SOCIAL-EMOTIONAL CLASSROOM CLIMATE:

EXPLORING THE ROLES OF TEACHERS, STUDENTS,

AND SEL IMPLEMENTATION SUPPORTS

A Dissertation

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Linking Statement

Historically, the social-emotional context of schools has not been considered by researchers and educators. Thirty years ago, Pintrich (1991) called attention to this issue, stating that "emotions are intimately involved in every aspect of the teaching and learning process and, therefore, an understanding of the nature of emotions within the school context is essential" (p. 199). Pintrich's message remains salient today and is perhaps even more important given the social and emotional demands placed on teachers and students during the global pandemic.

Teachers and students constantly interact with each other throughout the day (Hamre et al., 2013), while also experiencing a range of emotions, such as anxiety, stress, happiness, pride, and rejection (Valiente et al., 2020). Therefore, teachers' and students' coping skills and interpersonal abilities permeate the classroom environment. Although there is an increased interest in school-based social-emotional factors, including teacher well-being (Grant et al., 2019) and student social-emotional learning (SEL; Haymovitz et al., 2018), there remains a limited understanding of the mechanisms through which teachers foster healthy social-emotional classroom climates conducive to learning. Healthy classroom climate consists of daily supportive, responsive, engaging, and effective teacher-student interactions (Moen et al., 2019). In turn, these high-quality interactions are associated with important social-emotional and academic student outcomes (Cash et al., 2019; LoCasale-Crouch et al., 2018; Mashburn et al., 2008). In this three-manuscript style dissertation, I seek to understand the teacher and student factors, as well as the SEL implementation supports, that may contribute to healthy classroom climate and student outcomes.

Theoretical Framework: The Prosocial Classroom Model

My work is guided by Jennings and Greenberg's (2009) Prosocial Classroom Model. The Prosocial Classroom Model is rooted in ecological systems theory (Bronfenbrenner & Morris, 2006), therefore, it emphasizes the proximal (e.g., relationships) and distal (e.g., public policies) factors that contribute to students' learning and development; however, this model is unique because it specifically considers the classroom and school context. Broadly, Jennings and Greenberg (2009) assert that teachers' social-emotional competence (e.g., burnout, self-regulatory skills, interpersonal abilities) influences their ability to foster close teacher-student relationships, use proactive classroom management strategies, and effectively implement SEL interventions. In turn, the social-emotional classroom climate is impacted, and of course, the classroom climate has implications for students' social-emotional and academic outcomes. Notably, this model emphasizes the bidirectionality of these associations, indicating that student functioning, relationships, classroom management, SEL implementation, and classroom climate interact in various ways. Lastly, both the Prosocial Classroom Model and ecological systems theory underscore the pervasive influence of school and community factors (e.g., financial resources, parent-school relationships). Although components of the Prosocial Classroom Model are empirically supported, there is a need for more evidence and a deeper understanding of its underlying mechanisms. In this linking statement, I situate my dissertation within the Prosocial Classroom Model, highlighting salient aspects for my papers.

Healthy Classroom Climate

I begin with a discussion of classroom climate as it is a common theme among my three papers. "Healthy classroom climate" is an amorphous concept with varying definitions, but it connotes an environment where teachers and students are supported, engaged, respectful, and

generally well-adjusted (Jennings & Greenberg, 2009). Broadly, classroom climate is shaped by a myriad of factors, including peer interactions, school policies, teachers' cultural responsiveness and effective teaching strategies, and families' engagement in the classroom. However, if we boil down classroom climate to its most basic components, we are left with the day-to-day interactions that occur in the classroom. Ecological systems theory (Bronfenbrenner & Morris, 2006) and the teaching through interactions framework (Hamre et al., 2013) suggest that students learn and develop new skills during proximal interactions with their teachers; therefore, I limit the scope of my definition to teacher-student interactions, but recognize the impact of peer (and sometimes family) interactions in the classroom. I suggest that it is the accumulation of daily teacher-student interactions that shape the overall climate. Specifically, teachers who engage in supportive, responsive, engaging, and effective interactions create healthy classroom climates conducive to learning and social-emotional development (Hamre et al., 2013). I provide further support for this definition of classroom climate by highlighting three domains of effective classroom interactions: emotional support, instructional support, and classroom organization.

Emotionally supportive interactions are characterized by teachers' responsiveness to student needs, respect for student perspectives, and awareness of student social-emotional functioning (Hamre et al., 2013). Daily emotional support is essential for creating a positive and healthy classroom climate. The importance of emotional support is rooted in attachment theory (Ainsworth, 1978; Ainsworth et al., 2015), which suggests that responsive and supportive interactions with caregivers set the foundation for safe environments where children feel comfortable exploring new situations and ideas (Bretherton & Munholland, 1999; Jennings & Greenberg, 2009). Similarly, emotionally supportive teacher-student interactions foster safe classroom climates, allowing students to demonstrate intellectual curiousity and face new

challenges. Thus, emotional support serves to enhance the classroom climate, as well as academic achievement (Mashburn et al., 2008).

When teachers engage in interactions with high quality instructional support, they promote high-level thinking, provide constructive feedback, model developmentally appropriate language, and use a variety of techniques to encourage student engagement. Drawing on cognitive and language development research (Hammond & Gibbons, 2005; Taylor et al., 2003; Wood et al., 1976), we know that children learn skills when adults provide appropriate modelling, scaffolding, and opportunities for practice. When students master new skills, they experience increased self-efficacy and demonstrate greater engagement (Sökmen, 2021), thus creating a classroom climate where students are confident, motivated, and interested in learning.

Lastly, interactions that foster classroom organization are essential for healthy classroom climate. When teachers provide classroom organization, they create routines and activities that promote student engagement and productivity while also using proactive strategies to prevent and redirect students' disruptive behaviors (Hamre et al., 2013). Research suggests that classrooms with clear routines, structure, and behavioral expectations help students develop important self-regulatory skills (Alderman & MacDonald, 2015; Ponitz et al., 2009). Thus, classroom organization not only creates a calm, structured classroom climate, but also promotes students' self-sufficiency, frustration tolerance, and coping skills.

Taken together, I assert that the most basic definition of healthy classroom climate consists of daily teacher-student interactions characterized by emotional support, instructional support, and classroom organization. In my three papers, I seek to highlight the importance of classroom climate while exploring the factors that contribute to high quality interactions.

Paper 1

In my first paper, I explore how teacher, student, and relational factors explain variation in three aspects of classroom climate (emotional support, instructional support, and classroom organization) across the school year. Specifically, I examine the following research question: are teacher burnout (i.e., emotional exhaustion and low personal accomplishment), classroom-level student aggression, and classroom-level teacher-student relational closeness at the beginning of the school year linked to changes in observed classroom interaction quality across the year? This research question is directly drawn from the Prosocial Classroom Model (Jennings & Greenberg, 2009), as it highlights several proposed predictors of healthy classroom climate.

First, Jennings and Greenberg (2009) suggest that teachers' social-emotional competence is a major contributor to healthy classroom climate. Specifically, they call attention to teacher burnout as a core component of social-emotional competence. Teacher burnout, a psychological response to chronic teaching-related stress and social-emotional demands (Maslach et al., 2001), has garnered significant research attention given its association with teacher turnover rates (Hanushek et al., 2016). Burnout is commonly characterized by three components: emotional exhaustion (i.e., chronic fatigue and depletion), low personal accomplishment (i.e., feelings of professional inefficacy), and depersonalization (i.e., feelings of detachment and irritability; Leiter & Maslach, 2016; Maslach et al., 2001). Jennings and Greenberg (2009) highlight the concept of "burnout cascade," meaning that when teachers become burned out, they are less able to manage students' disruptive and off-task behaviors; the classroom climate subsequently suffers because teachers turn to more reactive and punitive classroom management strategies. These strategies do not teach students appropriate self-regulation, therefore, creating a "self-sustaining cycle of classroom disruption" (p. 492). Although there is a clear theoretical

connection between teacher burnout and classroom climate, I seek to empirically test this link in my first paper.

Second, Jennings and Greenberg (2009) assert that daily classroom management strategies have profound impacts on classroom climate. Unfortunately, many teachers do not learn evidence-based authoritative and proactive classroom management strategies during training, and there is often little opportunity for practice (Greenberg et al., 2014). Not surprisingly, many teachers struggle with students' disruptive classroom behaviors and disciplinary problems (Schmidt & Jones-Fosu, 2019; Tsouloupas et al., 2010). Furthermore, correlational evidence suggests that classroom disruptive behavior (e.g., student aggression, off-task behavior) is linked to classroom climate (i.e., teacher sensitivity and emotional support; Thomas, et al., 2011). Given the conceptual underpinnings and preliminary evidence linking students' aggressive behaviors and classroom climate, I include this as another predictor of interaction quality.

Lastly, teacher-student relationship quality is also expected to influence classroom climate within the Prosocial Classroom Model (Jennings & Greenberg, 2009). Returning to attachment theory (Ainsworth, 1978; Ainsworth et al., 2015), it follows that close teacher-student relationships are associated with positive student outcomes (Roorda, et al., 2011; Wentzel, 2016). Furthermore, when classrooms are characterized by more positive teacher-student relationships, teachers are better able to adapt to students' needs during daily interactions (Pennings et al., 2018), thus fostering healthy classroom climate. A great deal of research supports the opposite association as well, suggesting that healthy classroom climate leads to warm teacher-student relationships (Moen et al., 2019). However, the Prosocial Classroom

Model urges us to keep in mind the bidirectionality of this association, inspiring my examination of teacher-student closeness as a predictor of classroom climate.

Paper 2

In my second paper, I seek to understand the benefit of an evidence-based, structured teacher coaching model that focuses on creating high-quality classroom interactions (Pianta & Allen, 2009), which are conducive to healthy classroom climate and student learning. This paper tackles a different aspect of the Prosocial Classroom Model (Jennings & Greenberg, 2009) – SEL intervention implementation. Specifically, I posit that interactions-focused teacher coaching in support of an SEL intervention, the 4Rs, provides implementation support that ultimately benefits student academic and social-emotional outcomes.

Universal SEL interventions have gained popularity as they are often associated with improvements in students' social-emotional competencies (Domitrovich et al., 2017; Kramer et al., 2014) and academic achievement (Corcoran et al., 2018). However, there is significant variability in the implementation of SEL interventions (Durlak, 2016; Rohrbach et al., 2006). This is concerning given that SEL program implementation fidelity is linked to program outcomes (Domitrovich & Greenberg, 2000). Specifically, implementation fidelity is associated with students' SEL skills, classroom behavior, and classroom interaction quality (Abry et al., 2013; Vroom et al., 2019). Some researchers suggest that one-on-one, structured teacher coaching may be the best way to improve SEL implementation (Landry et al., 2006; Meyers et al., 2019). However, it is important that coaching targets teaching practices, such as high-quality interactions, that are linked to healthy classroom climate and students' skill development. Returning to the Prosocial Classroom Model (Jennings & Greenberg, 2009), we clearly see that SEL implementation is believed to foster healthy classroom climate; however, the bidirectional

arrows also suggest that healthy classroom climate (i.e., effective interactions) may support SEL implementation. My second paper highlights this bidirectionality, suggesting that interactions-focused coaching fosters high quality interactions, subsequently contributing to SEL intervention implementation that improves student outcomes.

Paper 3

In my third paper, I focus solely on emotionally supportive interactions, to further understand the social-emotional classroom context and emotionally laden interactions (Valiente et al., 2020). Specifically, I dive deeply into certain teacher social-emotional competencies that may contribute to creating a healthy, emotionally supportive classroom climate. Jennings and Greenberg (2009) suggest that teachers' self-regulatory skills are another important aspect of their social-emotional competence, yet teachers' emotion regulation strategies receive limited research attention. Given this growing field of research, I first seek to examine two emotion regulation strategies (cognitive reappraisal and expressive suppression) descriptively and in correlation with one another. Second, I aim to uncover how these two strategies are related to other important factors, including teacher burnout, years of experience, and class size. Based on inconsistencies in the emotion regulation literature (Brady et al., 2019; Westerlud & Santtila, 2018), we approach these first two goals in an exploratory manner; it remains unclear how cognitive reappraisal and expressive suppression may be correlated with one another, as well as how they are linked to other teacher and classroom factors in public elementary school teachers. Third, I examine the potential associations between these emotion regulation strategies and observed emotionally supportive classroom interactions. Without considering contextual factors, we hypothesize that greater use of cognitive reappraisal will be associated with more emotional support, but that greater use of expressive suppression will be associated with less emotional

support. However, as the Prosocial Classroom Model (Jennings & Greenberg, 2009) suggests, it is important to consider contextual factors that may influence the utility of these emotion regulation strategies (Brockman et al., 2017). Thus, I anticipate that the associations between emotion regulation strategies and emotionally supportive interactions will be altered by teacher and classroom factors. More specifically, I consider four factors as potential moderators: emotional exhaustion, personal accomplishment, years of teaching experience, and class size.

It is particularly important that we continue to understand how teachers regulate and express their emotions during daily interactions. In fact, I argue that teachers' emotion regulation strategies may be among the most proximal contributors to high quality interactions. In other words, the specific emotions that teachers experience may be less important for interactions compared to the ways teachers manage and communicate those emotions in front of their students. A small body of qualitative and quantitative research suggests that teachers use emotion regulation strategies throughout the school day (Chang & Taxer, 2020; Sutton et al., 2009), and that effective emotion regulation is associated with self-reported (Buettner et al., 2016) and observed (Swartz & McElwain, 2012) interaction quality. Overall, the Prosocial Classroom Model (Jennings & Greenberg, 2009) suggests that teachers with strong self-regulatory skills may be better able to foster healthy classroom climates; however, further empirical evidence is needed to support this connection.

In summary, this dissertation unpacks the Prosocial Classroom Model (Jennings & Greenberg, 2009) in new ways by operationalizing healthy classroom climate as teacher-student interaction quality, and subsequently exploring various factors expected to contribute to high quality interactions. This conceptualization of classroom climate is essential to my three papers as it allows for the observation and empirical examination of a previously unclear and

multifaceted term. Of course, this oversimplification of classroom climate means that certain factors (e.g., peer interactions, teacher-parent relationships, cultural responsiveness) are not included. I urge future researchers to explore other contributors to classroom climate so that the field may develop a deeper understanding of this important concept. Taken together, these three papers are a step in the right direction, providing more nuanced information about the teacher, student, and relational factors, as well as SEL implementation supports, that influence healthy classroom climate and associated student outcomes.

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Understanding High Quality Teacher-Student Interactions in High Needs Elementary Schools: An Exploration of Teacher, Student, and Relational Contributors

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Abstract

Research consistently demonstrates that high quality teacher-student interactions have meaningful links to students' learning, development, and mental health (Choi et al., 2018; Mashburn et al., 2008; McLean & Connor, 2015). However, little is known about the factors that contribute to quality teacher-student interactions (Early et al., 2007). These interactions are dynamic; therefore, they are likely influenced by teacher characteristics, student characteristics, and dyadic relational elements. In 330 third- and fourth-grade classrooms across 60 high needs elementary schools, we aimed to better understand how teacher burnout, student aggression, and teacher-student relational closeness explained variation in observed classroom interaction quality (i.e., emotional support, instructional support, and classroom organization) later in the year, controlling for earlier observations. Importantly, student aggression and teacher-student relational closeness were measured from both teacher and student perspectives. While teacher burnout earlier in the year was not significantly associated with changes in interaction quality across the year, results highlighted the importance of student behavior and relational factors. Specifically, more teacher-reported classroom-level aggression was associated with less emotional support and classroom organization across the year. Additionally, greater student-reported teacher-student relational closeness was linked to increased emotional support, instructional support, and classroom organization. These results indicate that fostering close teacher-student relationships may contribute to improved classroom interaction quality. Practical implications for teachers, instructional coaches, and school psychologists are discussed.

Keywords: teacher-student interactions, burnout, aggression, teacher-student relationships

Understanding High Quality Teacher-Student Interactions in High Needs Elementary

Schools: An Exploration of Teacher, Student, and Relational Contributors

High quality teacher-student interactions hold profound implications for students' academic success, social-emotional development, and mental health (Hamre et al., 2014; Mashburn et al., 2008; McLean & Connor, 2015); however, far too little is known about the factors that contribute to high quality, effective classroom interactions (Abry et al., 2017; Early et al., 2007). Recent findings suggest that overall classroom interaction quality may be influenced by aspects of teachers' emotional experience and mental health (Ansari et al., 2020), challenging student behaviors (Luckner & Pianta, 2011), and relational factors rooted in the quality of dyadic teacher-student relationships (Pennings et al., 2018). Thus, the present study aims to explore three possible contributors to overall classroom interaction quality: teacher burnout, student aggressive behavior, and teacher-student relational closeness. It is particularly important that we understand these potential contributors to interaction quality within the context of high needs schools, which are often under-resourced and contain high proportions of low-income and racially/ethnically minoritized students (Bottiani et al., 2019; Hoglund et al., 2015). Low-income and minority youth often experience poorer teaching quality (Mangiante, 2011; Peske & Haycock, 2006), yet are in need of high-quality, supportive teacher-student interactions to help reduce racial and ethnic disparities in academic achievement (Bottiani et al., 2019) and mental health (Cook et al., 2017).

One way to conceptualize and operationalize effective teacher-student interactions is by considering three interaction domains: emotional support, instructional support, and classroom organization (Hamre et al., 2014). We seek to understand the factors contributing to these three components of observed teacher-student interaction quality across the year within a diverse

sample of 330 third- and fourth-grade teachers in 60 high needs, urban elementary schools. First, we examine two components of teacher burnout (emotional exhaustion and personal accomplishment) earlier in the school year in relation to teacher-student interaction quality later in the year, controlling for earlier observations. Second, we examine classroom levels of both teacher- and student-reported aggressive behavior earlier in the school year in relation to later interaction quality. Third, we explore the association between classroom levels of both teacher- and student-reported relational closeness earlier in the school year and interaction quality later in the year. It is vital that we understand how these factors, which are closely linked to teacher and student mental health, may foster effective teacher-student interactions in order to create targeted, interactions-focused interventions.

Teacher-Student Interactions in the Context of the Prosocial Classroom

A great deal of research demonstrates that high-quality teacher-student interactions, characterized by emotional support, instructional support, and classroom organization, foster the development of students' social-emotional and academic skills (Cash et al., 2019; Hamre et al., 2013; Roberts et al., 2016). These findings are consistent with ecological systems theory, which suggests that children learn and develop as they interact with the proximal (e.g., teachers, parents, peers) systems in their environment (Bronfenbrenner & Morris, 2006). However, teacher-student interactions do not happen in a vacuum; they occur in the context of the classroom and broader school system. The Prosocial Classroom Model (Jennings & Greenberg, 2009), a classroom-focused adaptation of ecological systems theory, considers this context and provides the framework that guides our hypotheses.

