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Fostering High-Quality Teaching with an Enriched Curriculum and Professional Development Support: The Head Start REDI Program

Celene E. Domitrovich, **Scott D. Gest**, **Sukhdeep Gill**, **Karen L. Bierman**, **Janet Welsh**, and **Damon Jones**

Pennsylvania State University

Abstract

This randomized controlled trial tested whether teaching quality in Head Start classrooms could be improved with the addition of evidence-based curriculum components targeting emergent language/literacy and social-emotional development and the provision of associated professional development support. Participants were lead and assistant teachers in 44 Head Start classrooms. Teachers received 4 days of workshop training along with weekly in-class support from a mentor teacher. End-of-year observations indicated that, compared to the control group, intervention teachers talked with children more frequently and in more cognitively complex ways, established a more positive classroom climate, and used more preventive behavior management strategies. Results supported the conclusion that enriched curriculum components and professional development support can produce improvements in multiple domains of teaching quality.

High quality early childhood programs produce students who are better adjusted and achieve more in preschool, elementary school, and adulthood (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Howes, Burchincal, Pianta, Bryant, Early, Clifford et al., 2008; NICHD Early Child Care Research Network [ECCRN], 2004), yet the majority of early childhood education provided in the United States is of low quality (LoCasale-Crouch, Konold, Pianta, Howes, Burchinal, Bryant et al., 2007). The situation is particularly serious for economically disadvantaged youth because they experience less stimulating early childhood environments at home (Hart & Risley, 1995) and are less likely than more advantaged youth to experience consistently high-quality instruction in elementary school (Pianta, Belsky, Houts, Morrison, & NICHD ECCRN, 2006). Head Start, the country's premier federal preschool education program for disadvantaged families, is intended to narrow the achievement gap that results from disparities in early childhood experiences. However, the results of the Family and Children Experiences Survey (FACES) evaluation suggest that while children attending Head Start gain some specific social and cognitive skills, the majority of participants enter school below the national norms in terms of overall achievement levels (U.S. Department of Health and Human Services, 2001; Zill, Resnick, Kim, O'Donnell, Sorongon, McKey, et al., 2003). These findings underscore the pressing need to enhance teaching quality in Head Start programs in ways that promote children's readiness for school.

Address correspondence to: Celene Domitrovich, The Pennsylvania State University, Prevention Research Center, 109 South Henderson Building, University Park, PA, 16801; cxd130@psu.edu.

In this report we describe the impact of the Head Start - REDI (Research-based, Developmentally-Informed) intervention on teaching quality, evaluated in the context of a randomized controlled trial. The REDI intervention included specific curriculum components targeting children's language, emergent literacy and social-emotional development, and also utilized professional development activities designed to improve the quality of teacher's language use, emotional support, and positive behavioral management strategies in the classroom. Prior analyses revealed a positive program impact on child skills, on measures of vocabulary, emergent literacy, emotional understanding, social problem-solving, social behavior, and learning engagement (Bierman et al., in press). In this paper, we examine program impact on generalized teaching quality.

Our focus is motivated by the growing body of research that suggests that proximal features of teaching quality, including teachers' instructional practices and the quality of teacher-student relationships, play a primary role in fostering child skill development and school readiness (Pianta, 2003; Mashburn & Pianta, 2006; Vandell & Wolfe, 2000). Yet, the increased emphasis on child achievement as the marker of preschool quality raises concerns that explicit instructional activities will become over-emphasized in preschool settings, promoting directive teacher behaviors that undermine developmentally-appropriate teaching quality (Love, Tarullo, Raikes & Chazan-Cohen, 2006). Hence, better understanding how professional development efforts focused on improving teaching quality may be combined with new curriculum components (including explicit instructional activities) in ways that promote positive teaching quality as well as increased child achievement represents a pressing need.

Characteristics of High Quality Teaching in Early Education Settings

High quality teaching fosters cognitive, behavioral, and social-emotional skills and has both interpersonal and instructional features (Howes et al., 2008; Kontos, Burchinal, Howes, Wisseh, & Galinsky, 2002; Pianta, 2003; La Paro, Pianta, & Stuhlman, 2004).

Emotional-behavioral support

Teachers who interact with students in a warm, sensitive and responsive style validate their students' emotional experiences and foster a sense of security that supports active engagement in classroom and learning activities (Howes & Smith, 1995; Kontos & Wilcox-Herzog, 1997; NICHD ECCRN, 1998).) In addition, several specific teaching strategies promote children's emotional understanding, emotion regulation, and social competence. These include “emotion coaching,” which involves empathic and non-judgmental responses to children's emotional expressions (Gottman, Katz, & Hooven, 1997) and social problem-solving dialogue, which provides children with “on line” support to manage conflicts by identifying problems and associated feelings, generating alternative solutions, and selecting solutions that are acceptable to all parties (Denham & Burton, 2003). Child self-control is supported when teachers reduced their reliance on teacher directives and negative consequences, and provide support for self-regulation, including clear expectations, predictable and appropriate routines (La Paro et al., 2004), and “induction strategies” which provide children with teacher and peer feedback to encourage student self-control efforts

(Bierman, 2004; Bierman, Greenberg, & the Conduct Problem Prevention Research Group [CPPRG], 1996). When teachers manage the inevitable conflicts and negative behaviors in preschool classrooms using positive discipline techniques rather than harsh and directive strategies, children display more positive behavior and higher levels of language development (Arnold, McWilliams, & Arnold, 1998; Whitebook, Howes, & Phillips, 1990). Hence, sensitive responding, proactive and preventive support, emotion coaching, induction strategies and positive behavioral management all increase the level of emotional-behavioral support in the preschool classroom, which in turn is associated with stronger cognitive and language skills in preschool (NICHD ECCRN, 2000a, 2000b) and higher levels of achievement in early elementary school (Howes et al., 2008; NICHD ECCRN, 2004; Peisner-Feinberg, Burchinal, Clifford, Culkin, Howes, Kagan, et al., 2001).

Cognitive linguistic support—Teachers provide instructional support by promoting children's higher-order thinking and problem solving skills. Learning is enhanced when children are provided with high quality feedback and when they are engaged in activities in a way that extends their knowledge (Meyer, Wardrop, Hastings, & Linn, 1993). Children's linguistic development is fostered when teachers build upon students' communications by expanding or recasting children's utterances using new words or grammatical structures that fit the context of the ongoing activity and are just slightly beyond the child's current skill level (Nelson & Welsh, 1998). Book reading has been a central focus of research in this area (Dickinson, 2001), but other classroom settings such as free play and mealtime also provide opportunities for stimulating language interactions (Cote, 2001). Teacher-student verbal interactions that include rich and varied vocabulary, back and forth exchanges between teacher and students, decontextualized and cognitively challenging talk are associated with children's cognitive and social competence in preschool (Kontos & Wilcox-Herzog, 1997) and later language and emergent literacy abilities (Beals, DeTemple, & Dickinson, 1994; Dickinson & Tabors, 2001; NICHD ECCRN, 2000b).

Interventions to Improve Teaching Quality

Surprisingly few early childhood interventions use experimental designs to measure their impact on teaching quality, but several recent empirical trials have documented success in increasing teacher support for children's language and emergent literacy development with a combination of curriculum components and general teaching strategies (Dickinson & Sprague, 2001; Girolametto, Weitzman, Lefebvre, & Greenberg, 2007; Landry, Swank, Smith, Assel, & Guennewig, 2006; Wasik, Bond, & Hindman, 2006). For example, Wasik and colleagues (2006) introduced a language and literacy intervention in Head Start classrooms that combined shared reading (e.g., asking questions, making connections, and explicitly teaching target vocabulary words while reading) with professional development designed to enhance general teacher language use (e.g., coaching in explicit routines and strategies to expand on children's utterances, foster listening, encourage conversations, and model rich language). Teachers attended 9 monthly, two-hour workshops and received in-class coaching sessions in which a mentor modeled the strategy, observed the teacher using the strategy and provided the teacher with written and oral feedback. Post-intervention observations indicated that intervention teachers talked significantly more than control teachers, used more open-ended questions, and used more conversational strategies.

