teacher burnout. Additionally, research is needed to better understand which of these sources contribute most to teacher burnout, their impacts on TSIQ and student outcomes, as well as their impacts on other teacher outcomes including retention, job satisfaction, and well-being.

Additional Areas for Future Research

This study included a sample of two general education teachers, two specialist teachers, and one special education teacher. However, most research studying teacher burnout and the relationship between MBPIs and burnout does not include special education teachers. For example, one meta-analysis included 893 studies measuring impacts of MBPIS on teacher well-being and found significant effects on teacher burnout. However, of the 149 studies that disclosed employment type, only 20.8% were special education teachers. If we assume that the remaining 744 studies did not include special education teachers, a major inequity is revealed in who is included in this research and offered opportunities to participate in MBPIs that can potentially improve teachers' well-being and reduce their burnout, increasing the longevity and quality of their teaching careers. Additionally, the meta-analysis did not include separate analyses for results pertaining to the special education teachers in their sample. Thus, relationships between MBPIs and class setting, employment type, and burnout remain unclear and require further investigation.

Interestingly, the math and language specialists were among the cases where TSIQ was least improved in my study. The instrument I used to measure TSIQ was designed for the general education classroom. More research is required to develop observational measurements for evaluating TSIQ in specialist and special education contexts. Developing appropriate instruments for measuring TSIQ in these contexts will help us better understand the role TSIQ plays in shaping student outcomes. Additionally, researchers who wish to investigate intervention impacts on outcomes related to the prosocial classroom model should consider how they quantify teacher well-being and SEC. Creating an assessment for evaluating SEC would improve consistency across studies, leading to a better understanding of intervention effects across all model variables, especially student outcomes. It would be beneficial to the field if teacher SEC could be assessed as a composite score an at the component-level, with subscales for each of the five competencies that compose this construct. Additionally, it may be worth creating both self-report and observational measures of SEC or considering cognitive and behavioral indicators of this outcome. Researchers interested in developing such instruments may consider adapting existing measures for assessing emotional intelligence.

Re-Evaluating Teacher Burnout

Much has changed globally, nationally, and in the field of education since the time teacher burnout data was collected at a scale large enough to produce normative values for emotional exhaustion, depersonalization, and personal accomplishment (e.g., Maslach et al., 1997). With increasing demands and accountability being placed on teachers, more frequent occurrences of school shootings, a pandemic, and rising political and economic tensions, it is no surprise that education faces a teacher shortage. When considering these changing circumstances, the widely discussed teacher retention problem, and the link between teacher burnout and teacher

turnover, it is reasonable to suspect that normative levels of teacher burnout today are not as they were nearly 30 years ago. In other words, the normative means provided by Maslach et al. (1996) may not provide an accurate point of comparison for teachers in the current study.

Researchers should consider re-evaluating the "norm" levels of teacher burnout as they exist today. When evaluating teacher burnout, researchers should also consider collecting other contextual data, including teacher specialization area, classroom context, grade level, and years of teaching experience. A national survey of teachers that also collects this type of data would help re-evaluate the normative levels of teacher burnout in today's current climate and determine whether differences exist between sub-groups. Research is also needed to understand how burnout may differentially impact teacher, classroom, and student outcomes in general and special education contexts. This issue can be addressed with the inclusion of more special education teachers in studies relating to MBPIs, teacher burnout, and SEC.

Contributions

The current study adds a valuable contribution to research on intervention research aimed at improving teacher burnout, teacher SEC, and TSIQ. LKM is a practice related to the use of MBPIs and compassion-based interventions. My findings suggest that LKM can lead to improvements in TSIQ but more research is needed to specify which areas of TSIQ are most likely to improve or demonstrate the greatest improvements through LKM and in what contexts.

Other studies demonstrating effects of MBPIs on burnout or emotion regulation require between 20 and 30 hours of teacher participation (e.g., Braun, Roeser, & Mashburn, 2020; Carroll et al., 2021; de Carvalho et al., 2021, Jazaeiri et al., 2013), often lasting 8–10 weeks in length and sometimes requiring teachers to complete "homework" or attend full-day immersion experiences. The LKM intervention used in this study required only three weeks of daily

practice, with less than 3.5 hours of total intervention participation and yielded promising effects for increasing personal accomplishment and cognitive reappraisal. Thus, a brief daily meditation practice may be a suitable cost- and time- efficient intervention for achieving similar effects as longer multi-component MBPIs.

