

# Improving Classroom Quality: Teacher Influences and Experimental Impacts of the 4Rs Program

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This study capitalizes on recent advances in the reliable and valid measurement of classroom-level social processes known to influence children's social-emotional and academic development and addresses a number of limitations in our current understanding of teacher- and intervention-related impacts on elementary school classroom processes. A cluster randomized controlled trial design was employed to (a) examine whether teacher social-emotional functioning forecasts differences in the quality of 3rd-grade classrooms, (b) test the experimental impact of a school-based social-emotional learning and literacy intervention on the quality of classroom processes controlling for teacher social-emotional functioning, and (c) examine whether intervention impacts on classroom quality are moderated by these teacher-related factors. Results indicated (a) positive effects of teachers' perceived emotional ability on classroom quality; (b) positive effects of the 4Rs Program on overall classroom quality, net of teacher social-emotional functioning indicators; and (c) intervention effects that are robust to differences in these teacher factors. These findings support and extend recent research examining intervention-induced changes in classroom-level social processes fundamental to positive youth development.

*Keywords:* classroom quality, classroom emotional and instructional climate, randomized trial, social-emotional learning, school-based intervention

Increasingly, school-based intervention and whole school reform efforts aim at identifying, assessing, and effecting changes in classroom-level processes associated with or predictive of children's social-emotional and academic development (Hamre &

Pianta, 2005; Pianta, 2006; Raver et al., 2008; Rimm-Kaufman, La Paro, Downer, & Pianta, 2005). These classroom processes are fundamentally social in nature, reflect the underlying quality of the interactions among teachers and students, and encompass emotional, instructional, and organizational dimensions of classroom experience. Indeed, in the absence of improving such social processes, other resources such as qualified teachers or costly curricular materials may be ineffective in promoting learning and achievement (Cohen, Raudenbush, & Ball, 2003; Fullan, 2001). Reliable and valid methods and measures for assessing important classroom-level social processes have recently been developed and are gaining use in the research community (Pianta, La Paro, & Hamre, 2008).

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Little is currently known, however, about the ability of school- and classroom-based interventions to successfully alter these social dimensions of classroom settings, particularly in poorly functioning classrooms. To date, only one study has provided experimental evidence of the positive impact of a planned intervention on elements of the emotional and organizational climate of the classroom (Raver et al., 2008). The Raver et al. (2008) study focused on behavior management training and weekly classroom visits by mental health consultants in Head Start-funded preschool programs. The present study is the first to our knowledge that uses a cluster randomized controlled trial design to test the causal impact of a universal, school-based preventive intervention—the 4Rs (Reading, Writing, Respect, and Resolution) Program—on the quality of the emotional, instructional and organizational processes of elementary school classrooms. Developed and run by a

creative group of innovators in public education, the Morningside Center for Teaching Social Responsibility (formerly Educators for Social Responsibility, Metropolitan Area, or ESR Metro), the 4Rs Program trains and provides ongoing coaching to teachers in the implementation of an integrated social-emotional learning and literacy curriculum.

### **A Theoretical Framework for Classroom Settings as Targets of Intervention Research**

Dynamic contextual models view children's development as taking place in a nested and interactive set of contexts ranging from the most immediate microcontexts to the more distal meso- and exocontexts. Individual experience and behaviors are dynamically mediated by numerous proximal processes (Bronfenbrenner & Morris, 1998; Sameroff, 1995). In microcontexts (e.g., family, classroom, and school), among the most salient proximal processes are those that involve important relationships (Pianta, 1999). Children experience classrooms through their relationships with their teachers and with their peers, and together children and teachers contribute to a dynamic and enduring set of interactions characterized by regular and consistent patterns (Kontos & Wilcox-Herzog, 1997; Meehan, Hughes, & Cavell, 2003; Meyer, Wardrop, Hastings, & Linn, 1993; Pianta, 1999; Pianta & Stuhlman, 2004). This set of relationships in aggregate constitutes the culture and climate of the classroom environment for all children. Teacher-student relationships are a joint function of the unique characteristics of children (e.g., their social-cognitive attributions and problem-solving style) and teachers (e.g., their social-emotional abilities and experiences of job stress and burnout) and the cultural norms, values, and practices they bring to the relationship and to the classroom. Together these characteristics contribute to the climate of the classroom.

From large-scale studies employing multilevel analyses, we know there exists significant classroom-level variation in student learning and achievement (Nye, Konstantopoulos, & Hedges, 2004) and that differences in student learning across years is linked to children's experiences in specific classrooms (Hamre & Pianta, 2005). Only recently, however, has a broad theory of the classroom-level mechanisms that link students' experiences in their classrooms to their academic and social-emotional development been elucidated and validated. This conceptualization and operationalization of classrooms, known as the Classroom Assessment Scoring System (CLASS) Framework (Hamre & Pianta, 2007; Hamre, Pianta, Mashburn, & Downer, 2007), focuses on proximal processes in classroom settings (Bronfenbrenner & Morris, 1998) and posits three broad domains of classroom interactions involving teachers and students: emotional support, classroom organization, and instructional support. These broad domains, each comprising a number of specific dimensions of interactions, have been linked to the promotion of student learning (Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008) and social-emotional development (Hamre & Pianta, 2005), have been found to be sensitive to intervention-based changes in preschool (Head Start) teacher practices (Raver et al., 2008), and are the focus of the present investigation.

### **Evidence of the Developmental Importance of Classroom Climate**

Prior research on classroom climate varies in definitional features but suggests that classroom climate influences children's social-emotional and academic outcomes. Positive classroom climate has been associated with greater self-esteem, perceived cognitive competence, internal locus of control, mastery motivation (R. M. Ryan & Grolnick, 1986), school satisfaction (Baker, 1999), academic performance, and less acting-out behavior (Toro et al., 1985), whereas poorer classroom environments have been associated with poor peer relations, poor academic focus, and higher levels of aggression (Kellam, Ling, Merisca, Brown, & Ialongo, 1998; Maslach, Jackson, & Leiter, 1996). Research has also identified teacher-child relationships as an essential process feature that contributes to classroom quality (National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network [ECCRN], 2003; Pianta, La Paro, Payne, Cox, & Bradley, 2002). However, a limitation of these earlier studies is that they often use measures such as checklists and analyses based on composite scores so that specific, observable classroom processes are not adequately captured. Recent improvements in measures of classroom processes include observational tools such as the Classroom Observational System (NICHD ECCRN, 2002) and the CLASS (Pianta, La Paro, & Hamre, 2008). Observational tools have the advantage of avoiding biases associated with teachers' ratings of their own classrooms and allow for the assessment of dimensions that are not possible for children to rate (e.g., the degree to which teachers use discussions and activities to promote higher order thinking skills). The CLASS in particular has provided a critical link between important domains of classroom processes and behaviorally anchored metrics of those processes such that they can be reliably observed and rated by independent observers (Hamre et al., 2007).

Assessing classroom processes using this observational instrument has now yielded evidence that in early schooling, exposure to classrooms marked by high-quality emotional and instructional interactions between teachers and students is associated with both social and academic development. For example, Hamre and Pianta (2005) found that by the end of first grade, children identified as at risk based on demographic characteristics (i.e., maternal education) and functional characteristics (i.e., behavioral, attentional, academic, and social) and whose classrooms were rated in the spring as high in instructional and emotional support showed gains in achievement (i.e., Woodcock-Johnson Psycho-Educational Battery-Revised) and relational functioning (i.e., teacher-child relationship quality) such that their scores were similar to those of their low-risk peers. In contrast, at-risk students in classrooms rated as having lower levels of support performed significantly worse than their low-risk peers. This study and its design not only highlight the conceptual and empirical distinction between systematically observed teacher-based supports in emotional and instructional interactions across the classroom from child-level behavioral features, but also provide evidence that emotionally and instructionally supportive classrooms can promote children's healthy social-emotional development and academic success.