We found only two randomized controlled trials documenting the impact of professional development efforts on emotional-behavioral support in preschool settings. Webster-Stratton, Reid and Hammond (2001) provided intervention teachers with six monthly, 1-day workshops that used videotape vignettes and group discussion to teach positive classroom management, discipline strategies, and ways to promote social competence in the classroom. Post-intervention observations indicated that compared to control teachers, intervention teachers used more praise, more effective discipline techniques, and fewer harsh and critical techniques. More recently, Raver and colleagues (2008) provided Head Start teachers with five 6-hour training sessions throughout the school year and weekly coaching from mental health consultants in behavior management strategies. These consultants also provided one-on-one direct consultation services to children in the spring. Results indicated significantly higher levels of positive climate, teacher sensitivity, and behavior management in intervention classrooms at the end of the year.

Overall, these studies suggest that teaching quality can be improved with strategic and sustained professional development activities. In particular, these effective interventions had several features of professional development in common: trainings that were specific and targeted (Guskey, 2003), opportunities for practice with feedback in naturalistic contexts (Elmore, 2002; Putnam & Borko, 2000), and adequate supervision time for teachers to reflect on their own practices, set goals, and self-evaluate (Bowman, Donovan, & Burns, 2001). Increasingly, mentoring that includes in-classroom coaching and out-of-classroom supervision meetings is emerging as a promising strategy for extending professional development experiences beyond instructional workshops (Haskins & Loeb, 2007; International Reading Association & National Association for the Education of Young Children, 1998). For example, teacher-reported mentoring and supervision were positively associated with observations of early childhood teachers' responsive involvement and engagement in emergent literacy (Howes, James, & Ritchie, 2003); and on-going coaching of elementary grade teachers in the implementation of social-emotional curricula was associated with better student outcomes (Aber, Brown, & Jones, 2003; Gorman-Smith, Beidel, Brown, Lochman, & Haaga, 2003).

The Current Study

As researchers begin to evaluate the impact of different professional development strategies on teaching quality with rigorous, randomized-controlled designs, three limitations are evident. First, no interventions have involved coordinated and integrated attempts to promote teaching quality in both emotional-behavioral and cognitive-linguistic domains. Second, few interventions have combined professional development in generalized teaching strategies with the provision of specific evidence-based curricula that exemplify those strategies. These are critical challenges because Head Start teachers often report feeling overwhelmed by the dual demands of implementing curriculum improvements designed to close the “achievement gap”, while also effectively managing behaviorally-challenging children who lack the self-regulation and social skills needed for engaged learning (Iutcovich, Fiene, Johnson, Koppel, & Langan, l997; Yoshikawa & Knitzer, 1997). One concern about the increased use of “scripted” research-based instructional curricula in Head Start settings is that they may undermine teaching quality by displacing child-directed activities or by

reducing sensitive-responsive and child-centered teaching practices. Evidence is needed that an intervention in a Head Start setting can integrate research-based instructional components targeting both social-emotional and emergent literacy school readiness skills, and at the same time, produce generalized improvements in teacher's behavioral management strategies, provision of emotional support, language use, and instructional quality. Third, it is not clear whether educational background or role within the classroom affects a teacher's capacity to benefit from interventions (Guskey, 2003; Haskins & Loeb, 2007). For example, Wasik and colleagues (2006) found no relationship between level of teacher education and quality of program implementation. Unfortunately, none of the evaluations of preschool intervention tested whether there were different effects on lead and assistant teachers.

This study of teaching quality in the context of the Head Start REDI intervention was designed to address each of these limitations. First, the program targeted improvements in both emotional-behavioral and cognitive-linguistic teaching quality, in an integrated and coordinated way. Second, attempts to improve general teaching quality with professional development workshops and intensive mentoring were integrated within a multi-component, research-based curriculum that included specific lessons to enhance child skills in language/emergent literacy and social-emotional skill domains. Finally, both lead teachers and assistant teachers were trained with the same procedures and observed with the same measures, allowing us to assess potential effects of teacher role on intervention effectiveness. We hypothesized that providing sufficient support to Head Start teachers in learning and implementing the REDI teaching strategies and curriculum activities would result in observable gains in teaching quality that extended well beyond the curriculum-based lessons, resulting in generalized improvements in emotional-behavioral and cognitive-linguistic support for students.

Methods

Design Overview

Head Start programs in three Pennsylvania counties participated in this study. Half of the participating classrooms were located in a larger, fairly densely populated urban county, and the other half were located in two smaller, rural counties. Initially, classrooms were stratified on county location, length of program, student demographics (proportion of minority and Spanish-speaking children), and center size to assure even representation in the intervention and comparison conditions. Most of the classrooms (67%) were in small centers (1-2 classrooms), but 4 centers were larger, containing 3-5 classrooms. Classrooms in the same center were always assigned to the same condition, to avoid inadvertent contamination of condition within centers. Within each stratified group, centers were randomly assigned to intervention or comparison conditions.

Participants

Participants included 84 teachers from 44 classrooms recruited over two consecutive years so intervention teachers were studied as they implemented REDI for the first time. Teacher data (other than gender) were not available for four teachers (2 intervention, 2 control) who left their positions after the mid-point of the year. Overall, the intervention and control

classrooms were very similar in the profiles of lead and assistant teachers (see Table 1). In both intervention and control classrooms, all but one teacher was female, at least 95% spoke English as a primary language, and over 80% were Caucasian. Most lead teachers had at least a 4-year degree (I = 55%, C = 64%); whereas most assistant teachers had either a High School education or some post-HS education (I = 68%, C = 75%). Most lead teachers had either a Child Development Associate credential (35% in each condition) or a teaching certificate (I = 40%, C = 52%); whereas only 5% of assistant teachers in each condition had either credential. Most teachers had 6 or more years of teaching experience (lead teachers I = 75%, C = 72%; assistant teachers I = 64%, C = 55%). In sum, intervention and control teachers displayed very similar profiles of personal demographics, education, credentials and experience. The randomization procedures ensured that intervention and control classrooms were equivalent in program setting (45% rural and 55% urban in each condition) and in the base curriculum (45% Creative Curriculum and 55% High/Scope).

Data Collection Procedures

In the spring, prior to the summer training and initiation of intervention, baseline observations of the classrooms were conducted and teachers reported on their professional background, personal resources, and job perceptions. Lead and assistant teachers were observed on the same day by the same observer. Similar procedures were repeated at the end of the April, after one year of intervention. At each time point, teachers were compensated $20. Due to a high rate of staff turnover over the summer, pre-intervention baseline observations were available only for 57 (68%) of the 84 participating teachers. Restricting the final outcome analyses to these 57 teachers (so that baseline scores could be used as covariates) would have reduced the sample size by nearly one-third. To avoid such a substantial loss of statistical power, baseline observations were used to establish the success of the randomization procedure in creating equivalent intervention and control groups; and outcome analyses utilized the end-of-year observations available for all 84 teachers.

In order to promote unbiased evaluations, there was no overlap between staff working on the research team collecting observations of teachers and those working on the intervention team. Observers were not informed of the intervention condition of the classrooms they observed, nor of the hypotheses of the overall study.