This study also highlighted the complexity of measuring teachers' SEC and well-being, including constructs like emotion regulation and teacher burnout and highlighted the importance of understanding relationships between these variables, and how they are measured. My study also indicates a need for research that re-evaluates present-day burnout, establishing current norm values that reflect the conditions of education today. The findings from this study present an interesting anomaly in that LKM improved TSIQ most in teachers who demonstrated little or no change in reported burnout. This is relevant for researchers studying the PCM and occupational health, and for those designing and implementing interventions geared towards reducing teacher burnout and enhancing factors across the PCM. Additionally, if research can establish more evidence supporting the use of LKM to improve TSIQ directly, it is worth investigating the cognitive or behavioral mechanisms through which this relationship may occur.

Limitations

A clear limitation of this study was the small sample size. Although I was able to interpret some effects and relationships at the individual level, results from my study should be generalized with caution to teacher populations until further research, with larger samples, investigate relationships between LKM, teacher burnout, and SEC. The small sample size also limited the types of analyses suitable for assessing differences between pre- and post-intervention levels of teacher burnout and emotion regulation. This limited the power of my study and its ability to detect statistically significant effects. Additionally, the non-parametric test

used was not based on population parameters, which also limits the generalizability of my findings.

The simple AB design used also presents some limitations. Although a small sample size is suitable for single-case research, a multiple-baseline design, in which intervention start times are staggered across participants, may have yielded greater clarity on the relationship between LKM, the independent variable in this study, and the various dependent measures that were assessed. This design would also enhance the internal validity of the study, reducing the likelihood that observed effects were due to factors other than the LKM intervention. Due to limited hours within the school day and limited personnel for conducting CLASS observations and administering the intervention, this design was not feasible. The design of this study could also be improved by collecting maintenance data after the intervention concluded. Additionally, although the WWC recommends using NAP for calculating effect size in single-case experimental designs, this metric does not account for baseline trends. Therefore, this study is limited in that I only applied the NAP metric for measuring effect size, when other metrics such as TauU can detect trends and therefore might result in different effect size estimates.

Implementing the CLASS instrument also presented some limitations. First, the version of the CLASS used in this study was designed for K–3 general education classrooms. Using this instrument in specialist and self-contained settings, therefore presents a validity threat. Additionally, Pianta et al. (2008) recommend 15- to 20- minute cycles of observation. However, specialist teachers in this sample conducted small-group lessons lasting 30–40 minutes in length. This resulted in observation cycles of 10 minutes in case E and 10–15 minutes in case D. In case E, each cycle of observation lasted a maximum of 10 minutes, which provided 33% less data to code per cycle than the desired observation length of 15 minutes. Time and setting conditions

therefore may have also influenced the validity of TSIQ results across baseline and intervention phases.

Second, observational data collection may be susceptible to observer bias, especially given that the person implementing the intervention was also involved in scoring TSIQ. This also threatens validity. I attempted to reduce this threat by collecting as much inter-rater reliability as possible throughout both phases of the study. Additionally, although inter-rater reliability scores did not always reach the recommended level of 80% agreement, each instance of disagreement was handled through discussions regarding observed interactions and recorded notes and comparing these with descriptions and instructions provided by the CLASS manual.

Limitations also related to measurement include the use of self-report instruments. It cannot be known whether teachers' responses to items on the ERQ and MBI accurately reflected their experiences. Additionally, during Time 1, teacher E failed to respond to an item on the expressive suppression subscale of the ERQ. I therefore calculated this teacher's subscale without that item data, essentially assigning a score of 0 to that item. Although findings related to this subscale were not found to be statistically significant, calculating the subscale in this way could increase the likelihood of a Type 2 error. However, due to expressive suppression scores of other participants, it is unlikely that this decision impacted the overall results related to this outcome.

Lastly, all five participants in this study volunteered to participate. Random selection was not possible in this study due to the limited number of interested teachers, which was exacerbated by the grade-level parameters of the observational instrument used to assess TSIQ. Therefore, a self-selection bias may be present in that teachers who volunteered to participate in

this study may be more likely to respond to the LKM intervention, leading to a higher likelihood of significant findings.

Conclusion

Teacher burnout, the growing teacher shortage, and teacher retention are topics that are commonly discussed among school administrators, teacher preparation leaders, and educational researchers. When attempting to address these issues, many turn to teacher preparation and development, pushing initiatives designed for improving teacher effectiveness. Although improving teacher effectiveness is one avenue towards enhancing self-efficacy, it does not address the myriad of other factors that contribute to teachers' burnout and decisions to leave the field. When job demands contribute to teacher burnout, it is counterintuitive to propose solutions that only add to these demands, yet this is becoming a common practice. Our society continues to increase demands on teachers, especially of those working with special education and high-need populations. However, as researchers have pointed out, many organizational factors contribute to teacher burnout. Moreover, these organizational factors often present working conditions that teachers have no control over, which when damaged may exacerbate other negative symptoms related to burnout, well-being, and job-satisfaction, all of which contribute to teacher turnover.

