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Title: Academic Outcomes of the Chicago School Readiness Project in First Grade: Do Children's Approaches to Learning Mediate Treatment Effects on Academic Skills?

Choice of Conference Section: Early Education

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Abstract 2 Body

Background/context:

When children enter kindergarten, they encounter many first-time expectations, such as completing independent work, adhering to strict time schedules, and following greater amounts of teacher-directed instruction. Children may find this transition daunting, especially if their home environments stand in stark contrast to their school settings (Entwisle, Alexander, & Olson, 2003; Pianta, Kraft-Sayre, Rimm Kaufman, Gercke, & Higgins, 2001). Meeting these expectations depends on children's approaches to learning (ATL), which are defined as characteristics and behaviors that children show while engaging in learning activities (Kenney-Benson, Pomerantz, Ryan, & Patrick; McClelland, Acock, & Morrison, 2006). Children's ATL include persistence and attentiveness, which largely reflect children's self-regulation. Aspects of executive functioning, such as attention, memory, and inhibitory control, underpin these skills (McClelland et al., 2006), which are more specific to learning than are skills used in social interactions with peers and teachers (e.g., positive peer interaction, cooperative play, sharing, and respect; Cooper & Farran, 1988; Ladd, Birch, & Buhs, 1999).

Purpose / objective / research question / focus of study:

The Chicago School Readiness Project (CSRP), a randomized, classroom-based mental health intervention, aimed to improve teachers' behavior management of preschoolers' dysregulated behavior. The current follow-up study examines potential impacts on academic skills of first graders by enhancing their ATL. This investigation seeks to answer three research questions: (1) Did children in the CSRP control group have lower academic ratings in first grade, when compared to the children who were randomly assigned to receive the CSRP intervention? (2) Were potential treatment impacts on first graders' academic skills dampened when children's ATL were added as a covariate? (3) Was there a direct impact on first graders' ATL? We will estimate hierarchical linear models (HLM) to take into account the nested design of CSRP, as well as structural equation modeling (SEM) to test for mediation.

Setting:

In an effort to balance generalizability and feasibility, we selected preschool sites on the basis of (a) receipt of Head Start funding, (b) having two or more classrooms that offered "full day" programming, and (c) location in one of seven high-poverty neighborhoods (see Raver et al., 2008, for a detailed discussion of exclusionary criteria). CSRP staff completed block-by-block surveys of all seven neighborhoods, in which all child-serving agencies were identified and screened to determine whether they met site selection criteria (including receipt of Head Start funding). Eligible sites were then invited to self-nominate for participation in the research project. Eighteen sites across seven neighborhoods completed the process and were included as CSRP sites, and two classrooms within each site were randomly selected for participation. Research staff successfully recruited 83% of the children enrolled in classrooms between Labor Day and the assigned enrollment cutoff date in mid-October of the school year.

Population / Participants / Subjects:

The CSRP sample consists of 602 children enrolled in 35 classrooms nested within 18 Head Start sites. Enrolled children ranged from ages 3 to 5 (29% identified as Latino/a, and 64% identified as African American). In our first set of models, our analytic sample included 356

children, where 108 children stayed with same teacher and 248 had a different teacher at kindergarten. In our second set of more conservative models predicting outcomes in kindergarten from child, classroom, and site characteristics in preschool, including literacy, math, self-regulatory, and social skills, our analytic sample included 280 children. Here, 76 children stayed with same teacher and 204 had a different teacher in kindergarten.

Intervention / Program / Practice:

The principal aim of the CSRP intervention was to marshal several primary programmatic components to improve low-income preschool-aged children's school readiness by increasing their emotional and behavioral adjustment. The first programmatic component emphasized workforce development, where CSRP provided teachers with 30 hours of training in strategies (e.g., rewarding positive behavior, redirecting negative behavior) that they could employ to provide their classrooms with more effective regulatory support and better management (Raver et al., 2008; Webster-Stratton et al., 2001; Webster-Stratton, Reid, & Stoolmiller, 2008). A second key component was to provide weekly "coaching" through classroom-based consultation provided by a mental health consultant (MHC) who supported teachers while they tried new techniques learned in the teacher training (Donohue, Falk, & Provet, 2000; Gorman-Smith et al., 2003). As an additional component, MHCs spent a significant portion of the school year conducting stress reduction workshops to help teachers to limit burnout. This was based on the premise that adults might have a difficult time implementing new strategies of building positive relationships with children who demonstrate especially challenging behaviors when the adults themselves may feel less well supported. Finally, MHCs provided direct child-focused consultation, working one-on-one with three to five children who exhibited the most challenging behavioral problems, with the view that these children might benefit from access to clinical psychological services that could be delivered through the Head Start setting (Perry, Dunne, McFadden, & Campbell, 2008).

Research Design:

To test the efficacy of this model, our research team conducted a cluster-randomized trial in Chicago, IL. Through extensive collaboration with community-based Head Start programs in seven of Chicago's most economically disadvantaged neighborhoods, CSRP was able to randomly assign nine Head Start sites to receive multi-component intervention services (and therefore serve as the "treatment group") and another nine Head Start sites to receive a lower-intensity package of services (including the support of a lower-cost "teacher's aide" in the classroom one day a week); these latter sites were designated as "control group" classrooms.