Intervention Design

The intervention was delivered by classroom teachers and integrated into existing curricula (i.e., Creative Curriculum and High/Scope) used by the Head Start centers. It included explicit curriculum-based lessons, center-based extension activities, and “teaching strategies” designed to be used throughout the day to generalize key intervention concepts. Teachers received detailed manuals and kits containing all materials needed to implement the intervention.

Language/emergent literacy skill enrichment—REDI targeted vocabulary, syntax, phonological awareness and print awareness with three program components. First, the interactive reading program was based on the shared reading program developed by Wasik and Bond (2001; Wasik, Bond, & Hindman, 2006) which was, in turn, an adaptation of the

dialogic reading program (Whitehurst, Arnold, Epstein, & Angell, 1994). The curriculum included two books per week, which were scripted with interactive questions. Each book included targeted vocabulary words, presented with the aid of physical props and illustrations. Second, teachers were provided with curricula materials to promote phonological awareness through a set of “Sound Games” based primarily upon the work of Lundberg and colleagues (Adams, Foorman, Lundberg, & Beeler, 1998). Teachers were asked to use a 10-15 minute Sound Game activity at least three times per week. Third, teachers were provided with a developmentally sequenced set of activities and materials to be used in their alphabet centers (e.g., letter stickers, letter bucket, materials for a Letter Wall, craft materials). They were asked to make sure that each child visited the alphabet center several times per week, and were given materials to track the children's acquisition of letter names.

In addition to these curriculum components, teachers received mentoring in the use of “language coaching” strategies, including vocabulary support, expansions and grammatical recasts, and decontextualized talk to provide a general scaffold for language development in the classroom (Dickinson & Smith, l994). The overall goal was to improve teacher's strategic use of language in ways that would increase child oral language skills including vocabulary, narrative, and syntax.

Social-emotional skill enrichment—The Preschool PATHS Curriculum (Domitrovich, Greenberg, Kusche, & Cortes, 2005) was used to promote children's social-emotional skills. It targeted four domains; 1) prosocial friendship skills, 2) emotional understanding and emotional expression skills, 3) self-control (e.g., the capacity to inhibit impulsive behavior and organize goal-directed activity), and 4) problem solving skills including interpersonal negotiation and conflict resolution skills. The curriculum is divided into 33 lessons that are delivered by teachers during circle time. These lessons include modeling stories and discussions, and utilize puppet characters, photographs, and teacher role-play demonstrations. Each lesson includes extension activities (e.g., cooperative projects and games) that provide children with opportunities to practice the target skills with teacher support. Teachers taught one PATHS lesson and conducted one extension activity each week.

The corresponding teaching strategies in the social-emotional domain included structuring the classroom with proactive rules and routines, positive management techniques (e.g., use of specific teacher praise and support), emotion coaching, induction strategies to encourage appropriate self-control, and the use of social problem-solving dialoguing to promote children's flexible thinking and social competence (Denham & Burton, 2003; Bierman et al., 1996).

Integrating the REDI program with existing curricula—Project staff developed “crosswalk” tables to illustrate how the REDI target skills and methods mapped onto each program's base curriculum (i.e., High/Scope or Creative Curriculum). Both of these curriculum publishers have recently developed supplemental materials to enhance language and emergent literacy skills, but none of the Head Start programs participating in this project were using them. The interactive reading program and emphasis on language use, as well as the emotion coaching and social problem-solving strategies that were central to the REDI

program were philosophically compatible with the strategic, child-centered teaching approach used in High/Scope and Creative Curriculum. They were integrated into existing book-reading, learning center, and play activities and routines. The “Sound Games”, alphabet centers, and social-emotional lesson presentations utilized more direct teacher instruction, and hence represented components that were not well-integrated with the core curriculum, but were “added on” to enhance the acquisition of specific child skills.

Training and Professional Development Support

Training workshops—In early August, prior to the beginning of the Head Start year, lead and assistant teachers attended a 3-day workshop. The workshop covered the theoretical and developmental model underlying REDI and oriented teachers to the rationale underlying the integration of the program's curriculum components and general teaching strategies. There was approximately a half-day of general orientation, 1 day of language and literacy emphasis, 1 day of social-emotional emphasis, and a half-day of program-specific meetings about the logistics of implementing REDI. The domain-specific days of the training not only focused on the mechanics of conducting the curriculum lessons but also emphasized the importance of generalization through curriculum extension activities and the use of teaching strategies. Midway through the year, a 1-day “booster” workshop provided a brief review of the REDI developmental model and intervention components. Teachers were encouraged to reflect on what had been working well and discuss ongoing challenges. Collective problem-solving occurred.

Mentoring—Intervention teachers also received weekly mentoring support provided by local educational consultants (“REDI trainers”), experienced master teachers who were supervised by two project-based senior educational trainers. The weekly consultations were intended to enhance the quality of implementation through modeling, coaching, and providing ongoing feedback. The REDI trainers spent an average of three hours per week (*SD* = .18, range = 2.69 – 3.33) in each classroom observing, modeling intervention techniques, or team teaching lessons. In addition, REDI trainers met weekly with both the lead and assistant teachers for one hour. A similar format was followed each week. First, the teachers presented their weekly implementation form, describing what they had done, reflecting on the effectiveness of the various activities and lessons, and noting any teaching questions or challenges. This served as a platform for the REDI trainers to comment on specific positive teaching practices they had observed that week and to provide suggestions for improvements or solutions for challenges that were encountered. During the second half of each meeting, REDI trainers reviewed specific teaching strategies that were a formal part of the intervention. These were organized according to a teaching pyramid, and “rolled out” over the course of the year. During the first half of the year, trainers focused on teaching strategies that were at the broad base of the teaching pyramid, including the use of positive management strategies (e.g., use of specific praise, organization of transition routines), social-emotion skill promotion (e.g., emotion coaching), and problem prevention strategies. Trainers also introduced and emphasized language coaching strategies, especially the use of questions, expansions, and decontextualized talk, as well as the generalized use of target vocabulary. During the second half of the year, trainers emphasized strategies that could be used to respond to and re-focus problem behaviors in positive ways, particularly the use of

induction strategies and social- problem solving dialogue. The goal was to maximize the use of teaching strategies that supported child language and social-emotional skill development and minimize the use of strategies at the tip of the pyramid, which included external controls (e.g., negative consequences, time-out). In presenting the various teaching strategies, REDI trainers used examples and videotaped models to introduce skill concepts, encouraged discussion about the specific use of the strategy in the teacher's classroom, and suggested practice activities for the coming week. Teachers were encouraged to identify personal goals regarding their planned use of the highlighted teaching strategies in the coming week. REDI trainers followed the same progression through these strategies with all teachers, but the pace was adjusted to match teachers' mastery of the material. If necessary, REDI trainers would extend the amount of time spent reviewing or practicing concepts before moving on.

REDI implementation quality—REDI implementation quality was monitored in the intervention classrooms only. Teacher ratings of curriculum dose and fidelity were high. On average, each week teachers reported implementing 1.77 PATHS lessons and extension activities, 6.08 dialogic reading activities, 2.57 Sound Game activities, and 3.56 alphabet center activities. Using ten 3-point scales to rate lesson quality (e.g., “Were you able to complete the lesson as written?”; “Were the children positively engaged and interested in the lesson?”) (α = .64), teachers gave an average rating of 2.88, indicating that the curriculum was being delivered as specified and that children understood and were engaged in the lessons.