An essential component of the Prosocial Classroom Model (Jennings & Greenberg, 2009) is a "healthy classroom climate." Although there are varying definitions of classroom climate, it

may be characterized by effective, engaging, and supportive teacher-student interactions. Thus, in the current study we operationalize classroom climate using three interaction quality domains: emotional support, instructional support, and classroom organization (Moen et al., 2019). The Prosocial Classroom Model suggests that various teacher, behavioral, and relational factors influence classroom climate (i.e., interaction quality; Jennings & Greenberg, 2009). First, teachers' overall mental health, social-emotional competencies, and burnout are assumed to be pervasive, influencing many classroom factors, including teachers' ability to foster effective teacher-student interactions. In the present study we focus on teacher burnout given its importance both for teacher-student interaction quality and teachers' mental health (Burić et al., 2020). Second, aspects of classroom management, including students' disruptive or aggressive behaviors, are linked to classroom climate (i.e., interaction quality). In the present study, we focus on classroom aggregated levels of student aggressive behavior because high proportions of children with difficult behaviors create more challenging contexts for teachers (Schmidt & Jones-Fosu, 2019) that may amplify risks for burnout and other mental health challenges (Hoglund et al., 2015). Third, "healthy teacher-student relationships" are assumed to contribute to classroom climate, and therefore, interaction quality. Given that classroom-level teacher-student relationship quality has also been associated with teachers' job-related emotional experiences (Corbin et al., 2019), the present study focuses specifically on classroom aggregated teacher-student relational quality as a predictor of overall classroom interaction quality. The decision to use classroom aggregated predictors also stems from research demonstrating that collective student characteristics (e.g., aggression) explain unique variance in classroom outcomes, above and beyond characteristics measured at the student level (Abry et al., 2018).

It is also important to note that the Prosocial Classroom Model situates the entire framework within the context of broader school and community factors; similarly, we consider our hypotheses within the context of urban, high needs schools. Many of the schools in the present study had limited access to resources and were situated in communities that experienced high levels of poverty and violence. Therefore, we recognize that systemic racial and socioeconomic inequities have likely influenced our results, and we interpret our findings with this in mind.

Teacher Burnout

Teacher burnout is the psychological response to chronic teaching-related interpersonal and emotional demands, and it includes three components: emotional exhaustion, (low) personal accomplishment, and depersonalization (Maslach et al., 2001). Emotional exhaustion is the experience of chronic fatigue and depletion from one's job; low personal accomplishment includes the experience of professional inefficacy and decreased productivity; depersonalization encompasses feelings of detachment and irritability in the workplace (Leiter & Maslach, 2016). The teaching profession is marked by significant interpersonal and emotional stressors; teachers strive to foster emotionally supportive relationships with students, manage disruptive behavior, create organized and instructive lessons, and navigate professional relationships. Importantly, this demanding interpersonal work occurs within the context of school systems, which dictate achievement standards and resource allocation (Maslach et al., 2001).

Within high-needs, urban elementary schools, demands are likely to be greater, while resources are limited (Hoglund et al., 2015). Furthermore, teachers face unique challenges and interpersonal demands when working with low-income and racially/ethnically minoritized students who often experience more out-of-school stressors (e.g., poverty, trauma, food

insecurity, chronic violence) when compared to their higher-income or white peers (Bottiani et al., 2019). Therefore, we might expect teachers in demanding, high needs environments to experience greater burnout (Bakker & Demerouti, 2007).

When teachers experience greater levels of burn out, we would expect their classroom climate to suffer. For example, teachers who feel more depleted may rely on reactive, rather than proactive, classroom management strategies that do not foster self-regulation and learning (Jennings & Greenberg, 2009). As a result, students have greater difficulty self-regulating and engaging in lessons, which may reinforce or exacerbate burnout (Jennings & Greenberg, 2009). However, only limited research suggests that teacher burnout is associated with poorer quality teacher-student interactions (Braun et al., 2019; Hoglund et al., 2015; Jennings, 2015). Two studies reported significant associations among concurrent burnout and observed emotional support and classroom organization, though their samples were relatively small (Braun et al., 2019; Jennings, 2015). A recent study conducted within preschool classrooms found that teachers ($N = 117$) who reported more emotional exhaustion also showed lower observed emotional support, instructional support, and classroom organization in their interactions (Ansari et al., 2020). However, it remains unknown if this association exists within high-needs, upper-elementary school classrooms.

Student Aggressive Behavior

According to the Prosocial Classroom Model (Jennings & Greenberg, 2009), we also expect factors related to classroom management to be associated with teacher-student interaction quality. Thus, we hypothesize that more classroom-level student aggression will be associated with lower quality interactions across the school year. Disruptive classroom behaviors and disciplinary problems pose significant challenges to classroom management and student learning

(Schmidt & Jones-Fosu, 2019; Tsouloupas et al., 2010). Because students learn through interactions with their teachers and peers (Durlak et al., 2011; Hamre et al., 2013), social and emotional competencies underlie nearly all aspects of learning. When students do not possess appropriate coping and interpersonal skills, they are unable to focus their attention on learning (Rosenblatt & Elias, 2008). Furthermore, when teachers are constantly responding to disruptive and aggressive student behaviors, they are less able to focus on high quality instruction and student learning (Jennings & Greenberg, 2009).

There is correlational evidence that classroom disruptive behavior is linked to teacher-student interactions (e.g., teacher sensitivity, emotional support; Thomas et al., 2011). Additionally, fifth-grade teachers with greater classroom organization report lower levels of student aggression (Luckner & Pianta, 2011). However, many studies rely solely on teacher reports of disruptive or aggressive behavior (McClowry, et al., 2013; Oliver, Wehby, & Reschly, 2011; Skaalvik & Skaalvik, 2017), which provide information about teachers' *perceptions* of this behavior. Teachers' perceptions of students are likely influenced by their own psychological functioning. For example, teachers who are more stressed or conscientious tend to perceive students' misbehavior as more severe or challenging (Kokkinos et al., 2005). Furthermore, teacher-reported aggression may be influenced by racial biases. For example, Black students' behavior is more likely to be perceived negatively by teachers, even when behaviors (e.g., high energy levels) are culturally acceptable at home (Downey & Pribesh, 2004; Tenenbaum & Ruck, 2007). Additionally, Black youth with anxiety and depression often present differently than white youth, and internalizing symptoms, like agitation, may be misunderstood by teachers (Noël et al., 2012). It is also important to consider students' self-reported aggressive behavior which may provide unique and meaningful information (De Los Reyes et al., 2013). In the present

study, teacher perceptions of individual students' aggression and student perceptions of their own aggression were both aggregated (i.e., averaged) to the classroom level, resulting in two classroom-level student aggression scores to represent these distinct perspectives.

Teacher-Student Relational Closeness

Further informed by the Prosocial Classroom Model (Jennings & Greenberg, 2009), we also consider the influence of teacher-student relationships on classroom interactions. Therefore, we hypothesize that greater classroom-level teacher-student closeness will be linked to improved interaction quality. This hypothesis is also guided by attachment theory (Ainsworth, 1978; Ainsworth et al., 2015). Although attachment theory refers to child-caregiver relationships, researchers have used this theory to understand the function of teacher-child relationships (Pianta et al., 2003). According to attachment theory, responsive and supportive caregivers create safe environments for their children, allowing them to display curiosity and explore new situations (Bretherton & Munholland, 1999; Jennings & Greenberg, 2009). Applying this theory to the school setting suggests that supportive and interactive teachers create a safe and healthy classroom climate in which students can explore new situations and ideas (Jennings & Greenberg, 2009).

Previous research has lent support to the reverse association, suggesting that classroom levels of emotional support (but not instructional support or classroom organization) predict increased closeness and reduced conflict within teacher-student relationships at the student level (Moen et al., 2019). More in line with our hypothesis, another study found that in classrooms with more positive teacher-student relationships, teachers were better able to adapt to students' needs during daily interactions (Pennings et al., 2018). Still, it remains unclear whether average teacher-student closeness (aggregated to the classroom-level) is linked to interaction quality.

There is also a recognized need for more student-reported data in the teacher-student relationship literature (Murray et al., 2008) given that as students mature, they form unique opinions about their relationships that are predictive of subsequent mental health outcomes (Rucinski et al., 2018). For example, student-reported teacher-student relationship quality has been linked to student-reported depressive symptoms and aggression (Rucinski et al., 2018). Furthermore, there is only moderate agreement between teachers' and students' reports of relationship quality in elementary school (Jellesma et al., 2015; Li et al., 2012), suggesting that students provide unique, but often untapped, perspectives. In the current study, teacher perceptions of closeness with individual students and student perceptions of closeness with their teachers were aggregated (i.e., averaged) to the classroom level, creating two classroom-level teacher-student closeness measures.

Current Study

Guided by the Prosocial Classroom Model (Jennings & Greenberg, 2009), the current study aims to better understand how teacher, student, and relational factors explain variation in observed classroom interaction quality (i.e., emotional support, instructional support, and classroom organization) across the school year. Specifically, in a sample of 330 third- and fourth-grade classrooms in urban, high needs schools, we address the following research question: are teacher burnout (emotional exhaustion and low personal accomplishment), classroom-level student aggression, and classroom-level teacher-student closeness earlier in the school year linked to changes in teacher-student interaction quality across the school year?

We hypothesize that teachers reporting greater emotional exhaustion and lower personal accomplishment earlier in the year will show poorer observed teacher-student interaction quality later in the year, controlling for earlier observed interaction quality. We also hypothesize that

teacher- and student-reported classroom-level student aggression will be associated with poorer interaction quality across the year. Conversely, we expect teacher- and student-reported classroom-level relational closeness to be associated with higher quality interactions across the year. Importantly, we will test these predictors in a single model for each interaction quality domain in order to account for any shared variance.

Method

Participants

Data for this study were collected across two cohorts (2015-2016; 2016-2017) as part of a randomized controlled trial (RCT) of a social-emotional and reading intervention, paired with a teacher coaching model. Teachers participating in the intervention implemented a social-emotional learning and reading curriculum, called the 4Rs (Jones et al., 2011), while also receiving one-on-one coaching, using MyTeachingPartner (Pianta & Allen, 2009) every two weeks. Across both cohorts, the study sample is comprised of 5,078 third- and fourth-grade students taught by 330 teachers from 60 urban, high needs elementary schools. The sample was evenly distributed between third (44%) and fourth (42.5%) grade classrooms. On average, 15 students per classroom ($SD = 5.12$) participated in the study.

The majority of teachers (89.8%) were female; however, the teacher sample was racially/ethnically diverse with 35.6% of teachers identifying as White, 25.4% Hispanic or Latino, 20.1% Black or African American, 6.6% Multiracial, 3% Asian, and .6% as Other. Teachers reported an average of 10.7 years of teaching experience ($SD = 7.6$), with the majority (90.4%) holding a master's degree. The average class size was 22 students ($SD = 5.9$, Range = 6-33). Approximately 14% of teachers taught in self-contained special education classrooms.

The student sample was largely comprised of Hispanic students (65.3%), with remaining students identifying as Black or African American (22.2%), White (6.1%), Asian (4.5%), Multiracial (.7%), and Native American (.4%). Approximately 52% of the students were female. The average age was 9-years (*SD* = .79). Approximately 83% of students in the sample were eligible to receive free or reduced price lunch. Across all schools, approximately 29% of students received special education services and were identified as having an active Individualized Education Plan (IEP) and 16% of students were considered to be Limited English Proficient (LEP).

Procedures

All full-time teachers were eligible to participate in the study. Out of 454 teachers, 73% consented to participate. Teachers completed an online self-report survey earlier in the school year, which included burnout and demographic information questions. Teachers in cohort one completed the self-report survey between August and December, while teachers in cohort two completed this survey between August and January. In the present analyses, we only included teachers who completed surveys prior to their classroom observation.

Student permission forms were distributed to teachers and sent home to parents at the beginning of the school year. Only those students with parental consent were eligible to participate in the study. Out of 7,706 eligible students, 66% received parental consent to participate. Teachers completed an online survey about participating students between November and March. In this survey, teachers provided information about teacher-student relationship quality and students' aggressive behavior. Again, teachers were only included in our analyses if they completed this survey prior to their classroom observation.

Procedures for Student Survey Administration. Students with active parental consent and written assent completed a self-report survey in their classrooms between January and May (cohort 1) and November and February (cohort 2). On the day of survey administration, 1,245 consented students (5%) refused to assent and did not complete the survey. Two trained researchers administered the survey to students as a group, visiting each classroom for approximately 45 minutes. While one researcher read each survey item aloud, the other circulated the classroom to provide assistance. For students whose primarily language was Spanish ($n = 122$ or 3% of students), the survey was administered in Spanish, either individually or in small groups, usually at the back of the classroom. During the initial administration, 1, 419 students (9%) were absent; 315 of these students completed a make-up survey. In this survey, students reported on their relationships with the teacher and their aggressive behaviors. Students completed their surveys prior to classroom observations.

Procedures for Classroom Observations. Live classroom observations were conducted by trained data collectors at two time points during the school year. A team of 18 classroom observers, who were trained to reliability and certified on the CLASS-UE (Pianta et al., 2012a), conducted the observations. Reliability certification required scoring within one scale point of the master-coded score on 80% of the dimension scores and scoring within one scale point of the master-coded score on at least two out of five codes within each dimension. With the exception of classrooms that were double-coded, each classroom observation was conducted by one observer and included four 20-minute cycles, with each cycle followed by a ten-minute coding period. Cohort one observations took place initially between January and May (observation 1) and then again between May and June (observation 2), while cohort two observations occurred first between November and February (observation 1) and then again between March and June

(observation 2). The vast majority of observations were completed in a single two-hour session, but a small number had to be split across two or three sessions, either on one day or across two different days (n = 9 classrooms at observation 1, n = 26 classrooms at observation 2).

Measures

The measures are described below, starting with the dependent variables, followed by the independent variables and covariates.

Dependent Variables

Teacher-Student Interaction Quality. Teacher-student interaction quality was observed at the classroom level via the *Classroom Assessment Scoring System - Upper Elementary* (CLASS-UE; Pianta et al., 2012a). This widely-used and validated measure was created to examine the teacher-student interactions and classroom demands that occur in upper elementary school settings (Pianta et al., 2012a). The CLASS-UE includes three domains: Emotional Support, Instructional Support, and Classroom Organization. Teachers engaging in emotionally supportive interactions are responsive to students' needs, emphasize students' perspectives, and create a positive classroom climate; teachers providing instructional support scaffold lessons appropriately, provide constructive feedback, and promote higher-order thinking; teachers demonstrating classroom organization prevent and redirect misbehavior, maximize students' engagement, and create routines that promote learning (Hamre et al., 2013). Structural validity has been supported by confirmatory factor analysis (CFA), which shows that the CLASS-UE fits a three-factor structure (Pianta et al., 2012b). In this sample, Emotional Support, Instructional Support, and Classroom Organization showed acceptable internal consistency at observation 1 ($\alpha = .79$, $\alpha = .85$, and $\alpha = .74$, respectively) and observation 2 ($\alpha = .79$, $\alpha = .88$, and $\alpha = .75$).

At each observation time point, CLASS scores were averaged across all four cycles to create 11 dimension scores. Domain scores were then calculated by taking the average of the dimension scores within each domain. For example, the total score for the Emotional Support domain was calculated as the average of the Positive Climate, Teacher Sensitivity, and Regard for Student Perspectives dimension scores. Interrater reliability (IRR) was calculated using the 50 observations (16%) that were double-coded at observation 1 and the 39 observations (12%) that were double-coded at observation 2. IRR was calculated using a one-way random intraclass correlation (ICC), which captures rater consistency across two measured constructs (Shrout & Fleiss, 1979). The ICC is a conservative measure of interrater reliability, as it includes both the variability within and across observers. ICCs can range from -1 to +1, with values less than .5 indicating poor reliability, values between .50 and .75 indicating moderate reliability, values between .75 and .90 indicating good reliability, and values greater than .90 indicating excellent reliability (Koo & Li, 2016). In the current study, ICCs were 0.62 and 0.74 for Emotional Support, 0.45 and 0.88 for Classroom Organization, and 0.59 and 0.72 for Instructional Support at observation 1 and observation 2, respectively.

Independent Variables

Teacher Burnout. Teacher burnout was measured using the emotional exhaustion and personal accomplishment subscales of the *Maslach Burnout Inventory - Educator Survey* (MBI-ES; Maslach, Jackson, & Schwab, 1996). The depersonalization subscale was not included in this study, as it has shown poorer internal consistency when compared to the other two scales (Schaufeli et al., 2001); therefore, it was excluded from the survey to reduce survey length. The two scales that we examine included nine emotional exhaustion items (e.g., "I feel emotionally drained from work") and eight personal accomplishment items (e.g., "I feel exhilarated after

working closely with my students"). Teachers were instructed to report the frequency with which they experienced the job-related stressors using a 7-point Likert scale ranging from 0 ("never") to 6 ("every day"). Emotional exhaustion and personal accomplishment both showed acceptable internal consistency with Cronbach's alpha values of .92 and .72, respectively.

Classroom-Level Student Aggression. Teachers reported on students' aggressive behaviors via the *Behavioral Assessment Scoring System for Children (BASC) – Aggression Subscale* (Reynolds & Kamphaus, 1998), which is widely-used to assess students' adaptive and problem behaviors within the school setting (Gladman & Lancaster, 2003). The Aggression Subscale consists of 14 items, such as this child "threatens to hurt others" or "breaks other children's things." Teachers were asked to reflect on the frequency of students' behaviors within the past 30 days, using a 4-point Likert scale ranging from 1 ("Never") to 4 ("Almost Always"). In the current sample, the BASC Aggression Subscale showed excellent internal consistency (α = .95). Teachers' responses were averaged for each classroom to reflect teachers' perceptions of student aggression at the classroom-level.

Students also completed the *Aggression Scale* (Orpinas & Frankowski, 2001) in order to provide information about classroom-level aggression from the student perspective. The Aggression Scale is a self-report measure used to assess overt, rather than relational, aggressive behaviors against other students in the school setting. The shortened version of this scale includes six items, such as "I pushed, shoved, or hit a kid at school" and "I called a kid at school a bad name." Students were instructed to think about how often the statement had occurred during the past two weeks, responding on a 4-point Likert scale of 0 ("Never") to 3 ("Many Times"). The Aggression Scale showed adequate internal consistency (α = .80) in the present

sample. Students' responses were averaged within each classroom to reflect students' perceptions of classroom-level aggression.

Classroom-Level Teacher-Student Closeness. Teachers reported on their relational closeness with individual students using the *Student-Teacher Relationship Scale* (STRS; Pianta, 2001). Teachers responded to eight closeness items (e.g., "I share an affectionate warm relationship with this child") using a 5-point Likert scale ranging from 1 ("does not apply to me") to 5 ("definitely applies to me"). The STRS closeness items demonstrated acceptable internal consistency ($\alpha = .86$). Teachers' responses to these items were averaged within their classrooms in order to assess teachers' perceptions of classroom-level teacher-student closeness.

