



Published in final edited form as:

Early Child Res Q. 2011 September ; 26(7): 442–452. doi:10.1016/j.ecresq.2011.03.003.

Classroom-based Interventions and Teachers' Perceived Job Stressors and Confidence: Evidence from a Randomized Trial in Head Start Settings

Fuhua Zhai,
Stony Brook University

C. Cybele Raver, and
New York University

Christine Li-Grining
Loyola University Chicago

Abstract

Preschool teachers' job stressors have received increasing attention but have been understudied in the literature. We investigated the impacts of a classroom-based intervention, the Chicago School Readiness Project (CSRP), on teachers' perceived job stressors and confidence, as indexed by their perceptions of job control, job resources, job demands, and confidence in behavior management. Using a clustered randomized controlled trial (RCT) design, the CSRP provided multifaceted services to the treatment group, including teacher training and mental health consultation, which were accompanied by stress-reduction services and workshops. Overall, 90 teachers in 35 classrooms at 18 Head Start sites participated in the study. After adjusting for teacher and classroom factors and site fixed effects, we found that the CSRP had significant effects on the improvement of teachers' perceived job control and work-related resources. We also found that the CSRP decreased teachers' confidence in behavior management and had no statistically significant effects on job demands. Overall, we did not find significant moderation effects of teacher race/ethnicity, education, teaching experience, or teacher type. The implications for research and policy are discussed.

Keywords

classroom-based intervention; perceived job stressors; confidence; randomized controlled trial; Head Start

© 2011 Elsevier Inc. All rights reserved.

Contact Information: Fuhua Zhai, Ph.D. (Corresponding Author), Assistant Professor, School of Social Welfare, Stony Brook University, Address: L2-093 Health Sciences Center, Stony Brook, NY 11794, Phone: 631-444-3176, fuhua.zhai@stonybrook.edu.
C. Cybele Raver, Ph.D., Professor, Institute of Human Development and Social Change, Steinhardt School of Culture, Education, and Human Development, New York University, Address: 246 Greene Street, 403W, New York, NY 10003, Phone: 212-998-5519, cybele.raver@nyu.edu
Christine Li-Grining, Ph.D., Assistant Professor, Department of Psychology, Loyola University Chicago, Address: 1032 W. Sheridan Road, Chicago, IL 60660, Phone: 773-508-8225, cligrining@luc.edu

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Job stressors generally refer to the work-related environmental conditions that have potential impacts on individuals' psychological, social, and physiological well-being (Curbow, Spratt, Ungaretti, McDonnell, & Breckler, 2000; Hurrell, Nelson, & Simmons, 1998). Recently, preschool teachers' job stressors have received increasing attention in research and policy arenas (Lambert & McCarthy, 2006). Facing too many work-related demands with too few resources, preschool teachers often experience emotional exhaustion and depersonalization. As detailed below, prior research has found that teachers' job stressors are associated with many negative consequences for teachers themselves and children in their care. Nevertheless, findings from a number of interventions designed to support teachers' classroom management and the quality of their classrooms have been mixed. Specifically, while some studies find that interventions including teacher training and mental health consultation services can reduce preschool teachers' perceived job stressors, other studies do not find similar evidence of impact (Alkon, Ramler, & MacLennan, 2003; Brennan, Bradley, Allen, & Perry, 2008; Gilliam, 2007; McCarthy, Kissen, Yadley, Wood, & Lambert, 2006).

In this study, we sought to address these questions by investigating the impacts of the Chicago School Readiness Project (CSRP) on teachers' perceived job stressors and confidence. As a randomized classroom-based intervention, the CSRP provided multifaceted services for teachers and classrooms in the treatment group, including teacher training and mental health consultation, accompanied by stress-reduction services and workshops. We first examined the effects of the CSRP intervention on teachers' perceptions of job stressors and confidence, including feelings of job control, job resources, job demands, and confidence in behavior management. We then investigated whether the treatment effects were moderated by teacher race/ethnicity, education, teaching experience, and teacher type.

As detailed below, teachers' perceived job control, resources, and demands, as well as their confidence in managing children's behaviors, are precursors to stress itself (also see Raver, Blair & Li-Grining, in press, for review). When stressed, teachers are more likely to experience negative consequences for themselves (e.g., burnout, absenteeism, and turnover) and for children in their care. A set of multifaceted services, such as those provided by the CSRP intervention, might be particularly effective in addressing these precursors to stress. In particular, teacher trainings in managing children's behavior might help teachers feel more confident and in better control of the classroom. Extensive supportive services provided by mental health consultants who are placed in their classrooms might change teachers' perception of job resources, help them better deal with demands, and give them control and confidence in their jobs. The introduction of stress-reduction techniques, including relaxation and cognitive-behavioral skills, might help teachers change the way they think about job control and demands. The CSRP was designed to include these features of service provision as part of a comprehensive effort to reduce teachers' perceived job stressors and increase their confidence in behavior management.

Preschool Teachers' Perceived Job Stressors and Confidence

Working in the early childhood education system with young children can be stressful. The stresses of such a job may be exacerbated in low-income communities where students face greater cumulative levels of disadvantage and where preschool settings themselves may be less well-resourced (Yoshikawa & Knitzer, 1997). In particular, children in neighborhoods of concentrated economic disadvantage often face higher risk of developing emotional and behavioral difficulties than their more advantaged peers in more affluent communities (Brennan et al., 2008; Fantuzzo et al., 1999; Hamre & Pianta, 2004; Reid, Webster-Stratton, & Baydar, 2004). High levels of family risk and community violence may especially threaten the emotional and behavioral adjustment of young, low-income children, increasing the probability that a teacher in a given classroom may have to cope with one or more

students' high levels of disruptive or challenging behavior (Margolin & Gordis, 2000; Raver et al., 2009). In addition, preschool teachers in the U.S. usually have to work long hours with low pay, little training in effective methods of classroom management, little administrative support, and little respect and appreciation from the public at large (Goelman & Guo, 1998; Kontos & Riessen, 1993; Li-Grining et al., 2010; Raver et al., 2009). As summarized by researchers (Curbow et al., 2000; Gilliam & Shahar, 2006; Hammarberg & Hagekull, 2000, 2002; Scott-Little & Holloway, 1992), some key characteristics of job stressors among preschool teachers include high work-related demands, low control in daily activities and routines, low resources for and rewards from their work, and low confidence in managing children's behavior. Thus, while managing the behavior and emotions of young children is a central (and sometimes frustrating or stress-inducing) task for all preschool teachers, it may be especially so for teachers who serve families in urban, low-income communities.

Prior research has shown that high-level job stressors in general are positively associated with teachers' burnout, absenteeism, and turnover, and negatively related to performance, job satisfaction, personal health, as well as child care quality and the consequences for children in their care (see research and reviews by Alkon et al., 2003; Curbow et al., 2000; Domitrovich, Gest, Gill, Jones, & DeRousie, 2009; Goelman & Guo, 1998; Han & Weiss, 2005; Raver et al., 2009; Talmor, Reiter, & Feigin, 2005). For example, the annual job turnover rate is as high as 31% in the National Child Care Staffing Study (Whitebook, Howes, & Philips, 1998), which is several times higher than that among elementary school teachers (e.g., 8.6% in Ingersoll & Rossi, 1995). Teachers who experience higher levels of stressors and burnout are more likely to engage in harsh interactions with students (Curbow et al., 2000; Hamre & Pianta, 2004). Preschoolers' likelihood of expulsion is also found to be positively associated with teachers' reports of feeling demands in the workplace and negatively related to reports of resources at work (Gilliam & Shahar, 2006). In contrast, research has shown that teachers with higher levels of self-confidence and control in classroom management use more cooperative styles in managing conflict and fewer authoritarian disciplinary strategies with children (Hammarberg & Hagekull, 2002; Morris-Rothschild & Brassard, 2006).

In terms of the impacts of classroom-based interventions, prior studies have shown that teacher training accompanied by mental health consultation and coaching can reduce preschool children's disruptive behaviors and improve teachers' self-efficacy in classroom management, as well as the overall quality of classrooms with high concentrations of low-income children (Brennan et al., 2008; Fukink & Lont, 2007; Han & Weiss, 2005; Klein & Knitzer, 2006; Raver et al., 2008, 2009, 2011; Webster-Stratton, Reid, & Hammond, 2001, 2004; Williford & Shelton, 2008). In particular, Alkon et al. (2003) find that mental health consultation services have significant effects on improving teachers' self-efficacy and confidence in their ability to intervene and to help children with emotional and behavioral difficulties. Limited evidence also shows that teacher training and mental health programs are associated with a reduction in preschool teachers' levels of work-related stressors, including low self-efficacy and confidence, high demands, and lack of control at work (see reviews in Brennan et al., 2008). In contrast, in the only randomized controlled evaluation of the Early Childhood Consultation Partnership (ECCP), a statewide teacher training and mental health consultation program among child care centers in Connecticut, Gilliam (2007) does not find significant effects on teachers' perceived job stressors, measured in terms of job control, job resources, and job demands. This lack of improvement may be due to the relatively short duration of the ECCP services (i.e., a one-time, 90-minute training session and 4-6 hours of consultation per week for eight weeks) (Brennan et al., 2008). Some evidence suggests that a longer duration of consultation significantly predicts higher teacher self-efficacy and confidence and lower burnout (Alkon et al., 2003; Hennigan, Upshur, &

Wenz-Gross, 2004). Furthermore, teachers have been found to benefit more from programs with a fixed curriculum and fewer variations across multiple sites (Fukkink & Lont, 2007). As a statewide program trying to meet the needs of more than 30 behavioral and social-emotional topics, the ECCP intervention opts to offer a menu-driven approach over a more fixed, manualized approach, and does not include components specifically for teacher stress reduction (Gilliam, 2007). Taking these factors together, it may not be surprising that evidence has been mixed when analyzing the impact of these programs on reducing teachers' perceived job stressors.