REDI trainers observed each of the curriculum components at least once each month and completed fidelity ratings using a 6-point Likert scale (1 = poor, 6 = exemplary). Average trainer ratings of implementation quality were as follows: (1) PATHS, M = 4.61, SD = .74; (2) dialogic reading, M = 4.39, SD = .57; (3) alphabet activities, M = 4.70, SD = .55; (4) Sound Game activities, M = 4.52, SD = .72; and (5) overall REDI program, M = 4.55, SD = .67. On this scale, scores between 4 and 5 correspond to descriptions of “adequate” to “strong.” REDI trainers also completed monthly ratings of how frequently teachers used the generalized teaching strategies using a 5-point Likert scale (1 = almost never, 5 = almost always). Average trainer ratings were as follows: emotional communication and support, M = 3.28, SD = .63; induction strategies M = 3.09, SD = .66; and language coaching M = 3.06, SD = .62.

Comparison of professional development in intervention and control conditions—Teachers in the control classrooms continued to conduct Head Start services “as usual” which included using the pre-existing base curriculum and following Head Start professional development standards. In all three counties, this included 4-6 days each year devoted to in-service training, which usually involved formal workshops or presentations on different curriculum components (e.g., Kid Writing) or program elements (e.g., assessment procedures). In addition, each teacher worked with an assigned supervisor or mentor, who visited the classroom on a monthly basis and provided teachers with individual feedback. Supervisors/mentors were charged with monitoring teachers' specific adherence to program requirements (e.g., hygiene practices) as well as evaluating broader aspects of curriculum and program implementation (e.g., lesson plans, parent involvement). Based upon broad

supervisory review, individualized goals were developed with each teacher, which served as the focus for individual action plans. Teachers assigned to the REDI program also participated in these program-based professional development activities.

In sum, the REDI program professional development activities differed from those provided by Head Start programs in three ways: 1) REDI coaching sessions with teachers were more intensive (weekly rather than monthly) and they were designated as supportive rather than evaluative, 2) REDI coaching sessions had a very focused agenda that included a review of the previous and upcoming curriculum activities and the presentation of target teaching strategies which teachers were encouraged to practice during the week, and 3) REDI coaching sessions used an array of methods to support teacher skill development, including in-vivo and videotaped modeling, reflection exercises, and specific problem-solving discussions. Thus, in focus, frequency, and method, REDI professional development provided more intensive and systematic support for the improvement of language use and social-emotional learning in the classroom than the basic professional development support offered in the “usual practice” Head Start classrooms.

Measures

The *Classroom Assessment Scoring System* (CLASS; La Paro & Pianta, 2003) is an observational measure that assesses 10 dimensions of teaching quality that were identified through a systematic literature review. Each CLASS item is given a rating on a 7-point Likert scale after an observation period of 20 consecutive minutes. Four 20-minute epochs are rated in one day in each classroom and ratings for each item are then averaged across the four epochs. Observers are instructed to consider the behavior of any adults in the classroom and to provide an overall score for the classroom but to weigh the behavior of the lead teacher most heavily.

Research assistants were trained by the CLASS developers and completed a reliability observation with a video at 80% agreement within one scale point. Scale developers identified one observer as a ‘master observer’, and the remaining observers completed live reliability observation with the master observer that met the same 80% agreement criterion. To further characterize the reliability of the individual behavioral rating items, intraclass correlations (ICCs) were computed using data from 13 classrooms observed during the training process. For each observer, first ratings were averaged across the four epochs for a given item, then inter-rater agreement was computed for these averaged scores. Reliability for the 10 individual behavioral ratings ranged from $r = .60$ to $r = .95$, median $r = .77$. Reliability was lowest for ‘quality of feedback’ ($r = .60$) and ‘over control’ ($r = .69$) and was highest for ‘positive climate’ ($r = .95$), ‘negative climate’ ($r = .84$), and ‘teacher sensitivity’ ($r = .83$). These reliability values compare favorably with those reported by Raver et al. (2008). The ten behavioral rating items were further summarized in two scores reflecting the domains of *Emotional Support* and *Instructional Support*, as recommended by the scale developers. Items assessing positive climate, negative climate (reverse coded), teachers' sensitivity, over control (reverse coded), and behavior management represented the domain of *Emotional Support* ($\alpha = .86$). Items assessing productivity, concept development,

instructional learning formats, and the quality of feedback provided to children comprised the domain of *Instructional Support* (α = .76).

The *Teaching Style Rating Scale* (TSRS; Domitrovich, Cortes, & Greenberg, 2000) covers similar content as the CLASS but is complementary because it focuses on the behavior of a specific teacher. The measure consists of 9 items, each rated on a 5-point Likert scale. Observers completed the TSRS individually for the lead teachers and assistant teachers immediately after concluding all four 20-min epochs of the CLASS observation. To document observer reliability, four observers each completed 2 sets of TSRS ratings (one for each classroom teacher) with the CLASS master observer. Average agreement on TSRS items was 93% within 1 scale point. ICCs for individual items ranged from $r = .60$ to $r = .75$, median $r = .68$. In the analyses, we examined intervention effects on each of the specific behavioral rating items as well as three summary scores. The *Positive Discipline* domain included three items (α = .84) that described proactive/preventive approaches, the use of praise, reinforcement and redirection, and the absence of negative discipline. The *Classroom Management* subscale included three items (α = .82) describing the teacher's preparedness, use of consistent routines, and effective control and limit-setting. The *Positive Emotional Climate* subscale included three items assessing emotion expression, support for student emotion regulation, and emotion modeling (α = .71).

The *Classroom Language and Literacy Environment Observation* (CLEO; Holland-Coviello, 2005) includes an observational measure of child-directed talk from a specific teacher. Child-directed talk is coded during 5 to 10 minute observations in three contexts (book reading, free play and mealtime; for details, see Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006). In each context, all child-directed utterances were classified into one of seven mutually exclusive categories that were later collapsed into three categories based on the function of the utterance. The reliability of the total count of utterances in each category was documented by calculating ICCs between the primary observer and each of the two secondary observers. Directives were intended to control the child's behavior ($r = .99, .93$), questions were intended to elicit information from the child ($r = .99, .93$), and statements were intended to answer or inform the child or comment on ongoing activities ($r = .96, .88$). Within each classroom context, observers also noted any instances of Decontextualized talk defined as utterances about people, places, or things not present ($r = .97, .98$). In addition, immediately after each observation segment, observers completed a set of eight 5-point ratings regarding teachers' talk which were averaged to create a richness-sensitivity scale for each teacher. Four of these items captured the overall richness of teacher talk (vocabulary, elaboration, cognitive challenge, decontextualized talk) and four items described sensitivity of teacher talk (availability, warmth, balance, responsiveness; across contexts, median 8-item α = .83). Composites for each of the utterance types were calculated by averaging the rate per minute across the three classroom contexts. Similarly, a composite for richness-sensitivity was calculated by averaging the ratings from each context. In sum, the CLEO yielded five indices that were based on counts of teachers' child-directed talk and one rating scale that summarized the observer's global judgment of the richness and child-centeredness of teachers' talk.

For each classroom, one research assistant collected the CLASS and TSRS observations (emotional-behavioral support and cognitive support) while a second research assistant collected the CLEO observations (linguistic support).

Results

Plan of Analyses

To determine whether the randomization procedure was effective, we tested for differences between intervention and control classrooms on pre-test levels of the summary measures of cognitive support (1 CLASS scale), linguistic support (5 CLEO items) and emotional-behavioral support (4 CLASS and TSRS scales). These tests revealed no statistically significant differences between intervention and control classrooms prior to the intervention. Across the 10 variables tested, the magnitude of intervention-control differences was small when expressed as Cohen's (1988) *d*, with the largest difference favoring the control group (*d* = .41 for Decontextualized talk). These results indicate that the randomization procedure was effective in creating equivalent sets of intervention and control classrooms. Because randomization was effective and because pre-test scores were available for only 57 of the 84 teachers, pre-test scores were not used as covariates in the models described below.