### **Importance of Teacher Social–Emotional Functioning for Classroom Processes and Child Outcomes**

One fundamental and largely unaddressed gap in the literature concerns whether and how classroom quality processes are influenced by aspects of teachers' own social–emotional functioning. A variety of teacher social–emotional experiences, beliefs, and skills have been identified as potential sources of influence on the development of children's social and/or academic competence: teachers' orientation toward their own professional development (Adalbjarnardottir & Selman, 1997; Selman, 2003), their perceptions of their role in attending to students' social–emotional needs (Daniels & Shumow, 2003; A. M. Ryan, Gheen, & Midgley, 1998), their interest and ability in forming close relationships with their students (Hamre & Pianta, 2001; Ladd & Burgess, 1999; Pianta, Steinberg, & Rollins, 1995), their experience of stress associated with individual student behavior and feelings of job burnout overall (Abidin & Robinson, 2002; Barbaresi & Olson, 1998; Emmer & Stough, 2001; Gold, 1984; Greene, Beszterczey, Katzenstein, Park, & Goring, 2002; Maslach et al., 1996; Yoon, 2002), their classroom management styles and strategies (Webster-Stratton, Reid, & Hammond, 2001; Wentzel, 2002), and their skill in promoting reading comprehension, word analysis, and writing skills (Rowan, Correnti, & Miller, 2002). Although psychological characteristics of teachers such as depression and attitudes about children and child-rearing have been linked to their behavior and the quality of their interactions with children in early child care and prekindergarten classroom settings (Hamre & Pianta, 2004; Pianta, Howes, et al., 2005), the degree to which such characteristics and other social–emotional experience, beliefs, and skills are linked to teachers' ability to establish and maintain sensitive, well-regulated, and instructionally engaging classrooms in elementary school is little understood (Pianta, Howes, et al., 2005).

Whether teachers believe they have relevant skills in perceiving, understanding, and regulating their own emotions and whether they feel stressed and overwhelmed by their work may have direct implications for the quality of the interactions that teachers have with their students as well as for the effectiveness of classroom- and school-based interventions to promote teachers' ability to develop and maintain high-quality interactions in their classrooms (Conduct Problems Prevention Research Group [CPPRG], 1999). A recent study of variation in profiles of classroom quality among a large sample of state-funded prekindergarten programs found few and inconsistent associations between profiles of classroom quality and several teacher sociodemographic characteristics (e.g., age, years of education and teaching experience, credentials in early childhood education). But indicators of teachers' own social–emotional functioning were not examined (LoCasale et al., 2007). In the present study, we aimed to extend the research in this area by examining the direct effects of key features of teacher social–emotional functioning (perceived emotional abilities, professional burnout) on the quality of classroom processes and whether these factors moderate the impact of classroom-focused intervention on classroom quality.

### **The Impact of Interventions on Features of Classroom Settings**

The extant research suggests that important relational dimensions of classroom and school environments may be malleable by

interventions such as the 4Rs Program. For example, the Fast Track prevention program, a social competence intervention delivered by first-grade teachers, produced significant positive effects on summary ratings by observers of four aspects of the entire classroom atmosphere: expressing feelings appropriately, following rules, staying focused and on task, and level of interest and enthusiasm (CPPRG, 1999). The Child Development Project, a comprehensive elementary school intervention, found that students' sense of their classroom as a community (students' perceptions of the classroom and school environment as supportive, caring, and welcoming of student participation) was higher for students in the randomly assigned group of program schools than for those in the group of comparison schools (Solomon, Watson, Battistich, Schaps, & Delucchi, 1996). The Comer School Development Program has been associated with changes in students' perceptions of school social and academic climate (Cook, Murphy, & Hunt, 2000), and other programs that specifically targeted and assessed changes in the classroom setting have also shown positive effects on classroom climate in elementary schools (Fraser & O'Brien, 1985). Most recently, a quasi-experimental test of the Responsive Classroom intervention among elementary school children, focusing on teaching principles and practices that integrate social and academic learning, found positive intervention impacts on children's perceptions of their classroom (Brock, Nishida, Chiong, Grimm, & Rimm-Kaufman, 2008). Similarly, Raver et al.'s (2008) Chicago School Readiness Project (CSRP) found that Head Start–funded preschool programs randomly assigned to receive behavior management training for classroom teachers coupled with weekly in-class mental health consultants were rated by independent observers as having significantly higher levels of positive classroom climate, teacher sensitivity, and behavior management than control classrooms.

Taken together, this research suggests the potential of school-based interventions such as the 4Rs Program to positively alter a range of relational features of classroom settings assessed in a variety of ways including direct observation and aggregated student perceptions. This research, however, is limited in a number of important ways. First, few studies have used school randomized experimental designs to specifically test the impact of such interventions on the quality of classroom processes. Notable exceptions are the Fast Track (CPPRG, 1999) and CSRP (Raver et al., 2008) interventions, each of which randomly assigned either whole elementary schools or preschool programs to intervention and control conditions and explicitly targeted and assessed intervention impacts on classrooms (see below). In contrast to quasi-experimental designs, cluster randomized controlled trial designs are increasingly considered the gold standard for estimating differences in school or classroom quality due to the introduction of a new program or set of practices. By randomly assigning whole organizational units (clusters; e.g., schools) to intervention and control conditions, typical threats to internal validity (e.g., selection processes, contamination) are minimized, thereby allowing for greater confidence in causal inferences (Bloom, 2005; Shadish, Cook, & Campbell, 2002).

Second, indices of classroom environments have typically been derived from and operationalized at levels lower than that of the classroom itself, with unaggregated student-level perceptions of classroom climate used to represent classroom-level phenomena without consideration for the nonindependence of student self-

reports due to the clustering of students within classrooms (Brock et al., 2008; Cook et al., 2000; Fraser & O'Brien, 1985; Solomon et al., 1996). Here, too, the Fast Track (CPPRG, 1999) and CSRP (Raver et al., 2008) studies are notable exceptions in that each used the ratings of independent observers to operationalize the quality of classroom functioning and estimated the impacts of the intervention at the classroom level. Third, although these two studies clearly document the effects of interventions on classroom processes in early childhood and early elementary school classrooms, respectively, no experimental studies have been identified that test the impact of intervention on middle elementary school classrooms. Fourth, no studies to date have tested the impact of interventions on classroom social processes after controlling for key teacher sociodemographic factors and/or characteristics of teachers' social-emotional functioning, or examined whether these factors moderate the effects of intervention on the quality of classroom processes.

In the present study, we addressed each of these limitations. We employed a school-randomized controlled design to examine two sets of influences on classroom quality. Specifically, we (a) examined whether teacher social-emotional functioning (perceptions of emotional ability, burnout) forecasts differences in the quality of third-grade classrooms; (b) tested the experimental impact of a school-based social-emotional learning and literacy intervention on the quality of classroom processes (independent observation-based ratings of classroom quality), controlling for teacher social-emotional functioning; and (c) examined whether intervention impacts on classroom quality are moderated by these teacher-related factors.

### The 4Rs Intervention

The 4Rs Program<sup>1</sup> is a school-based intervention in literacy development, conflict resolution, and intergroup understanding that trains and supports all teachers in kindergarten through fifth grade in how to integrate the teaching of social and emotional skills into the language arts curriculum. It is considered a universal intervention in that it targets and is implemented with the entire teacher and student population of a given school (Institute of Medicine, 1994). Through the program, teachers learn how to use high-quality children's literature as a springboard for helping students gain skills and understanding in the areas of handling anger, listening, assertiveness, cooperation, negotiation, mediation, building community, celebrating differences, and countering bias. By focusing on basic human themes of conflict, feelings, relationships, and community, the 4Rs curriculum adds social and emotional meaning and depth to rigorous literacy instruction. The 4Rs Program provides a pedagogical link between the teaching of conflict resolution and the teaching of fundamental academic skills, thereby capitalizing on their mutual influence on successful youth development (Hinshaw, 1992; Jones, Brown, & Aber, in press).

