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Immediate Effects of a School Readiness Intervention for Children in Foster Care

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Abstract

Research findings—School readiness is a strong predictor of adjustment in elementary school and beyond. Children in foster care are at particular risk for academic and social difficulties in school. Limitations in self-regulatory skills and caregiver involvement among these children might contribute to a lack of school readiness. This study presents the immediate effects on school readiness of a targeted, short-term intervention designed to improve children's early literacy, prosocial, and self-regulatory skills during the summer before kindergarten entry: Kids in Transition to School (KITS). Using a randomized controlled trial design, 192 children in foster care were assigned to either an intervention or services as usual comparison condition. Multimethod, multiagent assessments were conducted immediately prior to and following the completion of the intervention. The results from structural equation modeling indicated that the intervention had significant, positive effects on early literacy and self-regulatory skills.

Practice—An efficacious, short-term, readily scalable, theoretically-based intervention targeted at specific vulnerabilities for children in foster care may help to improve their school readiness and eventual school adjustment.

Keywords

school readiness; foster children; self-regulation; caregiver involvement; intervention

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Prospective longitudinal studies have shown that school readiness (i.e., preparedness for meeting the academic and social-emotional demands of school) positively impacts educational and psychosocial adjustment into adulthood (Campbell et al., 2008; Fothergill et al., 2008; Schweinhart et al., 2005), suggesting that interventions designed to promote school readiness can have comprehensive and long-ranging effects. To date, school readiness interventions that have shown effects into adulthood are typically intensive and long term (i.e., duration of 1 year or more; e.g., Campbell et al., 2008; Schweinhart et al., 2005). Although some researchers have asserted that longer term interventions might be required to prevent behavioral and academic problems (e.g., Greenberg, Domitrovich, & Bumbarger, 2001), this remains an empirical question. Recent improvements in the

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understanding of the underlying behavioral and neurobiological mechanisms central to school success (Blair & Diamond, 2008; Pears, Fisher, Bruce, Kim, & Yoerger, 2010) may permit the development of more precise, short-term school readiness interventions that have long-term effects. This is an especially important area to investigate because the most vulnerable children, including children in foster care, might not be able to take full advantage of long-term interventions. For example, the multiple placement transitions that children in foster care often experience (Pears & Fisher, 2005) can prevent them from receiving the full dosage of a long-term intervention. In addition, few long-term programs operate in the summer. During this *summer services gap*, high-risk children might fail to acquire critical skills that facilitate a positive kindergarten transition (Alexander, Entwisle, & Olson, 2001). To serve a wider range of children at risk for poor school outcomes, research into the efficacy of intensive, shorter-term, theory-driven programs to promote school readiness is greatly needed. If such programs were effective in increasing school readiness, they would represent another tool to promote better school adjustment in children who might otherwise miss the opportunity to be involved in long-term interventions.

Core Components of School Readiness

Converging evidence suggests that a successful transition to school requires both early literacy and social-emotional skills (Blair, 2002; Raver, 2002). A number of early literacy skills are linked to reading outcomes, which in turn positively predict achievement in reading and math across elementary and middle school (Duncan et al., 2007). Among the strongest predictors of early reading outcomes are phonological awareness, letter–sound knowledge, letter identification, and understanding of concepts about print (National Institute for Literacy, 2009; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004).

Social-emotional competence can be subdivided into two interrelated sets of competencies: prosocial and self-regulatory skills (Blair, 2002). Key prosocial behaviors, such as successfully entering peer groups, sharing and cooperating, maintaining social interactions, and accurately interpreting the emotions of others, predict positive peer and teacher relationships (Denham et al., 2002; Ladd, Birch, & Buhs, 1999; Pianta & Stuhlman, 2004). Self-regulatory skills involve the capacity to regulate emotions and behaviors in different situations as well as inhibitory control. For example, children must control their negative and positive emotions to prevent them from disrupting academic performance and social relationships and regulate their behavior to make successful transitions between activities and avoid disrupting classroom activities (Blair, 2002; Graziano, Reavis, Keane, & Calkins, 2007). Inhibitory control, an executive function that overlaps with self-regulation, involves voluntarily inhibiting a prepotent attentional or behavioral response (e.g., yelling out an answer in class) to perform a different response (e.g., raising one’s hand). Proficiency in self-regulatory skills has been linked to better engagement in learning, higher academic achievement, and better social skills (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009; Graziano et al., 2007; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003).

School Readiness in Children in Foster Care

Children in foster care represent a group at extremely high risk for a range of negative outcomes across the lifespan, including high rates of behavioral, social, mental health, and drug abuse and dependence problems (Leslie, Hurlburt, Landsverk, Barth, & Slymen, 2004; Vaughn, Ollie, McMillen, Scott, & Munson, 2007). Children in foster care have particular difficulties in school settings, showing poor literacy skills and high rates of special education placement, academic failure, and school dropout (Geenen & Powers, 2006; Pears, Fisher et al., 2010; Smithgall, Gladden, Howard, Goerge, & Courtney, 2004). Poor school adjustment and attendance predict marijuana and alcohol use and involvement in criminal

behavior over time in this population (Ryan, Hernandez, & Herz, 2007; Thompson & Auslander, 2007). Although there is limited research on the school readiness skills of children in foster care, emerging evidence shows that they lag behind their peers in academic and social-emotional skills (Fantuzzo & Perlman, 2007; Pears, Heywood, Kim, & Fisher, 2011). Given the evidence that children in foster care enter school with less developed skills and the importance of school readiness to later school adjustment, testing promising interventions to promote school readiness in these children is clearly warranted.