Given the empirical and theoretical framework of job stressors and confidence among preschool teachers, as reviewed above, in the CSRP intervention we provided comprehensive and multifaceted services for Head Start teachers. In particular, as detailed below, the CSRP provided intensive trainings in behavior management strategies that might help preschool teachers more effectively manage their classrooms. Research in staff development for early childhood educators and classroom-based interventions suggests a complementary theoretical framework: If teachers experience burnout as a result of too many classroom demands with too little administrative support, they may be unlikely to take new, proactive steps to support children's behavioral self-regulation (Brouwers & Tomic, 2000; Helterbran & Fennimore, 2004; Raver et al., 2009; Wasik, Bond, & Hindman, 2006). As children's disruptive behaviors are important sources of teachers' burnout and stress, mentors or coaches may provide emotional support to teachers as they try to implement new strategies to deal with children's behavior problems (Brouwers & Tomic, 2000; Fuchs, Fuchs, & Bishop, 1992; Raver et al., 2008; Woolfolk, Rosoff, & Hoy, 1990). Following this framework, we included mental health consultants (MHCs) in the CSRP intervention. The MHCs took the main responsibility for the other three components (i.e., weekly class visits to coach teachers to implement the new techniques they learned in the training and to provide stress-reduction strategies, on-site stress-reduction workshops, and one-on-one mental health services for children who had high emotional and behavioral problems). With teacher training and MHCs' services, our intent was that teachers might experience lower job stressors and use more effective classroom management strategies over the course of the school year. As a result, they would be better able to help emotionally dysregulated children to develop more effective self-regulatory skills and also to maintain emotionally supportive class environments that were more rewarding to teach and more conducive to learning (Thijs, Koomen, & van der Leij, 2006; Raver et al., 2008; Webster-Stratton et al., 2001).

In summary, most prior interventions provide teacher training and mental health consultation services to improve teachers' behavior management skills and reduce children's behavior difficulties, whereas few have included components to directly focus on teachers' stress reduction (Gilliam & Shahar, 2006). Moreover, although many researchers have suggested that job stressors result from an imbalance between appraised demands and resources, fewer studies have measured job stressors across multiple dimensions and most of them do not reflect the context of preschool environments (Curbow et al., 2000; Lambert & McCarthy, 2006). Further, many interventions are implemented over a short duration, without a manualized curriculum, and may not help consultants build a positive collaborative relationship with preschool teachers, though the quality of those relationships has been identified as one of the most important characteristics of effective programs (Green, Everhart, Gordon, & Gettman, 2006).

In this study, we aimed to examine the effects of the CSRP on teachers' perceived job stressors and confidence. As detailed below, the CSRP provided a year-long intervention for Head Start teachers. Its multifaceted services included not only manualized training accompanied by mental health consultation through the intervention year, but also stress-reduction components for teachers.

We focused on two research questions in this study. Our first question was whether the CSRP intervention significantly reduced teachers' perceived job stressors and increased their confidence by having a significant impact on teachers' perceptions of job control, job resources, job demands, and confidence in behavior management. Based on the prior findings of the CSRP and the limited evidence in the literature (Alkon et al., 2003; Brennan et al., 2008; Fukkink & Lont, 2007; Han & Weiss, 2005; Klein & Knitzer, 2006; Raver et al., 2008, 2009, 2011; Webster-Stratton et al., 2001; Williford & Shelton, 2008), we hypothesized that teachers in the treatment group of the CSRP would feel more job control, lower job demands, and more confidence in behavior management as compared to their control group-assigned counterparts. Given our provision of MHCs' support throughout the intervention year, we also expected that the CSRP intervention would significantly increase teachers' perceptions of job resources.

Our second research question was whether the treatment effects, if any, were moderated by teacher race/ethnicity, education, teaching experience, and teacher type (i.e., head teachers versus assistant teachers). To the extent that Latina teachers may face additional stressors related to language barriers, immigration, or acculturation, treatment impacts may have varied as a function of teacher race/ethnicity (Flores et al., 2002). Teachers' formal education and work experience have been found to be positively associated with their perceived control in handling children's behavior problems as well as care quality and child outcomes, and negatively with teachers' stress, burnout, and depression (Domitrovich et al., 2009; Fukkink & Lont, 2007; Goelman & Guo, 1998; Hammarberg & Hagekull, 2000; Hamre & Pianta, 2004). Therefore, teachers' education and teaching experience may moderate the treatment effects on their perceived job stressors and confidence. Similarly, the intervention may also have different impacts on teachers by teacher type (i.e., head teachers versus assistant teachers). Thus, tests of moderation allowed us to examine whether the CSRP intervention's benefits could be characterized as similar across all teachers in our sample.

Method

As a way to support low-income, ethnic minority children's development of self-regulation and opportunities for learning, the CSRP provided a multifaceted classroom-based intervention to help preschool teachers reduce work-related stress and improve their competence in providing positive emotional support and effective classroom management strategies (Raver et al., 2009). Overall, two cohorts of Head Start children and teachers in seven of the economically disadvantaged neighborhoods of Chicago participated in the CSRP intervention, with Cohort One participating from fall to spring in 2004–05 and Cohort Two from fall to spring in 2005–06.

Procedure and Participants

Using a clustered randomized controlled trial (RCT) design and a pairwise matching procedure (Bloom, 2005), we first identified nine pairs of matched Head Start sites based on a range of demographic characteristics that were collected by each site and reported annually to the federal government. There were 14 site-level demographic characteristics, including teachers' average annual salary; the number of children ages 3-5, teaching staff, and family support worker on staff; and the percentages of African American children, slots subsidized by child care subsidy, teachers with bachelor's degrees, teaching assistants with any college education, single-parent families, families with at least one parent employed, and families receiving any mental health consultation services or referrals. These demographics reflected program capacity and quality and might also affect the implementation and impacts of the CSRP intervention. Methods employing sum of squared distances and sum of absolute distances were used to estimate the best matches for pairs of sites across the 14 variables.

One site in each matched pair was then randomly assigned to the treatment group and the other to the control group. Two classrooms from each site were randomly selected for participation. After randomization, one classroom left the study due to Head Start funding cuts. As a result, a total of 35 classrooms (i.e., 18 in the treatment group and 17 in the control group) at 18 Head Start sites participated in the CSRP.

Overall, 90 teachers (after the exit of four teachers who either moved or quit during the school year) and 602 children participated in the CSRP. Children, on average, were four years old in the fall of the Head Start year and about half were boys. Approximately 66% of participating children were non-Hispanic black, 26% were Hispanic, and 8% were members of other racial or ethnic groups. Teachers, on average, were 40 years old and almost all (97%) were female. Approximately 71% of teachers were African American, 20% were Hispanic, and 9% were non-Hispanic white. Teachers who were immigrants from other countries accounted for 16% of the full sample. Head teachers accounted for 34% of the sample while most of the others were assistant teachers (only four classrooms had team teachers). Approximately 27% of the teachers had bachelor's degrees or higher and 30% of them had three years or less of preschool teaching experience. More than one third (i.e., 37%) of the teachers were married at baseline. Almost half of them (i.e., 45%) were living with four or more people and the majority of them (i.e., 64%) were the primary income earners of their households.

Intervention Services

The CSRP intervention was comprised of four specific components of services for teachers and classrooms in the treatment group. The first component was teacher training on behavior management strategies. Throughout the fall to winter in the Head Start year, teachers in the treatment group were invited to participate in 30 hours of workshop-style training sessions (across five Saturdays from October to January). Led by a licensed clinical social worker and experienced trainer, these training sessions were designed to apply behavior management strategies, adapted from the evidence-based Incredible Years Teacher Training Program (Webster-Stratton et al., 2004), to reduce children's challenging behaviors. The incentives provided for teachers to participate in the training sessions included a compensative payment at a rate of \$15 per hour, catered lunches, and on-site child care.