The 4Rs Program was developed 5 years ago by the Morningside Center for Teaching Social Responsibility in direct response to several national and local policy shifts. From a national perspective, the 4Rs evolved in response to the tension between the movement to reform education between standards-based accountability with its focus on academic achievement, on the one hand (e.g., the policy and practice zeitgeist promoted by the No Child

Left Behind Act of 2001), and social and character development, on the other, with its focus on social-emotional competence and prosocial and negative attitudes and behaviors (e.g., the growing recognition of social-emotional skills as critical to school success; Collaborative for Academic, Social, and Emotional Learning, 2003). From a local perspective, the 4Rs evolved in response to the dramatic reorganization of schools and districts in its local city and the new requirement that city schools adopt a balanced literacy approach to reading that integrates both phonics and whole language approaches to literacy promotion. By integrating the conflict resolution lessons into a curriculum that employs this approach, Morningside Center made it possible for schools to adopt the program into an increasingly tightly scheduled school day by embedding it in the new regularly scheduled balanced literacy block.

Importantly, the 4Rs Program targets several key features of settings identified by the National Research Council and the Institute of Medicine as critical to the promotion of positive youth development (National Research Council & Institute of Medicine, 2002), including (a) the building of secure and supportive relationships between children and teachers and among all school staff; (b) a pedagogy reflecting the values of inclusion, belonging, and the celebration of diversity; (c) the establishment of positive social norms that emphasize individuals' contribution to and support of the classroom and school community while respecting each person's ideas and autonomy; (d) the development and maintenance of clear and consistent rules with appropriate and predictable mechanisms for control and limit setting in classrooms and schools overall; and (e) a focus on the learning and practicing of key developmentally appropriate and relevant skills through a variety of instructional techniques. In short, the 4Rs Program aims to promote caring classroom communities marked by consistent and positive rules and norms, and safe and secure environments that convey respect for student diversity, ideas, and autonomy.

The 4Rs Program has two primary components: (a) a comprehensive seven-unit, 21–35 lesson, literacy-based curriculum in conflict resolution and social-emotional learning (provided to teachers in a standardized, grade-specific teaching guide); and (b) 25 hours of training followed by ongoing coaching of teachers to support them in teaching the 4Rs curriculum with a minimum of 12 contacts in one school year. The program's theory of change emphasizes the role of introducing teachers to a set of social-emotional learning skills and concepts and then supporting them in the use of these skills and concepts in their everyday interactions in the school with one another, with school administrators, and with the children in their classrooms through the consistent teaching of lessons from the 4Rs curriculum.

The intensive professional development activities provided to teachers to support their use of the curriculum consist of 5 days of training that take place just prior to the beginning of the school year and/or within the first 2 weeks after school begins as teachers are working to establish their classroom communities and routines. This training is then followed by ongoing classroom coaching by

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trained program staff developers. Teacher training emphasizes both individual and collective learning and support for sustained program implementation. Thus, teachers are trained in large groups and in individual sessions; they receive individually tailored ongoing support but also work in within- and cross-grade groups to coordinate and align curriculum implementation, share experiences and complementary activities, and plan as a cohesive unit. The introductory training is designed to (a) introduce the teachers to the curricular units and the specific lessons and activities tied to each unit, (b) give them an opportunity to practice conflict resolution skills at the adult level through role play and experiential learning, and (c) inspire them to employ the ideas and skills embodied in the curriculum in their own lives both professionally and personally.

Ongoing classroom coaching encompasses modeling of class lessons and workshops led by program staff developers, coplanning and teaching of lessons by the teacher and staff developer, and, finally, lesson observations and feedback. In addition, staff developers convene regular conferences with teachers either in a one-on-one format or with a group of teachers from one or multiple grades.

At its core, the program's theory of change involves helping teachers more deeply assimilate, find utility in, and become skilled at practicing the concepts of the 4Rs Program in their own lives and teaching them in their classroom through the consistent delivery of lessons from the 4Rs curriculum and the provision of greater social-emotional learning opportunities in which students can practice the component skills and be supported in applying them in real-life situations. Teachers' beliefs and their willingness and ability to implement specific classroom intervention models may influence both the quantity and the quality of program implementation as well as the effectiveness of the intervention itself (CPPRG, 1999; Elias et al., 1997; Fullan, 2001; Hauer, 2003). When teachers embrace and practice the program's principles and implementation strategies, they establish a set of expectations and norms for behaviors in their classrooms, and children begin using those skills and behaviors. Teachers who practice good listening skills (e.g., direct eye contact, paraphrasing, acknowledging comprehension) during interactions with their students and other adults, and who can teach these skills and provide real-life, real-time examples of how they are effective, increase the likelihood that their students will employ them in their own interactions. But it is not merely the practice of good listening skills by the teacher or any given student that is important; it is how the use of these skills reflects a set of transactional social processes in the classroom that enable teachers and students to develop the closer and more supportive relationships believed to underlie children's long-term adjustment and learning (Hamre & Pianta, 2001; Pianta, 2006; Tseng & Seidman, 2007). Therefore, central to the program's theory of change is that teachers are successfully engaged in serving as the gateway to changing broad characteristics of classrooms including relationships and climate, as well as in the development of individual children.

There are a number of emergent studies that have documented the positive impacts of school-based intervention efforts on child-level outcomes, specifically the promotion of children's social, emotional, and academic development (e.g., Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2009; Flannery et al., 2003; Jones, Brown, & Aber, in press; Jones, Brown, Hoglund, & Aber,

in press). There also now exists a substantial knowledge base regarding the features of children's social settings (including classrooms and schools) that foster such positive development (National Research Council & Institute of Medicine, 2002). However, relatively little is known about the way these features of settings develop and function, or how they can be promoted by interventions that directly target not individual children per se but these processes and practices of the settings themselves (Tseng & Seidman, 2007). In the present study, we addressed this critical gap in the research literature. We focused on a rigorous test of an intervention that explicitly targets the quality of classroom settings through the training and ongoing coaching and support of the primary classroom facilitator, the teacher. We directly tested the causal impact of this setting-level intervention on a limited but important set of classroom social processes while controlling for important features of teachers' own social-emotional functioning. Ours is the first study to report experimental effects of the 4Rs Program on the quality of key classroom processes after one year of exposure to the program.

The primary questions addressed in this article are (a) How do characteristics of teacher social-emotional functioning, including self-reports of emotional abilities and experiences of job-related burnout, forecast differences in the emotional, instructional, and organizational quality of third-grade public school classrooms? (b) What is the experimental impact of the 4Rs Program on the emotional, instructional, and organizational quality of classrooms controlling for teacher social-emotional functioning indicators? (c) Is the impact of the 4Rs Program on classroom quality moderated by teachers' social-emotional functioning?

On the basis of prior research review, it is expected that classrooms of teachers with higher self-reported emotional abilities and lower levels of job burnout at the beginning of the school year will be rated by independent observers as higher in emotional, instructional, and organizational quality at the end of the school year. It is also expected that classrooms in the 4Rs intervention schools will have higher average levels of emotional, instructional, and organizational quality at the end of the year than classrooms in the control schools. Finally, it is expected that 4Rs intervention effects on classroom emotional, instructional, and organizational quality will be robust across teachers with varying levels of social-emotional functioning.