We used multiple regression models to test whether the intervention was associated with significant differences on post-test measures of the key outcome domains. For the CLASS ratings, which produced only one score per classroom (i.e., CLASS ratings), each post-test score was predicted by three dichotomous variables representing cohort, setting (rural vs. urban) and intervention condition (0 = control, 1 = intervention). Cohort and setting were included to control for any differences in teaching quality across years of the study and between program settings and to permit tests of whether intervention effects varied by cohort or setting (described below).

For the CLEO and TSRS ratings, which produced separate scores for lead and assistant teachers, it was necessary to account for the fact that lead-assistant teacher pairs shared the same classroom environments. For this purpose, we used random effects regression models with classroom as the nesting factor (StataCorp, 2005). These models are equivalent to random-intercept models in a hierarchical linear modeling (HLM) approach, in which an additional random effect represents non-systematic between-classroom variation. Specification of additional random effects on model coefficients besides the intercept was limited by the small sample size and few units (teachers) per clustering level (classroom). The present approach is sufficient to produce standard errors that are unbiased by the fact that teacher-pairs shared the same classroom environment. Two measures of linguistic input (Directives and Decontextualized talk) were log-transformed to reduce skewness in the distribution before conducting analyses.

All of the TSRS variables deviated more substantially from normality, with response patterns displaying a discrete/ordinal distribution in which modal values were at the scale extremes. For these variables we used random effects ordered probit models that accounted for between-class random variation but did not depend on the assumption of normal distributions. Analyses were carried out in Stata and models derived through maximum

likelihood estimation. The nature of such models is that ordinal responses are linked to a latent, continuously distributed variable that represents the level of the construct of interest (e.g., classroom management). This latent variable influences which ordinal level/response will occur, and the ordered probit model can assess the degree to which other background variables might impact higher or lower responses. Higher positive coefficients for predictors thus influence the probability that the response will be at a higher "cut point" (separating the ordinal responses); these cut points are estimated in the model as intercepts and are estimated in a typical regression. In the case of the intervention status dummy variable, the positive coefficient represents an increase in probability of higher level in the results for the TSRS outcomes.

For all regression models, we tested condition by setting and condition by cohort interaction terms to determine whether the intervention worked differently in urban and rural settings or for teachers in the two cohorts. None of these interaction terms approached statistical significance. For the outcome measures with separate scores for lead and assistant teachers, we added a dichotomous variable indicating teaching status (0 = assistant; 1 = lead) and tested the interaction between condition and teaching status to determine whether the intervention worked differently for lead and assistant teachers: none were significant. Given the absence of interaction effects, in the remainder of the results section we focus on the main effect for the dummy variable representing intervention condition but we note when cohort or setting emerged as main effects. We present the raw beta coefficients, which can be interpreted in light of the original scaling (e.g., utterances per minute for linguistic input). Estimates of effect size (d) were derived from the regression models and were calculated as the difference in the adjusted means of the intervention and control groups divided by the pooled standard deviation (Cohen, 1988). We do not estimate effect size for the TSRS variables because the ordered probit models do not presume a normal distribution, making the applicability of a formula based on standard deviations questionable.

We examined outcomes for both individual behavioral rating items and for summary scales for two reasons. First, the broad summary scales may obscure theoretically meaningful variations in program impact. Each individual item is psychometrically reliable (see ICCs above) and summarizes a meaningful dimension of teaching quality derived from research (La Paro et al., 2004): for example, Raver and colleagues (2008) focused entirely on four individual "items" from the CLASS. Second, we anticipated that program effects on some of the broad "umbrella" categories might be driven primarily by change in item-dimensions that were a central focus of the intervention. For example, under the umbrella category of "Positive Discipline" on the TSRS, the REDI intervention emphasized the use of preventive/proactive behavior management, but did not train teachers specifically in the use of reinforcement strategies.

We adopt a hierarchical approach to interpreting results in an effort to balance the risks for Type 1 and Type 2 errors. Given the limited statistical power to detect these classroom-level effects, we reduce the risk of Type 2 errors by describing trend-level ($p < .10$) effects and report the effect size so that readers can judge the potential meaningfulness of the effect. At the same time, to reduce the risk of Type 1 errors, we interpret effects for individual items

only when there is clear replication for an effect across multiple items in a domain, across measures (CLASS, TSRS) or when a dimension was specifically targeted by REDI.

Effects on Teaching Quality: Emotional/Behavioral Support

Emotional support—The 3-item TSRS *Positive Emotional Climate* scale revealed a significant positive intervention impact ($p = .05$, Table 2). Each of the three items comprising the scale contributed to this impact, as emotion expression, emotion regulation, and emotion modeling each yielded separate non-significant trend-level effects favoring intervention classrooms. On the 5-item CLASS *Emotional Climate* scale, moderate differences favored intervention over control classrooms, but these differences did not reach statistical significance ($d = .39$, $p = .11$). Analyses of the individual items, however, revealed a statistically significant and moderate-sized intervention effect on positive climate ($d = .61$, $p = .04$) and a non-significant trend in favor of the intervention group on teacher sensitivity ($d = .58$, $p = .07$). No intervention effects emerged for negative climate, over-control, or behavior management.

Behavioral support—The 3-item TSRS *Classroom Management* scale revealed a significant and positive intervention impact ($p = .002$; see Table 3). Analyses of the individual items comprising this scale revealed a non-significant trend for limit setting ($p = .07$), but no effects on the other items, suggesting that the overall classroom management improvements resulted from diffuse changes across the item dimensions. No significant intervention effect emerged on the 3-item TSRS *Positive Discipline* scale ($p = .13$). However, intervention teachers scored higher on the individual item rating of proactive/preventive classroom management ($p = .001$), which included specific strategies that were emphasized in the REDI intervention.

Cognitive-Linguistic Teaching Quality

There was a non-significant trend favoring intervention classrooms on the 4-item CLASS scale of *Instructional Support* ($d = .45$, $p = .08$; see Table 3). Each of the individual items within this scale (productivity, quality of feedback, concept development and instructional learning formats) had similar regression coefficients, but only one (productivity) revealed a non-significant trend, suggesting no noteworthy variations in program impact within the broad domain of instructional support. With regard to linguistic support, intervention teachers were observed to make more statements ($p = .001$) and to ask more questions ($p < .001$). In contrast, directives, which were not desirable, showed no intervention effect ($p > .10$, see Table 4). Intervention teachers made significantly more decontextualized utterances ($p = .005$) and were rated by observers as engaging in richer and more sensitive talk with children ($p = .004$). The magnitude of these effects was in the moderate to large range, with effect sizes ranging from $d = .67$ to $d = .89$. Main effects for setting indicated lower rates of questions and statements in Cohort 2 but no interaction effect between cohort and intervention status.

To provide a more fine-grained perspective on these improvements in language input, we examined effects for each of the three classroom settings: book reading, free play and mealtime (see Table 5). The pattern and magnitude of reliable intervention effects was

similar in each of the three settings. In each setting, intervention teachers were more likely than control teachers to make statements and to ask questions, and were rated as engaging in richer and more sensitive language interactions, but were no more likely to issue directives. Rates of decontextualized talk were higher for intervention teachers during free play and mealtime, but not during book-reading. Effect sizes were generally largest during mealtime, especially for questions (d = .97), decontextualized utterances (d = .73) and ratings of richness-sensitivity (d = .64). There were no significant interaction effects of teacher status with intervention status, suggesting that the intervention was associated with similar effects on the linguistic input provided by lead teachers and assistant teachers.