Classroom-level teacher-student closeness was also assessed from the student perspective using a subset of items from the *Learning about Teacher-Student Interactions* (LATSI; Downer et al., 2015) measure. Students responded using a 5-point Likert scale ranging from 1 ("almost never") to 5 ("almost always"). Previous factor analysis (Rucinski et al., 2018) supports the use of four LATSI items - "my teacher likes me," "my teacher says nice things to me," "I can talk to my teacher if I have a problem," and "my teacher helps me when I need help." – to reflect relational closeness. This subset of LATSI items showed acceptable internal consistency ($\alpha = .71$) in the current sample. Responses to these LATSI items were averaged within classrooms to examine students' perceptions of classroom-level teacher-student closeness.

Covariates

Teacher and Classroom Demographics. Classroom demographic information, such as students' gender (0 = male, 1 = female) and age were collected from school records provided by the local Department of Education. Teacher demographic information, including gender (0 = male, 1 = female), race/ethnicity (0 = White, 1 = Hispanic or Latino, 2 = Black or African

American, 3 = Multiracial, 4 = Asian, 5 = American Indian or Alaska Native, 6 = Native

Hawaiian or Pacific Islander, 7 = Other, 8 = Hispanic and Black), and years of experience, were

collected via teacher-report during the initial teacher survey. Teachers also provided information

about their classroom demographics, such as classroom size and languages spoken in the

classroom, through the initial survey.

Analytic Approach

All data were analyzed using StataIC 16. First, study variables were examined

descriptively, to assess variability and potential skewness. Second, bivariate correlations were

calculated to examine associations among variables of interest. Next, missing data in the study

sample was examined. Given that this dataset contains numerous covariates that may be related

to teacher-student interaction quality, there is a reduced likelihood that unobserved variables are

influencing the three outcome variables. Therefore, we assumed the data to be missing at random

(MAR) and proceeded with single-level multiple imputation using Blimp v2.1 (Keller & Enders,

2019). Ten imputed datasets were created for each of the three outcomes.

In the present data, teachers (Level 1) are nested within schools (Level 2). Given this data

structure, unconditional two-level models were calculated for each outcome of interest. The

resulting intraclass correlation coefficients (ICC) ranged from .11 to .15, suggesting that 11-15%

of the variation in the outcomes is at the school level. To adjust for this nested data structure, all

models were examined using school-level clustered standard errors.

In Models 1 through 3, multiple regression with clustered standard errors was conducted

to assess our research question: whether teacher burnout, classroom-level aggression, and

classroom-level relational closeness earlier in the school year are associated with changes in

teacher-student interaction quality across the year. Models were run separately for each measure

of interaction quality: emotional support (Model 1), instructional support (Model 2), and

classroom organization (Model 3). Analyses were conducted using both teacher- and student-

reported measures of classroom-level student aggression and teacher-student closeness.

Covariates, including class size, teacher gender, intervention condition, and cohort, were selected

because they were significantly correlated with one or more of the three outcome variables

and/or they were conceptually relevant to the model (e.g., intervention condition). Other

covariates (teacher race/ethnicity, years of experience, educational attainment) were considered,

but ultimately excluded from the models because they were not significantly correlated with any

outcomes of interest. Cohen's f^2 was calculated to determine local effect size (e.g., the proportion

of variance uniquely explained by the predictor of interest, compared to the variance explained

by all other predictors in the model) for all predictors that were significantly associated with the

outcomes (Cohen 1988; Selya et al., 2012). Based on conventional guidelines, f^2 effect sizes are

interpreted as small (0.02), medium (0.15), and large (0.35; Cohen, 1988).

Results

Table 1 provides descriptive statistics for teacher-student interaction quality (i.e.,

emotional support, instructional support, and classroom organization) both later (observation 2)

and earlier in the school year (observation 1), teacher burnout (i.e., emotional exhaustion and

personal accomplishment), teacher- and student-reports of classroom-level student aggression,

teacher- and student-reports of classroom-level teacher-student closeness, and covariates (i.e.,

gender, class size, cohort, and intervention condition). Data from both observation timepoints

indicated that teachers generally displayed moderate levels of classroom organization

(observation 1 $M = 5.89$, $SD = 0.70$; observation 2 $M = 5.94$, $SD = 0.74$) and moderate to lower

levels of emotional (observation 1 $M = 4.52$, $SD = 0.82$; observation 2 $M = 4.31$, $SD = 0.91$) and

instructional (observation 1 $M = 3.55$, $SD = 0.80$; observation 2 $M = 3.32$, $SD = 0.87$) support.

On average, teachers reported relatively low emotional exhaustion ($M = 2.25$, $SD = 1.40$) and

high personal accomplishment ($M = 5.21$, $SD = 0.71$) earlier in the year. Both teachers and

students reported relatively little classroom-level student aggression. Conversely, they generally

reported more classroom-level teacher-student closeness, though teachers reported more

closeness than did students.

Table 2 provides bivariate correlations among the study variables. Earlier observations of

emotional support, instructional support, and classroom organization (observation 1) were

significantly correlated with later observations of the same CLASS domain (observation 2), with

correlations ranging from .37 to .42. Furthermore, all three CLASS domains were significantly

correlated with each other later in the year (observation 2), with correlations ranging from .43 to

.66. As expected, emotional exhaustion and personal accomplishment were significantly

negatively correlated ($r = -.16$, $p < .01$) earlier in the school year. Though significant, the

correlation is relatively small, suggesting that these are related but distinct components of

burnout. Teacher- and student-reports of classroom-level student aggression were significantly

correlated ($r = .45$, $p < .001$), suggesting that the measures assess similar constructs from

different perspectives. Teacher- and student-reports of classroom-level teacher-student closeness

were also significantly correlated ($r = .12$, $p < .05$); the relatively small correlation is consistent

with prior research suggesting that teachers and students have different perspectives on their

relationship quality (Jellesma et al., 2015; Li et al., 2012).

Models 1 through 3 simultaneously address the research question: are teacher burnout,

classroom-level student aggression, and classroom-level relational closeness earlier in the school

year linked with changes in teacher-student interaction quality across the school year? Table 3

presents the multiple regression results for all models.

Emotional Support

In Model 1, emotional support from observation 2 is the outcome. Results revealed that

emotional exhaustion and personal accomplishment earlier in the year were not significantly

associated with emotional support later in the year, controlling for earlier observations of

emotional support. However, Model 1 shows significant associations for teacher-reported

classroom-level student aggression ($B = -.44$, $p = .02$, $f^2 = .02$) and student-reported classroom-

level teacher-student closeness ($B = .40$, $p < .001$, $f^2 = .04$). In other words, on average, every

one-unit increase in teacher-reported classroom-level aggression was associated with a .44

decrease in emotional support at observation 2. Conversely, every one-unit increase in student-

reported classroom-level closeness was associated with a .40 increase in emotional support at

observation 2.

Instructional Support

In Model 2 instructional support from observation 2 is the outcome. As we saw with

emotional support, ratings of emotional exhaustion and personal accomplishment from earlier in

the year were not significantly associated with later instructional support, controlling for

instructional support from observation 1. However, in this model, only student-reported

classroom-level teacher-student closeness was associated with instructional support ($B = .29$, $p =$

$.03$, $f^2 = .02$), indicating that on average, a one-unit increase in student-reported classroom-level

closeness was associated with a .29 increase in instructional support.

Classroom Organization

Lastly, Model 3 includes classroom organization from observation 2 as the outcome. It should be noted that there was more measurement error in classroom organization from observation 1 (ICC = 0.45), used as a covariate, than is ideal; therefore, results should be interpreted cautiously. As in the previous models, emotional exhaustion was not significantly associated with classroom organization; however, there was a marginally significant association between personal accomplishment and classroom organization ($B = -.10$, $p = .09$, $f^2 = .01$), controlling for observation 1. This association indicates that on average, every one-unit increase in personal accomplishment is associated with a .10 decrease in classroom organization. As in Model 1, this model shows significant associations for teacher-reported classroom-level student aggression ($B = -.47$, $p < .001$, $f^2 = .03$) and student-reported classroom-level teacher-student closeness ($B = .23$, $p = .02$, $f^2 = .01$). On average, every one-unit increase in teacher-reported classroom-level aggression is associated with a .47 decrease in classroom organization, whereas every one-unit increase in student-reported classroom-level closeness is associated with a .23 increase in classroom organization.

Discussion

In the present study, we sought to better understand the factors contributing to teacher-student interaction quality, as informed by the Prosocial Classroom Model (Jennings & Greenberg, 2009). We examined three possible contributors to observed teacher-student interaction quality (i.e., emotional support, instructional support, and classroom organization) across the school year: teacher burnout (i.e., emotional exhaustion and personal accomplishment), classroom-level student aggression, and classroom-level teacher-student closeness. We specifically focused on these predictors given prior evidence of their associations

with classroom interaction quality (Ansari et al., 2020; Luckner & Pianta, 2011), and their

importance for teacher job-related emotional experiences and mental health (Corbin et al., 2019).

Given our relatively large sample (N = 330 teachers), rigorous methodology (e.g., observational

data, student- and teacher-reported measures), and unique, high-needs population, we were well

positioned to uncover factors that may help foster effective classroom interactions.

Burnout and Teacher-Student Interaction Quality

Teachers' emotional exhaustion and personal accomplishment earlier in the school year

were not significantly associated with changes in interaction quality across the year. There are

several possible explanations for these nonsignificant findings. First, teachers in this sample

reported relatively low levels of emotional exhaustion and relatively high levels of personal

accomplishment earlier in the school year. This was surprising as we hypothesized that working

in high-needs, urban elementary schools would present unique challenges, placing teachers at

greater risk for burnout. It is possible that social desirability may have limited variability in

responses, causing teachers to underreport "true" levels of burnout. Teachers in this sample may

have also possessed resiliency, allowing them to meet the challenges of their environment

(Beltman et al., 2011). Second, burnout earlier in the school year may be less relevant than the

development of burnout throughout the year when considering interaction quality across the

year. For example, perhaps early reports of burnout are more associated with teachers'

experiences over the summer or previous school year, rather than the balance of resources and

stressors in the school year that is just getting underway. Teachers may also mentally prepare or

steel themselves for the year ahead in the Fall, but these defenses may be worn down as the year

progresses. Third, our lack of findings here may point to a measurement issue, as other work

suggests that teacher depression, which overlaps with burnout, may indeed be related to

interactions, when observed by the classroom-learning environment (CLE) rubric (McLean & Connor, 2015). Lastly, burnout is consistently related to teacher outcomes, such as attrition (Hanushek et al., 2016), yet it may be less important for daily interactions that occur within the proximal classroom social context. In fact, working hard to provide high quality interactions for students in the face of adversity within high-needs schools may actually *lead* to burnout over the course of the year, which in turn could increase teacher turnover.

Classroom Student Aggression and Teacher-Student Interaction Quality

In line with our hypotheses, greater teacher-reported classroom-level student aggression was significantly associated with lower emotional support and classroom organization across the school year, though local effect sizes were small. This finding is consistent with previous research suggesting that aggressive and disruptive classroom behavior is challenging for teachers (Schmidt & Jones-Fosu, 2019; Tsouloupas et al., 2010). Interestingly, student-reported classroom-level aggression was not significantly associated with interaction quality. Both teacher- and student-reported aggression were included in the model because multiple reporters provide overlapping but unique information (De Los Reyes et al., 2013). Including them in the model simultaneously allowed us to isolate that unique information. Thus, these discrepant findings highlight the implications that teachers' *perceptions* of students' aggressive behavior may have on their own teaching practices. Previous research shows that certain teachers (e.g., those who are more conscientious or stressed) perceive student disruptive or oppositional behavior as more severe and interpersonally challenging (Kokkinos et al., 2005). Additionally, when teachers perceive student behaviors as purposeful (e.g., vindictive) they are more likely to report higher levels of disruptive behaviors (Yoder & Williford, 2019). In keeping with that schema, it is likely that such teachers would have greater difficulty managing student behavior

and fostering emotionally supportive interactions when perceiving high levels of classroom

aggression. Teachers may benefit from psychoeducation about the potential internal (e.g.,

temperament, mental health) and environmental (e.g., family, school, trauma) contributors to

disruptive behavior, as this may help them to perceive such behavior less harshly and react in a

more proactive, compassionate, and emotionally supportive manner.

Classroom Teacher-Student Closeness and Teacher-Student Interaction Quality

Consistent with our hypotheses, average student-reported teacher-closeness was

associated with increased emotional support, instructional support, and classroom organization.

Although it has been long established that more positive classroom interactions contribute to the

formation of stronger teacher-student relationships (Buyse et al., 2008; Corbin et al., 2020;

Wubbels et al., 2014), these results speak to the potential bidirectionality of this association. In

the present sample, when students on average, felt closer to their teachers, their teachers

provided increased emotional support, instructional support, and classroom organization. Taken

together, these findings suggest that the quality of relationships rooted in teacher-student dyads

and teachers' overall ability to engage in consistent, high quality learning-supportive interactions

are dynamically related and mutually reinforcing over time. Practically, these findings suggest

that interventions designed to support teacher's competencies in developing and maintaining

close dyadic interpersonal relationships with each student in their classroom (e.g., Gehlbach et

al., 2016) and in providing emotionally, instructionally, and organizationally supportive

interactions across all students in their classroom (Brown et al., 2010) may yield the strongest

improvements in interactions at each level, and subsequently on more distal teacher (e.g., mental

health) and student (e.g., social-emotional, academic) outcomes.

Importantly, these findings also indicate that student perspectives provide meaningful and unique information about teacher-student closeness above and beyond teachers' perspectives. In fact, teacher perceptions of relational closeness were not significantly associated with interaction quality. It is possible that teachers are more attuned to students' aggressive or disruptive behaviors, rather than dyadic relationships, which may influence their classroom practices and interactions. These findings suggest that teachers would be remiss to focus solely on behavior management or academic instruction at the expense of relationship quality. Rather, there is a need for an integrated perspective as behavior management and instructional quality are supported by close teacher-student relationships. It would be worthwhile for researchers, teachers, and school psychologists to further explore and understand students' perspectives of teacher-student relationships, given their clear, ubiquitous contribution to how critical interactions play out in the classroom.

Limitations and Future Directions

Although the present study brought new methodological strengths to these questions (e.g., observational data), there were also limitations that need to be acknowledged. First, the students in this sample were mostly Hispanic/Latino and came from low-income families. While this allowed us to explore teacher-student interaction quality within the context of high-needs, urban elementary schools, it reduces our ability to generalize findings to other populations. It is also important to consider that teachers were able to choose whether or not they wanted to participate in this study. Teachers who agreed to participate may have differed in burnout and teacher-student interaction style when compared to those who did not choose to participate. As a result, this sample may not capture the full range of teacher burnout and interaction quality that exists in these schools.

In this study, teacher-student interactions were objectively observed by trained data collectors; however, all other constructs were reported on by teachers or students. Future research might aim to gather independent observations of dyadic classroom relationships and aggressive behaviors, or get 'under the skin' of teacher burnout and stress by collecting cortisol or heart rate (Oberle, & Schonert-Reichl, 2016). Furthermore, researchers may want to study the implications of other classroom social factors (e.g., peer relationships) for teaching practice, particularly within the context of high-needs schools.

The present data also came from a RCT of a social-emotional learning and teacher coaching intervention. Although we controlled for intervention condition, it is possible that the intervention may have influenced our variables of interest in ways that do not reflect typical practice. Thus, researchers should examine these factors in schools where teachers are not participating in an intervention study.

Lastly, returning to the Prosocial Classroom Model (Jennings & Greenberg, 2009), we must acknowledge the potential bidirectionality among all of the predictors and outcomes included in this study. Theoretically, we expect teacher characteristics, student characteristics, dyadic relationships, and classroom interactions to influence one another in complex and dynamic ways. We hope that future research examines the interplay between these variables across time, in order to provide a more nuanced understanding and test the Prosocial Classroom Model.

Conclusion

High quality teacher-student interactions are consistently linked to academic and social-emotional outcomes (Choi et al., 2018; McLean & Connor, 2015). Classroom interactions have also been conceptually and empirically identified as key drivers of the development of high-

quality dyadic relationships between teachers and students (Corbin et al., 2020; Wubbels et al., 2014). However, less is known about the factors that foster classroom interaction quality (Early et al., 2007), including how teacher-student relationships at the classroom level may feed back into enriched interactions over the course of the school year. Interestingly, the present study did not find an association between burnout and teacher-student interaction quality. Rather, teachers' perceptions of classroom-level student aggression and students' perceptions of classroom-level teacher-student closeness contributed to changes in teacher-student interaction quality across the year. In combination, these findings suggest that student behavior and relational factors, and in particular the way that teachers and student *perceive* these features of the classroom experience, may be higher priority targets for intervention or coaching in high-needs schools than teachers' own stress and burnout when aiming to improve teacher-student interactions.

Declarations

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Table 1. Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Interaction Quality					
Emotional Support (O1)	320	4.52	0.82	2.17	6.50
Emotional Support (O2)	314	4.31	0.91	2.00	7.00
Instructional Support (O1)	320	3.55	0.80	1.40	6.25
Instructional Support (O2)	314	3.32	0.87	1.00	5.50
Classroom Organization (O1)	320	5.89	0.70	2.83	7.00
Classroom Organization (O2)	314	5.94	0.74	3.33	7.00
Teacher Burnout					
Emotional Exhaustion	294	2.25	1.40	0.00	5.78
Personal Accomplishment	302	5.21	0.71	2.29	6.00
Classroom Aggression	318	1.45	0.28	1.02	2.71
Classroom Aggression (TR)					
Classroom Aggression (SR)	324	0.50	0.27	0.03	1.58
Classroom Teacher-Student Closeness					
Classroom Closeness (TR)	317	4.06	0.46	2.25	4.98
Classroom Closeness (SR)	324	3.00	0.40	1.25	3.84
Covariates					
Class Size	321	22.36	5.92	6.00	33.00
Teacher Gender	327	0.91	0.29	0.00	1.00
Cohort	330	1.55	0.50	1.00	2.00
Intervention Condition	330	0.46	0.50	0.00	1.00

Note. O1 = observation 1; O2 = observation 2; TR = teacher-reported; SR = student-reported.