## Method

### Participants

Participants were 82 third-grade teachers and 82 classrooms in 18 public urban elementary schools in a large metropolitan city in the eastern United States. These teachers and their classrooms are part of a 3-year (six-wave) longitudinal, experimental evaluation of a universal, schoolwide literacy and social-emotional learning prevention program (4Rs) in nine intervention ( $n = 37$ ; 45.1%) and nine control schools ( $n = 45$ ; 54.9%). The larger study aims to test the short-term, longitudinal impact of the 4Rs Program on both child-level and setting-level outcomes. Data for the present study came from these 82 teachers and classrooms during the first year of this larger 3-year study. Baseline teacher report data on social-emotional functioning were gathered in the fall (2004) from 78 teachers, and follow-up data, including independent observa-

tions and ratings of classroom processes, were collected in the spring (2005) from the same teachers plus an additional four teachers. There was no teacher attrition from fall to spring.

Table 1 presents these general baseline classroom and teacher sociodemographic characteristics by intervention and control schools. Classrooms ranged in size from 4 to 27 students with an average of 18 ( $SD = 4.7$ ), and average class size did not differ between treatment and control school classrooms. Four percent of classrooms were bilingual (two in treatment schools and two in control schools), 6% were team taught (teacher data were collected from just one primary teacher in these cases, and team-taught classrooms were evenly split between treatment and control schools), and 18% were special education classrooms. Child-level data are not included in this analysis; however, classrooms included children representing the typical demographics of public schools in this northeastern urban school district (from diverse racial-ethnic groups and primarily low-income families). According to teacher reports, teachers ranged in age from 23 to 61 years with an average of 36.3 years ( $SD = 9.7$ ) and had an average of 7 years ( $SD = 5.81$ ) of teaching experience, with an average of 4.9 years' experience in their current school. A large majority of teachers were female (94%). Teachers' racial-ethnic backgrounds were as follows: 20% Hispanic/Latino, 27% Black/African American, 51% non-Hispanic White, and 2% representing other racial-ethnic groups (e.g., Asian, Pacific Islander, Native American).

**School selection and randomization.** In the planning year, 18 schools were identified, pairwise matched, and randomly assigned to 4Rs intervention or control conditions (nine schools to each). Building on the long-standing relationships in the school community developed by the 4Rs Program practitioners at the Morningside Center for Teaching Social Responsibility, 41 schools were originally identified by district-level instructional supervisors as potential participants in the 4Rs Child-Level Study. The goal was the identification of candidate schools that, if selected to participate in the study, were not so high functioning that

change due to the 4Rs would not be evident or so poorly functioning that they would not be able to engage in whole school implementation of the program. Twenty-four of these 41 schools agreed to the process of matching and randomization to intervention or control conditions.

Prior to randomization, we employed a pairwise matching procedure to ensure demographic similarity of intervention and control groups. Specifically, we used an algorithm to compute the distance from each school to every other school along 20 dimensions of demographic and school characteristics likely to be related to the outcome variables of interest. All variables employed, with the exception of a measure of Organizational Readiness, were drawn from the 2001–2002 administrative databases maintained by the local department of education. These variables were selected to represent a number of important dimensions related to the outcomes targeted by the intervention such as the number of students, percentage of students receiving a free lunch, racial and ethnic composition, student attendance and achievement, average spending per student, and teacher experience. The measure of Organizational Readiness was developed collaboratively by ESR Metro (currently Morningside Center for Teaching Social Responsibility) and the principal investigators of this study and completed for all 41 of the schools that participated in the initial recruitment process. The measure included a number of dimensions such as principal leadership style, openness of communication, administrative or teacher buy-in, administrative and staff stability, number and degree of other programs, demands on teacher time, and amount of professional development as well as overall ratings of readiness.

To conduct random assignment of matched pairs to 4Rs intervention and control groups, we employed a MATLAB uniform random numbers generator to generate, in sequence, 12 random numbers ranging from 0 to 1 that were assigned to the first school in each of the 12 pairs (24 schools were recruited to participate in this study, 18 as study schools and 6 as backup schools). The first

Table 1  
Sample Demographic Characteristics by Intervention and Control Schools

Demographic	Intervention ( $n = 45$ )				Control ( $n = 37$ )				Total ( $N = 82$ )			
	$n$	%	$M$	$SD$	$n$	%	$M$	$SD$	$n$	%	$M$	$SD$
Classroom characteristics												
Class size			17.27	4.84			18.30	4.47			17.73	4.67
Special education	9	20.0			6	16.2			15	18.2		
Bilingual <sup>a</sup>	2	5.1			1	3.1			3	4.2		
Team taught	2	4.4			2	5.4			4	4.9		
Teacher age (years) <sup>b</sup>			35.27	9.59			37.49	9.87			36.28	9.72
Teacher gender												
Female	41	91.1			36	97.3			77	93.9		
Male	4	8.9			1	2.7			5	6.1		
Teacher race/ethnicity												
Non-Hispanic, White	23	51.1			22	59.5			45	54.9		
Hispanic/Latino	9	20.0			3	8.1			12	14.6		
Black/African American	12	26.7			10	27.0			22	26.8		
Other	1	2.2			2	5.4			3	3.7		
Teaching experience (years)			5.69	4.25			8.59	7.01 <sup>c</sup>			7.00	5.81

Note. Range: class size = 4–27; teacher age = 23–61; teaching experience = 1–30.

<sup>a</sup> Based on 71 classrooms due to missing data. <sup>b</sup> Based on 81 classrooms due to missing data. <sup>c</sup> Significantly higher for control group compared with intervention group,  $F(1, 80) = 5.35, p < .05, \eta = .25$ .

school in each pair was assigned to the treatment or control group based on the randomly generated number, and the second school in the pair was, therefore, assigned to the other group. After random assignment, the two groups were compared across the 20 demographic and school characteristics employed in the matching procedures. As expected, the two groups did not differ significantly on any of these characteristics, and eta-squared values (the proportion of variance in each dimension explained by differences between the two groups) were minimal. Because the final set of 18 schools was not randomly selected from the initially recommended pool of 41 schools, nor drawn randomly from the entire population of elementary schools in this city, the external validity or generalizability of the results from the present study is compromised. However, the success of our rigorous matching and random assignment procedure, as evidenced by the lack of any significant demographic differences between intervention and control schools, gives us confidence that our results represent an internally valid test of intervention effects on classroom quality.

On the basis of these statistics, the schools can be described as racially and ethnically diverse, composed primarily of students who receive a free school lunch, and characterized by attendance rates over 89% and one-year stability rates that range from 86% to 95%. Further, children in these schools are highly representative of children in all public elementary schools in this large northeastern metropolitan city according to these dimensions.

**4Rs Program implementation.** Implementation of the two primary components of the 4Rs Program (teacher training and coaching, curriculum delivery) was systematically tracked and monitored. During the first year of implementation, teachers on average delivered three quarters of a lesson in the 4Rs curriculum per week, with the majority closer to the benchmark of one lesson per week. Further, the majority of teachers appear to have spent on average between 20 and 25 total hours (~40 min per week) implementing the 4Rs curriculum throughout the year beyond the time they spent in training. Teachers in the nine intervention schools received on average 2.4 days ( $SD = 0.33$ ) of training in the delivery of the 4Rs curriculum, and schools received an average of 38 days (range: 21–52;  $SD = 9.6$ ) of coaching by 4Rs staff developers. Although there is variability in 4Rs implementation between teachers and schools, this variation is not inconsistent with similar programs and evaluation studies that focus on public schools (e.g., Kam, Greenberg, & Walls, 2003).