Discussion

Most definitions of “school readiness” recognize the importance of both social-emotional and cognitive skills, noting that academic achievement requires the development of adaptive learning behaviors as well as the acquisition of content knowledge (Blair, 2002; Howes et al., 2008; Ladd, Birch, & Buhs, 1999). Nonetheless, many recent efforts to enhance the quality of early childhood care settings, and Head Start in particular, focus narrowly on early academic skill development. This is perhaps understandable in the context of federal policies and grant programs that focus attention on reading achievement in elementary school and emergent literacy skills in early childhood (e.g., the U.S. Department of Education's Reading First, Early Reading First and Early Childhood Education Professional Development programs). It is hoped that these programs will lead to meaningful reductions in the achievement gap associated with socioeconomic disadvantage, but there is some risk that their exclusive focus on early literacy may leave the impression that other school readiness skills are unrelated to, less important than, or incompatible with vigorous efforts to promote literacy. In this context, we believe the most important finding from this randomized trial is that typical Head Start programs can improve their support for multiple domains of school readiness, including explicit instruction in emergent literacy skills along with broad support for children's language skills and social-emotional competencies using developmentally-supportive teaching practices (Peisner-Feinberg et al., 2001).

In the present randomized controlled trial, an intervention that included new evidence-based curriculum components, enhanced teaching strategies, and sustained professional development of Head Start teachers was associated with higher scores on end-of-year observations of teaching quality. Statistically significant impacts were evident in areas of positive emotional climate, positive classroom management (especially the use of proactive-preventive management strategies), and language use. Compared to teachers in the control classrooms, Head Start REDI teachers talked with children more frequently and in more cognitively complex ways, using more questions and decontextualized talk, in a manner that was more sensitive and responsive to children. These differences in quality were observed across classroom contexts, including contexts which included specific REDI curriculum components (e.g., reading) and contexts in which no specific curriculum materials or activities were provided (e.g., mealtime, free play), suggesting that the differences in teacher behavior generalized throughout the day. Overall, this study adds to a small but growing experimental literature identifying viable strategies for improving the quality of teaching experienced by young children (Raver et al., 2008; Wasik et al., 2006; Webster-Stratton et

al., 2001). In the following section, we speculate on how the curriculum components and mentoring procedures may explain these positive intervention effects, but further research is needed to clarify the processes involved.

Curriculum-based Mentoring

The REDI intervention utilized research-based curriculum materials as a first step and central lever to achieve generalized gains in teaching quality. The approach was similar to that taken by Wasik and colleagues (2006) when they used brief but carefully structured interactive reading lessons and extension activities as a starting point for more generalized improvements in teacher-child language interactions. In this approach, curriculum components are brief activity formats that help to introduce key concepts and structure theoretically important learning processes. Professional development activities, particularly individual mentoring, are then designed to foster a deeper understanding of these formats and processes so that teachers can use them in a flexible and responsive manner throughout the day, as well as during the scripted lessons. Conceptually, the curriculum components provide an important scaffold for professional development efforts, as they provide a concrete model and performance demand to encourage teachers to try out and extend new and elaborated teaching strategies. Mentoring relationships provide opportunities for personal reaction, reflection, exploration, and extension, encouraging teachers to engage in intentional efforts to improve the quality of their relationships and interactions with children that extend beyond the relatively brief structured lesson times.

The curriculum materials also “prime the pump”, fostering specific child skills that promote student responsivity to teaching support. For example, the PATHS curriculum includes lessons on feelings, friendship skills, self-control techniques, and social problem-solving strategies, and teachers can refer to these lessons when they encourage children to apply skills in problem situations. One specific illustration involves a strategy for emotion regulation (“Doing Turtle”) adapted from Schneider and Robin (1978) that is introduced in the Preschool PATHS lessons. Based upon a modeling story, children are shown how they can calm down when they are upset or overly excited; they can stop their behavior, go into their shell (hug themselves), take a deep breath to calm down, and state the problem and how they feel. This allows teachers to cue children to use this explicit behavioral sequence when children are aroused by a disagreement or frustration, and support them in self-calming (“Doing Turtle”) and working out the problem through dialogue with their peers. Reciprocally, the degree to which teachers remind children and support them in applying their PATHS skills during the day plays a central role in helping children to consolidate this self-regulation skill. As children become more capable of using these skills, teachers can reduce their reliance on external control. In this way, the curriculum skills and corresponding social-emotional teaching strategies are transactional in influence, proactive (rather than reactive), and mutually beneficial in terms of promoting a positive classroom climate. The strategies support children's regulatory and problem solving skills in a way that is complementary but distinct from traditional forms of behavior management. The positive intervention effect on emotional-behavioral support, in particular the positive climate and teacher sensitivity items within the CLASS emotional support subscale, indicate that teachers were effectively generalizing the skills taught through the PATHS Curriculum.

A second example involves the support teachers were given to improve their language use with children. The interactive reading curriculum provided “scripted” lessons for teachers, with targeted vocabulary words and exemplar questions and expansions provided to illustrate how teachers could use specific books as platforms for expanded discussions with children. Teachers were asked to follow these lesson scripts at the start of the year, providing a concrete guide for improved language use, but the ultimate goal was to promote their comfort and capacity to use enriched language flexibly and automatically across the day in their interactions with children. At the end-of- year observations, the intervention impact on teachers' decontextualized utterances was statistically significant in the free play and mealtime settings, with the largest effect size at mealtime. These findings suggest that teachers were generalizing their linguistic support to settings that lacked specific curriculum materials and underscore the potential value of mealtime as a focus of teacher language use interventions (Cote, 2001; Gest et al., 2006).

Prior research suggests that providing explicit curriculum components alone, without additional professional development support focused on improving teaching strategies, is often insufficient to promote improvements in teaching quality. For example, Justice and colleagues found that teachers using a research based language and literacy curriculum without professional development support were judged to be providing generally low levels of language and literacy instruction quality (Justice, Mashburn, Hamre, & Pianta, 2008). Given the design of the REDI program, it is not possible to determine what the effects might have been without the mentoring component. However, the assumption underlying program design was that the provision of support from master teachers was a critical, inextricably linked and mutually supportive facet determining program impact on student gains. Future research that compares the use of a curriculum alone and in conjunction with mentoring might clarify the specific active features of these two components, and the “value added” in their combination.

Conversely, it is unknown what the impact of the professional development activities used in REDI might have been, if they were used without accompanying curriculum components. Raver and colleagues (2008) achieved meaningful gains in classroom emotional climates and behavior management through sustained professional development without structured curriculum lessons. Similar to the REDI program, the professional development activities in that study included formal workshops, and a mentoring relationship, in which a coach spent time in the classroom with teachers and held individual meetings with them to discuss specific teaching strategies. A dismantling research design would be necessary to determine the extent to which, and domains in which, the combination of curriculum-based lessons and mentored professional development activities have value over the use of either one of those strategies alone. This is an important area for future research.

Mentoring as a Professional Development Strategy

Although mentoring is emerging as a promising method of delivering professional development support to preschool teachers, there is very little theory regarding the process features that make it effective. What does exist is primarily in reference to the training of new teachers in educational settings (Hawkey, 1997). The use of mentoring as a training

technique is based on the assumption that individuals with greater knowledge and experience are a resource to those with less knowledge and experience. However, more research is needed to better understand the characteristics of individuals that make them effective mentors, the relationships between participating members, and the consultation meetings that are associated with the optimal gains in teaching quality.