Table 2. Bivariate Correlations among Covariates, Predictors, and Outcomes

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Emot. Sup. (O1)	1.00															
(2) Emot. Sup. (O2)	.0.42***	1.00														
(3) Instruct. Sup. (O1)	0.63***	0.35***	1.00													
(4) Instruct. Sup. (O2)	0.32***	0.66***	0.37***	1.00												
(5) Classroom Org. (O1)	0.52***	0.27***	0.36***	0.23***	1.00											
(6) Classroom Org. (O2)	0.32***	0.56***	0.31***	0.43***	0.41***	1.00										
(7) EE	-0.09	-0.04	-0.07	-0.10	-0.08	-0.03	1.00									
(8) PA	0.06	-0.03	0.02	0.02	0.05	-0.06	-0.16**	1.00								
(9) Class. Agg. (TR)	-0.07	-0.08	-0.08	-0.08	-0.18**	-0.23***	0.10	-0.23***	1.00							
(10) Class. Agg. (SR)	-0.12	-0.08	-0.09	-0.14*	-0.28***	-0.22***	0.03	-0.21***	0.45***	1.00						
(11) Class. Close. (TR)	0.08	0.03	0.01	-0.09	0.10	0.03	0.05	0.05	-0.18**	-0.05	1.00					
(12) Class. Close. (SR)	0.22***	0.28***	0.16***	0.21***	0.22***	0.22***	-0.02	0.24***	-0.17**	-0.30***	0.12*	1.00				
(13) Class Size	-0.03	-0.10	-0.03	0.02	0.11	0.04	0.03	0.01	-0.43***	-0.34***	0.15*	0.12	1.00			
(14) Teacher Gender	-0.09	-0.04	-0.06	-0.07	-0.01	-0.13*	0.08	-0.13**	-0.01	0.06	0.22***	-0.00	0.04	1.00		
(15) Cohort	0.02	-0.03***	-0.18**	-0.25***	0.17**	0.01	0.07	-0.01	-0.13*	-0.15*	-0.00	-0.01	0.05	-0.08	1.00	
(16) Intervention Con.	0.02	0.06	-0.06	-0.05	-0.03	-0.08	0.03	-0.06	0.18**	0.13*	0.04	-0.01	-0.15*	0.02	0.05	1.00

$* p<0.1, ** p<0.05, *** p<0.01.$

Note. O1 = observation 1; O2 = observation 2; Emot. Sup. = emotional support; Instruct. Sup. = instructional support; Classroom Org. = classroom organization; EE = emotional exhaustion; PA = personal accomplishment; TR = teacher-reported; SR = student-reported; Class. Agg. = classroom-level student aggression; Class. Close. = classroom-level teacher-student closeness; Intervention Con. = intervention condition.

Table 3. Multiple Regression Results Examining Teacher Burnout, Student Aggression, and Teacher-Student Closeness as Predictors of Teacher-Student Interaction Quality

	Model 1: Emotional Support (O2)			Model 2: Instructional Support (O2)			Model 3: Classroom Organization (O2)		
	Coef.	St.Err.	t-value	Coef	St.Err.	t-value	Coef	St.Err.	t-value
Constant	3.92	0.72	5.45***	3.44	0.77	4.48***	4.93	0.62	7.99***
Teacher Burnout									
EE	0.02	0.03	0.47	-0.03	0.04	-0.71	0.02	0.03	0.75
PA	-0.08	0.08	-1.04	0.06	0.08	0.73	-0.10	0.06	-1.71†
Classroom Aggression									
Class. Agg. (TR)	-0.44	0.19	-2.36*	-0.26	0.16	-1.65	-0.47	0.13	-3.53***
Class. Agg. (SR)	-0.22	0.17	-1.30	-0.28	0.19	-1.45	-0.15	0.17	-0.92
Classroom Teacher-Student Closeness									
Class. Close. (TR)	0.01	0.09	0.12	-0.17	0.11	-1.54	0.04	0.08	0.54
Class. Close. (SR)	0.40	0.11	3.51***	0.29	0.13	2.28*	0.23	0.10	2.34*
Covariates									
Interaction Quality (O1) ‡	0.39	0.05	7.97***	0.28	0.05	5.69***	0.40	0.05	7.57***
Teacher Gender	-0.17	0.16	-1.04	-0.25	0.14	-1.71†	-0.32	0.12	-2.60**
Class Size	-0.03	0.01	-3.07***	-0.01	0.01	-0.69	-0.02	0.01	-2.93**
Cohort	-0.54	0.11	-4.80***	-0.42	0.11	-3.88***	-0.17	0.09	-1.87†
Intervention Cond.	0.17	0.10	1.66	0.03	0.10	0.30	-0.06	0.09	-0.70

† $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

‡ Interaction Quality (O1) represents Emotional Support, Instructional Support, or Classroom Organization from observation 1 when that domain is the outcome.

Note. EE = emotional exhaustion; PA = personal accomplishment; O1 = observation 1; O2 = observation 2; TR = teacher-reported; SR = student-reported; Class. Agg. = classroom-level student aggression; Class. Close. = classroom-level teacher-student closeness; Intervention Con. = intervention condition.

Testing the Integration of a Teacher Coaching Model and a Social-Emotional Learning and Literacy Intervention in Urban Elementary Schools

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Abstract

Teachers often report inadequate training in and insufficient time for social emotional learning (SEL; Buchanan et al., 2009). Thus, it is not surprising that tremendous variability exists in the implementation of school-based SEL interventions (Durlak, 2016; Rohrbach et al., 2006), which has been closely linked to program outcomes for teachers and students (Domitrovich & Greenberg, 2000). In this study, we used a quasi-experimental design to better understand the utility of providing structured, evidence-based teacher coaching to support SEL program implementation. We paired an integrated SEL and literacy curriculum, 4Rs (Reading, Writing, Respect, & Resolution), with a validated approach to supporting curriculum implementation, MTP (MyTeachingPartner). Across 91 classrooms within 15 urban public elementary schools, we assessed one central research question: does the integration of 4Rs with an evidence-based coaching model, MTP, lead to greater classroom-level effects on students' social-emotional and academic functioning than 4Rs only during a single school year? In summary, 4Rs+MTP classrooms showed significantly lower levels of hostile attribution bias and aggressive interpersonal negotiation strategies, as well as, greater attendance rates and teacher-reported academic skills.

Keywords: social-emotional learning, teacher coaching, implementation, universal school-based intervention

Testing the Integration of a Teacher Coaching Model and a Social-Emotional Learning and

Literacy Intervention in Urban Elementary Schools

Numerous studies indicate that social-emotional learning (SEL) curricula reduce students' aggressive behavior, foster prosocial behavior (Portnow et al., 2018; Taylor et al., 2017) and improve academic performance (Corcoran et al., 2018). However, there appear to be high rates of implementation variability within such school-based programs (Durlak, 2016), which have been linked to program outcomes for teachers and students (Domitrovich & Greenberg, 2000). Inconsistent implementation may stem from inadequate training, as many teachers report receiving SEL training during one-day inservice workshops (Buchanan et al., 2009). Instead, weekly one-on-one, structured coaching may provide an effective path to producing high quality instruction (Kraft et al., 2018) and implementation, particularly when that coaching is focused on teacher-student interactions (Allen et al., 2011). Recently, researchers have combined evidence-based coaching models with SEL interventions to improve implementation (Ashworth et al., 2018; Skaar et al., 2016). Although this approach has gained popularity, there is limited research identifying the unique benefits of coaching, above and beyond an SEL intervention itself.

In order to better understand the utility of providing individualized, interactions-focused coaching in support of teachers' SEL program implementation, the current study paired an integrated SEL and literacy curriculum, Reading, Writing, Respect, and Resolution (4Rs; Morningside Center for Teaching Social Responsibility, 2001), with a structured and validated coaching model, MyTeachingPartner (MTP; Pianta & Allen, 2009). Using a quasi-experimental design across 91 classrooms within 15 urban public elementary schools, this study examined the extent to which classrooms of third-, fourth-, and fifth-grade students demonstrated

improvements in academic and social-emotional skills when exposed to 4Rs+MTP during the 2012-2013 school year, as compared to matched classrooms receiving 4Rs *without* the enhanced implementation supports (4Rs only) during the 2005-2006 school year. Unlike previous studies, this study design uniquely isolated the effects of MTP coaching supports, while accounting for other differences between the two groups.

Efficacy of SEL Curricula in Promoting Social, Emotional, and Academic Skills

Universal SEL interventions, implemented school-wide, have been associated with improvements in students' social-emotional competencies and internalizing symptoms (e.g., depression, anxiety; Domitrovich et al., 2017; Kramer et al., 2014), as well as with reductions in externalizing symptoms (e.g., aggressive behavior; Lynch et al., 2018; Taylor et al., 2017) and improved academic outcomes (Corcoran et al., 2018). Importantly, aggressive behaviors are associated with specific information processing deficits (Portnow et al., 2018). Students who exhibit aggression often display a hostile attribution bias (HAB), interpreting ambiguous social interactions as aggressive (Crick & Dodge, 1994). These students also tend to rely on aggressive interpersonal negotiation strategies (AINS), generating aggressive rather than prosocial solutions in response to conflict (Selman & Demorest, 1984). SEL programs, including 4Rs, target these social-cognitive processes, in order to reduce aggressive behaviors (Jones et al., 2011).

Inadequate Implementation Supports Undermine Fidelity and Curricular Effects

Studies from K-12 curricula and school-based intervention research (Kraft et al., 2018; Greenberg et al., 2005) suggest that curricula implemented with low fidelity fail to produce intended benefits. Yet, there are high rates of variability in implementation trials of school-based programs (Durlak, 2016; Rohrbach et al., 2006). Domitrovich and Greenberg's (2000) seminal review found that SEL program implementation fidelity was linked to program outcomes. Recent

studies similarly show that aspects of implementation fidelity (e.g., quality of engagement) are associated with students' SEL skills, classroom behavior, and teacher-student interaction quality (Abry et al., 2013; Vroom et al., 2019). Thus, the system in place for training teachers and supporting SEL implementation may be as important as the intervention itself (Devaney et al., 2006).

One-on-one, structured coaching that provides ongoing support to teachers may be the most direct path to producing high quality implementation (Landry et al., 2006; Meyers et al., 2019). It is critical for coaches to target aspects of teachers' practice that have validated links to student outcomes. Hamre and colleagues (2007; 2013) argue that the daily interactions between teachers and students are the primary agents of curricular effects on developmental change (LoCasale-Crouch et al., 2018; Mashburn et al., 2008). Thus, MTP is an evidence-based coaching program that provides a focused lens through which coaches view classroom interactions, allowing them to give targeted feedback to teachers and promote effective teacher-student interactions in service of curriculum implementation.

4Rs+MyTeachingPartner Coaching

The current study evaluates 4Rs+MTP, the product of merging two validated interventions. The 4Rs component is a universal, school-based intervention that integrates social-emotional development into the language arts curriculum. Previous research evaluating the 4Rs program has demonstrated effects on students' social-emotional and academic competencies (Jones et al., 2010, 2011). However, the original 4Rs coaching was unstrucutured and included a high degree of variability across teacher-coach pairs, resulting in significant variability in implementation fidelity among teachers (Brown et al., 2011; Jones et al., 2010).

MTP implementation support consists of one-on-one, video-based coaching and access to video exemplars of teaching practices. MTP coaching is structured, focusing on enhancing high-quality classroom interactions to improve curriculum implementation and student learning (Pianta & Allen, 2009). MTP has demonstrated moderate to large positive effects on teacher-student interaction quality, and student social and academic outcomes (Downer et al., 2011; Pianta & Allen, 2009). The synthesis of these programs aims to improve the implementation, and consequently the impacts, of 4Rs through MTP's focus on enriching key classroom interactions.

Current Study, Research Questions, and Hypotheses

This study uses a quasi-experimental design to evaluate the efficacy of 4Rs+MTP, which was implemented in 2012-2013 across six elementary schools. Nine comparison schools were drawn from the same school district, where 4Rs was implemented *without* MTP during the 2005-2006 school year. We used a propensity score procedure to equate the two groups, in order to assess one central research question: does the integration of 4Rs with an evidence-based coaching model, MTP, lead to greater classroom-level effects on students' social-emotional and academic functioning than 4Rs only during a single school year? This study design is unique, because it isolates the effect of MTP coaching supports by specifying a contrast between the 4Rs+MTP intervention and a 4Rs only group (while accounting for any other differences between the two groups). To our knowledge, no other study of a universal SEL intervention has specifically examined teacher coaching effects in this way. We hypothesized that, on average, 4Rs+MTP classrooms would have students who exhibited less HAB, AINS, anxiety, depression, and aggressive behavior, as well as improved social competence and academic skills, when compared to the 4Rs only classrooms.

In universal or Tier 1 SEL interventions, like 4Rs, teachers are providing knowledge and skills to *all* students in their classrooms. This is important because classroom-level social-emotional skills (e.g., aggressive and disruptive behaviors) impact individual students' skill acquisition and behavior (Abry et al., 2017), as well as teachers' stress and well-being (Jeon & Ardeleanu, 2020). Presumably, teachers who effectively implement SEL curricula will have more well-adjusted and prosocial students in their classroom, thus creating an environment conducive to teaching and learning (Jennings & Greenberg, 2009). In keeping with this theory of change, we examine the utility of using an evidence-based coaching model to support teachers' SEL implementation in order to promote classroom level social-emotional and academic outcomes.

Method

Participants

Participants are divided across two samples (4Rs only and 4Rs+MTP) and described below. All participants are from the same large, northeastern urban area. Data were collected from 2005-2006 for the 4Rs only schools and from 2012-2013 for the 4Rs+MTP schools.

4Rs Only Participants. Participants in the 4Rs only sample included 498 students within 56 fourth-grade classrooms across nine schools. Classrooms were on average 3% White, 53% Hispanic, 38% Black or African American, and 6% Other. Teachers were 54% White, 31% Hispanic, and 14% Black or African American, on average. Students were on average 8.17 years old ($SD = 0.70$), with 42% of students receiving free or reduce priced lunch.

4Rs+MTP Participants. Participants in the 4Rs+MTP sample included 526 students within 35 third- (37.1%), fourth- (31.4%), fifth-grade (22.9%), and mixed upper elementary grade (8.6%) classrooms across six schools. Classrooms were on average 11% White, 44%

Hispanic, 21% Black or African American, and 25% Other. Teachers were 53% White, 16% Hispanic, and 29% Black or African American, on average. Out of the 35 classrooms, 17 were general education classrooms, 15 were co-taught, and three were self-contained special education classrooms. Students were on average 8.85 years old (SD=1.16; $M_{\text{3rd Grade}}$ = 8.04, $M_{\text{4th Grade}}$ = 8.83, $M_{\text{5th Grade}}$ = 9.96, $M_{\text{Mixed Grade}}$ = 9.10). Fifty-seven percent of students within these classrooms received free or reduced-price lunch.

Description of Interventions and Implementation

4Rs Only. The 4Rs (Reading, Writing, Respect & Resolution) program is a universal, school-based intervention focused on conflict resolution and intergroup understanding. In this program, SEL is integrated into a K-5 language arts curriculum and implemented at the classroom-level. This seven-unit curriculum fosters skills related to anger, listening, assertiveness, cooperation, negotiation, mediation, and community. Each unit includes a grade-appropriate book, which is associated with three to five SEL lessons. Teachers are expected to implement at least one lesson per week. Teachers engaged in a 25-hour introductory training course and had access to unstandardized coaching from a 4Rs staff developer. Although coaching did not follow a standard, evidence-based format, teachers were expected to meet in person with staff developers 12 times per year.

Previously reported implementation data (Jones et al., 2011) evaluated two components of 4Rs: curriculum delivery and teacher training. Teachers in the 4Rs only schools received an average of 2.4 (SD = 0.33) days of training and 38 (SD = 9.6) days of coaching support. On average, teachers delivered 75% of a 4Rs lesson per week, though the majority were closer to reaching the one lesson per week benchmark.

4Rs+MTP. The 4Rs+MTP program is the result of merging two validated interventions, 4Rs (described above) and MTP (My Teaching Partner). MTP is a professional development program with two components: (1) individual, video-based coaching and (2) access to an interactive website with video examples of ideal teaching practices. 4Rs+MTP was implemented via eight, one-on-one structured coaching cycles. Every two weeks, teachers videotaped a 4Rs lesson in their classroom. The coach then edited the tape, dividing it into three short segments focusing on specific elements of effective teacher-student interactions that aligned with the Classroom Assessment Scoring System (*CLASS*; Pianta et al., 2012). The video segments were posted to a private website for each teacher to review, in addition to written feedback and questions from the coach intended to prompt teacher reflections. Teachers viewed the segments and responded to the questions, then met wih their coach for 30-45 minutes to discuss coach feedback and questions, teachers' responses, areas for growth, and plans for future lessons. Lastly, coaches provided teachers with a written meeting summary and action plan for the next cycle.

4Rs+MTP implementation data were collected to monitor both the 4Rs and MTP components of the intervention. Regarding the 4Rs component, all teachers attended a three-day training, and completed 100% of 4Rs lessons for each of the seven units. Regarding MTP, all teachers completed the expected eight coaching cycles (excluding one teacher who missed a few months due to maternity leave). Independent raters determined how well coaches adhered to the core elements of MTP coaching conferences (e.g., using CLASS language), resulting in a 92% adherence rate. Coaches were also observed to demonstrate strong relationship-building skills ($M = 2.76$, $SD = 0.25$ on a 3-pt. scale) and a detailed focus on teacher-student interactions ($M = 2.37$, $SD = 0.56$). Coaching prompts were also coded by an implementation support specialist and

indicated strong adherence to the MTP protocol ($M = 11.80$, $SD = 1.76$, scale max. = 15). Coaches indicated that teachers generally implemented the agreed upon action plan, as this was evident in subsequent lesson videos. Overall, the implementation data indicate that 4Rs+MTP was implemented at a high level of fidelity.

Procedures

All full-time teachers were eligible to participate in 4Rs or 4Rs+MTP. During Fall 2005 (4Rs only) and Fall 2012 (4Rs+MTP), consenting teachers completed online demographic surveys. Student permission forms were sent home to parents during the initial weeks of school. The average parent consent rate was 65.2% in 4Rs only schools and 67% in 4Rs+MTP schools. There were no significant correlations between classroom consent rates and outcomes of interest in either study. Teachers completed ratings of consented students at the beginning (September-October) and end (May-June) of their respective school years. Participating students completed self-ratings via classroom administrations of surveys by trained data collectors during the fall and spring. Live classroom observations were conducted by data collectors trained in the *CLASS* during the fall of each school year. Student record data from the city Department of Education (DOE) was also collected in the summers following the intervention years (2006 and 2013).

Measures

The following measures were aggregated to reflect average classroom levels of a given construct. This allows us to understand changes in social-emotional and academic skills across entire classrooms of students.

Variables Relevant to the Propensity Matching Procedure

Teacher-student interaction quality was observed at the classroom level via the Classroom Assessment Scoring System - Upper Elementary (*CLASS-UE*; Pianta et al., 2012) in

the fall. The *CLASS-UE* includes three domains: Emotional Support, Instructional Support, and Classroom Organization. Emotional Support, Instructional Support, and Classroom Organization showed excellent internal consistency ($\alpha = 0.91$, $\alpha = 0.93$, and $\alpha = 0.91$, respectively) in the 4Rs only sample, as well as in the 4Rs+MTP sample ($\alpha = 0.91$, $\alpha = 0.93$, and $\alpha = 0.81$, respectively).