The second component of the CSRP intervention was to provide mental health consultation to classrooms. During the first ten weeks (or the first third) of the intervention, clinically trained mental health consultants (MHCs) attended classes weekly to coach teachers to implement the behavior management strategies and support the use of specific techniques to promote children's positive emotion and behavioral development. The MHCs held master's degrees in social work and had experience working in early childhood settings and with families facing multiple poverty-related risks. They participated in the teacher training sessions and received biweekly clinical supervision from a licensed clinical social worker with a master's degree. During class visits, MHCs also provided ongoing stress management consultation to help teachers deal with work-related stress. When performing coaching functions, MHCs observed, assessed, and challenged individual teachers' routines and stress coping mechanisms. They provided stress-reduction strategies tailored to teachers' individual needs, including locus of control, relaxation techniques, and cognitive-behavioral skills (Bond & Bruce, 2000; Daniels & Guppy, 1994; van der Klink, Blonk, Schene, & van Dijk, 2001). Some of the strategies included encouraging teachers who rarely left the classroom to use their allotted breaks; changing the daily routines that made them feel particularly stressed out, hassled, fatigued, or helpless; providing teachers with feedback that could increase their feeling of control over the behavior of children; being an active listener and helping teachers problem-solve staff or parent issues; and using cognitive-behavioral

strategies to help teachers identify and replace negative patterns of thinking about job control and demands with positive statements.

The third component was the stress-reduction workshops provided by MHCs. In the second ten weeks of the intervention, MHCs held a one-day stress-reduction workshop for each Head Start site. The workshops reviewed the features, common sources, and symptoms of preschool teachers' stress and focused on the feasible solutions for stress reduction. With the introduction of the evidence-based stress-reduction strategies, as detailed above, teachers discussed the practical solutions and coping strategies that they could implement in daily routines. Teachers were also asked to examine their routine methods of eating, sleeping, and resting, and to explore ways of improvement in these areas. Preschool-specific solutions were explored as teachers discussed the implications of utilizing breaks and vacations, rearranging work schedules, and depending upon co-workers as methods to combat stress. Through the discussion and implementation of stress-reduction strategies, MHCs helped teachers relieve work-related stress, reduce burnout, and strengthen their ability and confidence in managing children's disruptive behaviors and meeting children's needs.

The last component of the CSR intervention was one-on-one mental health consultation services for individual children. In the first six months of the intervention, MHCs identified 3-4 children per class based on clinical judgment, consultation with teachers, and review of teacher-reported measures of children's behavioral problems in the fall of the Head Start year. During the last ten weeks of the intervention, children in the treatment group who had high emotional and behavioral problems, as identified by the teachers and MHCs, received individual mental health consultation services. MHCs provided targeted, direct intervention services (including individual and group therapies) to these children based on the extensive practice and research of the Positive Behavioral Support (PBS) approach (Sugai et al., 2000). This holistic approach valued a "person-centered" perspective and brought together a team, including MHCs, teachers, and parents, that was committed to the healthy development of the children of concern. The intervention process included functional behavioral assessment, hypothesis development, development of an intervention plan, and monitoring of the plan's effectiveness. MHCs recorded the primary clinical concerns addressed during the one-on-one sessions and the number of school visits spent working with individual children.

In terms of implementation fidelity of the CSR intervention, nearly all teachers in the treatment group attended the training sessions, with an average of three of the five sessions (i.e., 18 hours, with a standard deviation of 9 hours), and the one-day on-site stress-reduction workshops. During classroom visits, MHCs also provided a follow-up review of the training topics for all treatment-assigned teachers, including those who might have missed an earlier training session. MHCs completed, on average, 29 classroom visits to their assigned classrooms (i.e., 128 hours, with a standard deviation of 18 hours) and the services were delivered fairly consistently across sites. MHCs' weekly reports showed that they coached teachers in the use of behavior management and stress-reduction strategies in every classroom throughout the intervention year. In addition, the review of MHCs' monthly logs showed that, overall, 137 children received individual mental health consultation services, with an average of 5.49 visits per child.

To ensure that the child-staff ratio was similar across treatment and control classrooms, teachers in the control group were provided staffing support by a teacher's aide who was at the associate's degree level, but only offered an extra pair of hands and eyes during everyday classroom activities, for the same amount of time per week as the MHCs in the treatment group.

Measures: Perceived Job Stressors and Confidence

Teachers' perceived job stressors and confidence were measured both before and after the CSRPs intervention by a teacher self-reported instrument consisting of four subscales. Most of the items were based on the Child Care Worker Job Stress Inventory (CCW-JSI), a self-report measure designed to capture the job stressors experienced by child care providers in family day care homes and child care centers (Curbow et al., 2000). Using a 5-point Likert scale ranging from 1 (rarely/never) to 5 (most of the time), the CCW-JSI measures perceived job stressors in three dimensions based on quantitative and qualitative research, including job control, job resources, and job demands. Prior research has shown that teachers' experiences of high job demands, low job resources, and lack of job control are associated with their feelings of burnout and exhaustion (Curbow et al., 2000; Hakanen, Bakker, & Schaufeli, 2006; Li-Grining et al., 2010). Given this study's focus on supporting teachers' classroom practices and the risks of high burden that might come with participating in a classroom-based intervention, we adopted shortened versions of child- and teacher-specific measures, including a shorter version of the CCW-JSI scale. Specifically, the job control subscale ($\alpha = .56$) measured teachers' feelings of control over things that happened at or around work, based on five items (e.g., control in daily activities, getting children to do what you want, and taking time for yourself during the workday). The job resources subscale ($\alpha = .62$), which measured teachers' positive feelings or satisfaction about their work, was aggregated from four items (e.g., children are happy with me, I am appreciated by parents, and I feel respected for the work that I do). The job demands subscale ($\alpha = .67$) measured teachers' feelings of stressful work situations, demands, or responsibilities in their work, based on six items (e.g., children with behavior problems are hard to deal with, I have to work long hours, and all children need attention at the same time). Higher scores on these subscales indicate that teachers felt more control in their daily activities and routines, greater resources at their work, and more work-related demands.

In addition, teachers in the CSRPs were also asked to report on their confidence in managing children's behavior on a 5-point Likert scale ranging from 1 (disagree) to 5 (agree). Based on prior research (Hammarberg & Hagekull, 2002; Scott-Little & Holloway, 1992), the CSRPs adopted the confidence subscale to measure teachers' beliefs regarding the causes of children's behavior as well as their confidence in handling misbehavior. The confidence subscale ($\alpha = .67$) included five reversely coded items (e.g., I often feel I do not have control over classroom, some children do things that I do not know how to handle, and sometimes I feel hopeless about certain children in the group). Higher scores on this subscale indicate that teachers felt more confident in managing children's behavior.

The low reliability of the subscales of teachers' perceived job stressors and confidence in our study was likely due to the substantially shortened version of CCW-JSI adopted here (i.e., 17 items for each subscale in the original CCW-JSI). An overall composite of all items for these subscales ($\alpha = .59$), or the composites of any of the subscales, did not result in higher reliability. A factor analysis indicated that only one predominant factor emerged among the items for each subscale (i.e., with Eigen-value of 1.73 for job control, 40% of the variance explained; Eigen-value of 1.97 for job resources, 51% of the variance explained; Eigen-value of 2.29 for job demands, 39% of the variance explained; and Eigen-value of 1.94 for confidence, 38% of the variance explained), while a second factor would be substantively weak (i.e., with Eigen-values close to or below one). Although a Cronbach's alpha of .70 has been widely accepted for adequate internal consistency, a value of .60 has also been considered acceptable (Hair, Anderson, Tatham, & Black, 1998; Ham, Kim, & Jeong, 2005; Ransford, Greenberge, Domitrovich, Small, & Jacobson, 2009). As discussed below, the subscales with low reliability should be interpreted cautiously.

Measures: Baseline Covariates

In the analyses, the pairwise-matched Head Start sites were included with fixed effects, as detailed below. Meanwhile, we also included teacher and classroom characteristics at baseline (i.e., fall of Head Start) to account for the heterogeneity across intervention settings and in teachers' needs and backgrounds that may have impacts on outcome variables (Downer, Locasale-Crouch, Hamre, & Pianta, 2009; Sheridan, Edwards, Marvin, & Knoche, 2009). For example, as discussed above, teachers' formal education and work experience are positively associated with their perceived control in handling children's behavior problems and negatively with teachers' stress (Domitrovich et al., 2009; Fukkink & Lont, 2007; Goelman & Guo, 1998; Hammarberg & Hagekull, 2000; Hamre & Pianta, 2004). Limited income, single parenthood, or supporting a large family may be sources of stress for teachers as well (Campbell, Shaw, & Gilliom, 2000; Li-Grining et al., 2010). Some evidence also suggests that teachers' age is negatively associated with job stress (Kontos & Riessen, 1993). In our study, teacher demographic and background data were collected through a questionnaire derived from the Cornell Early Social Development Study (Raver, 2003). Specifically, teacher demographics included age, race/ethnicity (i.e., African American or not), and immigration (i.e., immigrant or born in the U.S.). Teachers' professional characteristics included teacher type (i.e., head teacher versus assistant or team teacher), education (i.e., having a bachelor's degree or higher), and preschool teaching experience (i.e., three years or less). Information on teachers' family background included marital status (i.e., married or not), family structure (i.e., living with four or more people), and household income sources (i.e., being the primary income earner or not).