## Procedure

At the start of the school year, meetings were held with all third-, fourth-, and fifth-grade teachers in the 18 participating schools where detailed study information was provided, and consent forms were distributed. Of the 96 eligible third-grade teachers, four teachers denied consent to participate in the study, for a teacher consent rate of 96%. An additional 10 teachers were excluded from the present analysis, as they were missing classroom observation or teacher report data due to their teaching role being that of a support teacher or teacher aide or their not having any student participants in their classroom. Teachers completed questionnaires rating the language and literacy skills, social competence, and externalizing problems of each child in their class with consent to participate (although these data are not included in the present study). Teachers also completed questions rating the

climate of their school and their own social and emotional skills and behaviors, including their professional background and development, their beliefs about the importance of social-emotional learning in school, their classroom management strategies and styles, and their experiences of stress and burnout. Teachers were compensated at \$36.50 per hour for their time completing surveys at each assessment—a rate comparable to the teacher union's negotiated per session compensation rate at the outset of the study.

Observers conducted classroom observations to assess classroom climate using the observational tool, the CLASS (Pianta, La Paro, & Hamre, 2008). Observations were conducted by 15 multiracial–multiethnic members of the research team who completed a 2-day CLASS training and reliability testing session. Prior to training, observers read a detailed manual with extensive descriptions of dimensions and rating anchor points. The 2-day training workshop consisted of guided practice in the coding of videotaped classroom footage. At the end of the second training day, each observer had to pass a reliability test that involved watching and coding five videotaped classroom segments. Criteria for passing were at least an 80% match (within one scale point) of a set of master codes on the global scales. All observers passed this criterion at the end of the second training session day or within the following 1–2 weeks, in all cases prior to being certified to conduct observations in the field.

Subsequently, observers were scheduled to conduct observations in all intervention and control study schools. Observers were kept blind to school intervention status. Observations were scheduled in 2-hr blocks during regular “instructional” time. Observers conducted four 20-min observational segments each followed by a 10-min coding segment.

To obtain observational data that best represented the typical climate of each classroom, observers followed strict guidelines, including observing only instructional time (e.g., no testing or test preparation, no parties) and during times when classroom composition would be considered typical (e.g., the regular classroom teacher is not only present but also in the primary instructional role, with the majority of regular students also present). If an observation was scheduled for a time during which there were significant irregularities in classroom composition or routine (e.g., a substitute teacher or different teacher, such as a literacy specialist, was leading a lesson rather than the classroom teacher, or a large portion of students were out of the room due to trips), the observation was rescheduled. For team-teaching classrooms, classroom observers focused on both teachers but gave greater weight to groups or activities involving the largest number of students. Although a 20-min segment might occasionally be interrupted or cut short (due to fire drills, changes in schedule, etc.), shortened segments needed to be at least 10 min in length for the codes to be considered valid. For 89% ( $n = 73$ ) of classrooms, four observation segments were obtained, and for 11% ( $n = 9$ ) of classrooms, two to three segments were obtained.

## Measures

All scale scores were computed as the mean across the items for each construct. Basic psychometrics and mean levels for each construct in the spring of third grade are presented in Table 2, by intervention and control groups. Intercorrelations among all study variables are presented in Table 3.

Table 2  
*Psychometric and Descriptive Data for Classroom Climate Scales by Intervention and Control Schools in Spring 2005*

Variable	$\alpha$	ICC	Range	<i>M (SD)</i>		
				Intervention ( <i>n</i> = 45)	Control ( <i>n</i> = 37)	Total ( <i>N</i> = 82)
Overall classroom quality	.93	.16	1.58–6.33	4.70 (1.04)	4.25 (0.77)	4.50 (0.94)
Classroom emotional support	.90	.15	1.63–6.38	4.96 (1.06)	4.55 (0.84)	4.77 (0.98)
Classroom instructional support	.90	.11	1.19–6.13	4.02 (1.31)	3.38 (0.99)	3.73 (1.21)
Classroom organization	.83	.13	1.58–6.67	4.79 (1.14)	4.45 (0.84)	4.64 (1.03)

Note. ICC = intraclass correlation at school level.

**Classroom climate.** Classroom climate was assessed with the CLASS (Pianta, La Paro, & Hamre, 2005, 2008). The CLASS is an observational instrument developed to assess classroom quality in preschool through fifth grade. The measure is based on developmental theory and research that suggest that it is through proximal processes in classroom settings (Bronfenbrenner & Morris, 1998), specifically the quality of the interactions among students and teachers that occurs on a daily basis (Pianta, 1999), that students are afforded opportunities to experience positive connections to their peers and teachers in well-regulated, organized classroom settings with instructional activities that are intentional, focused, and oriented around high-quality feedback loops, and that such experiences are the primary mechanisms promoting positive student development and learning (Cameron, Connor, & Morrison, 2005; Emmer & Stough, 2001; Greenberg, Domitrovich, & Bumbarger, 2001; Hamre & Pianta, 2001; Howes et al., 2008; Morrison & Connor, 2002; NICHD ECCRN, 2003; Rutter & Maughan, 2002).

The measure assesses three primary domains of classroom climate: Emotional Support, Classroom Organization, and Instructional Support. Each broad domain comprises several specific subscales used to operationalize the types of interactions that compose each domain. Each subscale, in turn, is represented by a set of behaviorally anchored, observable descriptors of interactions in the classroom (teacher–student, student–student) that observers use as guides in establishing a single rating for the subscale.

Emotional Support comprises four subscales: Positive Climate (i.e., the level of respect, warmth, enjoyment, and emotional connection evident in student–teacher relationships and peer interac-

tions), Negative Climate (i.e., the level of disrespect, anger, hostility, or aggression exhibited by teachers and/or students), Teacher Sensitivity (i.e., teachers' consistency and effectiveness in responding to students' academic and emotional needs), and Regard for Student Perspectives (i.e., degree to which activities encourage student autonomy and emphasize students' interests, motivations, and points of view). Classroom Organization includes three subscales: Behavior Management (i.e., frequency of disruptive behavior and teachers' effectiveness in monitoring, preventing, and redirecting misbehavior), Productivity (i.e., how consistently learning is maximized with clear activities and routines, teacher preparation, efficient transitions, and minimal disruptions), and Instructional Learning Formats (i.e., how well materials, modalities, and activities are used to engage students in learning). Instructional Support comprises two subscales: Concept Development (i.e., the degree to which activities and discussion promote higher order thinking skills and cognition) and Quality of Feedback (i.e., teachers' consistency in providing specific, process-oriented feedback and back-and-forth exchanges to extend students' learning).

The underlying three-domain structure of the CLASS has now been established through a series of confirmatory factor analyses with data from approximately 4,000 U.S. preschool through fifth-grade classrooms, providing strong evidence that classroom interactions comprise distinct emotional, organizational, and instructional domains and that the three-domain structure is applicable across the prekindergarten to fifth-grade years (Hamre et al., 2007). The CLASS has demonstrated both criterion and predictive validity. In preschool settings, each of the three domains of the CLASS has been positively and significantly correlated with the Early Childhood Environment Rating Scale–Revised (criterion validity), a common measure of quality in early childhood classrooms, and most notably with the interactions factor ( $r_s = .45-.63$ ) that captures the extent to which teacher–child interactions are promoted, children are encouraged to communicate and use language, and effective discipline is provided (Pianta, La Paro, & Hamre, 2008). CLASS domains have also been related to children's social and academic development (predictive validity) during both the preschool (e.g., Howes et al., 2008) and elementary school years (e.g., Pianta, Belsky, et al., 2008). For example, after adjusting for selection effects and prior student functioning, observed Emotional Support has been found to predict standardized early literacy test scores in preschool and first grade (NICHD ECCRN, 2003), lower maternal reports of internalizing behaviors in kindergarten and first grade (NICHD ECCRN, 2003), and

Table 3  
*Intercorrelations Among Classroom Outcome Scales and Teacher Social–Emotional Functioning Variables*

Variable	1	2	3	4	5	6
1. Classroom quality	—	.93**	.86**	.89**	-.13	.15
2. Emotional support		—	.72**	.74**	-.19	.11
3. Instructional support			—	.67**	-.03	.19
4. Classroom organization				—	-.08	.12
5. Burnout					—	-.25*
6. Emotional ability						—

Note. Correlations are based on data for classroom quality and its domains collected at Wave 2 (spring 2005) and data on burnout and emotional ability collected at baseline (fall 2004).