Teacher emotional exhaustion was measured in the fall using the emotional exhaustion subscale of the Maslach Burnout Inventory - Educator Survey (*MBI-ES*; Maslach et al., 1996). Teachers reported the frequency with which they experienced emotional exhaustion based on nine items (e.g., "I feel emotionally drained from work") using a 7-point Likert scale ranging from 0 ("never") to 6 ("every day"). Internal consistency was high in both the 4Rs and 4Rs+MTP samples ($\alpha = 0.90$ and $\alpha = 0.89$, respectively).

Teacher and classroom demographics were collected from teacher self-report and records provided by the city DOE. Demographic covariates included teacher race, classroom size, and percentage of students receiving free/reduced price lunch.

Variables Relevant to the Quasi-Experimental Contrast

Other teacher and classroom demographics were obtained from student self-report. This included students' gender, age, and race/ethnicity. Teachers also provided information, such as teacher gender and years of experience.

Classroom-level hostile attribution bias (HAB) and aggressive interpersonal negotiation strategies (AINS) were assessed via student report using a six-item adaptation of the Home Interview (Dodge, 1986). Regarding HAB, students listened to six vignettes and looked at accompanying illustrations. In each vignette, students were instructed to imagine themselves in an ambiguous altercation with a peer (e.g., a peer spills milk on your back in the cafeteria) and identify the cause of the altercation, choosing from four possible causal attributions (e.g., the

child slipped on something, the child wanted to make fun of you). Responses were coded as 1 (hostile) or 0 (benign). To measure AINS, students were asked how they would respond to each of the six scenarios presented in the vignettes, choosing from four possible responses (e.g., ignore it, pour milk on the child's back). Responses were coded as 1 (aggressive) and 0 (non-aggressive). The HAB and AINS scores showed acceptable internal consistency for the 4Rs only sample in the fall ($\alpha = 0.82$ and $\alpha = 0.91$, respectively) and spring ($\alpha = 0.79$ and $\alpha = 0.89$, respectively), as well as in the 4Rs+MTP sample in the fall ($\alpha = 0.73$ and $\alpha = 0.86$, respectively) and spring ($\alpha = 0.77$ and $\alpha = 0.88$, respectively).

Classroom-level anxiety and depression were measured using the Behavioral Assessment Scoring System for Children (*BASC*) Internalizing Problems Index (Reynolds & Kamphaus, 1998). This included 13 anxiety items (e.g., "I worry about little things") and 13 depression items (e.g., "Nothing is fun anymore"). Students determined if items were true or false since "the beginning of summer" (fall administration) or "the new year in January" (spring administration). The anxiety and depression subscales showed acceptable internal consistency for the 4Rs only sample in the fall ($\alpha = 0.82$ and $\alpha = 0.83$, respectively) and spring ($\alpha = 0.82$ and $\alpha = 0.87$, respectively). The 4Rs+MTP sample also showed acceptable internal consistency in the fall ($\alpha = 0.80$ and $\alpha = 0.85$, respectively) and spring ($\alpha = 0.80$ and $\alpha = 0.86$, respectively).

Classroom-level aggression was reported by teachers reported via the *BASC* Aggression Subscale (Reynolds & Kamphaus, 1998), consisting of 14 items, such as this child "threatens to hurt others." Teachers reflected on the frequency of students' behaviors within the past 30 days, using a 4-point Likert scale ranging from 1 ("Never") to 4 ("Almost Always"). Internal consistency was excellent in both fall and spring for the 4Rs only sample ($\alpha = 0.95$ in both waves)and the 4Rs+MTP sample ($\alpha = 0.92$, $\alpha = 0.91$, respectively).

Classroom-level social competence was reported by teachers using the Prosocial/Communication Skills and Emotion Regulation Skills subscales from the Social Competence Scale (Conduct Problems Prevention Research Group [CPPRG], 1999). Teachers reflected on the frequency of students' behaviors from the past 30 days and respond on a 1 ("Never") to 4 ("Almost Always") scale. The Prosocial/Communication Skills subscale included 11 items (e.g., "resolves peer problems on his/her own") and the Emotion Regulation Skills subscale included 8 items (e.g., "controls temper when there is a disagreement"). The Social Competence Scale showed excellent internal consistency ($\alpha = 0.97$) in both fall and spring for the 4Rs only and 4Rs+MTP ($\alpha = 0.97$ for both fall and spring) samples.

Classroom-level academic skills were rated by teachers via an academic rating scale created by the U.S. DOE (National Center for Education Statistics, 2004; Tourangeau et al., 2006). Teachers reflected on individual students' skills, knowledge, and behaviors within the area of reading and language arts. They reported the degree to which students had acquired 10 different skills (e.g., "conveys ideas clearly when speaking") using the following 5-point scale: 1 "Not Yet," 2 "Beginning," 3 "In progress," 4 "Intermediate," and 5 "Proficient." The academic rating scale showed excellent internal consistency in the fall and spring for the 4Rs only ($\alpha = 0.94$ and $\alpha = 0.93$, respectively) and 4Rs+MTP ($\alpha = 0.96$ and $\alpha = 0.97$, respectively) samples.

Information about academic skills was also colleted from the local DOE during the summers following the intervention years (2006 and 2013). This included students' standardized math and reading test scores, as well as classroom attendance rates.

Analytic Approach

This study uses a mixed model approach to estimate the effect of 4Rs+MTP, as opposed to 4Rs only, on classroom aggregated outcomes nested within schools. The decision to aggregate

student-level data is consistent with the program theory of change and allows outcomes to be examined at the program implementation level, along with covariates in the same level, without biasing point estimates (Jacob et al., 2014; Kmenta, 1971). However, since program assignment took place at the school level, a two-level model with random intercept at the school level was specified for each of the outcomes of interest using the following reduced equation:

$$y_{ij} = \beta_0 + \beta_1 x_{ij} + u_j + \epsilon_{ij} \tag{1}$$

Where y_{ij} is the classroom-level outcome of interest, $\beta_0 + \beta_1 x_{ij}$ represents the fixed effect of 4Rs+MTP, u_j represents the random effect at the school level, and the error term ϵ_{ij}. Covariates included in this model are proportion of female students in the classroom and mean age centered at the school level.

Propensity Matching Procedure

To estimate the average effect of participating in 4Rs+MTP compared to 4Rs only, the current study utilizes a propensity weighting (i.e., matching) approach known as inverse probability of treatment weighting (IPTW; Hernán et al., 2001). This method produces weights for each observation in the sample. Weights estimated from propensity scores are used to adjust the distribution of confounding variables so they are similar for both groups. In other words, we adjust for the over-selection of classrooms with certain characteristics to 4Rs+MTP or 4Rs only classrooms. The resulting weighted sample represents a pseudo-population where both groups have similar or matched covariate distributions (Leite, 2016). Previous literature shows that the quality of teacher-student interactions, as well as teacher-classroom demographics, such as classroom size and student socioeconomic status (SES), predict students' academic and social-emotional outcomes (Bellibas, 2016; LoCasale-Crouch et al., 2018). Therefore, a potential imbalance of these covariates between the two treatment groups might bias the results.

According to Rosenbaum and Rubin (1983), a propensity score is the conditional probability of receiving a treatment given pretreatment characteristics. In this study, propensity scores were estimated using logistic regression to predict classroom exposure to 4Rs+MTP given covariates.

$$p(X) \equiv Pr(D = 1|x) = E(D|X) \qquad (2)$$

where D = {1,0} refers to the exposure to 4Rs+MTP (1) vs. 4Rs only (0). X is the vector of baseline covariates measured/reported at fall: *CLASS* domains of teacher-student interaction quality (Behavioral Management, Regard for Students' Perspective, Teacher Sensitivity, Positive Climate, Quality of Feedback), teacher report of emotional exhaustion, teacher race/ethnicity (dummy coded), classroom size, and proportion of students with and without free/reduced price lunch eligibility.

Propensity score weights in this study were calculated using the inverse of the probability of exposure to the condition the classroom was exposed to (Stuart, 2010; see equation 3).

$$\omega_i = \frac{z_i}{e_i(x)} + \frac{1 - z_i}{1 - e_i(x)} \qquad (3)$$

where z_i represents the treatment indicator (4Rs+MTP =1; 4Rs=0) and $e_i(x)$ is the estimated propensity score. Covariate balance was evaluated using *t*-tests to compare treatment group means after weighting the covariates by the propensity. When there are no statistically significant differences between treatment groups, the covariate balance is assumed to be adequate (Leite, 2016).

All analyses were conducted using Stata 13 Software. Robust standard errors are reported to account for intragroup correlations. All models were fitted using maximum likelihood.

Results

Propensity scores for 91 classrooms were estimated using logistic regression, $\chi^2(10) =$ 58.44, pseudo $R^2=0.51$. Region of common support for the propensities was [.03808421, .99973214], with mean ($M=0.52$, $SD=0.34$). The sample was split into 5 equally spaced intervals of the propensity score to test the balancing property. The average propensity score and baseline covariates did not differ between 4Rs+MTP and 4Rs only conditions across the 5 blocks, suggesting the balancing property was satisfied (See Appendix, Table 1). *T*-tests of weighted mean differences between pretreatment covariates in 4Rs+MTP and 4Rs only conditions show no significant differences for ten of the eleven covariates. Only the proportion of students with free/reduced price lunch was significantly different between treatment groups, with a higher proportion for 4Rs+MTP *(M=0.60; SD=0.04)* compared with 4Rs only (*M=0.40; SD=0.03*). Table 1 shows mean differences between covariates in 4Rs+MTP and 4Rs only conditions after propensity weighting.

To examine the effect of 4Rs+MTP on students' academic and SEL outcomes, each of the outcomes was regressed on treatment exposure (0=4Rs, 1=4Rs+MTP), proportion of female students in the classroom, average classroom age, and values of the outcome at time 1 (fall). Table 2 shows descriptive information of study outcomes at fall and spring for each of the programs. Propensity weights were introduced as sampling weights at the classroom level. Regarding SEL outcomes, exposure to 4Rs+MTP was associated with significantly lower classroom-level HAB than exposure to 4Rs only ($b = -.070$, *Robust* SE $= 0.03$, 95% CI: [-.126, -.014]). Similarly, AINS were significantly lower in classrooms exposed to 4Rs+MTP than their counterparts exposed to 4Rs only ($b = -.13$, *Robust* SE $= 0.03$, 95% CI: [-.212, -.064]). Classroom exposure to 4Rs+MTP compared with 4Rs only was associated at the trend level (*p* <

.10) with positive effects on social competence ($b = .15$, *Robust* SE = 0.07, 95% CI [-.006, .295]). Academic outcomes were also significantly associated with exposure to 4Rs+MTP. Teacher-rated academic skills were higher in classrooms exposed to 4Rs+MTP compared to 4Rs only ($b = .28$, *Robust* SE = 0.09, 95% CI: [.051, .516]). Likewise, attendance was higher in classrooms exposed to 4Rs+MTP compared to 4Rs only ($b = .04$, *Robust* SE = 0.01, 95% CI: [.024, .060]). Table 3 shows coefficients and test statistics for each predictor, including effect size estimates. Cohen's *d* effect sizes were estimated using the differences between weighted means of the two programs divided by either the standard deviation of the control group or the pooled standard deviation. Cohen's *d* effect sizes are interpreted as small (0.2), medium (0.5), and large (0.8; Fritz et al., 2012).

Discussion

A growing research base indicates that SEL interventions promote students' social-emotional (Taylor et al., 2017) and academic development (Corcoran et al., 2018); however, there is tremendous variability in the implementation of such interventions (Durlak, 2016), which is connected to program outcomes (Domitrovich & Greenberg, 2000). This implementation variability was evident in a previous trial of 4Rs (Jones et al., 2011), which suggests that improving fidelity and teacher supports could intensify the positive 4Rs benefits. In the current study, we used a quasi-experimental design to examine the effects of the MTP evidence-based coaching model in tandem with 4Rs. This methodology allowed us to isolate the effects of MTP coaching, which served as an implementation support for teachers as they used 4Rs. We discuss the significance of our findings within the context of other 4Rs and 4Rs+MTP evaluation findings, as well as, the broader SEL intervention literature.

4Rs+MTP Effects on Classroom-level Social-Emotional Outcomes

4Rs+MTP, like other universal SEL interventions, is designed to target all students' social-emotional skills, making classroom-level social-emotional outcomes most proximal in the theory of change. In our study, 4Rs+MTP classrooms demonstrated lower HAB and AINS, on average, when compared to 4Rs only classrooms. These outcomes are noteworthy because 4Rs is designed to address these social-cognitive skills and has led to reductions in students' HAB and AINS in the past (Jones et al., 2011). The effect sizes in this study were 0.17 for HAB and 0.29 for AINS, suggesting that the effect of MTP coaching on top of 4Rs is relatively small. However, the interpretation of these effect sizes is different than in most other studies. First, we are comparing 4Rs+MTP to 4Rs only, rather than to a business-as-usual (BAU) control. When school-based SEL interventions, including 4Rs, are compared with control schools, effect sizes are typically in the small to medium range (0.14 to 0.57; Durlak et al., 2011; Jones et al., 2011); therefore, the potential overall effect of 4Rs, when implemented with MTP coaching support, could as much as double previously reported effect sizes. Second, effect sizes in other studies are typically based on student-level data, while our outcomes are aggregated to the classroom level. Given that there are fewer classrooms than students, our study is underpowered and thus provides a more conservative estimate of the effects of 4Rs+MTP.

Although a previous 4Rs trial found reductions in students' aggressive behaviors, anxiety, and depression, as well as improvements in social competence (Jones et al., 2011), we did not find significant differences between 4Rs only and 4Rs+MTP classrooms on these outcomes. However, there was a trend level ($p < .10$; $ES = 0.13$) positive effect on social competence favoring the 4Rs+MTP classrooms. Given that our study is underpowered, it is possible that 4Rs+MTP would show significantly greater effects on social competence compared

to 4Rs only in a larger sample. In fact, a recent RCT found that students in 4Rs+MTP classrooms showed improved social competence and fewer aggressive behaviors when compared to students in BAU control classrooms (Brown et al. 2019). As for anxiety and depression, we posit that improvements in these internalizing symptoms may not be visible after one year of Tier 1 intervention, as it may take two years to see meaningful effects (Jones et al., 2011).

Overall, these findings provide support for the positive impacts of universal SEL interventions on classroom-level social-emotional skills. Furthermore, they provide unique information about implementation support and teacher coaching. In our sample, MTP coaching to improve 4Rs implementation resulted in significantly greater intervention outcomes, suggesting a potential solution to the well-documented inconsistency in SEL training (Buchanan et al., 2009) and implementation (Domitrovich & Greenberg, 2000).

4Rs+MTP Effects on Classroom-level Academic Outcomes

Academic outcomes are more distally related to the intervention targets of SEL curricula; however, school-based SEL interventions are often associated with academic improvements (Corcoran et al., 2018). In this study, 4Rs+MTP classrooms showed greater teacher-reported academic skills, on average, than did their 4Rs counterparts. However, these academic impacts did not extend to end-of-year standardized testing in reading and math. Furthermore, the 4Rs+MTP classrooms had higher attendance rates based on DOE data. Effect sizes were 0.17 for teacher-reported classroom academic skills and 0.46 for school attendance, suggesting that the effect of MTP coaching on 4Rs is small to moderate within the academic domain. While MTP may support 4Rs implementation, the interactions-focused MTP coaching model is also likely to create rich teacher-student interactions, which may foster a positive classroom climate conducive to learning, positive teacher perceptions, and increased student attendance (LoCasale-Crouch et

al., 2018; Mashburn et al., 2008). Notably, we suggest that the positive effect on attendance rates be interpreted with caution; due to our quasi-experimental design, we cannot determine whether policy changes across the years (2005 versus 2012) may also have impacted attendance.

We aimed to select academic outcomes that were sensitive to 4Rs intervention effects. However, in a previous trial there were no main effects of 4Rs on academic outcomes; instead, students who were identified by their teachers as high "behavioral risk," demonstrated significant improvements in standardized math and reading achievement, attendance, and teacher-reported academic skills (Jones et al., 2010; 2011). Effect sizes for this higher risk group were small to moderate, ranging from 0.31 to 0.60, and have been partially replicated in another RCT contrasting 4Rs+MTP with a BAU control group (Brown et al., 2019). In this study, we were unable to account for student risk factors due to low power and classroom-aggregated outcomes; therefore, we cannot determine whether 4Rs+MTP in this sample produced larger academic effects (and extended to standardized test scores) for high risk students. Nevertheless, current results indicate significant effects on teacher-rated academic skills and attendance across all students within 4Rs+MTP classrooms, rather than high risk students only, and mirror effect sizes on academic outcomes from past SEL intervention evaluations (Corcoran et al., 2018).

Many educators have been concerned that time devoted to SEL in-service training and curricula implementation might detract from the academic mission of schools; these positive findings for teacher-reported academic skills and attendance contradict that claim. Additionally, 4Rs+MTP produced greater effects than 4Rs alone, suggesting that the structured, interactions-focused MTP coaching model supported 4Rs implementation and fostered classroom-level changes in academic skills and attendance.

Strengths & Limitations

The current study design uniquely allowed us to isolate the effects of MTP coaching and compare it to 4Rs only classrooms. This provided essential information about the benefits of structured, evidence-based teacher coaching and implementation fidelity for a school-based intervention. To our knowledge, no other study of a universal SEL intervention has isolated coaching effects in this way. Clearly, there is a need for more research in this domain, such as designing randomized contrasts to expand on this quasi-experimental work. This study also provides a fairly conservative test of the differences between the 4Rs+MTP and 4Rs interventions, with comparisons based on outcomes already known to be sensitive to 4Rs-induced changes (Jones et al., 2011), rather than outcomes that may be differentially sensitive to 4Rs+MTP.

Despite these strengths, this study had limitations. We used a quasi-experimental design, and as such, confounding factors may contribute to group differences. While analytic procedures were used to reduce group differences, two factors still need to be considered. First, the 4Rs+MTP data were collected during the 2012-2013 school year, while the 4Rs matched sample data were collected in the 2005-2006 school year. It is possible that timing differences, policy changes, attitudes towards SEL, and unmeasured external factors influenced our results. Second, during the propensity matching procedure, there was an imbalance for free/reduced price lunch status, with significantly more students in the 4Rs+MTP group eligible. The higher risk composition of 4Rs+MTP schools may provide an alternative explanation for our findings, as 4Rs has previously shown greater effects in higher risk students (Jones et al., 2010; 2011). Furthermore, a recent study evaluating a combination of MTP and the Good Behavior Game intervention found a moderating effect of teacher stress and challenging student behavior (Tolan

et al., 2020); therefore, it is possible that our findings are reflective of a conditional effect rather than a main effect of 4Rs+MTP. An additional limitation is that we relied on teachers' and students' perceptions of SEL skills, rather than using direct or observational SEL skill assessments. Lastly, the 4Rs+MTP sample had greater age variation, including third-, fourth-, and fifth-grade students, compared to the 4Rs sample, containing only fourth-graders. Thus, variation by grade-level and/or age is a potential confound that may have influenced our results.