Emotional exhaustion is one of the most prevalent and obvious signs of teacher burnout. Depersonalization, distancing oneself from others and forming an unhealthy detachment, is a symptom of burnout that can serve to ameliorate emotional exhaustion but often does so at the expense of oneself and of one's students. It is important to ask then, who is most at-risk for experiencing emotional exhaustion? Potential answers may include teachers in under-resourced and under-funded schools, teachers who work with students who present academic, emotional, or behavioral challenges, or teachers experiencing high levels of conflict within their schools, or

teachers experiencing all of these conditions at once. Now, take any of these conditions and apply them to a teacher who has become so depersonalized after years of emotional exhaustion that they no longer care about their job or their students. This teacher laughs off issues related to organizational structures and administration and has adopted an attitude of "not caring." Now, ask yourself, how likely do you think it is that this teacher will decide to leave the field? Also consider, how does their decision to stay or leave impact their self and their students?

Next, apply this scenario to a teacher who is heavily invested in their students' growth and development, constantly taking advantages of opportunities to further their own learning, often working beyond their contractual hours and spending their own money to ensure their students are having high-quality educational experiences. This teacher is frustrated by their perceived injustices in organizational and administrative processes and policies, feeling powerless and worried about how these factors will impact their students. Again, I encourage you to ask yourself, how likely is it that this teacher will decide to leave the field? How does their decision to stay or leave impact their self and their students?

Neither teacher in these scenarios may be adopting the "right" approach. In fact, it is possible that these two teachers are the same person, viewed at different points in their career. Teachers who are emotionally invested in their students and their jobs may be among the most likely to experience emotional exhaustion. Over time, this can lead to a teacher's decision to leave the field or contribute to their depersonalization. Neither path is ideal, and both can create damaging effects on student outcomes. Further, teachers in high-need school districts or those working with students who present academic, emotional, or behavioral challenges, may face higher risks of burnout. In this way, organizational factors may contribute to disproportionalities in teacher burnout, leading to inequities in subsequent student outcomes.

I designed this study because I was determined to find a solution for caring teachers to remain in the field and continue providing high quality levels of instruction and support for their students, without sacrificing their own well-being. I believed that cultivating compassion through lovingkindness meditation could contribute to positive outcomes for teachers and students and could provide teachers a way to care for their students, while also caring for themselves. In this way, teachers could learn to acknowledge and tend to the suffering of themselves and of others in a way that can lift or prevent emotional exhaustion. This study showed that lovingkindness meditation had meaningful effects on the quality of teacher-student interactions, though weaker evidence was found in relation to teacher burnout. Although compassion meditation cannot solve all the issues that contribute to teacher burnout, it can provide teachers with a healthy strategy for coping with factors beyond their control.

It is imperative to enact policies that prioritize teacher well-being and to develop and support initiatives for enhancing teachers' social-emotional competencies in ways that can foster teacher resilience, promote their well-being, and enhance the quality of teacher-student relationships. However, this responsibility should not fall solely on the shoulders of teachers, who already face a mounting pile of demands. Instead, societal and school cultures should adopt values and missions that prioritize teacher well-being and resilience and uphold these missions through their policies and actions. Until then, teachers can learn to care for themselves in ways that cultivate inner peace and compassion, which translate to prosocial behaviors, positively impacting those around them, including the students in their care. This compassion serves as an anchor for teachers, allowing them to remain undisturbed in the stormy seas brought on by inequitable or unjust working conditions and educational or administrative policies.

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Appendix A

Talking Points for Informational Meetings with Recruited Teachers

Talking points for initial meeting with teachers who show interest:

- Thank them for their willingness to participate – express gratitude for their willingness to help with my dissertation study – truly did my best to maximize their benefits while minimizing their obligations
- Talk about potential benefits: well-being, stress-reduction, improvement of occupational health and teaching practices, more positive classroom climate
- State the importance of
    - completing meditation daily before school either in-person or via Google Meet. If miss the morning meditation, should complete at some point in the day and let me know when completed so I can document.
    - Selecting a 45-minute block of instruction that I can come observe – okay if small-group or whole class or switching between subjects.
- explain to them that not all participating teachers will start at the same time, so it is important not to share their experiences with each other because it may compromise the integrity of the study.
- Show them the intervention website and how to access all of their materials including optional online journal.
- Explain how online journal can be used throughout the study.
- Review financial incentives and explain that I can also review their observation scores with them after the study if they are interested.
- Ask if there are any questions and answer questions
- Let them know that I will periodically text or call them to check on their progress and remind them of any uncompleted tasks.
- Explain consent form and ask them if they have any questions – direct them to link to sign virtual consent form when ready.