Though trainings were offered to all teachers randomized to treatment, not all teachers were able to take advantage of these sessions: Teachers attended three of the five trainings on average. Similarly, even though classroom visits were a main ingredient of the intervention package, some classrooms received as few as 21 visits while other classrooms received as many as 40 visits, with an average of 29 visits (or 128 hours of consultation) during the academic year. Analyses of consultants' logs suggest that the most common social services offered to teachers were social support and coaching during MHCs' classroom visits.

Data Collection and Analysis:

Data collection. The present investigation will examine associations among treatment, kindergarteners' academic skills, and ATL (n = 367). The measure of ATL (e.g., children's on

task behavior) was based the Cooper Farran Behavior Rating Scale (CFBRS; Cooper & Farran, 1991). Teacher reports of academic skills were based on items from the Early Childhood Longitudinal Study – Kindergarten Cohort (ECLS-K).

Developmental indicators in preschool included self-regulation, social competence, and academic skills. Self-regulation was directly assessed using the Preschool Self-Regulation Assessment (PSRA; Smith-Donald et al., 2007), which has shown to have measurement equivalence across African American and Latino children and boys and girls (Raver et al., submitted). The PSRA consists of 2 components: a battery of tasks administered by a trained assessor, and an assessor report. The first component includes 2 executive functioning tasks and 4 effortful control tasks (Smith-Donald et al., 2007). The executive functioning tasks included Balance Beam (Murray & Kochanska, 2002) and Pencil Tap, which was adapted from the peg-tapping task (Blair & Razza, 2007; Diamond & Taylor, 1996). The effortful control tasks consisted of Toy Wrap, Toy Wait, Snack Delay, and Tongue Task, which were adapted from lab-based delay tasks (see Murray & Kochanska, 2002). These tasks were selected because they were brief, required few materials, yet yielded useful data for 3- to 5-year-old children in lab-based protocols and in a pilot field study (Smith et al., 2007). Assessors live-coded latencies or performance levels for each task. To calculate executive functioning and effortful control composites, task scores were standardized and averaged. Over 20% of the self-regulation assessments were videotaped and double-coded. For all continuous variables, the consistency of the assessor and coder responses was examined, where Cronbach's alphas had an average of .93 and ranged from .73 - .99.

The second component of the PSRA includes a 28-item assessor report (Smith-Donald et al., 2007) that provides an overall portrait of children's attention, behavior, and emotions throughout the assessor-child interaction. The framework and descriptors for these items were adapted from the 15-item Leiter-R social-emotional rating scale (examiner version; Roid & Miller, 1997) and the Disruptive Behavior-Diagnostic Observation Schedule coding system (DB-DOS; Wakschlag et al, 2005). The assessor report included 16 items that tapped children's attention/impulse control (e.g., "pays attention during instructions and demonstrations"). Items were coded using a Likert scale ranging from 0 to 3, and some items were reverse-coded to minimize automatic responding. Inter-rater reliability and internal validity of the assessor report constructs were high, with a Cronbach's alpha of .92 for internal consistency.

To assess children's social competence, teachers completed the short form of the Social Competence and Behavior Evaluation (SCBE-30; LaFreniere & Dumas, 1996). The SCBE-30 provides information on the socioemotional adjustment of children ages 3-6. It includes a social competence subscale, which consists of 10 items (e.g., "works easily in groups"). We used a 6-point scale, ranging from 0 = never to 5 = always. As reported in previous research (LaFreniere & Dumas, 1996), internal validity was high for the current sample ($\alpha = .85-.93$); however, inter-rater reliability was relatively lower ($ICC = .55-.72$).

Prior to administering the academic assessments, assessors evaluated children's understanding of spoken English using the game "Simon Says" ($\alpha=.92$) (PreLAS Simon Says; Duncan & DeAvila, 1998). The assessor directs children's behavior with a list of commands. However, children must follow the directions of the assessor only when he or she begins a command with the phrase "Simon says". Bilingual children who passed this screener completed both Spanish and English assessments, and their highest score was used in analysis. Children who only spoke English only participated in English assessments.

Once the “Simon says” screener was finished, assessors administered tests of children’s math, letter naming, and vocabulary skills. Based on the Early Childhood Longitudinal Study’s Kindergarten Cohort (ECLS-K), the math subscale includes 19 items that tap children’s early math skills such as their recognition of numbers and shapes, understanding of size, and ability to count (Zill, 2003a). For example, children were shown a picture of 2 paintbrushes and asked how many paintbrushes were on the page. Items were coded as correct (1) or incorrect (0), and children’s scores across the math items were averaged ($\alpha = .82$). For letter naming, children were asked to identify as many letters of the alphabet as possible (Zill, 2003b). Because the English alphabet contains 26 letters and the Spanish alphabet contains 30 letters, we calculate the percentage of English letters known and percentage of Spanish letters known ($\alpha = .92$).