Conclusion

Overall, this study emphasized the importance of a school-based SEL intervention for academic and social-emotional outcomes, as well as the promise of an evidence-based teacher coaching model designed to support high-quality, effective SEL implementation. Although teacher coaching is an added expense, it may provide teachers with the training and support needed to effectively implement SEL interventions. Additionally, the added cost of coaching seems justified given the number of students who may benefit from universal intervention, as well as the long-term positive impacts of social-emotional development, academic skills, and school attendance for students' mental and physical health (Allison & Attisha, 2019; Miles & Stipek, 2006).

Declarations

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Table 1. *Means and standard deviations for predictors across conditions **after** the propensity score matching procedure estimated at the classroom level.*

	4Rs+MTP (n = 35)	4Rs only (n = 56)	t test	Total Sample (N= 88)
Covariates included in PS Model				
CLASS – Behavioral Management	5.00 (.16)	5.27 (.16)	1.22 ns	5.07 (1.20)
CLASS – Regard for Students' Perspective	4.02 (.16)	3.98 (.17)	-0.15 ns	4.12 (1.16)
CLASS – Teacher Sensitivity	4.87 (.16)	4.93 (.18)	0.26 ns	4.91 (1.16)
CLASS – Positive Climate	4.59 (.16)	4.57 (.17)	-0.09 ns	4.57 (1.18)
CLASS – Quality of Feedback	4.04 (.19)	4.08 (.19)	0.17 ns	3.96 (1.27)
Teacher Report – Emotional Exhaustion	2.53 (.18)	2.32 (.19)	-0.81 ns	2.45 (1.32)
Teacher Race – White non-Hispanic	0.54 (.07)	0.46 (.08)	-0.84 ns	0.53 (0.50)
Teacher Race - Hispanic	0.22 (.06)	0.39 (.07)	1.70 ~	0.22 (0.41)
Teacher Race - African American	0.22 (.05)	0.15 (.06)	-0.76 ns	0.23 (0.42)
Classroom – Size	19.24 (.83)	20.40 (.89)	0.96 ns	20.27 (6.23)
% Students with FRPL	0.60 (.04)	0.40 (.03)	3.99 ***	0.45 (.28)

Note: Covariates in the table are those included in the propensity score model.

Table 2. *Means and standard deviations for outcomes of interest across conditions at Fall and Spring*

	Fall		Spring	
Study Outcomes	4Rs Only	4Rs+MTP	4Rs Only	4Rs+MTP
Hostile Bias	0.40 (0.23)	0.35 (0.10)	0.45 (0.22)	0.33 (0.12)
Aggressive INS	0.27 (0.21)	0.15 (0.10)	0.31 (0.24)	0.14 (0.12)
Anxiety	0.49 (0.15)	0.54 (0.08)	0.47 (0.15)	0.50 (0.11)
Depressive Symptoms	0.33 (0.15)	0.33 (0.09)	0.33 (0.18)	0.32 (0.10)
Social Competence	2.71 (0.53)	2.93 (0.49)	2.68 (0.53)	3.05 (0.46)
Aggressive Behavior	1.57 (0.35)	1.44 (0.30)	1.67 (0.40)	1.43 (0.24)
Academic Skills	3.04 (0.83)	3.61 (0.54)	3.27 (0.88)	3.96 (0.52)
Attendance Rate	0.90 (0.04)	0.95 (0.02)	0.90 (0.04)	0.95 (0.03)
Standardized Math Score	-0.38 (0.87)	-0.20 (0.58)	-0.18 (0.80)	-0.14 (0.70)
Standardized Reading Score	-0.42 (0.89)	-0.35 (0.78)	-0.27 (0.90)	-0.13 (0.71)

Table 3. *Estimated mean differences between 4Rs+MTP and 4Rs only interventions for all outcomes.*

	Social Emotional Outcomes						Academic Outcomes			
	HAB	AINS	Anxiety	Depressive Symptoms	Social Competence	Aggressive Behavior	Academic Skills	Attendance Rate	Standardized Math Score	Standardized Reading Score
Fixed Effects										
Intercept	0.15	0.20	0.20	0.07	0.59	0.57	0.64	0.90	-0.25	-0.40
	(.05)**	(.05)***	(.05)***	(.04)~	(.19)***	(.10)***	(.25)*	(.01)***	(.07)	(.12)**
4Rs+MTP indicator	-0.07	-0.13	-0.03 (.02)	-0.03	0.15	-0.08	0.28	0.04	-0.10	0.08
	(.03)*	(.03)**		(.02)	(.07)~	(.06)	(.09)**	(.01)***	(.11)	(.15)
% Girls	0.03	0.03	0.03	-0.02	0.12	-0.01	0.12	0.01	0.28	0.40
	(.03)	(.03)	(.01)~	(.02)	(.07)~	(.05)	(.10)	(.01)	(.11)*	(.12)
Baseline Measure	0.71	0.47	0.55	0.83	0.76	0.68	0.84			
	(.08)***	(.14)**	(.08)***	(.08)***	(.07)***	(.06)***	(.07)***			
Average Class Age centered	-0.02	-0.03	-0.02 (.01)	0.02	-0.02	0.06	0.08	-0.02	-0.24	-0.19
	(.02)	(.03)		(.02)	(.04)	(.03)*	(.09)	(.01)***	(.09)*	(.17)
Random Effects										
School-level	0.0016	0.0002	0.0006	0.0020	0.0084	0.0070	0.019	0.01	0.01	0.03
	(.0005)	(.0011)	(.0004)	(.0009)	(.0064)	(.003)	(.010)	(.00)	(.01)	(.04)
Residual	0.0114	0.0325	0.0085	0.0088	0.0643	0.0306	0.158	0.01	0.42	0.48
	(.0023)	(.0154)	(.0024)	(.0020)	(.0269)	(.012)	(.054)	(.01)	(.11)	(.14)
Model Fit										
-2 LL	492.162	-91.286	-292.09	-285.349	25.1028	-75.127	159.41	-339.17	304.98	326.925
Effect size measure (TX)	|0.173|	|0.291|	|0.100|	|0.085|	|0.133|	|0.098|	|0.166|	|0.461|	|0.066|	|0.048|
(TX – pooled sd on outcome)	|0.173|	|0.279|	|0.101|	|0.089|	|0.132|	|0.091|	|0.166|	|0.460|	|0.064|	|0.045|

Note: Average classroom age is centered at 9.58.

Understanding Teachers' Emotion Regulation Strategies and Related Contextual Factors

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Abstract

Given the increasing demands and stressors teachers have faced amidst the global pandemic (Pressley, 2021), it is essential that we gain a more nuanced understanding of teachers' emotion regulation (ER) in the classroom. The teacher ER literature is growing, and we aim to contribute meaningfully in four ways. First, we examine two ER strategies (cognitive reappraisal and expressive suppression) descriptively in a sample of 190 public school teachers (grades K-6) from 33 elementary schools. Second, we explore how these two ER strategies are related to important teacher (burnout, years of experience) and classroom (class size) factors. Third, we examine the potential associations between these ER strategies and observed emotionally supportive classroom interactions. Lastly, we seek to understand when and for whom ER strategies are most essential for fostering emotionally supportive classroom interactions by including teacher and classroom factors as potential moderators. Teachers in this sample reported frequent use of cognitive reappraisal and relatively infrequent use of expressive suppression. These two ER strategies were not significantly correlated with one another; however, they were significantly correlated with emotional exhaustion and personal accomplishment. Cognitive reappraisal was also significantly correlated with years of experience. Contrary to our hypotheses, cognitive reappraisal and expressive suppression did not predict unique variance in observed emotionally supportive interactions, and there were no conditional effects when moderators were added to the model. Implications for teacher supports and interventions are discussed.

Understanding Teachers' Emotion Regulation Strategies and Related Contextual Factors

Teaching has been consistently identified as a stressful, underpaid, and emotionally demanding profession (Schmidt & Jones-Fosu, 2019; von der Embse & Mankin, 2021); however, demands have increased amidst the global pandemic, as teachers are expected to adopt new teaching approaches (e.g., distance learning, hybrid teaching), support students and parents as they interact with instructional technology, and adhere to COVID-19 classroom guidelines (e.g., distance and masking requirements; Pressley, 2021). Not surprisingly, teacher stress, burnout, and attrition appear to be worsening during this challenging time (Steiner & Woo, 2021). Thus, it is increasingly important to understand how teachers cope with their emotions in the classroom, as well as the potential links between teachers' emotion regulation (ER) strategies, classroom factors, and teaching practices. Although teachers report using ER strategies (e.g., cognitive reappraisal, expressive suppression) during the school day (Sutton et al., 2009; Taxer & Gross, 2018), there is limited research linking these strategies to teacher and classroom factors (e.g., teacher burnout, years of experience, class size). Furthermore, only one study provides empirical evidence linking teachers' ER strategies to observed teacher-student interaction quality (Swartz & McElwain, 2012). Given the growing body of teacher ER research, we aim to contribute meaningfully to this literature in four ways. First, we examine two ER strategies (cognitive reappraisal and expressive suppression) descriptively in a sample of 190 elementary school teachers. Second, we uncover how these two ER strategies are related to factors (e.g., teacher burnout, years of experience, class size) that are important for teaching practices (Ansari et al., 2020; Blatchford et al., 2011), student outcomes (Madigan & Kim, 2021; McLean & Connor, 2015), and opportunities for targeted intervention. Third, we explore the potential associations between these ER strategies and observed emotionally supportive

classroom interactions. Lastly, we seek to understand when and for whom ER strategies are most essential for fostering emotionally supportive classroom interactions.

Emotion Regulation

Given the emotional demands of teaching (Jennings & Greenberg, 2009), we know that teachers must regulate their emotions throughout the school day (Sutton et al., 2009; Taxer & Gross, 2018). ER strategies have been widely studied among adults (Brockman et al., 2017; Koole, 2009); however, there is less research specifically dedicated to teachers' use of ER strategies. Theoretically, much of the ER literature is grounded in the process model of ER (Gross, 2002; Gross, 2015). Broadly, this model suggests that there are *antecedent-focused* and *response-focused* ER strategies. Antecedent-focused strategies are techniques that we use before an emotional response is fully activated, while response-focused strategies are employed after we have already begun experiencing emotions (Gross & John, 2003). Of note, the term "strategies" connotes a conscious process, however, it is assumed in the field of ER research that many ER strategies may be implemented automatically or unconsciously (Gross & John, 2003).

Although the process model of ER includes five strategy categories (situation modification, attentional deployment, cognitive change, and response modification), two specific strategies (cognitive reappraisal and expressive suppression) have been widely studied (Brady et al., 2019; Gross & John, 2003; Preece et al., 2020). When the originators of the process model of ER set out to create a measure of ER strategies, they used several criteria (Gross & John, 2003). First, they aimed to choose strategies that were commonly used in "everyday life." Second, they sought strategies that could be experimentally manipulated. Lastly, they aimed to represent both antecedent-focused and response-focused strategies. Thus, when they created the Emotion Regulation Questionnaire (ERQ), they decided only to measure cognitive reappraisal and

expressive suppression. Cognitive reappraisal (an antecedent-focused strategy) is the process by which individuals change their appraisal, or interpretation, of a given situation, while expressive suppression (a response-focused strategy) is the process of inhibiting the outward expression of an emotion.

As the ERQ (Gross & John, 2003) gained popularity and its two-factor structure was repeatedly confirmed (Brady et al., 2019; Preece et al., 2020), a common theme emerged in the literature: cognitive reappraisal and expressive suppression were pitted against each other. Cognitive reappraisal was framed as the "adaptive" strategy, and expressive suppression was framed as the "maladaptive" strategy (Brockman et al., 2017). There is some support for this narrative, as a body of research indicates that using cognitive reappraisal effectively decreases the intensity of negative emotions (Ray et al., 2010) and is associated with positive outcomes, including healthier social-emotional functioning (Gross, 2002; Gross & John, 2003). Furthermore, many studies indicate that using expressive suppression does not decrease the internal experience of negative emotions, but simply the outward appearance or expression of emotions (Gross, 1998; Koole, 2019). Additionally, expressive suppression has been linked to impaired memory (Bonanno et al., 2004) and increased emotional exhaustion (Chang, 2013).

Despite this evidence, there are also contradictory findings related to cognitive reappraisal and expressive suppression. For example, in Asian cultures, expressive suppression is not associated with increased negative emotions or outcomes (Butler et al., 2007), and many African American adults use expressive suppression to avoid negative stereotypes (Wilson & Gentzler, 2021). This has led many to call for a more contextual perspective within the field (Aldao, 2013; Brockman et al., 2017). In other words, it is becoming clear that the adaptiveness of ER strategies may be based on the individual and the context (Brockman et al., 2017).

Furthermore, how cognitive reappraisal and expressive suppression operate together remains unclear. Some results indicate that cognitive reappraisal and expressive suppression are positively correlated (Westerlud & Santtila, 2018), while others show no significant correlations (Brady et al., 2019). Interestingly, latent class analysis also suggests that there are individual differences in the number of ER strategies people commonly use (Dixon-Gordon et al., 2015). This means that some people may use both cognitive reappraisal and expressive suppression, while others may use neither strategy or only one. Given that many findings in the adult ER literature are inconsistent, the need for a contextual perspective is clear, thus leading to the current study's focus on both individual and contextual factors when examining teachers' ER strategies.

Teacher Emotion Regulation and Related Factors

The teacher ER literature is growing, but our understanding of how teachers' ER functions in the school setting remains limited. Within the classroom, teachers report using cognitive reappraisal to increase their patience for student misbehavior (Chang & Taxer, 2020; Sutton, 2004). For example, when a student is misbehaving, teachers report trying to see the situation from the student's perspective or remembering the student's challenging home life to increase empathy (Chang & Taxer, 2020; Sutton, 2004). Teachers also describe using expressive suppression during the school day (Chang & Taxer, 2020). For instance, teachers use expressive suppression to minimize their negative emotions, such as anger and frustration, when students fail to follow classroom rules (Sutton et al., 2009; Taxer & Gross, 2018). They may also use expressive suppression to decrease positive emotions when a student tells an inappropriate, but humorous joke (Sutton et al., 2009; Taxer & Gross, 2018). Thus, we know that teachers use cognitive reappraisal and expressive suppression to regulate their emotions; however, there is

limited research exploring how these strategies operate together and alongside important teacher and classroom factors. A more nuanced understanding of how ER strategies relate to teacher (e.g., burnout, years of experience) and classroom (e.g., class size) factors may have important implications for interventions. For example, if these factors are associated with ER strategies, then risk factors may be identified and used to inform targeted ER or mindfulness interventions in support of teachers in challenging situations.

Teacher Burnout

One important and widely studied factor is teacher burnout, or the psychological response to chronic teaching-related stress and emotional demands (Maslach et al., 2001). In this paper, we conceptualize teacher burnout using two categories: emotional exhaustion and low personal accomplishment (Maslach et al., 2001). Emotional exhaustion captures the chronic fatigue and depletion that teachers may experience, while low personal accomplishment includes feelings of professional inefficacy and reduced productivity (Leiter & Maslach, 2016). Although teacher burnout has become an increasingly popular topic, only a few studies link teacher burnout to ER strategies (Brackett et al., 2010; Chang, 2020; Jeon & Ardeleanu, 2020). In a recent study using structural equation modeling, Chang (2020) found that teachers' habitual uses of expressive suppression contributed to higher levels of emotional exhaustion and professional inefficacy. Furthermore, teachers who frequently used cognitive reappraisal experienced less emotional exhaustion and more personal accomplishment. These findings are consistent with other teacher burnout studies (Brackett et al., 2010; Chang 2009), as well as research connecting teachers' use of cognitive reappraisal to less perceived stress and teachers' use of expressive suppression to more perceived stress (Jeon & Ardeleanu, 2020).

Years of Teaching Experience

Years of teaching experience is another critical factor to consider in connection to teachers' ER strategies. In the broader adult ER literature, age is often an important moderator when considering the effectiveness of ER strategies. For example, one study showed that younger adults used more cognitive reappraisal and more expressive suppression compared to older adults (Westerlud & Santtila, 2018). Other researchers (Brockman et al., 2017) found that frequent use of cognitive reappraisal was associated with more negative affect for adolescents, but that high use of cognitive reappraisal was associated with improved emotional well-being for adults. These findings suggest that younger adults may need to engage in more cognitive reappraisal and expressive suppression because they have greater difficulty efficiently regulating their emotions (Orgeta, 2009; Westerlud & Santtila, 2018), and that older adults may use these strategies more effectively (Urry & Gross, 2010). In the professional context, we suggest that years of experience are more relevant than age but operate similarly, meaning that newer teachers may have a harder time regulating their emotions when compared to more experienced teachers. Thus, newer teachers may use more cognitive reappraisal and more expressive suppression, when compared to more experienced teachers. Although qualitative (Sutton et al., 2009) and descriptive (Taxer & Gross, 2018) studies about teachers' ER include years of teaching experience to bolster the validity of teachers' self-reported data, they do not consider years of experience as a variable of interest. Thus, to our knowledge, our study is the first to explore the associations between teachers' ER strategies and years of experience.

Class Size

Lastly, one key contextual factor for teachers is class size. Class size has been widely studied and results largely suggest that smaller class sizes (i.e., less than 20 students) are

associated with better student outcomes (Whitmore Schanzenbach, 2014) and less teacher stress (Zinsser et al., 2019). In larger classes, there is also less student engagement and more off-task behavior (Blatchford et al., 2011). To our knowledge, there are no previous studies examining the relationship between teachers' ER strategies and class size; however, a recent study indicates that when preschool teachers have more students with challenging behaviors in their classroom, they use more expressive suppression (Jeon & Ardeleanu, 2020). It is plausible that teachers who are overburdened with large classes may regulate their emotions differently when compared to teachers in smaller, more manageable classrooms.