\*  $p < .05$ . \*\*  $p < .01$ .



students' positive behavioral engagement in the classroom in first grade (NICHD ECCRN, 2002). Similarly, observed Instructional Support has been found to predict academic functioning in preschool (Howes et al., 2008) and positive behavioral engagement in the first-grade classroom (NICHD ECCRN, 2003). Further, exposure to classrooms high in Emotional Support and Instructional Support has been associated with reducing the gap in achievement between high- and low-risk first graders (Hamre & Pianta, 2005). Taken together, these results provide strong evidence for the use of the CLASS as a valid observational instrument for assessing key aspects of classroom processes across varied student bodies and grade levels.

Consistent with its use in other studies, subscales of the CLASS received a single rating ranging from 1 to 7, which is guided by a set of behaviorally anchored descriptors of the types of interactions that constitute the subscale. Classroom observers completed ratings on each of the nine subscales for each observational segment. Typically, subscale ratings were obtained for four segments (see Procedure), and a composite was created for each subscale based on an average of the ratings across all segments. CLASS constructs Emotional Support, Classroom Organization, and Instructional Support were then computed as the mean across subscale composites. Internal reliability was .90 for Emotional Support, .83 for Classroom Organization, and .90 for Instructional Support. Given the high correlations among these three constructs (.67–.74), a composite index of overall classroom quality was computed as the mean across all nine subscale composites. Internal reliability for this scale was .93.

During the second wave of the study (spring, third grade), 82 observations of classrooms were conducted by trained classroom observers who were kept blind to the intervention status of the schools by the research team.<sup>2</sup> Twelve percent of these observations were double-coded to ensure reliability of observations as conducted in the field. For double-coded observations, two trained observers coded the same classroom simultaneously and independently. Interrater reliability was assessed as the degree to which two coders were within one point of each other's scores (La Paro, Pianta, & Stuhlman, 2004). Interrater reliability for the classroom quality subscales was .89 for Emotional Support, .79 for Instructional Support, and .76 for Classroom Organization. Interrater reliability for overall Classroom Quality was .83.

**Teacher burnout.** Teacher burnout in relation to teachers' work as educators was assessed with the 22-item Maslach Burnout Inventory–Educators Survey (Maslach et al., 1996). This measure is designed to assess three aspects of stress and burnout among teachers: emotional exhaustion (nine items), depersonalization (five items), and sense of personal accomplishment (eight items). Emotional exhaustion assesses feelings of being emotionally overextended and exhausted by one's work (e.g., "I feel fatigued when I get up in the morning and have to face another day on the job"), depersonalization assesses an unfeeling and impersonal response toward students (e.g., "I feel I treat some students as if they were impersonal objects"), and personal accomplishment assesses feelings of competence and successful achievement in one's work (e.g., "I feel exhilarated after working closely with my students"). Responses are indicated on a 7-point Likert scale ranging from 0 (*never*) to 6 (*every day*). For the purposes of the present study, a total teacher burnout score was computed as an average of 18 of the original 22 items.<sup>3</sup> The internal reliabilities of the 18-item total

burnout scale were adequate in fall 2004 and spring 2005 ( $\alpha = .87-.91$ , respectively).

**Teachers' perceived emotional ability.** Teachers' perceived emotional ability was assessed with the 23-item Perceived Emotional Intelligence Scale (Brackett & Mayer, 2003). This measure assesses several key aspects of emotional ability including the ability to perceive the emotions of others (e.g., "By looking at people's facial expressions, I recognize the emotions they are experiencing"), access and understand one's own emotions (e.g., "I have a rich vocabulary to describe my emotions"), and regulate one's emotions (e.g., "When I'm in a bad mood, it takes me a long time to get over it"). Respondents indicate for each item how accurately or inaccurately the item describes them. Responses are indicated on a 5-point Likert scale ranging from 1 (*very inaccurate*) to 5 (*very accurate*). For the purposes of the present study and based on the results of confirmatory factor analyses, a total score based on an average of 17 of the original 23 items was computed for both fall 2004 and spring 2005 assessments. The internal reliabilities of the total perceived emotional ability scale were adequate in fall 2004 and spring 2005 ( $\alpha = .85-.87$ , respectively).

## Results

Separate two-level hierarchical linear models were used to (a) examine the influence of baseline teacher social-emotional functioning on classroom climate, (b) estimate the experimental impact of the 4Rs Program on classroom climate, and (c) examine whether the impact of intervention is moderated by these indicators of teacher functioning. All analyses were conducted with the hierarchical linear modeling software package HLM (Version 6.02), with full maximum likelihood estimation used for all models. Hierarchical linear modeling allows for the simultaneous estimation of variance associated with individual (between classrooms) and population (between schools) components based on the specification of fixed- and random-effect variables in the model (Bryk & Raudenbush, 1992). As a result, standard errors are appropriately adjusted for nonindependence due to the clustering of classrooms within schools. Specifically, in the first model (Model A), variation in classroom climate at spring 2005 (after one year of intervention) is estimated as a function of teacher factors at Level 1 (including teacher burnout and perceived emotional ability)<sup>4</sup> and school factors at Level 2 (including treatment status and eight dummy variables representing school matched-pair status). In the second model (Model B), cross-level interactions between treat-

<sup>2</sup> Four items were dropped from the computation of the total scale based on confirmatory factor analyses that were conducted to demonstrate that the manifest construct indicators of overall teacher burnout represented the hypothesized latent phenomena for the current sample and to ensure factorial invariance of the latent construct across time (Little, 1997).

<sup>3</sup> It is possible some coders made inferences about intervention status based on the presence of 4Rs Program materials in a school or classroom.

<sup>4</sup> To reduce potential confounds in our estimates of teacher social-emotional functioning indicators and intervention impacts on observed classroom quality, we included as covariates in Level 1 of each model dummy variables representing teacher race-ethnicity and a dichotomous variable indicating classroom status as a general or special education classroom but did not report them.

ment status and classroom and teacher factors are included at Level 2 to test whether these factors moderate the impact of the 4Rs intervention on classroom climate.

As shown in Table 4 (Model A), there is a significant main effect for teachers' perceived emotional ability ( $t = 2.31, p < .03$ , effect size [ES] = .52) such that higher levels of teachers' perceived emotional ability at the beginning of the school year was related to higher observed classroom quality at the end of the school year. Teacher burnout was not related to overall classroom climate. Also, as shown in Table 4 (Model A), treatment status is significantly related to classroom quality ( $t = 2.76, p < .03$ , ES = .70), indicating that over and above teachers' social-emotional functioning, there is a significantly higher mean level of observed classroom quality in intervention school classrooms compared with control school classrooms at the end of the first year. As shown in Table 4 (Model B), teachers' perceived emotional ability did not, however, moderate the effect of intervention on classroom climate.

Although the three subscales composing overall classroom climate were highly positively correlated ( $r_s = .67-.74$ ), we conducted post hoc analyses to examine the specificity of direct and moderated intervention impacts on the three subdomains of classroom quality: classroom emotional support, instructional support, and organization. These analyses followed the same form as the primary analyses described above.