Appendix B

Introductory Script for Lovingkindness Meditation Intervention

Welcome to today's practice.

As you embark on today's practice, you will be asked to direct phrases of lovingkindness towards yourself or towards others. I encourage you to find a phrase that is easy to remember and feels true to you. Some examples are "May I be happy" "May I be at ease" or "May I be free of mental and physical suffering." Other suggestions will be offered throughout your practice, but please feel free to improvise and choose your own phrases. As you participate, it is perfectly natural, and expected, for your mind to wander during these exercises. If you find your mind wandering, you can simply recognize the mind wandering as "thinking" and return to your anchor: the phrases of lovingkindness. During practice, try to sit up tall, with your back straight, and feet planted on the floor if you're in a chair, or crossed in front of you if sitting on the floor. You may choose to rest your hands on your knees with palms facing up or down, or you may wish to place one hand on your heart.

You will start with directing these phrases of lovingkindness towards yourself and then turn towards others. As you direct these phrases of lovingkindness towards others, I want you to try to keep the focus on individuals within your workplace. This may include fellow teachers, colleagues, administrators, school staff and personnel, or your students. In these meditations, you will be asked to bring to mind individuals you care deeply for and who you feel care deeply for you, as well as neutral parties, and even individuals you find challenging. Again, I encourage you to select individuals with whom you work, including your students. Perhaps you choose a student who is charismatic and easy to teach for the benefactor and for the difficult person you may choose a student with whom you have difficulty forming a positive relationship. During practice, you may experience some emotional responses, you can acknowledge these and direct the phrases back to yourself and care for yourself, as needed. And please don't worry if you can't remember all of this. You will be guided through each of these steps throughout the meditation – my aim here is only to encourage you to apply these practices towards your teaching or work life, when possible. Of course, you may also wish to include people from other aspects of your life as well.

Are there any questions before we begin?

You may now begin by taking a deep breath in, close your eyes, and breathe out. You may keep your eyes closed for the meditation, or you can leave them slightly open with your gaze facing downward.
[begin playing audio clip]

Appendix C

Critical Values for the Wilcoxon Signed-Rank Test

Wilcoxon Signed-Rank Test Critical Values Table

Reject H_0 if the test value is less than or equal to the value given in the table.

n	One tailed, $\alpha = 0.05$ Two tailed, $\alpha = 0.10$	$\alpha = 0.025$ $\alpha = 0.05$	$\alpha = 0.01$ $\alpha = 0.02$	$\alpha = 0.005$ $\alpha = 0.01$
5	1	--	--	--
6	2	1	--	--
7	4	2	0	--
8	6	4	2	1
9	8	6	3	2
10	11	8	5	3
11	14	11	7	5
12	17	14	10	7
13	21	17	13	10
14	26	21	16	13
15	30	25	20	16
16	36	30	24	19
17	41	35	28	23
18	47	40	33	28
19	54	46	38	32
20	60	52	43	37
21	68	59	49	43
22	75	66	56	49
23	83	73	62	55
24	92	81	69	61
25	101	90	77	68
26	110	98	85	76
27	120	107	93	84
28	130	117	102	92
29	141	127	111	100
30	152	137	120	109

Appendix D

Visual Analysis Results Matrix

 = Level = Trend  = Level & Trend

	CLASS Domain Averages		
Case	Emotional Support	Classroom Organization	Instructional Support
A			
B			
C			
D			
E			

	Emotional Support Dimensions			
Case	Positive Climate	Negative Climate	Teacher Sensitivity	Regard for Student Perspectives
A				
B				
C				
D				
E				

	Classroom Organization Dimensions		
Case	Behavior Management	Productivity	Instructional Learning Formats
A		✓	✓
B			
C	✓	✓	✓
D			✓
E			

	Instructional Support Dimensions		
Case	Concept Development	Quality of Feedback	Language Modeling
A	✓	✓	✓
B	✓	✓	✓
C		✓	✓
D			
E			

Appendix E

Visual Analysis Matrix: Unintended Effects

Opposite direction level ✕ Opposite direction trend ✕ Opposite direction level & trend ✕

	CLASS Domain Averages		
Case	Emotional Support	Classroom Organization	Instructional Support
A			
B			
C			
D			✕
E		✕	✕

	Emotional Support Dimensions			
Case	Positive Climate	Negative Climate	Teacher Sensitivity	Regard for Student Perspectives
A				
B				
C				
D				
E	✕	✕		

	Classroom Organization Dimensions		
Case	Behavior Management	Productivity	Instructional Learning Formats
A			
B			
C			
D			
E			✕

	Instructional Support Dimensions		
Case	Concept Development	Quality of Feedback	Language Modeling
A			
B			
C			
D	✕	✕	
E	✕	✕	