Although intervention programs designed for use in general or low-SES populations might benefit children in foster care, these programs may be insufficient to fully address these children's needs. Specifically, abuse and neglect, parental deprivation, and subsequent caregiver transitions—all common experiences for children placed into foster care—appear to be associated with alterations in the brain regions that underlie self-regulatory skills. For example, experiencing multiple caregiver transitions has been linked to deficits in inhibitory control (Lewis, Dozier, Ackerman, & Sepulveda, 2007; Pears, Bruce, Fisher, & Kim, 2010). As cited above, self-regulatory skills are central to children's readiness to learn, participate in classroom activities, and maintain positive peer relationships (Howse et al., 2003). Although some specialized preschool programs might briefly address self-regulatory skills, it is not a main focus of typical programs and thus might be insufficient to address the self-regulatory deficits among children in foster care. Experiencing multiple caregiver transitions is also likely to have a detrimental effect on caregiver involvement in early literacy activities. Such involvement is linked to kindergarten preparedness and subsequent school adjustment (Evans, Shaw, & Bell, 2000; Senechal & LeFevre, 2002). While some preschool programs emphasize caregiver involvement (e.g., Head Start), not all do. Overall, to better serve children in foster care, interventions might need to accommodate the short-term nature of foster care placements and include emphases on self-regulatory skills and caregiver involvement in early literacy in addition to other core components of school readiness.

The Present Study

The KITS Program is a short-term, readily scalable intervention focusing on school readiness and improved subsequent school functioning that was specifically designed for children in foster care (Pears, Fisher, & Bronz, 2007; Pears, Fisher, Heywood, & Bronz, 2007). To that end, the KITS program occurs in two phases. The *school readiness phase* (approximately two thirds of the curriculum) occurs in the 2 months before kindergarten entry and focuses on preparing the children and caregivers for school. The *transition/maintenance phase* occurs in the first 2 months of kindergarten and focuses on supporting a positive transition to school. The KITS Program is based on the rationale that efficacious school readiness interventions should be *developmentally timed* to occur at the critical transition to school, include a *focus on self-regulatory skills* as well as early literacy and prosocial skills, and feature *high-density occurrences of learning opportunities*.

Developmental timing

The KITS Program is designed for delivery during the summer before and the first 2 months of kindergarten. Pianta and Cox (1999) argued that this period is optimal for intervention because children reorganizing their competencies for the transition might be particularly open to influence and this transition might set the trajectory of the child's later school career. Also, as noted above, programs that operate during the academic year create a summer services gap, which the KITS Program is designed to fill.

Focus on self-regulation

Within the manualized KITS school readiness group curriculum, the children are taught specific emotion and behavior regulation skills, including how to focus attention, sit still, and wait for one's turn. Additionally, within the KITS caregiver group curriculum, the caregivers learn evidence-based, positive behavior management skills that parallel those used in the school readiness groups. Caregivers' use of positive control may contribute to children's self-regulation (see Karreman, van Tuijl, van Aken, & Deković, 2008).

High-density occurrences of learning opportunities

Hamre and Pianta (2007) defined learning opportunities as "a set of theoretically driven dimensions of interactions between adults and children with empirically supported links to children's social, emotional, and academic achievement" (p. 50). Within many early learning settings, children might spend less than half of their time in instructional activities (Hamre & Pianta, 2007). The KITS curriculum is designed to include a high density of occurrences of learning opportunities focused on critical early literacy, prosocial, and self-regulatory skills within the ecologically valid context of the classroom. Transitions and snack times are also utilized as instructional opportunities. Because the caregiver curriculum highlights the skills taught in the classroom, the caregivers can reinforce and practice these skills at home.

Using a randomized controlled trial (RCT) design, we evaluated the efficacy of the school readiness phase of the intervention for increasing readiness skills prior to kindergarten entry among children in foster care. We focused on this phase because the measurement of skills prior to school entry allows us to observe the "purest" effects of the intervention (i.e., after school entry, classroom environment and curriculum could moderate the effects of the intervention and thus require separate evaluation from the analyses reported here). We hypothesized that the school readiness phase of the intervention would have positive effects on early literacy, prosocial, and self-regulation skills regardless of baseline levels.

Method

Participants

One hundred ninety-two children in foster care and their caregivers participated in the RCT. At recruitment, each child had to be in nonkinship or kinship foster care in one of two counties in the Pacific Northwest, entering kindergarten in the fall, a monolingual or bilingual English speaker, and not involved in another treatment protocol closely associated with the KITS Program. If a child was deemed eligible to participate, a staff member contacted the child's caseworker (considered the legal guardian while the child is in foster care) to request consent for the child to participate and then contacted the caregiver(s) to invite them to participate. For a successful recruitment, both the caseworker and caregiver(s) had to consent to participate. Because of the complexity of this multistep process, families were randomized to the KITS group or to the foster care comparison (FCC) group prior to contacting the caseworker and caregiver(s).