Teacher Emotion Regulation and Emotionally Supportive Classroom Interaction

Although teachers report using ER strategies to improve their empathy and classroom interactions (Sutton et al., 2009; Taxer & Gross, 2018), very little empirical research supports this connection (Swartz & McElwain, 2012). This is an unfortunate gap in the literature because emotionally supportive classroom interactions are important for students' academic and social-emotional outcomes (LoCasale-Crouch et al., 2018; Mashburn et al., 2008); however, more research is needed to understand factors that may help teachers foster those interactions. Valiente and colleagues (2020) posit that teachers with greater social-emotional functioning are better able to engage in emotionally supportive interactions. Although they cite various social-emotional factors (e.g., ER, stress, mental health) as relevant for emotional support (Valiente et al., 2020), we suggest that teachers' ER strategies may be most important for daily emotionally supportive interactions. During emotional moments, teachers may be more likely to enact strategies to regulate and express their own emotions in order to support and validate their students. Thus, we propose that teachers' use of ER strategies is closely related to their ability to provide emotionally supportive interactions.

Consistent with this notion, Chang and Taxer (2020) found that teachers who reported frequent use of cognitive reappraisal and infrequent use of expressive suppression were less likely to express anger in the classroom. Furthermore, Buettner and colleagues (2016) found that teachers' self-reported use of cognitive reappraisal was associated with increased self-reported responsiveness to children's negative emotions. In other words, teachers using cognitive reappraisal also reported reacting positively and expressing encouragement when children expressed negative emotions. To our knowledge, only one other study has examined the association between teachers' ER strategies and observed emotional support. Swartz and McElwain (2012) found that preservice teachers who reported frequent use of cognitive reappraisal demonstrated more supportive responses to preschoolers' positive and negative emotional displays. However, preservice teachers' use of expressive suppression strategies did not explain unique variance in their emotional support. While Swartz and McElwain (2012) provide preliminary evidence linking teachers' use of cognitive reappraisal and emotional support in the classroom, their sample was small ($N = 24$) and limited to preservice early educators, and their observational measure of teachers' supportive responses was not validated or widely used. Thus, there is a need for further research exploring the association between teachers' ER strategies and observed emotionally supportive interactions. Without considering teacher or classroom contextual factors, we anticipate findings that are consistent with traditional views about the utility of ER strategies; thus, we predict that greater use of cognitive reappraisal will be associated with more emotional support, whereas greater use of expressive suppression will be associated with less emotional support.

Teacher Emotion Regulation and Emotionally Supportive Classroom Interaction:

Potential Moderation Effects

In keeping with the contextual perspective of ER strategies, we also seek to understand individual and contextual factors that may influence the link between teachers' ER strategies and emotionally supportive interactions. Thus, we also explore the four teacher (emotional exhaustion, personal accomplishment, years of teaching experience) and classroom (class size) factors we discussed earlier as potential moderators. We suggest that these factors may alter the way that ER strategies are connected with teachers' emotionally supportive interactions. Notably, this contextual approach to understanding the utility of ER strategies is still new and has not been widely applied to the teacher ER literature. Therefore, there is minimal theoretical and empirical research that directly supports specific hypotheses. Instead, we draw on related research and theory to guide hypotheses within this new domain while recognizing that our moderation analyses are novel and somewhat exploratory.

Emotional Exhaustion and Class Size

We expect some teacher and classroom moderators to confirm traditional views about cognitive reappraisal and expressive suppression. In other words, some moderators may strengthen the connections between cognitive reappraisal and positive outcomes, and expressive suppression and negative outcomes. When teachers are in stressful situations, we predict that cognitive reappraisal will serve as a protective factor, but that expressive suppression will be problematic. For example, when teachers are stressed and overburdened, using cognitive reappraisal may help them cope with their emotions more effectively (Jeon & Ardeleanu, 2020), which would likely benefit their emotionally supportive interactions. Conversely, when teachers are dealing with significant stressors and using expressive suppression, they may experience

"expressive dissonance" due to the inconsistency between their inner experience and outer expression in the classroom (Koole, 2009). Expressive dissonance often leads to feelings of inauthenticity (Koole, 2009), which may negatively impact teachers' ability to provide emotional support. Thus, we predict that the stressful and draining experiences of emotional exhaustion and large class sizes will similarly moderate the associations between ER strategies and emotional support. More specifically, we expect stronger positive associations between cognitive reappraisal and emotional support when teachers experience greater emotional exhaustion or larger class sizes. Conversely, we anticipate that greater emotional exhaustion or large class sizes may exacerbate the negative association between expressive suppression and emotionally supportive interactions.

Personal Accomplishment and Years of Teaching Experience

In contrast, we expect our other moderators to run somewhat counter to traditional views about cognitive reappraisal and expressive suppression. Specifically, when teachers have more strengths, we expect both ER strategies to be effective and related to more emotionally supportive interactions. For example, in the broader ER literature, age is often a strength or protective factor, as older adults are able to use multiple ER strategies effectively, including cognitive reappraisal and expressive suppression, given their years of practice implementing these strategies (Brockman et al., 2017; Urry & Gross, 2010). Conversely, younger adults use cognitive reappraisal and expressive suppression more frequently and less effectively (Urry & Gross, 2010; Westerlud & Santtila, 2018). In the school context, we suggest that years of teaching experience and personal accomplishment may function as protective factors. Therefore, we expect a stronger positive association between cognitive reappraisal and emotional support for teachers with more years of experience or a greater sense of personal accomplishment.

Interestingly, we anticipate that expression suppression will become positively associated with emotional support, rather than negatively associated, when teachers have more years of experience or greater feelings of personal accomplishment. In contrast, when teachers have less experience or report low personal accomplishment, we anticipate a negative association between expressive suppression and emotional support.

Current Study

The data were gathered from two cohorts during baseline data collection for a randomized controlled trial (RCT) of a social-emotional learning intervention. In this study, we have four main goals. First, we seek to examine two ER strategies (cognitive reappraisal and expressive suppression) descriptively and in conjunction, in a sample of 190 public school teachers (grades K-6) from 33 elementary schools. Second, we aim to uncover how these two ER strategies are related to other important factors, including teacher burnout, years of experience, and class size. Based on inconsistencies in the ER literature (Brady et al., 2019; Westerlud & Santtila, 2018), we approach these first two goals in an exploratory manner; it remains unclear how cognitive reappraisal and expressive suppression may be correlated with one another, as well as how they are linked to other teacher and classroom factors, in public elementary school teachers. Third, we examine the potential associations between these ER strategies and observed emotionally supportive classroom interactions. Importantly, all models included covariates that account for study design factors (i.e., cohort, grade level), as well as covariates that may create challenging classroom environments (i.e., classroom racial/ethnic diversity, percentage of students who demonstrate limited English proficiency or receive special education services). We expect the links between ER strategies and emotionally supportive interactions to be consistent with traditional views (Koole, 2019; Ray et al., 2010) and some previous research (Swartz &

McElwain, 2012) about cognitive reappraisal and expressive suppression. In other words, we hypothesize that greater use of cognitive reappraisal will be associated with more emotional support, but that greater use of expressive suppression will be associated with less emotional support. However, we anticipate that these associations will be altered by teacher and classroom factors. More specifically, we consider four factors as potential moderators: emotional exhaustion, personal accomplishment, years of teaching experience, and class size.

We expect that two moderators (emotional exhaustion and class size) will reinforce traditional views about cognitive reappraisal and expressive suppression. Specifically, we expect stronger positive associations between cognitive reappraisal and emotional support when teachers experience greater emotional exhaustion or larger class sizes. In contrast, we predict that greater emotional exhaustion or larger class sizes may strengthen the negative association between expressive suppression and emotionally supportive interactions. We expect our other moderators (personal accomplishment and years of teaching experience) to challenge traditional views about cognitive reappraisal and expressive suppression. Although we anticipate a stronger positive association between cognitive reappraisal and emotional support for teachers with more years of experience or a greater sense of personal accomplishment, we suggest that expressive suppression will be positively associated with emotional support, rather than negatively associated, when teachers have more years of experience or greater feelings of personal accomplishment.

Method

Participants

Participants include 190 elementary school teachers from 33 schools within a large public school district. Teachers in this sample were roughly evenly distributed among K-6 classrooms.

The majority of teachers were female (95.6%). The sample was racially/ethnically homogenous with 84.6% of teachers identifying as White, 6.7% Hispanic or Latino/a, 2.7% Black or African American, 2.7% Asian, and 3.4% multiracial. Teachers reported an average of 9.9 years ($SD =$ 7.6) of teaching experience, with the majority (65.8%) holding a master's degree.

The teachers in this sample taught a total of 4,192 students, with an average class size of 22.78 ($SD = 3.20$). The student sample was 49% female. The students were racially/ethnically heterogenous with 35.7% of students identified as White, 25.5% Hispanic or Latino/a, 14.3% Asian, 8.4% Black or African American, 8.2% Middle Eastern or North African, and 6.1% multiracial or other. Among the student sample, 24.8% of students were identified as Limited English Proficient (LEP) and 11.7% had an active Individualized Education Plan (IEP).

Procedures

The present analyses use data collected during the baseline year of a RCT of a social-emotional learning intervention. Data collection occurred in two cohorts during Spring 2019 and 2020, respectively. All teachers (grades K-6) within these schools ($N = 33$) were eligible to participate. A subset of consented teachers ($N =190$) was randomly selected, creating a sample with approximately one teacher per grade level from each school. Teachers completed an online survey and participated in classroom observations. Teachers in cohort 1 ($n = 129$) completed this survey between March and June 2019, and teachers in cohort 2 ($n = 61$) completed it in early March 2020. Classroom observations were conducted between March and April 2019 (cohort 1) and January and early March 2020 (cohort 2). All 2020 data were collected prior to COVID-19 school closures.

Measures

        Teacher Emotion Regulation Strategies. Teachers reported on their use of ER strategies using the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). This measure included six cognitive reappraisal items (e.g., "I control my emotions by changing the way I think about the situation I'm in") and four expressive suppression items (e.g., "I control my emotions by not expressing them"). Teachers responded to these items on a 7-point Likert scale ranging from 1 ("Strongly Disagree") to 7 ("Strongly Agree"). In the present sample, the cognitive reappraisal and expressive suppression factors both showed acceptable internal consistency with Cronbach's alpha values of 0.88 and 0.82, respectively.

        Teacher Burnout. Teacher burnout was measured using the emotional exhaustion and personal accomplishment subscales of the Maslach Burnout Inventory - Educator Survey (MBI-ES; Maslach et al., 1996). The depersonalization subscale was not included in this study; it has shown poorer internal consistency when compared to the other two scales (Schaufeli et al., 2001), therefore, it was excluded from the study to reduce survey length. The two scales that we examine included nine emotional exhaustion items (e.g., "I feel emotionally drained from work") and eight personal accomplishment items (e.g., "I feel exhilarated after working closely with my students"). Teachers were instructed to report the frequency with which they experienced the burnout symptoms using a 7-point Likert scale ranging from 0 ("never") to 6 ("every day"); higher scores reflected more emotional exhaustion and more personal accomplishment. Emotional exhaustion and personal accomplishment both showed excellent internal consistency with Cronbach's alpha values of 0.90 and 0.86, respectively.

        Years of Teaching Experience. Teachers reported how many years they worked as a teacher ($M = 9.94$, $SD = 7.63$) via an online survey. Sixth grade teachers had the highest average

years of experience ($M = 13.36$, $SD = 6.79$) and fourth grade teachers had the lowest average years of experience ($M = 8.02$, $SD = 6.16$).

Class Size. Teachers reported class size via an online survey. Teachers were asked to report the number of students in their class at the time of their classroom observation ($M = 22.78$, $SD = 3.20$). Average class size was relatively consistent across grade levels.

Emotionally Supportive Classroom Interactions. Emotionally supportive teacher-student interactions were observed at the classroom level via the *Classroom Assessment Scoring System* (CLASS; Pianta et al., 2008). Specifically, K-3 classrooms were observed using the CLASS K-3 (Pianta et al., 2008) and the grade 4-6 classrooms were observed using the CLASS-UE (Upper Elementary; Pianta et al., 2012a). These widely used and validated measures were initially created to examine teacher-student interactions and classroom demands in elementary classrooms. In both versions of the CLASS, observations are divided into three domains: Emotional Support, Instructional Support, and Classroom Organization. Although interactions may look different across grades, these domains are consistently observed and this factor structure is confirmed across elementary school classrooms (Hamre et al., 2013). In the present analyses, we look exclusively at the Emotional Support domain, which theoretically includes four dimensions: Positive Climate, Negative Climate (reverse coded), Teacher Sensitivity, and Regard for Student Perspectives.

The Negative Climate dimension is often excluded from the Emotional Support domain in upper elementary and secondary classrooms (Hafen et al., 2015), as well as in some kindergarten classrooms (Pakarinen et al., 2010), because factor analyses sometimes show that the Negative Climate dimension fits better within the Classroom Organization domain. Furthermore, the Negative Climate domain is often restricted by limited variability across

elementary school classrooms (Hamre et al., 2013; Pakarinen et al., 2010). In the present sample, Negative Climate shows limited variability for both K-3 ($M = 6.92$, $SD = 0.23$) and 4-6 grade ($M = 6.69$, $SD = 0.82$) classrooms. Thus, we exclude Negative Climate from the Emotional Support domain scores in this sample. The three remaining dimensions were averaged to create one Emotional Support domain score for each teacher, drawing from the CLASS K-3 and CLASS-UE scores, respectively. Overall, the Emotional Support domain captures teachers who are responsive to students' needs, emphasize students' perspectives, and create a positive classroom climate (Hamre et al., 2013). In this sample, Emotional Support showed acceptable internal consistency in K-3 classrooms ($\alpha = 0.76$) and moderate internal consistency in grade 4-6 classrooms ($\alpha = 0.68$).

Covariates. We considered several covariates based on study design and conceptual importance. Given the study design, we controlled for cohort (cohort 1 = 0; cohort 2 = 1) and grade level (with Kindergarten left out as the reference group) in all models. The initial grade level variable was transformed into seven "dummy" variables. For example, for the Kindergarten variable, Kindergarten classrooms are coded as 1 and all other classrooms are coded as 0. Grade level is a particularly important covariate given that teacher ER and emotionally supportive interactions may look different across grades (Pianta et al., 2012b); however, teachers are expected to use ER strategies and provide emotional support (Hamre et al., 2013) regardless of grade level.

We also considered conceptually relevant aspects of classroom diversity, which teachers reported via online survey. Classroom racial/ethnic composition (i.e., classroom diversity) was calculated using Simpson's Diversity Index (Simpson, 1949). This index indicates the likelihood of any two randomly selected students in a given classroom belonging to different racial/ethnic

groups (Rucinski et al., 2021). Simpson's Diversity Index factors in the number of groups within the classrooms, as well as the number of students within each of those groups. We calculated the index using eight categories: Asian, Black or African American, Hispanic or Latino/a, Middle Eastern or North African, Native American, Native Hawaiian or Pacific Islander, White, and Other. The index scores range from 0, indicating homogeneity (i.e., no diversity), to 1, indicating equal representation of all racial/ethnic groups (i.e., greater diversity). Simpson's Diversity Index was considered because previous research links greater classroom racial/ethnic diversity to closer teacher-student relationships (Rucinski et al., 2021), which may support more emotionally supportive interactions (Pennings et al., 2018). We also considered other classroom diversity factors, including the percentages of students identified as LEP or with active IEPs. Previous research indicates that teachers may interact differently with English language learners, and that forming emotionally supportive teacher-student relationships with LEP students may be challenging due to language barriers (Sulliven et al., 2015). Additionally, students with IEPs often present with unique behavioral challenges and needs, which many teachers feel ill-equipped to manage (Scott, 2017); thus, teachers may struggle to implement proactive and emotionally supportive interactions when they are struggling with behavior management.

Teachers also provided demographic information, such as gender and race/ethnicity. However, teacher gender and race/ethnicity were not considered as covariates because the sample is predominantly female and racially/ethnically homogenous.

Analytic Approach

Data Exploration

All analyses were conducted using StataIC 17 and SPSS Statistics 25. Data were plotted graphically using histograms to explore the relevant variables' distributions and potential

outliers. Descriptive statistics were calculated for all variables of interest (see Table 1). Missing data analyses indicated that the majority of the sample (95%) had complete data for all variables of interest. Importantly, only two teachers were missing classroom observations of emotional support. Missing data were examined and no consistent patterns were identified. Furthermore, given that this dataset contains numerous covariates that may be related to emotionally supportive interactions, there is a reduced likelihood that unobserved variables influenced this outcome variable. Thus, data were determined to be missing at random (MAR) and multiple imputation was used to address the small amount of missing data. Ten imputed datasets were created in StataIC 17 using Markov Chain Monte Carlo (MCMC) procedures. This process assumes that all variables in the imputed dataset have multivariate normal distributions; however, research indicates that this procedure is reliable even when the normality assumption is violated if the sample size is large (Lee & Carlin, 2010).

In the present data, teachers (Level 1) are nested within schools (Level 2). This nested data structure suggests that the assumption of independence of observations may be violated. To address this issue, we ran an unconditional two-level model, which had no predictors, to show how much variability exists at each level. In other words, these results demonstrate how much variation in observed emotional support is at the teacher level versus the school level. The intraclass correlations coefficient (ICC) was 0.03, indicating that only 3% of the variation in emotional support is at the school level. Additionally, the design effect (i.e., the ICC multiplied by the average number of teachers in each school) was calculated, resulting in a value of 0.05. Given this very low ICC and small design effect, multilevel analysis is not necessary; instead, all analyses were conducted using clustered standard errors to account for the nested data structure.

Descriptive and Correlational Analyses

The first two aims of this study were to (1) examine cognitive reappraisal and expressive suppression descriptively and in conjunction, and (2) understand how these two ER strategies are related to teacher emotional exhaustion, personal accomplishment, years of experience, and class size. Descriptive statistics were calculated for both ER strategies (see Table 1). Correlations among cognitive reappraisal, expressive suppression, emotional exhaustion, personal accomplishment, years of experience, class size, and covariates were computed to examine potential relationships (see Table 2).

Direct & Moderation Analyses

Multiple regression models with clustered standard errors were run using imputed data to test the associations between ER strategies and emotional support, as well as possible moderation effects (see Table 3). All regression and moderation models included the following covariates: grade level (with Kindergarten left out as the reference group), cohort, emotional exhaustion, personal accomplishment, years of experience, and class size. Aspects of classroom diversity (i.e., classroom racial/ethnic diversity, percentage of students identified as LEP or who have IEPs) were considered as covariates. These factors were examined alongside variables of interest; however, there were no significant associations or patterns. Therefore, these covariates were excluded from analyses to maximize model parsimony.

The multiple regression models included teachers' cognitive reappraisal and expressive suppression scores as independent variables and observed emotional support as the dependent variable. This allowed us to test the independent contributions of cognitive reappraisal and expressive suppression to emotionally supportive interactions. To explore the proposed moderators, eight interaction terms, with centered predictors, were created: cognitive reappraisal

x emotional exhaustion, expressive suppression x emotional exhaustion, cognitive reappraisal x personal accomplishment, expressive suppression x personal accomplishment, cognitive reappraisal x years of experience, expressive suppression x years of experience, cognitive reappraisal x class size, and expressive suppression x class size. These interaction terms were added individually to the initial model. Cohen's f^2 was calculated to determine local effect size (e.g., the proportion of variance uniquely explained by the predictor of interest, compared to the variance explained by the outcome in the model) for any predictors that were significantly associated with emotional support (Cohen 1988; Selya et al., 2012). Based on conventional guidelines, f^2 effect sizes are interpreted as small (0.02), medium (0.15), and large (0.35; Cohen, 1988).