Appendix F

Wilcoxon Signed-Rank Test Calculations: Burnout

Table F1

Emotional Exhaustion Calculations

Case	Emotional Exhaustion at Time 1 y_i	Emotional Exhaustion at Time 2 x_i	Difference $d_i = y_i - x_i$	Absolute Value of Difference $\lvert d_i \rvert$	Rank of Absolute Difference (sign)
A	48	50	-2	2	2.5(-)
B	25	24	1	1	1(+)
C	29	27	2	2	2.5(+)
D	38	32	6	6	4(+)
E	29	17	12	12	5(+)

$$T_- = \left\{\frac{[n(n+1)]}{2}\right\} - T_+$$

$$T_+ = 1 + 2.5 + 4 + 5 = 12.5$$

$$T_- = \left\{\frac{[5(5+1)]}{2}\right\} - 12.5$$

$$T_- = 2.5$$

$$W = 2.5$$

Table F2

Depersonalization Calculations

Case	Depersonalization at Time 1 y_i	Depersonalization at Time 2 x_i	Difference $d_i = y_i - x_i$	$\lvert d_i \rvert$	Rank of absolute difference (sign)
A	12	16	-4	4	4.5(-)
B	10	14	-4	4	4.5(-)
C	2	0	2	2	1.5(+)
D	4	6	-2	2	1.5(-)
E	5	2	3	3	3(+)

$$T_- = \left\{\frac{[n(n+1)]}{2}\right\} - T_+$$

$$T_+ = 1.5 + 3 = 4.5$$

$$T_- = \left\{\frac{[5(5+1)]}{2}\right\} - 4.5$$

$$T_- = 10.5$$

$$W = 10.5$$

Table F3

Personal Accomplishment Calculations

Case	Personal accomplishment at Time 1 y_i	Personal accomplishment at Time 2 x_i	Difference $d_i = y_i - x_i$	$\lvert d_i \rvert$	Rank of absolute difference (sign)
A	28	34	-6	6	3 (-)
B	28	35	-7	7	4(-)
C	39	37	2	2	1(+)
D	40	45	-5	5	2(-)
E	34	43	-9	9	5(-)

$$T_{-} = \left\{\frac{[n(n+1)]}{2}\right\} - T_{+}$$

$$T_{+} = 1$$

$$T_{-} = \left\{\frac{[5(5+1)]}{2}\right\} - 1$$

$$T_{-} = 15 - 1 = 14$$

$$W = 1$$

Appendix G

Wilcoxon Signed-Rank Test Calculations: Emotion Regulation

Table G1

Cognitive Reappraisal Calculations

Case	Cognitive reappraisal at Time 1 y_i	Cognitive reappraisal at Time 2 x_i	Difference $d_i = y_i - x_i$	$\lvert d_i \rvert$	Rank of absolute difference (sign)
A	24	24	0	0	1(+/-)*
B	26	31	-5	5	4 (-)
C	28	29	-1	1	2 (-)
D	12	23	-11	11	5 (-)
E	24	26	-2	2	3 (-)

*This rank is dropped due to the zero difference for Case A (see Pratt, 1959).

$$T_- = \left\{\frac{[n(n+1)]}{2}\right\} - T_+$$

$$T_+ = 0$$

$$T_- = \left\{\frac{[5(5+1)]}{2}\right\} - 0$$

$$T_- = 15$$

$$W = 0$$

Table G2

Expressive Suppression Calculations

Case	Expressive suppression at Time 1 y_i	Expressive suppression at Time 2 x_i	Difference $d_i = y_i - x_i$	$\lvert d_i \rvert$	Rank of absolute difference (sign)
A	18	17	1	1	1 (+)
B	19	15	4	4	3 (+)
C	4	6	-2	2	2 (-)
D	21	13	8	8	5 (+)
E	20	15	5	5	4 (+)