It appears likely that the interpersonal skills of the mentor and the quality of the mentor-mentee relationship are important elements of effective mentoring programs. For example, Brooks (1996) asked 150 educational mentors what they felt was the most important skill or quality needed to be an effective mentor and the majority cited interpersonal skills. Research from the clinical treatment literature suggests that the quality of the therapist-client relationship, often referred to as the “therapeutic alliance,” is an essential element through which the process of change occurs (Martin, Garske, & Davis, 2000). In addition to the affective bond, it may be the degree of collaboration or goal alignment between the mentor and mentee that facilitates the process of learning and teacher behavior change.

In addition, the structure of mentor-mentee meetings and the specific activities used to promote the transfer of knowledge may play a central role in determining mentoring effects on teaching quality. The REDI mentoring model was based upon three best practice features identified in the research regarding knowledge transfer and effective professional development. Specifically, one feature of effective professional development is that the performance outcomes that represent goals of the training are specific, well-defined, and measured during the process of the intervention (Gusky, 2003). This assures that mentors and mentees have a shared vision of their time use and are focused on attaining the same goals. In the REDI program, each mentoring session began with a review of the lessons and teaching strategies that teachers had used during the prior week, encouraging self-reflection by the teacher and offering an opportunity for performance feedback by the mentor. Each session ended with a plan including target goals for the coming week. A second characteristic of effective professional development is that teachers are provided with opportunities for practice in naturalistic settings with feedback (Noell & Witt, 1999). Indeed, prior research examining effective school-based consultation suggests that providing information about effective behavior management strategies does little to improve teacher practice, unless the consultant also provides individual performance feedback to guide teacher skill development (Leach & Conto, 1999; Noell & Witt, 1999). In the REDI program, the mentor spent 2-3 hours per week in each classroom, observing and modeling the targeted teaching strategies. The mentor also completed ratings regularly to track the progress of each teacher in their acquisition of targeted teaching strategies. Hence, the mentors had a high level of knowledge regarding the teacher's strengths and areas for development, as well as a good understanding of each classroom's challenges and dynamics. The mentor was thus in a good position to provide feedback and suggestions, and to encourage and support the teacher in her attempts to use the teaching strategies. Finally, a third principle underlying effective professional development is that teachers should be provided with adequate time to reflect, self-evaluate, and set personal goals, in order to increase their motivation for intentional improvements in their teaching quality (Bowman et al., 2001). The REDI intervention encouraged self-reflection by asking teachers to complete a weekly review sheet in which they described their implementation of curriculum

components and teaching strategies and discussed the impact on children's learning engagement and skill acquisition. In another research program, Pianta and colleagues have videotaped teachers conducting lessons and have used these videotapes as a platform for encouraging teacher self-reflection and providing performance feedback (Pianta, 2007).

In general, research is just emerging to characterize effective mentoring practices. Given the apparent potential of this technique to improve teaching quality, it represents an important direction for further research efforts.

Parallel Gains for Lead Teachers and Assistant Teachers

Most existing studies designed to foster teaching quality focus on lead teachers, but assistant teachers are physically present for nearly same amount of time and so have the potential to contribute to classroom teaching quality and thus to child outcomes. The lack of baseline differences between lead teachers and assistant teachers in the present study is consistent with accumulating evidence that teacher education and credentials are only weakly associated with variations in preschool teaching quality (Early, Bryant, Pianta, Clifford, Burchinal, Ritchie, et al., 2006). Wasik and colleagues (2006) extended those results to an experimental context by demonstrating that efforts to enhance teachers' language use in the classroom were equally effective across levels of teacher education. Our results replicate those findings with respect to language use and further extend them to the domain of emotional-behavioral support: REDI intervention effects were as large for assistant teachers as they were for more highly educated lead teachers. Clearly there are constraints on job expectations for assistant teachers based on pay and responsibility differentials, but these results underscore the importance of including assistant teachers in discussions about professional development in Head Start settings.

Limitations

It is important to note several limitations of the present study. First, this study had modest statistical power to detect educationally meaningful effects, raising the risk of Type II errors. This is a common challenge in studies where classrooms are the appropriate level of analysis. In our case, using Cohen's (1988) general guidelines for characterizing the strength of effect sizes (i.e., .20 = small, .50 = medium, .80 = large), effects that were medium to large in magnitude ($.62 < d < .97$) were identified as statistically reliable, but medium-sized effects ($.39 < d < .54$) were often just above conventional significance levels. For this reason, we described non-significant trends as well as statistically significant findings in the results section. However, clearly the non-significant trends must be interpreted with caution, as they may not be reliable and the additional tests raise risks for Type I error. Experimental studies to enhance teaching quality are rare (Pianta et al., 2006), but our findings are very similar to those reported by Raver and colleagues (2008), who reported effect sizes ranging from $d = .53$ to $d = .89$ for four items from the CLASS (positive climate, teacher sensitivity, negative climate, behavior management). Statistical power was especially limited in tests for interaction effects, suggesting caution in interpreting the absence of differences between lead and assistant teachers in intervention effects.

Second, although we collected pre-intervention observations in the Spring preceding the intervention year in order to have a baseline measure prior to initiating the intervention, teacher turnover and reassignment resulted in pre-intervention observations being available for only 68% of the teachers. We used these data to establish the success of the randomization process but conducted outcome analyses using only post-test scores. This preserved statistical power and the rigor of the experimental design that supports our inference that end-of-year differences were the result of the REDI program, but it likely reduced the precision of our estimates of change and precluded description of the specific trajectories of gains in teaching quality for individual teachers.

Third, given our design, we cannot determine which curriculum components or aspects of the professional development model accounted for particular outcomes. Future studies examining the process of change over time in a way that would clarify the distinct roles of curriculum materials, workshops, and ongoing mentoring would be of great interest.

Fourth, although observers were “blind” to intervention–control status of the classrooms, and did not know the hypotheses under study, research assistants may have observed the presence of intervention materials (e.g., PATHS posters) in some classrooms, as these were not stripped from the classrooms prior to observations. It is unlikely that this exposure was enough to bias observers, but we cannot rule out some possible influence.

Fifth, the extent to which the present findings generalize to Head Start programs in various parts of the country is unknown. The three participating counties represented a cross-section of the rural to urban programs that characterize Head Start in Pennsylvania, which are similar to Head Start classrooms in many parts of the country. At the program level, it is important to note that the REDI intervention was an enhancement program and built upon the comprehensive structure and organized daily routines provided by the base programs. Unfortunately, we did not collect measures of High/Scope or Creative Curriculum implementation fidelity, so are not able to determine how the fidelity of these base curriculums affected or were affected by the REDI intervention. However, the results of this study may not generalize to Head Start programs or other preschool programs that operate without a similar core curriculum.

Sixth, the quantity of mentoring in the present intervention (i.e., a one hour meeting plus three hours of in-class coaching each week) is greater than the amounts that are typically allocated for professional development within “usual practice” Head Start programs. Yet, the amounts are very similar to the levels of mentoring provided by other programs that are showing positive results (Raver et al., 2008) and by successful applicants for federal Early Reading First funds to enhance language and literacy instruction (U.S. Department of Education, 2008). A critical need for the future is to determine the minimum resources that are needed to make substantial improvements in teaching quality, in order to address the gap between levels of mentoring associated with positive effects and resources allocated to support professional development within the current Head Start system.

Summary and Future Directions

The REDI program provides an example of how professional development efforts focused on improving teaching quality may be combined with evidence-based curriculum components in a way that promotes high quality teaching. The findings suggest that, with effective professional development support, Head Start teachers can incorporate some explicit instructional activities targeting emergent literacy and social-emotional skills into their curriculum and, at the same time, improve developmentally-appropriate teaching practices and produce higher-quality teacher-student interactions.