Results

Descriptive and Correlational Results

Table 1 provides descriptive statistics for all variables of interest within the original (i.e., not imputed) dataset. In the present sample, teachers reported using cognitive reappraisal fairly frequently ($M = 5.41$, $SD = 0.88$). Conversely, teachers reported using expressive suppression infrequently ($M = 3.38$, $SD = 1.20$). Teachers also reported low levels of emotional exhaustion ($M = 3.81$, $SD = 1.24$) and high levels of personal accomplishment ($M = 6.16$, $SD = 0.70$). On average, teachers in this sample were fairly experienced, with an average of 9.94 years of experience ($SD = 7.63$), and they taught in moderate to large classes ($M = 22.78$, $SD = 3.20$). Their classrooms were also relatively diverse, with an average Simpson's Diversity Index of 0.59 ($SD = .18$), indicating racial/ethnic heterogenity. Lastly, teachers demonstrated relatively high levels of observed emotional support ($M = 5.13$, $SD = 0.89$).

Table 2 includes bivariate correlations among the study variables. Interestingly, cognitive reappraisal and expressive suppression were not significantly correlated ($r = -0.10$, $p = 0.17$). Emotional exhaustion was negatively associated with cognitive reappraisal ($r = -0.22$, $p = 0.002$) and positively associated with expression suppression ($r = 0.24$, $p < 0.001$). Personal accomplishment was positively correlated with cognitive reappraisal ($r = 0.40$, $p < 0.001$) and negatively correlated with expressive suppression ($r = -0.16$, $p = 0.03$). Years of teaching experience was also positively correlated with cognitive reappraisal ($r = 0.19$, $p = 0.01$), but not significantly correlated with expressive suppression ($r = 0.02$, $p = 0.77$). Neither class size nor emotional support were significantly correlated with cognitive reappraisal or expressive suppression.

Direct & Moderation Effects Results

Table 3 presents the multiple regression results, with unstandardized coefficients, examining the possible links between ER strategies and observed emotionally supportive interactions. Results revealed that neither cognitive reappraisal nor expressive suppression were significantly associated with observed emotional support, which is consistent with nonsignificant bivariate correlations. Class size ($b = -0.04$, $p = 0.04$) was significantly associated with emotional support; however, the effect size was small ($f = 0.03$). In other words, on average, every one-unit increase in class size was associated with a .04 decrease in emotional support.

Table 3 also presents the moderation results. Each of the eight interaction terms were entered into the model one at a time. When interaction terms were included, all relevant predictors were centered to improve interpretability, and covariates remained consistent with previous models. However, there were no significant moderation effects.

Discussion

The field of teacher ER research is growing, thus we aimed to contribute meaningfully to this literature in four ways. First, we examined two ER strategies (cognitive reappraisal and expressive suppression) descriptively and in conjunction, in a sample of elementary school teachers. Second, we explored how two ER strategies were related to contextual factors (e.g., teacher burnout, years of experience, class size) that are important for teaching practices (Ansari et al., 2020; Blatchford et al., 2011) and student outcomes (Madigan & Kim, 2021; McLean & Connor, 2015). Third, we explored the potential associations between ER strategies and observed emotionally supportive classroom interactions. Lastly, we employed a contextual perspective, attempting to understand when and for whom ER strategies are most essential for emotionally supportive classroom interactions. We discuss the significance of our findings within the context of other teacher ER research, as well as the broader ER literature.

What do Cognitive Reappraisal and Expressive Suppression Look Like, and How are They Related, for Elementary School Teachers?

In the present sample, elementary school teachers reported frequently using cognitive reappraisal and infrequently using expressive suppression. This is somewhat inconsistent with previous studies. Although teachers often report using cognitive reappraisal (Chang & Taxer, 2020; Sutton, 2004), they typically report using expressive suppression most frequently (Taxer & Gross, 2018). Thus, teachers in the current sample differ from previous samples of teachers in their use of expressive suppression. Additionally, in this sample, cognitive reappraisal and expressive suppression were not significantly correlated. Previous studies in the adult ER literature provide inconsistent findings about the connection between cognitive reappraisal and expressive suppression; some studies indicate that cognitive reappraisal and expressive

suppression are positively correlated (Westerlud & Santtila, 2018), whereas others show no significant correlations (Brady et al., 2019). The present findings indicate that cognitive reappraisal and expressive suppression are unrelated in the present sample of elementary school teachers, meaning that some teachers may use both strategies, while others may use neither strategy or only one. In the future, researchers may use latent profile analysis (Dixon-Gordon et al., 2015) to identify patterns in teachers' use of different ER strategies.

Furthermore, we recommend that future researchers measure teachers' ER strategies in other, more contextualized, ways. Using the ERQ (Gross & John, 2003), teachers in this study reported on their general tendency to use cognitive reappraisal and expressive suppression regardless of context. However, other studies show that it is helpful to ask teachers about their ER in context (e.g., how they respond to student disruptive behavior, specifically; Chang & Taxer, 2020). Future researchers may ask teachers to respond to vignettes depicting challenging classroom situations, allowing them to imagine how they would respond in concrete (rather than abstract) situations (Brackett et al., 2010). Ideally, researchers will observe teachers' ER strategies in action, but appropriate measures are not fully developed or validated (Gordon et al., 2021).

How are Cognitive Reappraisal and Expressive Suppression Associated with Teacher and Classroom Factors?

We examined potential correlations between teachers' ER strategies and four teacher and classroom contextual factors: emotional exhaustion, personal accomplishment, years of experience, and class size. It should be noted that these analyses were correlational and nondirectional, meaning that causality cannot be inferred. Cognitive reappraisal was significantly negatively correlated with emotional exhaustion and significantly positively correlated with

personal accomplishment. Conversely, expressive suppression was significantly positively correlated with emotional exhaustion and significantly negatively correlated with personal accomplishment. These findings are consistent with previous research connecting ER strategies and teacher burnout (Brackett et al., 2010). Teachers who frequently use cognitive reappraisal have been found to experience less emotional exhaustion and more personal accomplishment, whereas teachers who frequently use expressive suppression have reported higher levels of emotional exhaustion and lower levels of professional efficacy (Chang, 2020). This is also consistent with traditional views that cognitive reappraisal is linked to better social-emotional functioning (Gross & John, 2003; Ray et al., 2010) and expressive suppression is linked to poorer well-being (Bonanno et al., 2004; Koole, 2019). Importantly, these associations may be bidirectional; ER strategies may exacerbate or alleviate symptoms of teacher burnout, but symptoms of burnout may also influence teachers' ER strategy selection.

In the present study, cognitive reappraisal was also significantly positively correlated with years of teaching experience; however, expressive suppression and years of experience were not significantly correlated. Although the connection between teachers' ER strategies and years of experience has not been explored in previous research, the adult ER literature suggests that age is connected to ER strategies. More specifically, older adults often use ER strategies more effectively and efficiently (Urry & Gross, 2010). In a professional context, we considered years of experience to be more relevant than age, but we speculated that experienced teachers might be more adept when using ER strategies. Our findings indicate that experienced teachers use cognitive reappraisal more frequently when compared to newer teachers, perhaps suggesting that teaching experience, or trial and error, has reinforced the use of cognitive reappraisal.

Because we cannot determine directionality, it is also possible that frequent use of cognitive reappraisal serves as a protective factor, helping teachers persevere and stick with teaching.

Lastly, class size was not significantly correlated with cognitive reappraisal or expressive suppression. We hypothesized that teachers who were overburdened with large classes might regulate their emotions differently when compared to teachers in smaller, more manageable classrooms. To our knowledge, no previous studies examine the relationship between teachers' ER strategies and class size; therefore, this hypothesis was exploratory. Our results indicate that teachers' ER strategies and class size are not linked in elementary schools. Notably, there are many other factors (e.g., teachers' beliefs about emotions, cultural influences, teachers' psychological well-being, students' disruptive behaviors) that may be associated with teachers' ER strategies in the classroom, but we were limited by the measures in the present dataset.

How are Cognitive Reappraisal and Expressive Suppression Linked to Emotionally Supportive Teacher-Student Interactions?

Teachers qualitatively report using ER strategies to improve their empathy and classroom interactions (Sutton et al., 2009); however, to our knowledge, only one other study directly tested the connection between teachers' ER strategies and emotionally supportive teacher-student interactions (Swartz & McElwain, 2012). Contrary to our hypotheses, cognitive reappraisal and expressive suppression did not predict unique variance in observed emotionally supportive interactions. This is somewhat inconsistent with previous findings that link cognitive reappraisal, but not expressive suppression, to observed emotionally responsive teaching practices (Swartz & McElwain, 2012). Notably, Swartz and McElwain's study included a small sample of preservice preschool teachers, rather than in-service elementary school teachers, and they utilized an unvalidated and less commonly used observational tool than the CLASS. Given the limited

research connecting ER strategies to observed interactions, it remains unclear whether teachers'

use of ER strategies improves or impedes their ability to foster high-quality, emotionally

supportive classroom interactions. It is possible that these two, general ER strategies are not

relevant for emotionally supportive classroom interactions, but rather, that ER strategies in

context (e.g., how teachers respond to student conflict; Chang & Taxer, 2020) may be more

closely tied to classroom interactions. Additionally, the construct of ER is highly nuanced and

our research question may have been overly simplistic. ER strategies are likely influenced by a

variety of factors including but not limited to, beliefs about emotions (Swartz & McElwain,

2012), emotion display rules (Chang, 2020), the regulation of positive or negative affect (Taxer

& Frenzel, 2015), and psychological well-being (Joormann & Stanton, 2016). Thus, there is

likely a complicated interplay between various factors when we consider the role of teachers' ER

strategies in the classroom.

This is also reflective of a broader issue in the field of education research: classroom

dynamics are incredibly complex and it can be difficult to identify the teacher and classroom

factors that predict teacher-student interaction quality (Early et al., 2007; Ripski et al., 2011;

Roberts et al., 2016). In our model, class size was significantly associated with emotionally

supportive interactions; however, the effect size was small. Thus, it is challenging to create

targeted interventions or policies that improve teacher-student interactions, despite the fact that

interaction quality is crucial for students' academic and social-emotional development

(LoCasale-Crouch et al., 2018; Mashburn et al., 2008).

Do Teacher and Classroom Contextual Factors Alter the Utility of Cognitive Reappraisal and Expressive Suppression?

Recent research highlights the importance of considering ER strategies in context, because the adaptiveness of different ER strategies may be based on individual and contextual factors (Brockman et al., 2017). Although we did not find a direct effect between teachers' ER strategies and observed emotionally supportive interactions, this contextual perspective led us to test several conditional effects. We considered four teacher and classroom factors (emotional exhaustion, personal accomplishment, years of teaching experience, and class size) that might alter the associations between ER strategies and observed emotional support. Unfortunately, there were no significant moderation effects. It should be noted that this contextual approach to understanding the usefulness of ER strategies is relatively new, and not yet widely used in the teacher ER literature. Therefore, there was minimal theoretical or empirical research directly supporting our moderation hypotheses. Additionally, there may be other untested moderators that would have altered the associations. For example, in the adult ER literature, race/ethnicity, cultural values, and racial discrimination all impact the utility of different ER strategies (Butler et al., 2007; Wilson & Gentzler, 2021). In the present study, the teacher sample was racially and ethnically homogenous, limiting our ability to explore racial/ethnic identities and stressors as moderators. Lastly, it is also possible that our specific moderation hypotheses were incorrect, and that mediation (i.e., indirect) or moderated mediation effects are plausible. Given the significant correlations between ER strategies and other factors (e.g., emotional exhaustion, personal accomplishment), there may be alternative pathways by which these variables are associated. We hope that future researchers employ longitudinal data to explore directionality, indirect effects, and mediational pathways among these factors.

Strengths and Limitations

The present study possesses many strengths. First, this study connects teachers' ER strategies to other key contextual factors, highlighting the importance of understanding teachers' ER within the classroom context. We encourage future researchers to adopt this contextual perspective when further exploring teachers' ER strategies. Second, we attempted to link teachers' ER strategies to observed emotionally supportive classroom interactions. Although teachers qualitatively report using ER strategies to improve their empathy and classroom interactions (Sutton et al., 2009), only one other study directly tested this link (Swartz & McElwain, 2012). Despite nonsignificant findings, we built upon this previous work by utilizing a larger sample, in-service elementary school teachers (versus preservice preschool teachers), and a validated, widely-used classroom observation tool. We hope that future researchers continue to use rigorous methodology in search of quantitative evidence linking teachers' ER strategies to observed classroom interaction quality.

Despite these strengths, this study also has several limitations. In addition to the limitations discussed in the above sections, it should be explicitly noted that this study utilized concurrent data, examining ER strategies, contextual factors, and emotionally supportive interactions at the same time. Therefore, we cannot speak to causality, underlying mechanisms, or patterns over time. Given this concurrent data, we also excluded student outcomes from our study. Future research might link teacher ER strategies, contextual factors, teacher-student interactions, and student outcomes to more fully understand how the interplay between these factors impacts students. Lastly, teachers in this sample chose whether or not they wanted to participate in data collection for a social-emotional learning intervention RCT. Teachers who

agreed to participate may differ in their ER abilities, attitude about ER, emotionally supportive practices, burnout, and years of experience.

Conclusion

Teaching is a stressful and emotionally demanding profession (Schmidt & Jones-Fosu, 2019; von der Embse & Mankin, 2021); and demands are only increasing amidst the global pandemic (Pressley, 2021). Thus, it is more important than ever to understand how teachers cope with their emotions in the classroom, as well as the potential links between teachers' ER strategies, contextual factors, and teaching practices. The present study indicates that teachers' ER strategies are associated with emotional exhaustion, personal accomplishment, and years of teaching experience. Future researchers, educators, and interventionists may want to consider the interplay between these factors when seeking to support teachers' well-being.

Declarations

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Table 1. Descriptive Statistics

Variable	Obs.	Frequency	Mean	Std. Dev.	Min.	Max.
ER Strategies						
Cognitive Reappraisal	183	-	5.41	0.88	2.67	7.00
Expressive Suppression	183	-	3.38	1.20	1.00	6.50
Teacher Factors						
Emotional Exhaustion	183	-	3.81	1.24	1.11	6.78
Personal Accomplishment	183	-	6.15	0.70	3.75	7.00
Years of Experience	181	-	9.94	7.63	0.00	33.00
Classroom Factors						
Class Size	184	-	22.78	3.20	14.00	31.00
Emotionally Supportive Interactions						
Observed Emotional Support	188	-	5.13	0.89	1.67	6.83
Covariates						
Simpson's Diversity Index	190	-	0.59	0.18	0.00	1.00
Percentage of LEP Students	184	-	24.82	26.95	0.00	100.00
Percentage of Students with IEPs	184	-	11.72	12.88	0.00	52.94
Kindergarten	29	15.26%	-	-	-	-
Grade 1	25	13.16%	-	-	-	-
Grade 2	29	15.26%	-	-	-	-
Grade 3	28	14.74%	-	-	-	-
Grade 4	26	13.68%	-	-	-	-
Grade 5	28	14.74%	-	-	-	-
Grade 6	25	13.16%	-	-	-	-
Cohort 1	129	67.89%	-	-	-	-
Cohort 2	61	32.11%	-	-	-	-

Table 2. Bivariate Correlations among Study Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Cognitive Reappraisal	1.00											
(2) Expressive Suppression	-0.10	1.00										
(3) Emotional Exhaustion	-0.22***	0.24***	1.00									
(4) Personal Accomplishment	0.40***	-0.16*	-0.31***	1.00								
(5) Years of Experience	0.19*	0.02	-0.17*	0.12	1.00							
(6) Class Size	-0.12	-0.01	0.02	-0.02	-0.05	1.00						
(7) Emotional Support	-0.01	-0.09	0.02	0.13	0.03	-0.20**	1.00					
(8) Grade	-0.01	0.06	0.00	-0.16*	0.11	0.14	-0.26***	1.00				
(9) Simpson's Diversity Index	-0.04	-0.03	0.08	0.03	-0.06	-0.02	-0.04	-0.10	1.00			
(10) Percentage LEP	-0.01	0.07	-0.03	-0.13	-0.07	-0.41***	0.11	-0.12	-0.01	1.00		
(11) Percentage with IEPs	0.11	0.02	0.03	0.07	-0.05	0.02	-0.04	0.10	0.08	0.00	1.00	
(12) Cohort	-0.11	0.11	0.14	-0.14	0.01	-0.02	-0.01	-0.02	0.01	-0.02	-0.14	1.00

*p < .05, **p < 0.01, ***p < .001

Table 3. Multiple Regression Results Examining ER Strategies and Emotionally Supportive Interactions

	Outcome: Emotional Support		
	Coefficient	Standard Error	*t*-value
Constant	5.64***	0.84	6.72
ER Strategies			
Cognitive Reappraisal (CR)	-0.10	0.08	-1.29
Expressive Suppression (ES)	-0.05	0.06	-0.91
Covariates			
Emotional Exhaustion	0.06	0.06	0.88
Personal Accomplishment	0.17	0.11	1.51
Years of Experience	0.01	0.01	1.04
Class Size	-0.04*	0.02	-2.18
Grade 1	0.19	0.22	0.87
Grade 2	-0.08	0.22	-0.37
Grade 3	-0.10	0.25	-0.42
Grade 4	-0.14	0.21	-0.65
Grade 5	-0.34	0.27	-1.31
Grade 6	-0.58	0.35	-1.68
Cohort	-0.03	0.13	-0.24
Interactions‡			
CR x Emotional Exhaustion	-0.07	0.07	-1.11
ES x Emotional Exhaustion	0.09	0.06	1.46
CR x Personal Accomplishment	-0.01	0.14	-0.07
ES x Personal Accomplishment	-0.10	0.11	-1.00
CR x Years of Experience	0.02	0.01	0.16
ES x Years of Experience	0.00	0.01	0.44
CR x Class Size	0.05	0.03	1.43
ES x Class Size	0.01	0.03	0.15

*p < .05, **p < 0.01, ***p < .001

‡ Interaction terms were added to the model one at a time to be tested independently.
Note: Coefficients are unstandardized. Kindergarten was left out as a reference group for other grades. The initial regression model, as well as those testing each interaction independently, included both ER strategies and all covariates. ER strategies and covariate coefficients shown above are from the initial regression model only. Relevant predictors were centered in the model when interaction terms were added.