Of the 339 families who were eligible to participate in the study, 219 (65%) initially verbally agreed to participate (113 KITS; 106 FCC). Twenty-seven of these families (11 KITS; 16 FCC) withdrew from the study before baseline data were collected. The demographic characteristics of the 192 participating families (102 KITS; 90 FCC) are presented in Table 1. There were no statistically significant differences between groups on any of these variables.

Study Design and Procedures

The children were assessed at the beginning of the summer before kindergarten, prior to the intervention (Time 1 [T1]) and at the end of the summer prior to kindergarten entry but after the school readiness phase of the intervention (Time 2 [T2]). T2 was timed so that the children's readiness skills could be measured before any formal elementary school instruction began and before any differences between the children's schools and classes could affect their skills.

Data collection procedures—At T1 and T2, the families participated in center-based assessments: a battery of standardized tests for children and a structured interview and questionnaires for caregivers. Consistent with a multi-method, multi-informant approach, several measures were used as indicators of each outcome domain. All data collection staff members were blind to the group assignment of the children and caregivers.

Intervention protocol—The KITS intervention occurs during the 2 months prior to kindergarten entry (school readiness phase) and the first 2 months of kindergarten (transition/maintenance phase). The intervention consists of two primary components: a 24-session school readiness group for the children (2 hr, twice weekly in the school readiness phase, 16 sessions; 2 hr, once weekly in the transition/maintenance phase, 8 sessions) focused on promoting early literacy and social-emotional skills and an 8-session caregiver group (2 hr, every 2 weeks; 4 sessions in each intervention phase) focused on promoting caregiver involvement in early literacy and school. As noted above, the study presented here covers the effects of the school readiness phase of the intervention.

School readiness group structure and curriculum—Like a typical kindergarten schedule, the school readiness group sessions have a highly structured, consistent routine with many transitions between activities. The sessions are held in center- or school-based classrooms. The manualized school readiness group curriculum covers three skill areas identified in prior research as being associated with later school outcomes: *early literacy skills* (e.g., letter names, phonological awareness, conventions of print, and comprehension), *prosocial skills* (e.g., reciprocal social interaction, social problem-solving, and emotion recognition), and *self-regulatory skills* (e.g., handling frustration and disappointment, controlling impulses, following multistep directions, listening, and making appropriate transitions). The curricular objectives are clearly specified for each session by skill domain, and the activities promote these specific skills. For example, the early literacy activities include a letter of the day (letter naming and letter–sound knowledge), a poem of the week (phonological awareness, concepts about print, and language), and storybook and dramatic activities (understanding of narrative). Prosocial and self-regulatory skills are taught using a blend of instruction (e.g., teachers define *sharing*, provide verbal examples, and ask the children for examples), role-playing (e.g., teachers model sharing and not sharing in a series of skits and children are asked to differentiate between the two), and activity-based intervention (e.g., children must share materials to complete an art project); the children receive feedback and guided practice in using the target skills. Multiple opportunities for using inhibitory control, maintaining attentional focus, and practicing newly acquired social skills are embedded across activities. A graduate-level lead teacher and two assistant teachers conduct the school readiness groups with 12–15 children. The high staff-to-child ratio provides children with high levels of support and feedback while practicing new skills.

Caregiver group structure and curriculum—The caregiver group meetings coincide with the school readiness group meeting times. Each group is led by a facilitator and an assistant. The manualized caregiver curriculum includes foci on skills relevant to the kindergarten transition (e.g., helping children to develop their early literacy skills,

developing routines around school activities, preparing children for the kindergarten transition, and using behavior management skills that parallel those used in the school readiness groups). The facilitator presents information, leads structured group discussions of the materials, and addresses questions and concerns. Skill acquisition is reinforced via role-plays and opportunities to practice new skills. A caregiver who misses a session receives a home visit (or a phone call if necessary) from the facilitator to cover the content and materials for that session.

The KITS school readiness group teachers and caregiver group facilitators complete a standardized 40-hr training program. At weekly intervention team meetings, the progress of individual families within the three school readiness domains is discussed, and strategies to address behavioral and literacy needs within the broader curriculum are planned.

Additional curriculum and data collection—The children and caregivers receive supplemental materials to support the implementation of new skills. These include weekly homework assignments, weekly *Home–School Connection* newsletters outlining the school readiness group topics for a given week, and home practice activities.

Attendance at school readiness groups and caregiver groups (or caregiver home visits and phone calls) was documented. On average, the children attended 74% of the school readiness group sessions in the school readiness phase of the intervention, and 72% of the children attended 75% or more of those sessions. The caregivers received 73% of the sessions in the school readiness phase, and 73% of the caregivers received 75% or more of those sessions. Implementation fidelity for the school readiness groups was determined by trained coders in vivo or via videotape based on systematic coding of the presence or absence of key elements of the curriculum (98% of the curriculum components were covered; range = 75 – 100%). Additionally, coders rated the teachers on implementation of key behavior management strategies (e.g., “Pre-taught expectations”, “Ignored or re-directed child non-compliance”) on a 3 point scale: 1 ‘did not occur’, 2 ‘sometimes occurred’ and 3 ‘did not occur’. On average, teachers received a rating of 2.95. Implementation fidelity for the caregiver groups was determined through caregiver ratings of whether the weekly topics had been covered (100% of the components were covered).