As shown in Table 5 (Model A), differences by treatment status in levels of classroom emotional support (now at the trend level,  $t = 2.24, p < .06$ , ES = .49) suggest higher average levels of emotional support in intervention school classrooms than control school classrooms, over and above teacher social-emotional functioning indicators. As shown in Table 5 (Model B), none of the teacher social-emotional functioning indicators appear to moderate the impact of intervention on classroom emotional support.

As shown in Table 6 (Model A), consistent with the results for overall classroom quality, higher levels of teachers' perceived emotional ability were related to higher levels of classroom instructional support ( $t = 2.11, p < .05$ , ES = .54). Differences by treatment status are also seen in levels of classroom instructional support ( $t = 3.07, p < .02$ , ES = .81), demonstrating higher average levels of instructional support in intervention school classrooms than control school classrooms. As shown in Table 6 (Model B), teachers' perceived emotional ability does not moderate the impact of intervention on classroom instructional support.

Finally, as shown in Table 7 (Model A), higher levels of teachers' perceived emotional ability were related to higher levels of classroom organization ( $t = 2.22, p < .04$ , ES = .51). No treatment status differences were found in levels of classroom organization (see Table 7, Model A), and as shown in Table 7 (Model B), teachers' perceived emotional ability did not moderate the impact of intervention on classroom instructional support.

### Discussion

This article addresses a number of important limitations in our current understanding of teacher- and intervention-related influences on the quality of elementary school classroom processes by capitalizing on recent advances in the ability to reliably and validly rate a targeted set of classroom-level social processes known to be associated with children's social-emotional and academic development (Hamre & Pianta, 2005, 2007; Hamre et al., 2007; Pianta, La Paro, & Hamre, 2008). First, this study focused on ratings of key classroom processes obtained from independent classroom observers trained to reliability in the use of the CLASS, a standardized classroom observation protocol that allows for behaviorally anchored ratings of teaching behaviors and teacher-child interactions that index dimensions of emotional, organizational, and instructional classroom processes. These domains of classroom interactions have been found to predict later student academic and social-emotional functioning (NICHD ECCRN, 2002, 2003), and the three-domain structure of classroom interactions has been shown to be generalizable across a variety of racially, ethnically, and economically diverse samples ranging from preschool to fifth grade (Hamre et al., 2007), making the CLASS a uniquely rigorous instrument for reliably and validly assessing classroom processes. The present study builds on this theoretical and methodological advance in the "science of classrooms" by examining whether teacher social-emotional functioning and universal school-based intervention produce meaningful differences in the quality of these observed classroom processes.

Second, although prior studies have reported associations between teachers' psychological functioning and demographic characteristics and the quality of their interactions with children in prekindergarten classrooms (Hamre & Pianta, 2004; LoCasale-Crouch et al., 2007), this study is the only one to our knowledge to examine how quality of classroom processes in elementary schools is forecasted by teacher social-emotional functioning as

Table 4  
Year 1 4Rs Treatment Impacts on Classroom Quality in Spring 2005 of Third Grade

Variable	Model A					Model B				
	Estimate	SE	df	t	p	Estimate	SE	df	t	p
Predictors										
Intercept	1.59	1.09	8	1.46	.18					
Treatment status	0.53	0.19	8	2.76	.03					
Burnout	0.04	0.15	17	0.28	.78					
Emotional ability	0.49	0.21	17	2.31	.03					
Treatment Status × Burnout						-0.26	0.25	16	-1.03	.32
Treatment Status × Emotional Ability						0.09	0.44	16	0.20	.85

Note. Eight dummy variables representing the eight best school-level matched pairs are included in all models at the school level (Level 2), with Pair 9 serving as the referent group. Estimates are unstandardized.

Table 5  
Year 1 4Rs Treatment Impacts on Classroom Emotional Support in Spring 2005 of Third Grade

Variable	Model A					Model B				
	Estimate	SE	df	t	p	Estimate	SE	df	t	p
Predictors										
Intercept	2.50	1.36	8	1.84	.10					
Treatment status	0.42	0.19	8	2.24	.06					
Burnout	0.00	0.15	17	0.03	.98					
Emotional ability	0.33	0.27	17	1.22	.24					
Treatment Status × Burnout						-0.20	0.29	16	-0.68	.50
Treatment Status × Emotional Ability						-0.07	0.52	16	-0.14	.89

Note. Eight dummy variables representing the eight best school-level matched pairs are included in all models at the school level (Level 2), with Pair 9 serving as the referent group. Estimates are unstandardized.

indexed by their perceived emotional abilities and their experiences of job-related burnout. Unexpectedly, teachers' experiences of job-related burnout were not related to differences in overall classroom quality. But as predicted, teachers' perceptions of their own emotional abilities (e.g., recognizing the emotions of others, understanding and regulating one's own emotions) at the outset of the year were positively and strongly ( $ES = .52$ ) related to their ability to establish high-quality social processes in their classrooms by the end of the school year.

Post hoc analyses of the influence of teacher factors on the three subdimensions of the CLASS indicated positive effects of teachers' perceived emotional abilities on classroom instructional support and classroom organization but not on emotional support. Although it is not uncommon for teachers' self-reported abilities to fail to predict their behaviors in the same domain, it is somewhat surprising that their self-perceived emotional abilities are related to supportive teacher behaviors and student-teacher interactions in the instructional and organizational domains. It appears that our assessment of teachers' perceived emotional abilities may be indexing other underlying aspects of teacher functioning that translate not into emotionally supportive behaviors and interactions per se but rather into a greater ability to manage their emotions in a manner that enables them to more effectively organize their classroom, engage with students, and maximize high-quality, productive learning time. Indeed, these results and preliminary results from other studies (Brackett & Katulak, 2007) suggest that explicit

attention to the promotion of emotional intelligence among teachers may be a critical component of school-based interventions designed to positively impact classroom settings.

Third, there is currently clear experimental evidence of the positive impact of school-based interventions on indices of classroom quality in prekindergarten and early elementary school classrooms (CPRG, 1999; Raver et al., 2008). The present study, however, is the first to date to combine (a) the use of a school-randomized experimental design to test the causal impacts of a universal school-based intervention on an empirically validated assessment of classroom quality in a population of middle elementary school classrooms (i.e., third grade), (b) the test of an intervention that explicitly targets the transformation of classroom settings via teachers who are trained and supported in providing instruction that embeds social-emotional skills into a balanced literacy curriculum, (c) the test of the direct effects of intervention on classroom quality controlling for teacher social-emotional factors, and (d) the test of whether the impact of intervention on classroom quality is moderated by teacher social-emotional factors.

Findings indicate that at the end of one school year, the quality of classroom social processes as rated by independent observers blind to the intervention status of the schools was significantly higher in 4Rs schools compared with control schools, even after controlling for a limited set of classroom characteristics and indicators of teacher social-emotional functioning. Importantly, nei-

Table 6  
Year 1 4Rs Treatment Impacts on Classroom Instructional Support in Spring 2005 of Third Grade

Variable	Model A					Model B				
	Estimate	SE	df	t	p	Estimate	SE	df	t	p
Predictors										
Intercept	-0.12	1.56	8	-0.07	.94					
Treatment status	0.80	0.26	8	3.07	.02					
Burnout	0.09	0.18	17	0.53	.60					
Emotional ability	0.65	0.31	17	2.11	.05					
Treatment Status × Burnout						-0.27	0.31	16	-0.88	.40
Treatment Status × Emotional Ability						0.15	0.59	16	0.25	.80

Note. Eight dummy variables representing the eight best school-level matched pairs are included in all models at the school level (Level 2), with Pair 9 serving as the referent group. Estimates are unstandardized.