Similarly, classroom characteristics may also play a key role in predicting teachers' perceived job stressors and confidence. For example, some studies found that larger class sizes and greater child-to-adult ratios are related to teachers' reports of lower levels of job control and more job demands, as well as children's elevated behavior problems and higher likelihood of expulsion (Gilliam & Shahar, 2006; Hammarberg & Hagekull, 2002). Teachers' perceived control in the classroom is negatively related to the proportions of boys and children rated with behavior problems (Hammarberg & Hagekull, 2002). In our analyses, classroom covariates included the quality, emotional climate, size, and staffing of the classrooms, as well as the aggregated measures of the characteristics of children in the classrooms.

Classroom quality was assessed using the Classroom Assessment Scoring System (CLASS; La Paro, Pianta, & Stuhlman, 2004). Using a 7-point Likert scale, the CLASS is a widely used research tool designed to measure classroom emotional climate and teacher behavior management skills. A team of trained observers conducted the CLASS assessment. These observers, which included six African Americans and six Caucasians or Asians, were graduate students or full-time research staff who had at least a bachelor's degree and were blind to the randomization of the intervention. To gauge inter-rater reliability, three-quarters of the observations were double-coded "live" onsite by two observers. We used two subscales of the CLASS collected at baseline (i.e., September of Head Start year), including positive emotional climate and teacher behavior management skills. The inter-rater reliability, as measured by intra-class correlation values (α), indicated adequate to high levels of inter-observer agreement (i.e., $\alpha = .82$ for positive climate; $\alpha = .66$ for behavior management). In addition, the number of children and adults observed in the classrooms were also included to control for the potential confounding impacts of differences in class size or staffing ratios.

Many preventive interventions targeting low-income children have demonstrated the importance of disaggregating the potential confounds of child and family demographic characteristics (see for example, Aber, Brown, & Jones, 2003; Schaeffer et al., 2006; Tolan,

Gorman-Smith, & Henry, 2004). As detailed above, many characteristics of children in classrooms are also likely to have important influences on teachers' perceived job stressors and confidence. Therefore, we also included the aggregated measures of the characteristics of children in the classrooms that the teachers were teaching. One of these measures was the average behavior problems of children, as measured by the teacher-reported Behavior Problems Index (BPI), which was adapted from a 28-item rating scale originally designed for parental reports of children's behavior problems (Zill, 1990) ($\alpha = .80$ for Internalizing and $\alpha = .92$ for Externalizing Behavior Problems). Consistent with the literature, as reviewed above, we also included in our models the percentages of boys and African American children, as well as the average poverty-related risks of children in the classrooms. Poverty-related risk was indexed by three indicators collected through parent interviews, including mother's education being less than a high-school diploma, families' income-to-needs ratio at less than half the federal poverty threshold, and mothers working ten hours or less per week. Previous analyses with large, nationally-representative datasets have suggested that these factors represent the most reduced and informative set of indicators for families' exposure to "deep poverty" (Raver, Garner, & Smith-Donald, 2007).

A small number of the 90 teachers who participated in the CSRPA had missing values on outcome measures and covariates. Although not completely overlapping, about 11% of teachers had missing data on age, living with four or more people, and pretreatment scores in job stressors; 8% on immigration and marital status, and primary income earner; and 7% on education and preschool teaching experience. Approximately 8% of teachers also had missing data on the outcome measures in the spring of Head Start year. Separate complete case analyses for individual outcome variables would result in different samples and thus would hinder comparisons across analyses and be particularly problematic for studying trends over time (Hill, Waldfogel, & Brooks-Gunn, 2002). Furthermore, complete case analyses on all valid outcome measures and covariates would reduce the sample to 61 teachers, a reduction of one third of the original sample ($n = 90$). Given that our sample was already relatively small, such a substantial reduction in sample size would further limit the statistical power of the analyses and introduce potential biases (Hill, Reiter, & Zanutto, 2004; Little & Rubin, 1987). Meanwhile, the method of mean-replacement and dummy variable adjustment for missing data, advocated by Cohen and Cohen (1983), has been shown to produce biased estimates (Allison, 2001; Jones, 1996).

To address the issue of missing data, we adopted a multiple imputation method. Multiple imputation uses multiple predictions for each missing value of variables based on other observed variables and the assumption that data are missing at random (Hill et al., 2004; Little & Rubin, 1987; Rubin, 1987, 1996; Schafer, 1997; van Buuren Boshuizen and Knook 1999). Two-tailed t-statistics did not show significant differences in non-missing data between teachers who had missing values on demographics and family background variables and those who had valid data on these variables. However, it is possible that the missing data depended on some unobserved variables or the unseen observations themselves since whether or not the data are missing at random can never be thoroughly tested. We included Head Start site fixed effects in multiple imputation to control for the heterogeneity across Head Start programs. A bootstrap method was also adopted, since it has the advantage of robustness, as it estimates regression coefficients in a bootstrap sample of the non-missing observations (van Buuren et al., 1999). We generated five sets of imputations for missing data and performed HLM analyses within each dataset separately (Hill et al., 2004; Little & Rubin, 1987; Rubin, 1987; Schafer, 1997). As detailed above, approximately 7% to 11% of teachers had missing data on one or more variables. The expected relative efficiency for recovering missing values from five imputed datasets ranged from 98.9% to 99.3% (Rubin, 1987). The final estimates were obtained using Rubin's (1987) combining rules for multiple imputation, using the average coefficients of the five imputed datasets as the final estimates

and the standard errors from the square root of average sampling variances plus the variance of coefficients.

Analytic Strategy

Our goal in this study was to provide intention-to-treat (ITT) estimates for the treatment effects of the CSRP intervention on teachers' perceived job stressors and confidence. As a conventional and rigorous test of program effects, an ITT analysis compares the average outcomes of the treatment group to those of the control group regardless of whether or not participants actually comply, or the extent to which they comply, with assigned treatment or control conditions (Angrist, 2006; Gibson, 2003; Peck, 2003; Zhai et al., 2010). Therefore, an ITT analysis provides the estimates of program effects on the population for whom the interventions are intended and thus has important policy relevance (Peck, 2003; Webster-Stratton et al., 2001).

Since the CSRP employed a clustered RCT design in which participants were matched and randomly assigned to treatment or control groups at the Head Start site level, teacher- and classroom-level factors were independent of treatment assignments. Post hoc bivariate tests and logistic regressions did not find statistically significant differences between treatment and control groups in the 14 site-level demographic characteristics that were used for pairwise matching. To this extent, the randomization at the clustered Head Start site level was successful. Nevertheless, as detailed below and presented in Table 1, further analyses found that the distribution of some teacher and classroom characteristics at baseline was not well balanced across treatment and control groups, which may have resulted from the relatively small sample size and the clustered design nature of the CSRP (see Guo & Fraser, 2009, and Puma et al., 2005, for discussion of similar challenges faced by other small and large multi-site cluster-RCT interventions).

To take into account the heterogeneity in teacher and classroom factors, the approach of regression adjustment has been increasingly used to estimate treatment effects in randomized experiments and various matching methods (Gibson, 2003; Hill et al., 2002; Hill, Brooks-Gunn, & Waldfogel, 2003; Pianta, Mashburn, Downer, Hamre, & Justice, 2008; Puma et al., 2005; Rubin & Thomas, 2000). By including covariates in the conditional models after matching or randomized assignment, one can reduce the uncertainty in outcomes and adjust for the remaining differences in the covariates. As a result, this model specification reduces potential bias and increases the chance of detecting statistically significant treatment effects.

Therefore, to estimate the effects of CSRP treatment, we adopted regression-adjusted, or conditional, models to include teacher characteristics, classroom contextual factors, and Head Start site-pair fixed effects in the analyses. In doing so, we used three-level hierarchical linear modeling (HLM) to account for the hierarchical structure of the CSRP data in which teachers were nested within classrooms that in turn were nested in Head Start sites. In general, HLM allows for the simultaneous estimation of variance associated with individual (within-subjects) and population (between-subjects) change based on the specification of fixed- and random-effect variables in the models (Raudenbush & Bryk, 2002).

Specifically, to estimate the effects of the CSRP intervention on teachers' perceived job stressors and confidence, we included teacher characteristics and pretreatment scores in job stressors in the fall of the Head Start year at Level 1, classroom characteristics at Level 2, and treatment assignment and Head Start site-pair fixed effects at Level 3. Following the notations in Raudenbush and Bryk (2002), the model of Level 1 is specified in Equation (1):

$$Y_{ijk} = \pi_{0jk} + \sum \pi_{mjk} X_{mijk} + e_{ijk} \quad (1)$$

where Y_{ijk} is the outcome of perceived job stressors and confidence of teacher i in classroom j within Head Start site k after the CSRP intervention; π_{0jk} is the intercept for classroom j in site k ; $\sum \pi_{mjk} X_{mijk}$ represents the sum of m teacher-level covariates. e_{ijk} is a Level-1 random effect that represents the deviation of teacher ijk 's scores of perceived job stressors and confidence from the predicted scores based on the teacher-level model.