Foster care comparison group—Children in this group received services commonly offered by the child welfare system, which could include individual child psychotherapy, participation in Head Start or another early childhood education program, and services such as speech therapy. No attempt was made to influence the type or amount of services given to children or their families.

Measures

Early literacy skills—Letter naming and letter–sound awareness were measured using the Letter Naming Fluency and Initial Sound Fluency subtests of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002). For the first subtest, the child is asked to identify as many letters as possible from a randomly ordered array of uppercase and lowercase letters. The score is the number of correct letters identified in 1 min. For the latter subtest, the child is asked to orally produce the initial sound of a word that corresponds to a stimulus picture. The total score is the number of correct initial sounds produced in 1 min.

Understanding of concepts about print was measured using the 24-item Concepts About Print Test (Clay, 2000), which assesses such print conventions as reading left to right, matching spoken to written words, and distinguishing pictures from text. The children

received 1 point for each correct answer, summed to produce a total score (standardized α = .77 at T1 and T2).

For the final indicator of early literacy skills, a caregiver rating of prereading skills was used.The caregivers were asked if the child could: recognize the letters of the alphabet (0 [*none*] to 3 [*all*]) and write his or her first name (0 [*no*] or 1 [*yes*]). Caregiver answers across these two questions were well correlated at T1 ($r = .36$, $p < .001$) and at T2 ($r = .42$, $p < .001$). Thus, their responses were standardized and averaged to produce a composite caregiver rating of prereading skills at T1 and T2 with higher scores indicating greater reading skills.

Prosocial skills—Caregivers completed the Preschool Penn Interactive Peer Play Scale (PIPPS; McWayne, Sekino, Hampton, & Fantuzzo, 2002): Play Interaction, Play Disruption, and Play Disconnection subscales. The Play Interaction scale asks caregivers to report the frequency with which children engage in prosocial behaviors such as helping, sharing, encouraging others to join play, and settling conflicts. Because prosocial skills were foci of the intervention, the Play Interaction scale was used in the present analyses (standardized α = .79 and .78 at T1 and T2, respectively). The raw Social Competence score from the caregiver-completed Child Behavior Checklist/4 – 18 (CBCL; Achenbach, 1991) was also used as an indicator. This version of the CBCL was used to ensure that items would be the same across the preschool and elementary school period.

Finally, emotion understanding was directly measured using eight short vignettes describing situations that would typically be expected to elicit happiness, sadness, anger, or fear (Fries & Pollak, 2004). The children were asked to select the picture that best represented the emotional state of the protagonist in each vignette and were scored as follows: 2 (*correctly identified the targeted emotion depicted in the story*), 1 (*selected an emotion of the same valence as the targeted emotion*), and 0 (*did neither*). Scores were summed across the eight vignettes.

Self-regulation—Self-regulation was assessed by composite scores for the three subcomponents: inhibitory control, behavioral regulation, and emotional regulation.

Inhibitory control: Scores from four measures were combined to create the inhibitory control composite. First, the caregivers completed the Children's Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001). Scores on the Inhibitory Control subscale (standardized α = .76 at T1 and T2) and the Attentional Focusing subscale (standardized α = .71 and .79 at T1 and T2, respectively) were averaged ($r = .54$ and .56, $p < .001$, at T1 and T2, respectively). Second, the caregivers completed the Inhibit subscale (standardized α = .91 and .92 at T1 and T2, respectively) from the Brief Rating Inventory of Executive Function–Preschool Version (BRIEF–P; Gioia, Espy, & Isquith, 2003). Third and fourth, the children completed two computer-administered tasks shown to activate specific regions of the prefrontal cortex and anterior cingulate gyrus (Botvinick, Nystrom, Fissell, Carter, & Cohen, 1999; Casey et al., 1997). The go/no go task required the children to inhibit a prepotent response by selectively responding to go stimuli while inhibiting responses to equally salient no go stimuli (Casey et al., 1997). Shapes were presented individually for 500 ms, and the children were instructed to press a button as quickly as possible for every shape (go stimuli; 75% of trials) except circles (no go stimulus; 25% of trials). Percentage of correctly inhibited responses on the no go trials was used as an indicator of inhibitory control. Scores from this task were excluded from analyses for 15 children at T1 and 10 children at T2 due to poor behavioral performance (i.e., less than 50% accuracy on the go trials and greater than 75% accuracy on the no go trials).

The flanker task required the children to selectively attend and respond to target stimuli in the presence of interfering stimuli (McDermott, Perez-Edgar, & Fox, 2007). A horizontal row of five circles was presented for 700 ms, and the children were instructed to press the button corresponding to the color of the central circle. The task included congruent trials (i.e., five red circles or five green circles) and incongruent trials (i.e., a central red circle flanked by green circles or a central green circle flanked by red circles). Three blocks of 60 trials each were presented. Percentage of errors of commission on the incongruent trials (reverse scored) was used as an indicator of inhibitory control. Scores from this task were excluded from analyses for 16 children at T1 and 6 children at T2 due to poor behavioral performance (i.e., more than 50% errors of omission and less than 25% errors of commission or less than 10% correct on trials with one color and greater than 80% correct on trials with the other color). Scores from the CBQ, BRIEF–P, and go/no go and flanker tasks were standardized and averaged to produce a composite inhibitory control score at T1 (standardized $\alpha = .61$) and at T2 (standardized $\alpha = .64$).