$$T_- = \left\{\frac{[n(n+1)]}{2}\right\} - T_+$$

$$T_+ = 1 + 3 + 4 + 5 \; = \; 13$$

$$T_- = \left\{\frac{[5(5+1)]}{2}\right\} - 13$$

$$T_- = \; 2$$

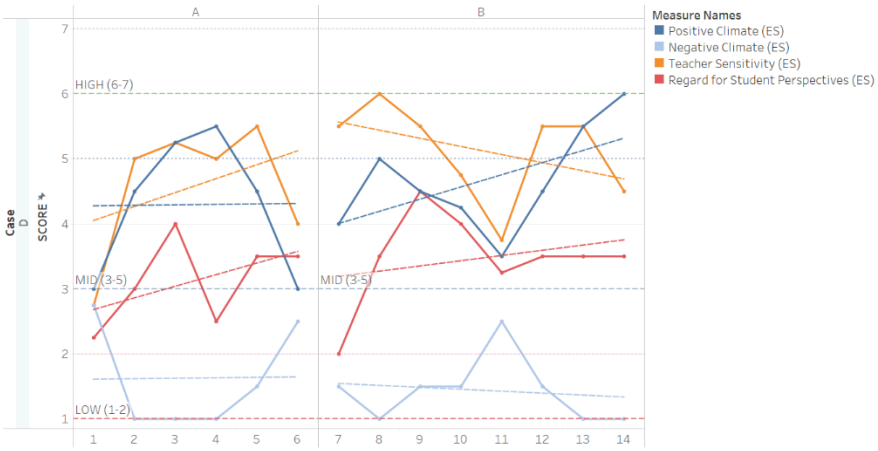
$$W = 2$$

Appendix H

Single-Case Experimental Graphs for CLASS Dimensions

Figure H1

Emotional Support Dimensions


A
B
Case
D
SCORE
HIGH (6-7)
MID (3-5)
LOW (1-2)
Measure Names
Positive Climate (ES)
Negative Climate (ES)
Teacher Sensitivity (ES)
Regard for Student Perspectives (ES)

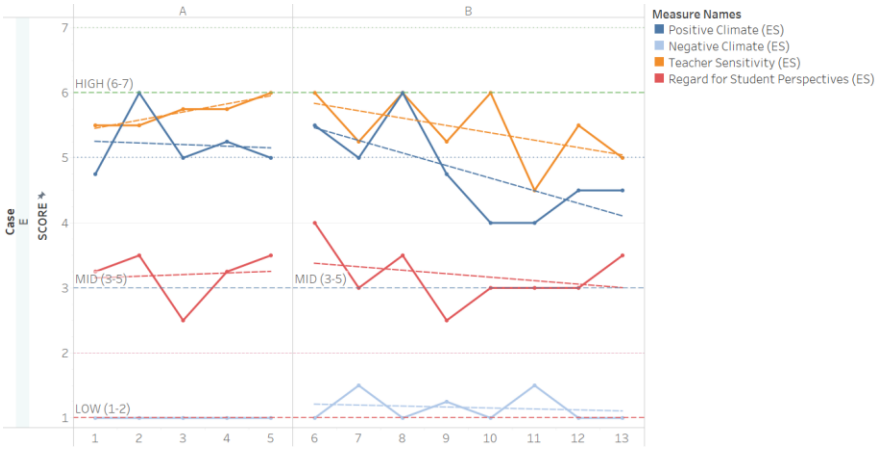
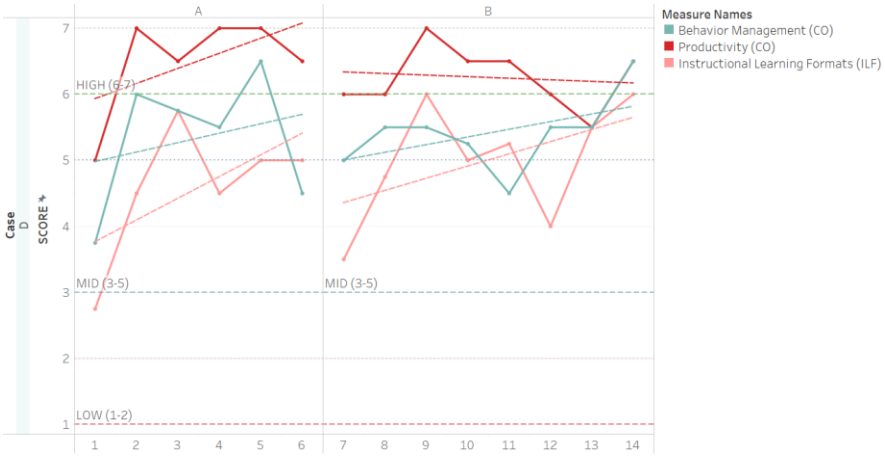

A
B
Case
E
SCORE
HIGH (6-7)
MID (3-5)
LOW (1-2)
Measure Names
Positive Climate (ES)
Negative Climate (ES)
Teacher Sensitivity (ES)
Regard for Student Perspectives (ES)

Figure H2

Classroom Organization Dimensions


A
B
Measure Names
Behavior Management (CO)
Productivity (CO)
Instructional Learning Formats (ILF)
Case D
SCORE
HIGH (6-7)
MID (3-5)
LOW (1-2)
1 2 3 4 5 6 7 8 9 10 11 12 13 14