The current report was focused solely on teacher outcomes; the impact of the intervention on child skills is reported elsewhere (Bierman et al., in press). Future analyses will test whether the aspects of teaching quality that were positively impacted by REDI mediated the effects of the intervention on child outcomes. These types of mediation analyses could provide important guidance for program improvements by illuminating the mechanisms through which early education programs impact children. Cross-domain mediation (e.g., gains in emotional climate mediating gains in literacy; improvements in linguistic support mediating behavioral improvement) would provide strong empirical justification for a balanced approach to early childhood education that emphasizes the complementary nature of language and literacy support and social-emotional support.

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Table 1
Teacher, Classroom and Program Characteristics of Intervention and Control Group

	Lead Teachers N (%)		Assistant Teachers N (%)	
	Intervention	**Control**	**Intervention**	**Control**
Female	22 (100%)	22 (100%)	21 (95%)	22 (100%)
Ethnicity				
White	17 (85%)	19 (86%)	20 (91%)	16 (80%)
Black	2 (10%)	2 (9%)	0 (0%)	1 (5%)
Hispanic	0 (0%)	1 (5%)	2 (9%)	1 (5%)
Multi-racial	1 (5%)	0 (0%)	0 (0%)	2 (10%)
Primary language				
English	19 (95%)	22 (100%)	21 (95%)	19 (95%)
Spanish	1 (5%)	0 (0%)	1 (5%)	1 (5%)
Education				
High School	2 (10%)	0 (0%)	10 (45%)	2 (10%)
Some post HS	3 (15%)	0 (0%)	5 (23%)	13 (65%)
Associate degree, vocational certificate	4 (20%)	8 (36%)	6 (27%)	3 (15%)
4-yr degree (or more)	11 (55%)	14 (64%)	1 (5%)	2 (10%)
Certification				
CDA	7 (35%)	9 (35%)	0 (0%)	1 (5%)
Teacher cert. or lic.	8 (40%)	11 (52%)	1 (5%)	0 (0%)
Experience				
0 to 5 years	5 (25%)	6 (27%)	8 (36%)	9 (45%)
6 to 10 years	4 (20%)	6 (27%)	7 (32%)	4 (20%)
11+ years	11 (55%)	10 (45%)	7 (32%)	7 (35%)
Program Setting				
Rural	10 (45%)	10 (45%)		
Urban	12 (55%)	12 (55%)		
Curriculum				
Creative Curriculum	12 (55%)	12 (55%)		
High/Scope	10 (45%)	10 (45%)		

Table 2

Means and Standard Deviations for Measures of Teaching Quality Assessed at the End of the Head Start Year

	Control		Intervention	
	M	**SD**	**M**	**SD**
Emotional Support				
Positive emotional climate (TSRS; 1 to 5)	2.52	1.05	3.18	1.24
Emotion expression	2.68	1.14	3.34	1.38
Emotion regulation	2.41	1.11	3.16	1.18
Emotion modeling	2.50	1.17	3.16	1.43
Emotional support (CLASS; 1 to 7)	5.65	0.81	5.97	0.45
Positive climate	5.32	1.13	5.90	0.67
Teacher sensitivity	4.83	1.21	5.42	0.79
Over-control (reversed)	6.32	0.82	6.61	0.39
Negative climate (reversed)	6.59	0.48	6.66	0.38
Behavior management	5.18	1.02	5.24	0.74
Behavioral Support				
Classroom management (TSRS; 1 to 5)	4.09	0.71	4.32	0.67
Control / Limit-setting	4.09	0.94	4.39	0.75
Preparedness	3.89	0.97	4.25	0.75
Consistent routines	4.23	0.71	4.27	0.73
Positive Discipline (TSRS; 1 to 5)	3.91	0.91	4.39	0.72
Proactive/preventive	3.55	1.04	4.14	0.88
Praise/Reinforcement	3.75	1.14	4.16	0.83
Absence negative	4.52	0.66	4.73	0.59
Instructional Support (CLASS; 1 to 7)	3.76	0.72	4.14	0.68
Productivity	4.97	0.92	5.41	0.85
Quality of feedback	2.68	1.08	3.15	0.99
Concept development	2.42	1.03	2.75	0.67
Instructional learning formats	3.48	0.99	3.81	1.15
Linguistic Support				
Statements (count/min)	5.77	1.78	7.03	1.58

	Control		Intervention	
	M	SD	M	SD
Questions (count/min)	2.98	1.15	3.95	1.20
Directives (count/min)	1.62	0.63	1.75	0.65
Decontextualized (count/min)	0.61	0.64	1.06	0.86
Richness-Sensitivity (1 to 5 rating)	3.07	0.53	3.41	0.44

Table 3
Effects of Head Start REDI on Teaching Quality: Emotional-Behavioral Support

	Intervention Coefficient	Standard Error	p-value	ES (d)
Emotional Support				
Positive emotional climate (TSRS)	1.26	.65	.05	
Emotion expression	1.15	.61	.06	
Emotion regulation	1.47	.81	.07	
Emotion modeling	.96	.58	.10	
Emotional support (CLASS)	.32	.20	.11	.39
Positive climate	.58	.27	.04	.61
Teacher sensitivity	.59	.31	.07	.58
Over-control (reversed)	.30	.20	.14	
Negative climate (reversed)	.07	.13	.60	
Behavior management	.06	.27	.84	
Behavioral Support				
Classroom management (TSRS)	2.43	.80	.002	
Control/limit-setting	1.47	.81	.07	
Preparedness	.84	.64	.19	
Consistent routines	.07	.69	.92	
Positive Discipline (TSRS)	.86	.57	.13	
Proactive/preventive	2.37	.73	.001	
Praise/reinforcement	1.05	.73	.15	
Absence negative	0.66	.49	.18	

Note: Main effects for cohort and setting were also included in these models.

Table 4
Effects of Head Start REDI on Teaching Quality: Cognitive-Linguistic Support

	Intervention Coefficient	Standard Error	p-value	ES (d)
Instructional Support (CLASS)	.38	.21	.08	.45
Productivity	.45	.27	.10	
Quality of feedback	.47	.31	.15	
Concept development	.33	.26	.21	
Instructional learning formats	.33	.33	.32	
Linguistic Support (overall)				
Statements	1.27	.39	.001	.82
Questions	1.02	.29	.000	.89
Directives (log)	.06	.06	.32	
Decontextualized utterances (log)	.24	.08	.005	.68
Richness-Sensitivity (rating)	.30	.10	.004	.67

Note. Scores for directives and decontextualized utterances were log-transformed prior to analysis to reduce skewness. Models included main effects for cohort and setting: rates of statements and questions were lower in Cohort 2.

Table 5

Effects of Head Start REDI on Teaching Quality: Linguistic Support in Three Classroom Settings

	Intervention Coefficient	Standard Error	p-value	ES (d)
Book-Reading				
Statements	1.14	.56	.04	.52
Questions	.99	.41	.02	.61
Directives (log)	.12	.08	.14	
Decontextualized utterances (log)	-.03	.09	.74	
Richness-Sensitivity (rating)	.26	.14	.05	.50
Free Play				
Statements	1.63	.48	.001	.81
Questions	.64	.30	.03	.47
Directives (log)	.04	.08	.66	
Decontextualized utterances (log)	.19	.08	.01	.54
Richness-Sensitivity (rating)	.26	.13	.05	.45
Mealtime				
Statements	1.05	.44	.02	.59
Questions	1.44	.36	.000	.97
Directives (log)	-.02	.08	.78	
Decontextualized utterances (log)	.42	.13	.001	.73
Richness-Sensitivity (rating)	.39	.13	.003	.64

Note. Scores for directives and decontextualized utterances were log-transformed prior to analysis to reduce skewness. All models included main effects for cohort and setting.