Behavioral regulation: Three measures were used to form a composite score of behavioral regulation. First, reversed scores on the Activity Level subscale (standardized $\alpha = .69$ and .73 at T1 and T2, respectively) and Impulsivity subscale (standardized $\alpha = .65$ at T1 and T2) of the CBQ were averaged at T1 and T2 ($r = .64$ and .53, $p < .001$ at T1 and T2, respectively). Second, the reversed score on the Externalizing subscale of the CBCL was used (standardized $\alpha = .91$ at T1 and T2). Third, the reversed score on the Lability subscale of the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997) was used (standardized $\alpha = .87$ at T1 and T2). The CBQ, CBCL, and ERC indicators were standardized and averaged to produce the behavioral regulation composite score (standardized $\alpha = .80$ and .82 at T1 and T2, respectively).

Emotional regulation: To measure emotional regulation, the reversed scores on the Anger subscale (standardized $\alpha = .78$ and .81 at T1 and T2, respectively) and the Reactivity/Soothability subscale (standardized $\alpha = .74$ and .79 at T1 and T2, respectively) of the CBQ were utilized. These indicators were averaged and combined at T1 and T2. The Emotion Regulation scale from the ERC was also utilized in this composite (standardized $\alpha = .75$ and .69 at T1 and T2, respectively). Finally, the reversed score on the Emotion Control subscale of the BRIEF–P was included in the composite score (standardized $\alpha = .89$ and .88 at T1 and T2, respectively). These indicators were standardized and averaged to create an emotional regulation composite score at T1 and at T2 (standardized $\alpha = .64$ and .67 at T1 and T2, respectively).

Treatment status—In these analyses, treatment status was represented by a dichotomous variable: 1 (*KITS intervention group*) or 0 (*FCC group*).

Control variables—A number of control variables assessed at T1 were included in the analyses. First, gender was included as a dichotomous variable: 0 (*male*) or 1 (*female*). Second, to control for general developmental delays, the sum of the scaled scores for the Block Design and Vocabulary subscales of the Wechsler Preschool and Primary Scales of Intelligence–Third Edition (WPPSI-III; Wechsler, 2002) were used to estimate a full-scale IQ or general cognitive ability (Sattler & Dumont, 2004). Third, type of foster care was included as a dichotomous variable: 0 (*nonkinship foster care*) or 1 (*kinship foster care*). Fourth, Latino ethnicity was included as a dichotomous control variable: 0 (*not of Latino ethnicity*) or 1 (*Latino ethnicity*). The children had to be bilingual or monolingual English speakers to participate in the study. However, given that the children were recruited after entering foster care, it was not possible to ascertain whether English was the primary language used in their biological homes or how long they had been speaking English, which

could have affected the outcome measures. Fifth, to control for prior early childhood education experiences, caregivers were asked to indicate how long their children had attended Head Start and how long they had attended any other daycare. Answers ranged from 0 (*no prior Head Start/daycare*) to 6 (*more than 2 years of prior Head Start/daycare*). As a child's history of early childhood education experiences might impact school readiness outcomes, we chose to use this variable collected at T1 because it included all educational experiences prior to the study. In preliminary analyses, we also examined effects of early childhood education experiences during the study. These did not significantly alter the results and thus we chose to use the more inclusive variable. There were no significant group differences on the control variables.

Data Analysis Plan

Preliminary analyses were conducted to examine group differences on the indicators of the outcome variables at T1. The correlations among the variables were then examined. SEM using Mplus version 6 (Muthén & Muthén, 1998–2010) was conducted to test the effects of the school readiness phase of the KITS Program on early literacy, prosocial, and self-regulatory skills. For each outcome, a separate model was tested in several steps. First, a latent variable model with indicators of the outcome of interest at both T1 and T2 was fit to the data to confirm the adequacy of the hypothesized indicators. Next, the direct effects of the covariates on the T1 outcome and the direct effect of intervention status on the T2 outcome were modeled. Factor loadings of outcome indicators were constrained to be equal across time in order to ensure the same factor structure for both time points. (Note that factor loadings are not equal across time in the figures because they are standardized.) We included the effects of Head Start and daycare experiences on both T1 and T2 outcomes in order to stringently test the possibility that intervention effects could be accounted for by prior early childhood education experiences. Lastly, to maximize power, a model was fitted that included only the covariates with significant direct effects on the T1 outcome (or T2 outcomes for early childhood education experiences) and the intervention effects.

When the intervention effect was found to be significant, the size of the effect was computed using the formula for the independent-groups pretest-posttest design (IGPP; Feingold, 2009): $d = (M_{\text{change-KITS}}/SD_{\text{raw(pre-KITS)}}) - (M_{\text{change-FCC}}/SD_{\text{raw(pre-FCC)}})$, where $M_{\text{change-KITS}}$ is the mean change for the KITS group, $M_{\text{change-FCC}}$ is the mean change for the FCC group, $SD_{\text{raw(pre-KITS)}}$ is the pretest SD for the KITS group, and $SD_{\text{raw(pre-FCC)}}$ is the pretest SD for the FCC group.