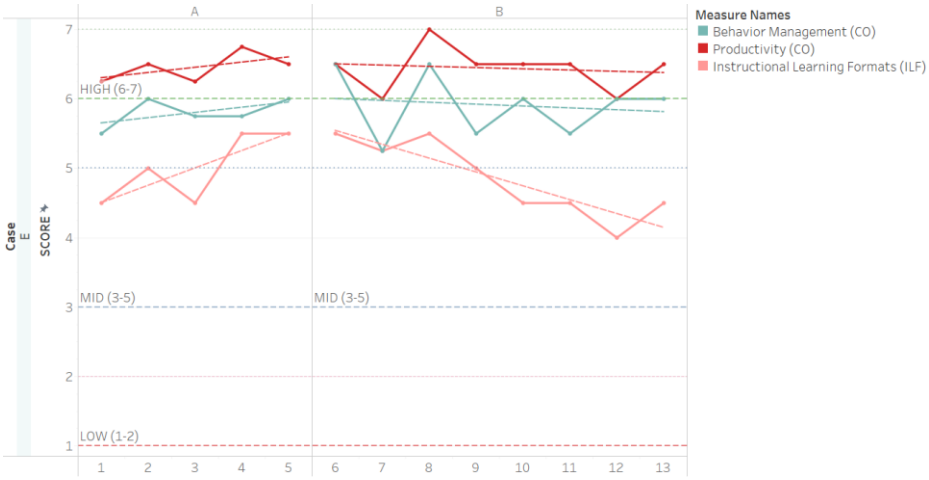
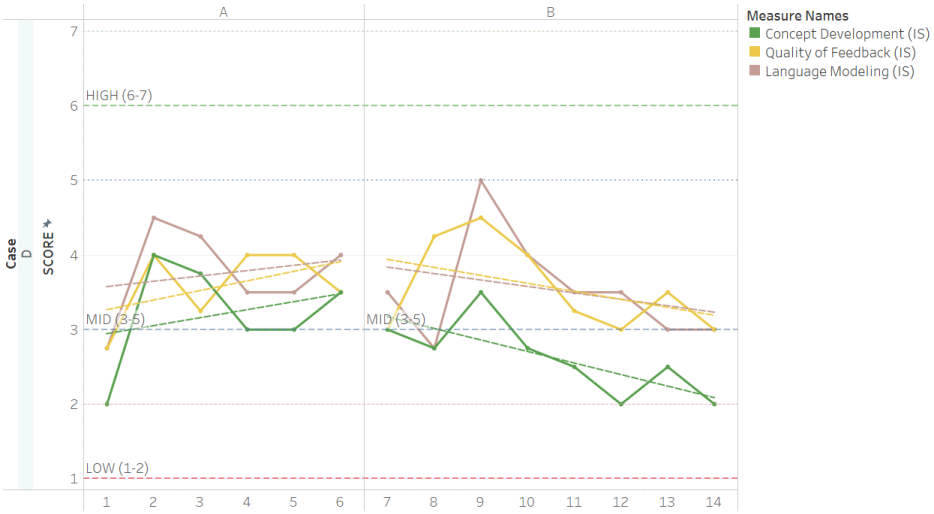
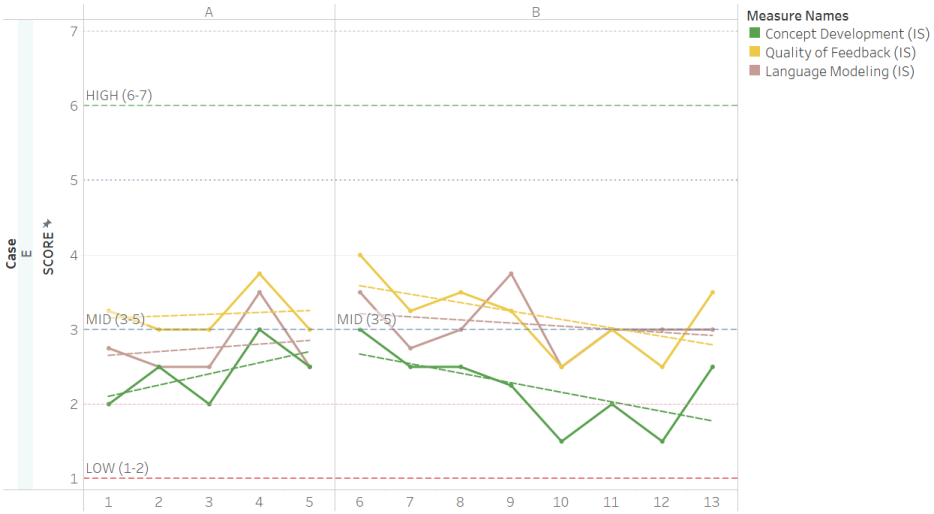