The Level-2 model is specified in Equation (2):

$$\pi_{mjk} = \beta_{m0k} + \sum \beta_{mnk} C_{njm} + r_{mjk} \quad (2)$$

where π_{mjk} represents the corresponding Level-1 coefficients that indicate the direction and strength of association between each teacher covariate and the outcomes of perceived job stressors and confidence in classroom jk ; β_{m0k} is the intercept for site k in modeling the classroom effect π_{mjk} ; $\sum \beta_{mnk} C_{njm}$ is the sum of n classroom-level covariates used to predict the classroom effect π_{mjk} . r_{mjk} is a Level-2 random effect that represents the deviation of classroom jk 's Level-1 coefficient, π_{mjk} , from its predicted value based on the Level-2 model.

Equation (3) shows the model specification at Level 3:

$$\beta_{mnk} = \gamma_{mn0} + \gamma_{001} T_k + \sum \gamma_{mnp} S_{pk} + u_{mnk} \quad (3)$$

where β_{mnk} represents the corresponding coefficients that represent the direction and strength of association between classroom characteristics and π_{mjk} ; γ_{mn0} is the intercept term in the site-level model for β_{mnk} ; γ_{001} represents the average difference between the treatment and control sites, which is also the estimate of CSRP treatment effect; T_k is treatment assignment (i.e., 1 = treatment group and 0 = control group); $\sum \gamma_{mnp} S_{pk}$ represents the sum of p site-pair dummy variables, which means that we included paired sites' fixed effects since Head Start sites initially were paired in the research design using a pairwise matching procedure. u_{mnk} is a Level-3 random effect that represents the deviation of site k 's coefficient, β_{mnk} , from its predicted value based on the site-level model.

Results

Descriptive Statistics

Table 1 shows the descriptive statistics of teacher and classroom characteristics at baseline (i.e., fall of Head Start) in the full sample as well as in the treatment and control groups, respectively. We conducted two-tailed t-tests to examine the balance of covariates across treatment and control groups. Given the relatively small sample size in the CSRP, we reported the results from the t-tests and the HLM analyses below that were marginally significant at $p < .10$, as well as conventionally statistically significant at $p < .05$ and $p < .01$.

As shown in Table 1, overall, the distribution of most covariates at baseline was balanced across treatment and control groups. Nevertheless, differences in some covariates between the treatment and control groups at teacher and classroom levels did exist. For example, teachers in the treatment group were more likely to be immigrants (i.e., 23%) than teachers in the control group (i.e., 8%). Compared to teachers in the control group, teachers in the

treatment group also tended to have higher pretreatment scores in job resources and demands, and lower scores in confidence. In addition, the classrooms in the treatment group tended to have lower scores in positive climate and teacher behavior management skills, and have more boys than classrooms in the control group.

In addition, the intra-class correlations (ICCs) from unconditional three-level models (Guo, 2005; Hedges & Hedberg, 2007) showed that the majority of variance in the outcomes was attributable to Level-1 (i.e., teachers) heterogeneity (i.e., from 84% in job control to 94% in job resources). On average 6% of the variance in the outcomes was explained at Level 2 (i.e., classrooms) and 4% was accounted for at Level 3 (i.e., Head Start sites).

Effects of CSRP on Job Stressors and Confidence

We first conducted a formal ITT test using three-level HLM models with only treatment assignment at Level 3 and excluding all other covariates. The results showed significant treatment effects only on teachers' confidence in behavior management ($B = -.51$, $SE = 0.18$, $p = .011$), but not on teachers' perceived job control ($B = .04$, $SE = .15$, $p = .812$), job reward ($B = .02$, $SE = .17$, $p = .914$), or job demands ($B = .14$, $SE = .16$, $p = .408$). As discussed above, the significant treatment effects on teachers' confidence and the non-significant findings on the other three outcome variables may be spurious because the unbalanced teacher and classroom factors across treatment groups were not taken into account in the models.

To refine estimates of the CSRP intervention effects, we further conducted HLM models controlling for all the covariates. Table 2 presents the results combining the estimates from the five datasets generated by multiple imputation ($n = 90$). These estimates were consistent with those using the non-imputed original complete data ($n = 61$), except that, due to the increases in sample size and available information, the imputed estimates were slightly larger in magnitude and more statistically significant for job control, job rewards, and lack of confidence, whereas the estimates for job demands remained statistically non-significant. The results were also robust across the five datasets from multiple imputation.

The results in Table 2, overall, show that the CSRP treatment had statistically significant effects on teachers' ratings of their job control, job resources, and confidence in behavior management, and no statistically significant effects on teachers' ratings of their job demands. The effect size (d) was also calculated by dividing the coefficient (B) by the pooled standard deviation of the measure from the imputed datasets. Specifically, compared to teachers in the control group, teachers in the treatment group tended to report higher job control ($B = .51$, $SE = .15$, $p = .001$, $d = .74$), better job resources ($B = .42$, $SE = .17$, $p = .013$, $d = .53$), and lower confidence ($B = -.38$, $SE = .16$, $p = .022$, $d = -.51$). In contrast, the findings on teachers' scores in job demands ($B = -.13$, $SE = .18$, $p = .475$, $d = -.18$) were not statistically significant. According to Cohen (1988), the sizes of the significant treatment effects (i.e., on job control, job resources, and confidence) were moderate (i.e., between .50 and .80). These findings suggest that the CSRP intervention helped the preschool teachers improve their feelings of job control and job resources, but also made them feel less confident in their behavior management.

The Roles of Potential Moderators

To further examine the roles of some potential moderators, including teacher race/ethnicity, education, teaching experience, and teacher type (i.e., head teachers versus assistant teachers), we included the interaction terms between treatment and these potential moderators in the models and added them separately to the models. Overall we did not find

significant moderation effects of these potential moderators since none of the interaction terms were statistically significant at $p < .05$.

Discussion

In this study, we investigated the effects of the CSRP intervention on teachers' perceived job stressors and confidence. After taking into account the potential roles of teacher and contextual factors, we found that the CSRP yielded significant benefits for treatment-assigned teachers, improving their feelings of job control and work-related resources, on average. Surprisingly, the CSRP also led to decreases in treatment group-assigned teachers' confidence in behavior management. In addition, the intervention had no significant effects on teachers' perceptions of job demands. Overall, we did not find significant moderation effects of teacher race/ethnicity, education, teaching experience, or teacher type, which may be due to the heterogeneity of the sample and the small sample size in our study.

Our findings regarding CSRP's improvement of teachers' perceived job control and job resources are consistent with the limited evidence in the literature (Alkon et al., 2003; Brennan et al., 2008). However, in probably the only randomized controlled study that evaluated the effects of the ECCP, a statewide teacher training and mental health consultation program in Connecticut, Gilliam (2007) did not find any statistically significant effects on teachers' perceived job stressors. As indicated above, this may be because the ECCP sought to meet teachers' more varied needs on more than 30 topics across the state and over a relatively short duration, and did not specifically deliver curricular or training components targeting stress reduction. In contrast, the CSRP intervention was delivered to a smaller number of sites in a single urban metropolitan area, and lasted throughout the fall to spring of the Head Start academic year. The CSRP intervention was manualized and delivered with a high level of consistency, with implementation in all sites guided by an adapted version of the Incredible Years Teacher Training Program (Webster-Stratton et al., 2004), and delivered by one trainer for all teachers and mental health consultants. Moreover, the CSRP intervention also contained specific components for stress reduction. As detailed above, some of the strategies and activities were directly related to changing teachers' feeling of job control and support, which may have resulted in statistically significant improvements in teachers' perceived job control and resources. Nevertheless, as discussed below, the current design of this study does not allow for teasing apart which element of the multifaceted intervention may have served as the direct change agent for its effects on teachers' perceived job stressors and confidence. The next steps for this type of work would involve a closer look at implementation, teacher engagement, and unpacking treatment components to better understand what drives treatment effects (see Landry, Anthony, Swank, & Monseque-Bailey, 2009 and Powell, Diamond, Burchinal, & Koehler, 2010, for examples). To take those next steps, analyses of treatment-on-treated (TOT) might provide important insights for policymakers and program administrators who want to know more about these important "real world" issues in the context of quality improvement and workforce development (Zhai et al., 2010). In addition, this study only looked at part of a larger conceptual model, which in its entirety would include stress and its sequelae (i.e., turnover) that are worthy of future attention.

The finding that teachers felt less confident in behavior management as a result of the CSRP intervention may be counterintuitive when lined up against the other findings in this study and given the previous reports of the CSRP's positive impacts on classroom and child outcomes (Raver et al., 2008, 2009, 2011). However, teachers' lack of confidence may also make sense from their own perspective. The training and coaching from MHCs in behavior management strategies may have provided teachers with concrete strategies that could be readily implemented when coping with "real-world" challenges of the classroom. As a

result, teachers may have felt higher levels of control and resources in their work, as found in this study. But one “down side” of training and consultation may have been that teachers in the treatment group were more vulnerable to feelings of self-doubt that were part of their learning process than were teachers in the control group. In addition, teachers in the treatment group may have developed feelings of dependence on MHCs and such feelings may have been heightened when MHCs were in the process of ending their classroom visits. Our exit survey data showed that over 80% of teachers reported that MHCs were “somewhat” to “very” helpful in classroom management and 89% of them said they would choose to have a MHC in their classroom again. On the one hand, this feedback indicated the successful placement of MHCs. On the other hand, it might offer evidence that teachers had come to feel that they needed to rely on MHCs in order to maintain higher standards of successful classroom management. From this perspective, it is reasonable that teachers in the treatment group showed more perceived job control and resources but also lower confidence than did teachers in the control group. Future interventions may develop specific plans, including follow-up services, to address the issues of sustainability and capacity-building in behavior management among teachers who have received consistent and intensive support from interventions like the CSRP.