Complete data were available on all control variables for 79.2% of the sample; 7.3% and 19.3% of the sample had missing data on one or more of the indicators of the latent outcome variables at T1 and T2, respectively. Although the missing data were minimal, full information maximum likelihood estimation with robust standard errors (to account for the nonindependence due to having several siblings in the data) was utilized to take full advantage of the available data. This method has been shown to provide unbiased estimates when data are missing at random (Arbuckle, 1996). The Little's Missing Completely at Random tests were not significant for any of the three models ($\chi^2 = 49.38$, $df = 50$, $p = .50$ for the early literacy model; $\chi^2 = 71.71$, $df = 66$, $p = .29$ for the prosocial model; and $\chi^2 = 38.98$, $df = 36$, $p = .34$ for the self-regulation model), indicating a random distribution of the missing data.

Results

There were no significant mean differences between groups on any of the outcome indicators at T1. Means and standard deviations for the outcome indicators for each group at T1 and T2 are shown in Table 2. As there were a large numbers of correlations, to avoid

Type 1 error, Bonferroni corrections were applied; only correlations with $p < .001$ are reported as significant. The associations between the outcome indicators and the control variables of interest are shown in Tables 3 and 4. As expected, child general cognitive ability (KITS $M = 90.68$, $SD = 13.86$; FCC $M = 90.15$, $SD = 13.57$) was significantly correlated with most early literacy skills and the emotion understanding skills. Being female was positively associated with inhibitory control skills across both time points. Neither being in kinship versus nonkinship foster care nor Latino ethnicity were significantly associated with the outcome measures. Similarly, neither time spent in Head Start prior to the start of study (KITS $M = 1.56$, $SD = 1.69$; FCC $M = 2.04$, $SD = 1.64$) or time spent in day care (KITS $M = 1.47$, $SD = 1.70$; FCC $M = 1.76$, $SD = 1.77$) were significantly associated with any of the outcome indicators.

Intervention Effects on Early Literacy

The model examining early literacy fit the data well, $\chi^2(29) = 37.85$, $p = .13$, CFI = .99, TLI = .98, RMSEA = .04. Covariances between indicators of early literacy were included to account for significant correlations across indicators. As shown in Figure 1, all of the indicators loaded significantly on the early literacy latent variable at T1 and T2, suggesting that these indicators were adequate measures of early literacy. Child general cognitive ability was positively associated with T1 early literacy. Consistent with our hypotheses, the effect of the school readiness phase of the KITS intervention on T2 early literacy was significant and positive even after controlling for the covariate and T1 early literacy. To calculate the size of the intervention effect, we averaged the standardized means of all the indicators for the early literacy latent variables at each time point for each group. The means for this composite score were as follows: for the KITS group T1 $M = -0.07$ ($SD = 0.75$) and T2 $M = 0.02$ ($SD = 0.79$); for the FCC group T1 $M = 0.08$, ($SD = 0.71$) and T2 $M = -0.02$ ($SD = 0.77$). These were entered into the formula outlined above yielding an effect size of .26.

Intervention Effects on Prosocial Skills

The model for prosocial skills (Figure 2) fit the data well, $\chi^2(30) = 33.87$, $p = .29$, CFI = .99, TLI = .98, RMSEA = .03. The significant factor loadings for all indicators confirmed the adequacy of these indicators. Child gender and type of foster care were significantly and positively related to T1 prosocial skills: girls and children in kinship foster care tended to have higher levels of prosocial skills. Contrary to our hypotheses, there were no statistically significant effects of the intervention on T2 prosocial skills.

Intervention Effects on Self-Regulatory Skills

The model for self-regulatory skills (Figure 3) fit the data well, $\chi^2(31) = 39.00$, $p = .15$, CFI = .99, TLI = .99, RMSEA = .04. Again, all indicators loaded significantly on the self-regulatory latent variable, suggesting that they adequately represented child skills at T1 and T2. Child gender and Latino ethnicity were positively related to self-regulatory skills at T1: girls and children of Latino ethnicity tended to have higher levels of self-regulation. In addition, the amount of time children attended child care was negatively associated with self-regulatory skills at T2. As hypothesized, there was a significant and positive intervention effect on self-regulatory skills over and above the effects of the covariates and the T1 self-regulatory skills. As with the literacy model, we calculated the size of the intervention effect by averaging the standardized means of the indicator variables [for the KITS group, T1 $M = -0.04$ ($SD = 0.82$) and T2 $M = 0.04$ ($SD = 0.82$); for the FCC group, T1 $M = 0.05$ ($SD = 0.93$) and T2 $M = -.03$ ($SD = 0.90$)]. The effect size was .18.

Discussion

There has been considerable discussion in the literature about the importance of early intervention to improve outcomes for high-risk children (e.g., Shonkoff & Phillips, 2000). Evidence suggests that the financial return on investments in social programs is greater when the programs are delivered early in development (Heckman, 2006). Moreover, the plasticity of the brain is presumed to be greater earlier in life; thus, such interventions are more likely to produce lasting changes (Shonkoff & Phillips, 2000). These issues are particularly relevant in the foster care population, where widespread disparities across social, cognitive, and emotional domains have been observed (e.g., Leslie et al., 2005).