A
B
Measure Names
Behavior Management (CO)
Productivity (CO)
Instructional Learning Formats (ILF)
Case E
SCORE
HIGH (6-7)
MID (3-5)
LOW (1-2)
1 2 3 4 5 6 7 8 9 10 11 12 13

Figure H3

Instructional Support Dimensions


A
B
Measure Names
Concept Development (IS)
Quality of Feedback (IS)
Language Modeling (IS)
Case D
SCORE
HIGH (6-7)
MID (3-5)
LOW (1-2)
7
6
5
4
3
2
1
1 2 3 4 5 6 7 8 9 10 11 12 13 14


A
B
Measure Names
Concept Development (IS)
Quality of Feedback (IS)
Language Modeling (IS)
Case E
SCORE
HIGH (6-7)
MID (3-5)
LOW (1-2)
7
6
5
4
3
2
1
1 2 3 4 5 6 7 8 9 10 11 12 13

Appendix I

NAP Effect Sizes for all TSIQ Outcomes

Table I1

Domain-Level effect Sizes

Emotional support			
Case	*NAP*	*SE*	95% CI
A	.91	.09	[.62, .98]
B	.64	.20	[.34, .85]
C	.71	.17	[.40, .89]
D	.67	.15	[.36, .87]
E	.25	.16	[.08, .58]
Classroom organization			
Case	*NAP*	*SE*	95% CI
A	.85	.10	[.55, .96]
B	.65	.16	[.35, .86]
C	.88	.12	[.56, .97]
D	.45	.18	[.20, .73]
E	.47	.18	[.21, .76]
Instructional support			
Case	*NAP*	*SE*	95% CI
A	.90	.07	[.61, .98]
B	.91	.07	[.60, .98]
C	.68	.16	[.37, .87]
D	.31	.17	[.12, .62]
E	.59	.18	[.29, .83]

Table I2

Dimension-Level Effect Sizes for Emotional Support

Positive climate			
Case	*NAP*	*SE*	95% CI
A	.84	.12	[.54, .95]
B	.66	.15	[.36, .86]
C	.71	.16	[.40, .89]
D	.57	.17	[.29, .81]
E	.28	.15	[.09, .60]
Negative climate			
Case	*NAP*	*SE*	95% CI
A	.77	.12	[.47, .92]
B	.66	.15	[.36, .86]
C	.72	.15	[.41, .90]
D	.52	.18	[.25, .78]
E	.31	.12	[.11, .63]
Teacher sensitivity			
Case	*NAP*	*SE*	95% CI
A	.80	.12	[.50, .94]
B	.66	.18	[.36, .86]
C	.68	.17	[.37, .87]
D	.69	.15	[.38, .88]
E	.36	.17	[.14, .67]
Regard for student perspectives			
Case	*NAP*	*SE*	95% CI
A	.91	.08	[.62, .98]
B	.78	.14	[.47, .93]
C	.61	.18	[.32, .84]
D	.64	.16	[.34, .85]
E	.44	.18	[.19, .73]

Table I3

Dimension-Level Effect Sizes for Classroom Organization

Behavior management			
Case	*NAP*	*SE*	95% CI
A	.53	.16	[.27, .77]
B	.54	.16	[.27, .79]
C	.78	.15	[.47, .93]
D	.44	.19	[.20, .72]
E	.57	.17	[.28, .82]
Productivity			
Case	*NAP*	*SE*	95% CI
A	.88	.09	[.58, .97]
B	.46	.17	[.21, .73]
C	.85	.12	[.54, .96]
D	.30	.17	[.11, .61]
E	.50	.17	[.23, .77]
Instructional learning formats			
Case	*NAP*	*SE*	95% CI
A	.93	.06	[.64, .99]
B	.83	.09	[.52, .95]
C	.78	.13	[.47, .93]
D	.65	.15	[.35, .86]
E	.41	.17	[.01, .71]

Table I4

Dimension-Level Effect Sizes for Instructional Support

Concept development			
Case	*NAP*	*SE*	95% CI
A	.74	.14	[.44, .91]
B	.72	.15	[.41, .90]
C	.47	.18	[.22, .74]
D	.22	.15	[.07, .53]
E	.41	.17	[.01, .71]
Quality of feedback			
Case	*NAP*	*SE*	95% CI
A	.83	.11	[.53, .95]
B	.88	.09	[.56, .97]
C	.73	.14	[.42, .90]
D	.49	.17	[.23, .76]
E	.54	.17	[.25, .80]
Language modeling			
Case	*NAP*	*SE*	95% CI
A	.89	.08	[.60, .98]
B	.82	.11	[.51, .95]
C	.72	.15	[.41, .90]
D	.38	.02	[.16, .67]
E	.76	.16	[.43, .93]