In addition, we did not find that the CSRP intervention had significant effects on teachers’ perceived job demands, which was consistent with some prior studies (e.g., Gilliam, 2007). One possible explanation is that job demands placed on teachers may not be an aspect of work that they have much control over. If programs and administrative staff have excessive demands on teachers, the training and mental health consultation services provided by the CSRP intervention for teachers may not be able to influence these demands, at least not teachers’ perceptions of demands on them. This may be evidence that interventions that focus on teachers and classrooms without intervening at the administrative or policy level may not work effectively to reduce teachers’ feeling of job demands. Effective administrative support and collaboration with other colleagues can reduce teachers’ job stress and increase job satisfaction (Curbow et al., 2000; Kontos & File, 1992). Therefore, future interventions may consider including components that target the administrative level of early childhood programs and reduce demands on teachers.

The findings in our study should be interpreted with caution. First, the CSRP intervention was conducted among a small sample of teachers who served in Head Start programs located in the very disadvantaged neighborhoods in Chicago. Therefore, the findings on the program effects of the CSRP intervention on teachers’ perceived job stressors and confidence should be understood within the context of an efficacy trial in 18 Head Start programs in Chicago. Replication of these results among a larger number of sites in Chicago and other sites across the U.S. is needed. Second, mainly due to the use of a much shortened version of CCW-JSI, the reliability of the subscales of perceived job stressors and confidence was relatively low in our study (i.e., Cronbach’s alpha ranging from .56 to .67). As a result, the findings should be interpreted cautiously. When it is financially feasible to conduct longer interviews than those in our study, future studies should make efforts to use the validated measure of CCW-JSI in its original format. Third, although the comprehensive, multifaceted services provided by the CSRP intervention was certainly a strength of our study, it would be difficult to disentangle which aspects of the intervention package actually had impacts on teachers’ perceived job stressors and confidence. Some recently developed analytical strategies, such as principal score matching (Hill et al., 2003; Zhai et al., 2010), would make it possible to sort out the effects of individual components in our next steps. Fourth, it should be noted that the design of the CSRP intervention in Head Start programs might have influenced its treatment effects differently than if it was provided in other preschool settings (e.g., privately funded centers). Lastly, head teachers only accounted for 34% of the sample while most of the others were assistant teachers. Compared to head

teachers, assistant teachers might have fewer resources and less control at work and thus might be more amenable to treatment focused on these issues. Therefore, the composition of our sample should be kept in mind when one interprets and generalizes findings from our study.

Most early childhood interventions that provide teacher training and consultation services only focus on the improvement of teachers' behavior management skills and the reduction in children's behavior difficulties, but ignore teachers' stress reduction (Gilliam & Shahar, 2006). As one of the first randomized interventions aiming to reduce teachers' perceived job stressors and improve their confidence in behavior management skills, the CSRP showed psychological benefits for teachers in terms of their perceptions in job control and resources. One "cost" of the intervention was that it also led to a moderate decrease in teachers' confidence in behavior management. An important implication of our findings is that classroom-based interventions offer added value in reducing teachers' perceived job stressors and increasing confidence, including the improvement in their feelings of control in managing children's behavior and more resources at work, in addition to improving the quality of instruction in early educational settings. An important question for future research is whether such interventions offer significant fiscal and staffing benefits to programs by supporting the retention of more highly-trained and competent teachers and by reducing teacher burnout and turnover. In the meantime, our findings suggest preliminary evidence that investments in classroom-based intervention offers additional psychological benefits to the adults who dedicate their time to serving low-income preschoolers.

Acknowledgments

The project described was supported by Award Number R01HD046160 from the Eunice Kennedy Shriver National Institute of Child Health & Human Development. The content is solely the responsibility of the authors and does not necessarily represent the official views of the Eunice Kennedy Shriver National Institute of Child Health & Human Development or the National Institutes of Health. The Chicago School Readiness Project is not associated with The Chicago School®, which is a trademark of The Chicago School of Professional Psychology.

References

- Aber JL, Brown JL, Jones SM. Developmental trajectories toward violence in middle childhood: Course, demographic differences, and response to school-based intervention. *Developmental Psychology*. 2003; 39:324–348. [PubMed: 12661889]
- Alkon A, Ramler M, MacLennan K. Evaluation of mental health consultation in child care centers. *Early Childhood Education Journal*. 2003; 31:91–99.
- Allison, PD. *Missing data*. Thousand Oaks, CA: Sage Publications; 2001.
- Angrist JD. Instrumental variables methods in experimental criminological research: What, why and how. *Journal of Experimental Criminology*. 2006; 2:23–44.
- Bloom, HS. *Learning more from social experiments: Evolving analytic approaches*. New York, NY: Russell Sage Foundation; 2005.
- Bond FW, Bruce D. Mediators of change in emotion-focused and problem-focused worksite stress management interventions. *Journal of Occupational Health Psychology*. 2000; 5:156–163. [PubMed: 10658893]
- Brennan EM, Bradley JR, Allen MD, Perry DF. The evidence base for mental health consultation in early childhood settings: Research synthesis addressing staff and program outcomes. *Early Education and Development*. 2008; 19:982–1022.
- Brouwers A, Tomic W. A longitudinal study of teacher burnout and perceived self-efficacy in classroom management. *Teaching and Teacher Education*. 2000; 16:239–253.
- Campbell SB, Shaw DS, Gilliom M. Early externalizing behavior problems: Toddlers and preschoolers at risk for later maladjustment. *Development and Psychopathology*. 2000; 12:467–488. [PubMed: 11014748]

- Cohen, J.; Cohen, P. Applied multiple regression/correlation analysis for the behavioral sciences. Hillsdale, NJ: Erlbaum; 1983.
- Cohen, J. Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Erlbaum; 1988.
- Curbow B, Spratt K, Ungaretti A, McDonnell, Breckler S. Development of the Child Care Worker Job Stress Inventory. *Early Childhood Research Quarterly*. 2000; 15:515–536.
- Daniels K, Guppy A. Occupational stress, social support, job control and psychological well-being. *Human Relations*. 1994; 47:1523–1544.
- Domitrovich CE, Gest SD, Gill S, Jones D, DeRousie RS. Individual factors associated with professional development training outcomes of the Head Start REDI program. *Early Education and Development*. 2009; 20:402–430.
- Downer JT, Locasale-Crouch J, Hamre B, Pianta R. Teacher characteristics associated with responsiveness and exposure to consultation and online professional development resources. *Early Education and Development*. 2009; 20:431–455.
- Fantuzzo J, Stoltzfus J, Lutz MN, Hamlet H, Balraj V, Turner C, Mosca S. An evaluation of the special needs referral process for low-income preschool children with emotional and behavioral problems. *Early Childhood Research Quarterly*. 1999; 14:465–482.
- Flores G, Fuentes-Afflick E, Barbot O, Carter-Pokras O, Claudio L, Lara M, Weitzman M. The health of Latino children: Urgent priorities, unanswered questions, and a research agenda. *Journal of the American Medical Association*. 2002; 288:82–90. [PubMed: 12090866]
- Fuchs LS, Fuchs D, Bishop N. Instructional adaptation for students at risk. *Journal of Educational Research*. 1992; 88:281–289.
- Fukkink RG, Lont A. Does training matter? A meta-analysis and review of caregiver training studies. *Early Childhood Research Quarterly*. 2007; 22:291–311.
- Gibson CM. Privileging the participants: The importance of sub-group analysis in social welfare evaluations. *American Journal of Evaluation*. 2003; 24:443–469.
- Gilliam, WS. Early Childhood Consultation Partnership: Results of a random-controlled evaluation Final report and executive summary. New Haven, CT: Child Study Center, Yale University; 2007.
- Gilliam WS, Shahar G. Preschool and child care expulsion and suspension: Rates and predictors in one state. *Infants & Young Children*. 2006; 19:228–245.
- Goelman H, Guo H. What we know and what we don't know about burnout among early childhood care providers. *Child & Youth Care Forum*. 1998; 27:175–199.
- Green BL, Everhart M, Gordon L, Gettman MG. Characteristics of effective mental health consultation in early childhood settings: Multilevel analysis of a national survey. *Topics in Early Childhood Special Education*. 2006; 26:142–152.
- Guo S. Analyzing grouped data with hierarchical linear modeling. *Children and Youth Service Review*. 2005; 27:637–652.
- Guo, S.; Fraser, MW. Propensity score analysis: Statistical methods and applications. Thousand Oaks, CA: Sage Publications; 2009.
- Hair, JF.; Anderson, RE.; Tatham, RL.; Black, W. Multivariate data analysis. Upper Saddle River, NJ: Prentice Hall; 1998.
- Hakanen JJ, Bakker AB, Schaufeli WB. Burnout and work engagement among teachers. *Journal of School Psychology*. 2006; 43:495–513.
- Ham S, Kim WG, Jeong S. Effect of information technology on performance in upscale hotels. *Hospitality Management*. 2005; 24:281–294.
- Hammarberg A, Hagekull B. Pre-school teachers' perceived control and intention to act regarding child behaviour problems. *Early Child Development and Care*. 2000; 160:155–166.
- Hammarberg A, Hagekull B. The relation between pre-school teachers' classroom experiences and their perceived control over child behaviour. *Early Child Development and Care*. 2002; 172:625–634.
- Hamre BK, Pianta RC. Self-reported depression in nonfamilial caregivers: Prevalence and associations with caregiver behavior in child-care settings. *Early Childhood Research Quarterly*. 2004; 19:297–318.