Most germane to the present study, children in foster care are at significant risk for school difficulties in the academic and social arenas (Courtney & Dworksy, 2006; Geenen & Powers, 2006) starting in the early elementary grades (Fantuzzo & Perlman, 2007; Pears, Fisher, et al., 2010). The KITS Program was designed to help such children by providing a short-term, theoretically-based intervention targeting empirically validated domains of school readiness. Our results suggest that the school readiness phase of the intervention facilitates school readiness prior to kindergarten entry.

The intervention had positive effects on growth in early literacy skills, controlling for baseline early literacy and general cognitive abilities. Intervention effects were also apparent when controlling for prior Head Start and child care experiences. As demonstrated by the means for the two groups, the KITS children showed increases on almost every indicator of literacy skills including: letter naming, understanding of concepts about print, and initial sound recognition. In contrast, the FCC children showed smaller gains or decreases in these skills, consistent with the theory that high-risk children lose or fail to gain valuable skills over the summer services gap (e.g., Alexander et al., 2001). Foundational reading skills have significant effects on reading acquisition and achievement (National Institute for Literacy, 2009). Thus, the improved preparedness of the KITS children could potentially positively impact their ongoing academic functioning.

We also found significant effects on self-regulatory skills, which are increasingly being emphasized in discussions of school readiness (e.g., Blair & Diamond, 2008). Our finding of significant intervention effects on self-regulatory skills is consistent with research demonstrating the efficacy of interventions in which self-regulatory skills are taught in tandem with other prosocial and/or early literacy skills within ecologically valid environments such as preschool and elementary school classrooms (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Riggs, Greenberg, Kusche, & Pentz, 2006). Improving self-regulatory abilities might be particularly important for children in foster care given the adverse effects of multiple caregiver transitions on inhibitory control (Lewis et al., 2007; Pears, Bruce et al., 2010).

Contrary to hypotheses, there were no significant intervention effects on prosocial skills. This might be partially due to the fact that measurement only included caregiver ratings. Although school-aged children spend part of their days with same-aged peers, preschool-aged children might not regularly find themselves in peer groups. Thus, caregivers might have insufficient opportunities to observe their children with peers and thus may find it difficult to answer questions related to peer group interactions. It might have been ideal to have observations of the children in peer groups, but this was not practical during the school readiness phase, as some of the children were not in a preschool environment. Once children enter school, observations and teacher ratings of their peer interactions become possible. With more opportunities to measure peer interactions, potential intervention effects might become more apparent.

Overall, our findings suggest significant intervention effects on two critical domains of school readiness prior to kindergarten entry. Beyond statistical significance, it is also important to consider the size of intervention effects, which ranged here from .18 for self-regulation to .26 for early literacy. Cohen (1988) suggested that these are “small” effects when compared to intervention effects across all of the behavioral sciences. However, in a recent review, Hill and colleagues (2008) suggested that empirical benchmarks based upon research on interventions and populations similar to those being used in a given study might be more meaningful. Results of their meta-analyses of educational interventions indicated average effect sizes ranging from .20 to .30. In a meta-analysis specific to summer interventions for general and high-risk students, Cooper and colleagues (2000) found a median effect size of .19. The KITS intervention shows comparable effect sizes.

That a short-term, research-informed intervention can be effective in promoting better school readiness in children in foster care is promising given the short-term nature of many foster care placements. The children are much more likely to receive the full dosage of such interventions. Additionally, because children in foster care might receive other services such as early childhood special education that typically occur during the academic year, the KITS intervention can complement those services, filling the summer services gap and providing an additional boost during the transition to school.

Limitations and Future Directions

Our study had three notable limitations. First, our sample was moderate in size compared to other randomized trials of prekindergarten interventions. However, this reflects the challenges inherent in recruiting participants in this population. Second, prosocial skills were measured by caregiver reports rather than direct observation. Since some of the children did not attend daycare or preschool, it was not practical to observe the children with their peers. However, in the RCT, in vivo observations are being completed after school entry. Thus, we can examine direct measures of prosocial skills in future studies. Third, although our sample was somewhat diverse (i.e., about one third Latino), the sample did not include many African-American children, a group that makes up a substantial proportion of the foster care population nationwide (Magruder & Shaw, 2008). Thus, these findings will need to be replicated with a more diverse sample.

As noted above, the RCT of the KITS intervention had two goals. The first goal was examined in the present study. The second, determining whether the intervention positively affects school adjustment after the transition to school, remains to be tested in future studies. Data is currently being collected from the children, their caregivers, and their teachers through the fifth grade. The RCT design will allow us to examine the effects of both phases of the intervention and mechanisms through which the effects of the school readiness phase impact later academic and social functioning in school.

In summary, children in foster care show unacceptably high rates of academic failure and school adjustment problems across their school years. As school readiness has been shown to have such a powerful and lasting effect, intervention at this critical transition point seems particularly warranted for these children. As shown here, an intervention designed to prepare these children for school can improve their early literacy and self-regulatory skills. Providing these children with the chance to start school with better skills has the potential to improve their long-term academic and social trajectories.