Lastly, the vocabulary subscale was adapted from the Peabody Picture Vocabulary Test (PPVT-III; Dunn & Dunn, 1997) for children who spoke English only, and from the Spanish-language version of the PPVT (i.e., the Test de Vocabulario en Imagenes Peabody (TVIP; Dunn, Lugo, Padilla, & Dunn, 1986) for children who spoke Spanish. Children were shown 24 sets of 4 pictures and asked to point to the picture that illustrated a given word. We coded each trial as correct (1) or incorrect (0), and then calculated the mean score across all trials ($\alpha = .78$). Internal validity was good ($> .7$) on all three academic subscales.

Preliminary data analysis. Given the nesting of children within classrooms, which were nested within sites, we employed hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002). Our multi-level models were characterized by the following equations. Below is our level 1 equation:

$$(1) Y_{ijk} = \pi_{0jk} + \pi_{1jk}Ch_{ijk} + \pi_{2jk}F_{ijk} + e_{ijk}$$

At level 1, we predicted children’s ATL and academic skills in kindergarten from child, classroom, and site characteristics in preschool. We controlled for characteristics of children (Ch) (i.e., gender, age, and race/ethnicity) and families (F) (i.e., human capital risk index, marital status, family size, whether Spanish was spoken at home, and welfare status). We centered the covariates so that π_{0jk} represents ATL and academic skills for the average child. The coefficients π_{1jk} through π_{2jk} represent the association between children’s academic skills and their social competence, behavior problems, and background characteristics in classroom jk . We also include e_{ijk} as a child-specific random effect.

Next, we present our level 2 equation:

$$(2) \pi_{0jk} = \beta_{00k} + \beta_{01k}Cl_{jk} + \beta_{02k}T_{jk} + r_{0jk}$$

Here, we predicted the intercept at level 1. Covariates at level 2 included features of classrooms (Cl) (i.e., quality in terms of behavior management and emotional climate, number of adults, number of children). We also included characteristics of teachers (T) (i.e., level of education, depressive symptoms, and experience with work-related stressors). Though not shown here, $\beta_{10} - \beta_{20}$ represent the pooled within-classroom regression coefficients for the Level-1 covariates.

Finally, below is our level 3 equation:

$$(3) \beta_{00k} = \gamma_{000} + \gamma_{001}S_k + u_{00k}$$

Here, we predicted the intercept at level 2. Level 3 site covariates (S) included treatment status, whether a family support worker was on staff, the size of the program, the percentage of families

who were African American, and the percentage of families who received welfare. Results were essentially the same when the 4 latter site characteristics were replaced with dummy variables representing pairs of sites that were matched on family and site characteristics that reflected program capacity. One site in each pair was randomly assigned to the treatment group, and the other site was then assigned to the control group. Though not shown here, γ_{010} and γ_{020} represent the pooled within-site regression coefficients for the level 2 covariates.

In order to assess whether direct assessments added value to our analyses, we estimated a second set of models, where equation 1 was replaced by the following equation:

$$(4) Y_{ijk} = \pi_{0jk} + \pi_{1jk}Ch_{ijk} + \pi_{2jk}F_{ijk} + \pi_{3jk}Lit_{ijk} + \pi_{4jk}Math_{ijk} + \pi_{5jk}SR_{ijk} + \pi_{5jk}SS_{ijk} + e_{ijk}$$

Here, equation 4 included preschoolers' literacy, math, self-regulatory, and social skills as covariates.

Findings / Results:

When predicting ATL and academic skills in kindergarten from treatment and other preschool experiences, we found treatment impacts on language, literacy, and math skills in kindergarten. However, these findings did not hold in more conservative models that controlled for academic and social outcomes in preschool. There were no treatment impacts on ATL in kindergarten. Thus, we did not conduct tests of mediation.

Interestingly, when predicting learning related and academic skills in kindergarten from treatment and other preschool experiences, we detected significant linkages between the following variables. In terms of child and family characteristics, we found that boys were at risk for lower scores. Furthermore, children's social competence and executive functioning were positively linked to better language, literacy, and math scores. Also, children whose parents had lower levels of education were at academic risk.

Regarding teacher and classroom characteristics, children whose preschool classrooms were rated higher in terms of classroom quality tended to have higher academic scores. Additionally, children whose teachers reported having more control in the classroom tended to have higher academic performance.

Conclusions:

In sum, preliminary evidence of CSRP impact on children's language, literacy, and math skills in kindergarten so far does not hold in more conservative models. Moreover, there was no preliminary evidence of CSRP impact on children's approaches to learning in kindergarten. Interestingly, preliminary evidence of child, family, and classroom characteristics in preschool as predictive of kindergarten outcomes

We will continue to explore whether CSRP yielded an impact on children's academic skills via more adaptive ATL, by following participants into first grade. The full CSRP intervention was administered throughout most of the preschool year. Therefore, there could be a lagged effect, once the entire intervention was completed. Results will be discussed in the context of early intervention and early childhood education. Implications for programs and policies will be addressed.

Appendices

Appendix A. References

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