- Han SS, Weiss B. Sustainability of teacher implementation of school-based mental health programs. *Journal of Abnormal Child Psychology*. 2005; 33:665–679. [PubMed: 16328743]
- Hedges LV, Hedberg EC. Intraclass correlations for planning group randomized experiments in rural education. *Journal of Research in Rural Education*. 2007; 22:1–15.
- Helterbran VR, Fennimore BS. Collaborative early childhood professional development: Building from a base of teacher investigation. *Early Childhood Education Journal*. 2004; 31:267–271.
- Hennigan, L.; Upshur, C.; Wenz-Gross, M. Together for kids: Second year report. Worcester, MA: Community Healthlink; 2004.
- Hill LJ, Brooks-Gunn J, Waldfogel J. Sustained effects of high participation in an early intervention for low-birth-weight premature infants. *Developmental Psychology*. 2003; 39:730–744. [PubMed: 12859126]
- Hill, LJ.; Reiter, JP.; Zanutto, EL. A comparison of experimental and observational data analyses. In: Gelman, A.; Meng, X., editors. *Applied Bayesian modeling and causal inference from incomplete-data perspectives: An essential journey with Donald Rubin's statistical family*. West Sussex, UK: John Wiley & Sons; 2004. p. 49-60.
- Hill LJ, Waldfogel J, Brooks-Gunn J. Differential effects of high-quality child care. *Journal of Policy Analysis and Management*. 2002; 21:601–627.
- Hurrell JJ Jr, Nelson DL, Simmons BL. Measuring job stressors and strains: Where have we been, where are we, and where do we need to go. *Journal of Occupational Health Psychology*. 1998; 3:368–389. [PubMed: 9805282]
- Ingersoll, R.; Rossi, R. Which types of schools have the highest teacher turnover?. Washington D.C.: National Center for Education Statistics; 1995. Issue Brief NCES Publication No 95–778
- Jones MP. Indicator and stratification methods for missing explanatory variables in multiple linear regression. *Journal of the American Statistical Association*. 1996; 91:222–230.
- Klein, L.; Knitzer, J. Pathways to Early School Success. New York, NY: National Center for Children in Poverty; 2006. Effective preschool curricula and teaching strategies.
- Kontos S, File N. Condition of employment, job satisfaction, and job commitment among early intervention personnel. *Journal of Early Intervention*. 1992; 16:155–165.
- Kontos S, Riessen J. Predictors of job satisfaction, job stress, and job commitment in family day care. *Journal of Applied Developmental Psychology*. 1993; 14:427–441.
- La Paro KM, Pianta RC, Stuhlman M. The classroom assessment scoring system: Findings from the prekindergarten year. *The Elementary School Journal*. 2004; 104:409–426.
- Lambert, RG.; McCarthy, CJ., editors. *Understanding teacher stress in an age of accountability*. Greenwich, CT: Information Age Publishing; 2006.
- Landry SH, Anthony JL, Swank PR, Monseque-Bailey P. Effectiveness of comprehensive professional development for teachers of at-risk preschoolers. *Journal of Educational Psychology*. 2009; 101:448–465.
- Li-Grining C, Raver CC, Champion K, Sardin L, Metzger M, Jones SM. Understanding and improving classroom emotional climate and behavior management in the “real world”: The role of Head Start teachers' psychosocial stressors. *Early Education and Development*. 2010; 21:65–94.
- Little, RJA.; Rubin, DB. *Statistical analysis with missing data*. New York, NY: John Wiley & Sons; 1987.
- Margolin G, Gordis EB. The effects of family violence on children. *Annual Review of Psychology*. 2000; 51:445–479.
- McCarthy, CJ.; Kissen, D.; Yadley, L.; Wood, T.; Lambert, RG. Relationship of teachers' preventive coping resources to burnout symptoms. In: Lambert, R.; McCarthy, C., editors. *Understanding teacher stress in an age of accountability*. Greenwich, CT: Information Age Publishing; 2006. p. 179-196.
- Morris-Rothschild B, Brassard MR. Teachers' conflict management styles: The role of attachment styles and classroom management efficacy. *Journal of School Psychology*. 2006; 44:105–121.
- Peck LR. Subgroup analysis in social experiments: Measuring program impacts based on post-treatment choice. *American Journal of Evaluation*. 2003; 24:157–187.

- Pianta R, Mashburn A, Downer J, Hamre B, Justice L. Effects of web-mediated professional development resources on teacher–child interactions in pre-kindergarten classrooms. *Early Childhood Research Quarterly*. 2008; 23:431–451.
- Powell DR, Diamond KE, Burchinal MR, Koehler MJ. Effects of an early literacy professional development intervention on head start teachers and children. *Journal of Educational Psychology*. 2010; 102:299–312.
- Puma, M.; Bell, S.; Cook, R.; Heid, C.; Lopez, M.; Zill, N.; Bernstein, H. *Head Start Impact Study: First year findings*. Washington, DC: US Department of Health and Human Services; 2005.
- Ransford CR, Greenberge MT, Domitrovich CE, Small M, Jacobson L. The role of teachers' psychological experiences and perceptions of curriculum supports on the implementation of a social and emotional learning curriculum. *School Psychology Review*. 2009; 38:510–532.
- Raudenbush, SW.; Bryk, AS. *Hierarchical linear models: Applications and data analysis methods*. Thousand Oaks, CA: Sage Publications; 2002.
- Raver CC. Does work pay psychologically as well as economically? The role of employment in predicting depressive symptoms and parenting among low-income families. *Child Development*. 2003; 74:1720–1736. [PubMed: 14669892]
- Raver, CC.; Blair, C.; Li-Grining, CP. the National Center for Research on Early Childhood Education book series on early childhood policy and practice. Baltimore, MD: Brookes; Extending models of emotional self-regulation to classroom settings: Implications for professional development. in press
- Raver, CC.; Garner, P.; Smith-Donald, R. The roles of emotion regulation and emotion knowledge for children's academic readiness: Are the links causal?. In: Pianta, RC.; Cox, MJ.; Snow, KL., editors. *School readiness and the transition to kindergarten in the era of accountability*. Baltimore, MD: Brookes; 2007. p. 121-147.
- Raver C, Jones SM, Li-Grining CP, Metzger M, Smallwood K, Sardin L. Improving preschool classroom processes: Preliminary findings from a randomized trial implemented in Head Start settings. *Early Childhood Research Quarterly*. 2008; 23:10–26.
- Raver CC, Jones SM, Li-Grining CP, Zhai F, Bub K, Pressler E. CSRP's impact on low-income preschoolers' pre-academic skills: Self-regulation and teacher-student relationships as two mediating mechanisms. *Child Development*. 2011; 82:362–387. [PubMed: 21291447]
- Raver CC, Jones SM, Li-Grining CP, Zhai F, Metzger MW, Solomon B. Targeting children's behavior problems in preschool classrooms: A cluster-randomized controlled trial. *Journal of Consulting and Clinical Psychology*. 2009; 77:302–316. [PubMed: 19309189]
- Reid MJ, Webster-Stratton C, Baydar N. Halting the development of conduct problems in Head Start children: The effects of parent training. *Journal of Clinical Child and Adolescent Psychology*. 2004; 33:279–291. [PubMed: 15136193]
- Rubin, DB. *Multiple imputation for nonresponse in surveys*. New York, NY: John Wiley & Sons; 1987.
- Rubin DB. Multiple imputation after 18+ years. *Journal of the American Statistical Association*. 1996; 91:473–489.
- Rubin D, Thomas N. Combining propensity score matching with additional adjustments for prognostic covariates. *Journal of the American Statistical Association*. 2000; 95:573–585.
- Schaeffer CM, Petras H, Ialongo N, Masyn KE, Hubbard S, Poduska J, Kellam S. A comparison of girls' and boys' aggressive-disruptive behavior trajectories across elementary school: Prediction of young adult antisocial outcomes. *Journal of Consulting and Clinical Psychology*. 2006; 74:500–510. [PubMed: 16822107]
- Schafer, JL. *Analysis of incomplete multivariate data*. London, UK: Chapman & Hall; 1997.
- Scott-Little MC, Holloway SD. Child care providers' reasoning about misbehaviors: Relation to classroom control strategies and professional training. *Early Childhood Research Quarterly*. 1992; 7:595–606.
- Sheridan SM, Edwards CP, Marvin CA, Knoche LL. Professional development in early childhood programs: Process issues and research needs. *Early Education and Development*. 2009; 20:377–401. [PubMed: 19809599]