Table 7  
*Year 1 4Rs Treatment Impacts on Classroom Organization in Spring 2005 of Third Grade*

Variable	Model A					Model B				
	Estimate	SE	df	t	p	Estimate	SE	df	t	p
Predictors										
Intercept	1.92	1.20	8	1.59	.15					
Treatment status	0.32	0.22	8	1.47	.18					
Burnout	0.12	0.17	17	0.68	.51					
Emotional ability	0.52	0.23	17	2.22	.04					
Treatment Status × Burnout						-0.44	0.29	16	-1.51	.15
Treatment Status × Emotional Ability						0.06	0.47	16	0.14	.89

*Note.* Eight dummy variables representing the eight best school-level matched pairs are included in all models at the school level (Level 2), with Pair 9 serving as the referent group. Estimates are unstandardized.

ther of the teacher factors, including perceived emotional ability, moderated the impact of intervention on overall classroom quality, suggesting that the effects of 4Rs intervention are robust at least across this targeted set of teacher social-emotional functioning indicators.

Post hoc analyses revealed a significant intervention effect on levels of classroom emotional support (significant at the trend level) and classroom instructional support but not classroom organization. These findings are both consistent with and extend the results of Raver et al. (2008). In that study, classrooms with teachers who had received behavior management training and a weekly classroom-based mental health consultant were observed to have significantly higher levels of positive classroom climate, teacher sensitivity, and behavior management, subscales of the CLASS associated with the broader dimensions of classroom emotional support (positive climate, teacher sensitivity) and classroom organization (behavior management). Both the CSRP and the 4Rs Program appear effective in promoting emotionally supportive teacher behaviors and teacher-student interactions, the former in preschool classroom settings and the latter in middle elementary school classrooms. In contrast, the 4Rs Program did not produce impacts on classroom organization, whereas the CSRP intervention, likely due to its specific intervention focus on behavior management, demonstrated positive effects on this subdomain, although no other subdomains of classroom organization were tested. Lastly, although not tested in the CSRP evaluation, the 4Rs Program appears effective in promoting higher quality instructional interactions and supports for students (e.g., concept development, quality of feedback). Reflecting a developmental-contextual approach (Bronfenbrenner & Morris, 1998; Lerner, 1998) to the understanding of development and prevention, the current study provides compelling evidence that key proximal processes in the microcontexts of children's elementary school classrooms are sensitive to improvement via school- and classroom-based intervention effects. Additional research will be needed to examine whether these intervention-related changes in classroom processes mediate the relationship between intervention and student academic and social-emotional outcomes.

Reflecting the primary findings on overall quality of classroom social processes, none of the classroom or teacher factors were found to moderate the impact of intervention on the specific domains of classroom emotional or instructional support.

Nonsignificant intervention effects on classroom processes associated with classroom organization suggests that though highly correlated with classroom emotional and instructional support (.67-.74, respectively), this dimension of classroom process is not independently sensitive to the 4Rs intervention at the end of one year of implementation. This finding is somewhat surprising, particularly given the program's emphasis on improving teachers' behavior management abilities (e.g., effectively monitoring, preventing, and redirecting disruptive behavior). Yet this is only one of the three subscales composing the classroom organization domain, and because the 4Rs Program focuses less explicitly on the other two aspects of this domain—Productivity (e.g., efficient management and use of instructional time) and Instructional Learning Formats (e.g., provision of activities or materials to maximize learning time and opportunities)—intervention induced changes in the broader classroom organization domain may require more than one year of exposure to the program and/or a revision in the focus of the 4Rs intervention. Although the program generally promotes classroom organization through structured and consistent implementation of the 4Rs curriculum, the teacher training and curriculum itself prioritize teachers' attention to the emotional dimensions (e.g., demonstrating respect for students, noticing and addressing student needs, providing opportunities for student talk and expression) and instructional dimensions (e.g., use of discussions and activities that encourage analytic and reasoning skills such as problem solving, consistent provision of high-quality exchanges and feedback loops) of their behaviors and interactions with students in the classroom.

This study has several important strengths, but there are a number of limitations that must be noted. First, although almost all third-grade classrooms across the 18 school participating in the first year of the study were included in this analysis ( $n = 82$ ), this relatively small sample of classrooms limited the power of the analyses reported here and constrained our ability to simultaneously control for and estimate the moderating impacts of other potentially important classroom characteristics (e.g., classroom size and compositional features such as student racial and ethnic diversity and classroom-aggregated levels of student behavioral and academic risk) and teacher characteristics (e.g., teacher years of experience) on quality of classroom processes. These limitations and constraints will be addressed in the future through analyses of intervention impact on classroom processes from the second and

third years of the study in which we observed and rated classroom processes in all third- and fourth-grade and then third-, fourth-, and fifth-grade classrooms, respectively, substantially increasing the size of our classroom sample in each of the subsequent years.

Second, the findings presented in this article represent point-in-time estimates of intervention effects on the quality of classroom processes at the end of the first year. Although this does not at all detract from the strength of the experimental contrast at that point in time, it does not allow us to draw any inferences regarding the impact of 4Rs on the form of change in classroom processes over one school year.

Third, although the overall alpha coefficient for the Classroom Organization subscale was adequate (.83), it was lower than the alpha coefficients of Emotional and Instructional Support subscales (.90 for each), and interrater reliability for this scale based on the double-coding of 12% of the classrooms (.76) was slightly lower than the expected 80% reliability criterion. The modest reliability of the Classroom Organization dimension could possibly account for null intervention impacts on this dimension of classroom quality. Fortunately, subsequent waves of classroom observation data in Years 2 and 3 provided an opportunity to double-code approximately 20% of all classrooms, and continued training of raters leads us to expect interrater reliability would be above threshold.

Fourth, the nature of the intervention itself, and the design of the evaluation, does not enable us to disentangle which specific components of the intervention were related to classroom quality. Although it is likely a combination of teacher training, ongoing coaching, and teacher implementation of the curriculum, the relative benefits of these components remains unknown.

Finally, the intervention effects on quality of classroom processes reported in this article were based on a sample of third-grade classrooms from a small number of urban public elementary schools that are attended in large majority by low-income Black/African American and Hispanic/Latino students. Although the findings of positive program impacts on key features of classroom processes are encouraging, our conclusions about the effectiveness of this intervention in modifying important features of classrooms must remain limited to the geographic and demographic characteristics of this sample. Further research will be needed to examine whether the effects reported here will be replicated in tests of this or other setting-focused interventions in suburban or rural school systems serving middle and higher income students, for example.

Despite these limitations, the results of this study advance our understanding of teacher- and intervention-based sources of influence on elementary school classroom processes known to influence student academic and social-emotional development. This study extends prior research that demonstrated links between quality of teacher-student interactions and teacher psychological and demographic characteristics (Hamre & Pianta, 2004; LoCasale-Crouch et al., 2007), suggesting that teacher perceptions of their emotional skills are also an important source of influence on the quality of the interactions characterizing instructional and organizational processes in the classroom. Most important, this study also provides strong experimental evidence that teacher training and support in the delivery of an integrated social-emotional learning and literacy intervention can positively affect elementary school classroom social processes, particularly processes associated with the provision of emotional and instructionally supportive

environments. Intervention impacts on classroom quality were robust at least across a selected number of classroom and teacher sociodemographic and social-emotional functioning factors. Research in early childhood classroom settings has found few consistent associations between classroom quality and teachers' education level per se (Early et al., 2006; NICHD ECCRN, 2005; Pianta, Howes, et al., 2005). However, if future studies provide additional support for the influence of teacher social-emotional competence and school-based social-emotional learning interventions on classroom quality, then schools of education and school systems themselves will need to carefully consider the implications of these findings for the assessment and promotion of such competencies in teacher selection and training processes and practices.

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