- Sugai G, Horner R, Dunlap G, Hieneman M, Lewis TJ, Nelson CM, Rief M. Applying positive behavior supports and functional behavioral assessment in schools. *Journal of Positive Behavior Interventions*. 2000; 2:131–143.
- Talmor R, Reiter S, Feigin N. Factors relating to regular education teacher burnout in inclusive education. *European Journal of Special Needs*. 2005; 20:215–229.
- Thijs JT, Koomen HM, van der Leij A. Teachers' self-reported pedagogical practices toward socially inhibited, hyperactive, and average children. *Psychology in the Schools*. 2006; 43:635–651.
- Tolan P, Gorman-Smith D, Henry D. Supporting families in a high-risk setting: Proximal effects of the SAFE Children preventive intervention. *Journal of Consulting and Clinical Psychology*. 2004; 72:855–869. [PubMed: 15482043]
- van Buuren S, Boshuizen HC, Knook DL. Multiple imputation of missing blood pressure covariates in survival analysis. *Statistics in Medicine*. 1999; 18:681–694. [PubMed: 10204197]
- van der Klink JJ, Blonk RW, Schene AH, van Dijk FJ. The benefits of interventions for work-related stress. *American Journal of Public Health*. 2001; 91:270–276. [PubMed: 11211637]
- Wasik BA, Bond MA, Hindman A. The effects of language and literacy intervention on Head Start children and teachers. *Journal of Educational Psychology*. 2006; 98:63–74.
- Webster-Stratton C, Reid MJ, Hammond M. Preventing conduct problems, promoting social competence: A parent and teacher training partnership in Head Start. *Journal of Clinical Child Psychology*. 2001; 30:238–302.
- Webster-Stratton C, Reid MJ, Hammond M. Treating children with early-onset conduct problems: Intervention outcomes for parent, child, and teacher training. *Journal of Clinical Child and Adolescent Psychology*. 2004; 33:105–124. [PubMed: 15028546]
- Whitebook, M.; Howes, C.; Philips, D. Worthy work, unlivable wages: The National Child Care Staffing Study, 1988-1997. Washington, D. C.: Center for Child Care Workforce; 1998.
- Williford AP, Shelton TL. Using mental health consultation to decrease disruptive behaviors in preschoolers: Adapting an empirically-supported intervention. *Journal of Child Psychology and Psychiatry*. 2008; 49:191–200. [PubMed: 18211278]
- Woolfolk AE, Rosoff B, Hoy WK. Teachers' sense of efficacy and their beliefs about managing their students. *Teaching and Teacher Education*. 1990; 6:137–148.
- Yoshikawa, H.; Knitzer, J. Lessons from the field: Head Start mental health strategies to meet changing needs. New York, NY: National Center for Children in Poverty; 1997.
- Zhai F, Raver CC, Jones S, Li-Grining C, Pressler E, Gao Q. Dosage effects on school readiness: Evidence from a randomized classroom-based intervention. *Social Service Review*. 2010; 84:615–654. [PubMed: 21488322]
- Zill, N. Behavior Problem Index based on parent report: National health interview survey Child health supplement. Washington, DC: National Center for Health Statistics; 1990.

Table 1

Descriptive statistics of teacher and classroom characteristics at baseline

	Full sample	Treatment group	Control group
	<i>n</i> = 90	<i>n</i> = 48	<i>n</i> = 42
<i>Teacher characteristics</i>			
Age	39.77 (12.03)	39.00 (12.23)	40.59 (11.91)
African American	0.71 (0.46)	0.67 (0.48)	0.76 (0.43)
Immigrant	0.16 (0.37)	0.23 (0.42)	0.08 (0.27) ⁺
Head teacher	0.34 (0.48)	0.33 (0.48)	0.36 (0.48)
Bachelor or higher degree	0.27 (0.45)	0.30 (0.46)	0.25 (0.44)
≤ 3 years of preschool teaching	0.30 (0.46)	0.36 (0.49)	0.23 (0.42)
Married	0.37 (0.49)	0.36 (0.49)	0.38 (0.49)
Living with ≥ 4 people	0.45 (0.50)	0.42 (0.50)	0.49 (0.51)
Household primary income earner	0.64 (0.48)	0.63 (0.49)	0.65 (0.48)
Pretreatment scores			
Job control	3.32 (0.71)	3.42 (0.73)	3.21 (0.69)
Job resources	3.91 (0.70)	4.05 (0.69)	3.78 (0.70) ⁺
Job demands	2.73 (0.69)	2.89 (0.71)	2.58 (0.63) [*]
Confidence	-1.82 (0.80)	-1.99 (0.83)	-1.65 (0.75) ⁺
<i>Classroom characteristics</i>			
	<i>n</i> = 35	<i>n</i> = 18	<i>n</i> = 17
Positive climate	5.25 (1.00)	4.96 (1.02)	5.56 (0.90) ⁺
Teacher behavior management	4.86 (1.07)	4.56 (1.11)	5.18 (0.96) ⁺
Class size	16.03 (2.92)	16.06 (3.08)	16.00 (2.83)
Number of adults in class	2.36 (0.69)	2.41 (0.78)	2.31 (0.59)
Percentage of boys	46.35 (10.58)	50.32 (10.46)	42.15 (9.24) [*]
Percentage of African American	67.14 (39.04)	67.23 (37.58)	67.05 (41.69)
Children's average poverty risks	1.08 (0.38)	1.13 (0.42)	1.03 (0.33)
Children's average BPI	6.58 (3.22)	6.93 (2.93)	6.21 (3.56)

Notes: means with standard deviations in parentheses;

^{*} $p < 0.05$,⁺ $p < 0.10$ for two-tailed t-statistics testing mean differences between control and treatment groups.

Table 2

CSR intervention effects on perceived job stressors and confidence in HLM analyses

	Job control	Job resources	Job demands	Confidence
Treatment	0.51** (0.15)	0.42* (0.17)	-0.13 (0.18)	-0.38* (0.16)
<i>Teacher characteristics</i>				
Age	0.01 (0.01)	0.03* (0.01)	-0.01 (0.01)	0.01 (0.01)
African American	0.16 (0.18)	0.43* (0.19)	0.00 (0.20)	0.14 (0.18)
Immigrant	-0.31 (0.22)	0.00 (0.26)	0.36 (0.29)	0.19 (0.29)
Head teacher	0.11 (0.15)	0.25+ (0.15)	0.13 (0.17)	0.38* (0.16)
Bachelor or higher degree	0.11 (0.20)	0.06 (0.20)	0.40+ (0.22)	-0.39+ (0.23)
≤ 3 years of preschool teaching	-0.12 (0.18)	0.45* (0.21)	-0.03 (0.22)	-0.14 (0.20)
Married	-0.03 (0.16)	-0.05 (0.19)	-0.14 (0.20)	-0.18 (0.20)
Living with ≥ 4 people	0.25+ (0.15)	0.33+ (0.20)	0.07 (0.17)	-0.08 (0.19)
Household primary income earner	-0.01 (0.17)	0.12 (0.17)	-0.25 (0.18)	-0.18 (0.19)
Pretreatment scores	0.25** (0.09)	0.45** (0.09)	0.12 (0.10)	0.24* (0.11)
<i>Classroom characteristics</i>				
Positive climate	0.61** (0.14)	0.44** (0.16)	-0.09 (0.15)	0.01 (0.15)
Teacher behavior management	-0.57** (0.13)	-0.37** (0.14)	0.30* (0.13)	-0.09 (0.14)
Class size	-0.06 (0.04)	0.00 (0.04)	-0.02 (0.04)	0.06 (0.05)
Number of adults in class	-0.78** (0.17)	-0.53** (0.17)	0.30+ (0.17)	-0.13 (0.16)
Percentage of boys	-0.02* (0.01)	-0.03** (0.01)	0.02* (0.01)	-0.00 (0.01)
Percentage of African American	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	-0.01 (0.01)
Children's average poverty risks	0.00 (0.24)	-0.12 (0.24)	-0.31 (0.26)	-0.42+ (0.15)
Children's average BPI	-0.06* (0.03)	-0.02 (0.03)	0.05+ (0.03)	0.03 (0.04)
<i>Site level pair fixed effects</i>				
	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Intercept	5.27** (1.07)	2.51* (1.18)	-0.75 (1.13)	-1.69 (1.08)

Notes: coefficients with standard errors in parentheses combining the estimates from the five datasets generated by multiple imputation (n = 90);

**
 $p < 0.01$,*
 $p < 0.05$,+
 $p < 0.10$