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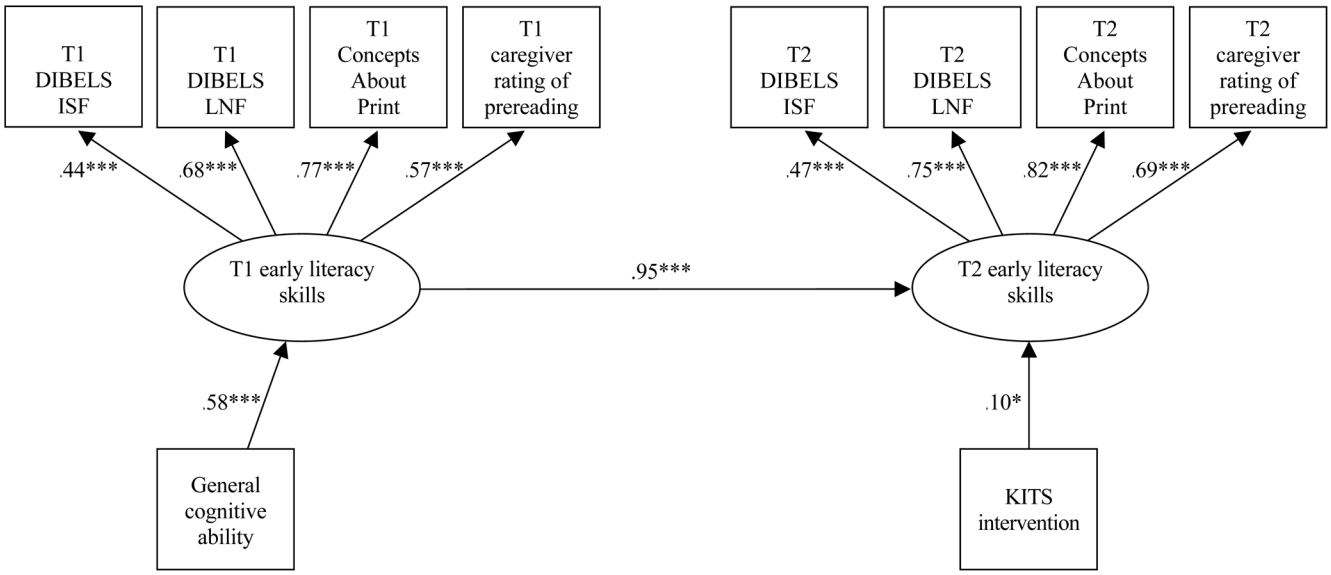

Figure 1.
Effects of the KITS intervention on early literacy skills
Note: All path coefficients are standardized.
* $p < .05$; ** $p < .01$; *** $p < .001$

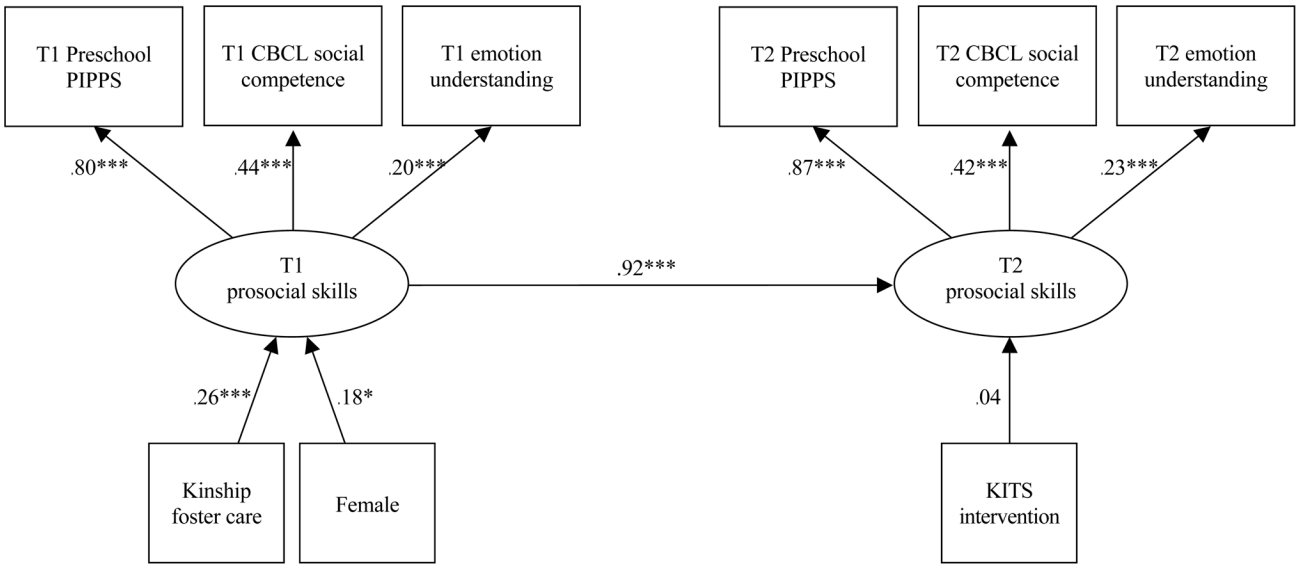

Figure 2.
Effects of the KITS intervention on prosocial skills
Note: All path coefficients are standardized.
* $p < .05$; ** $p < .01$; *** $p < .001$

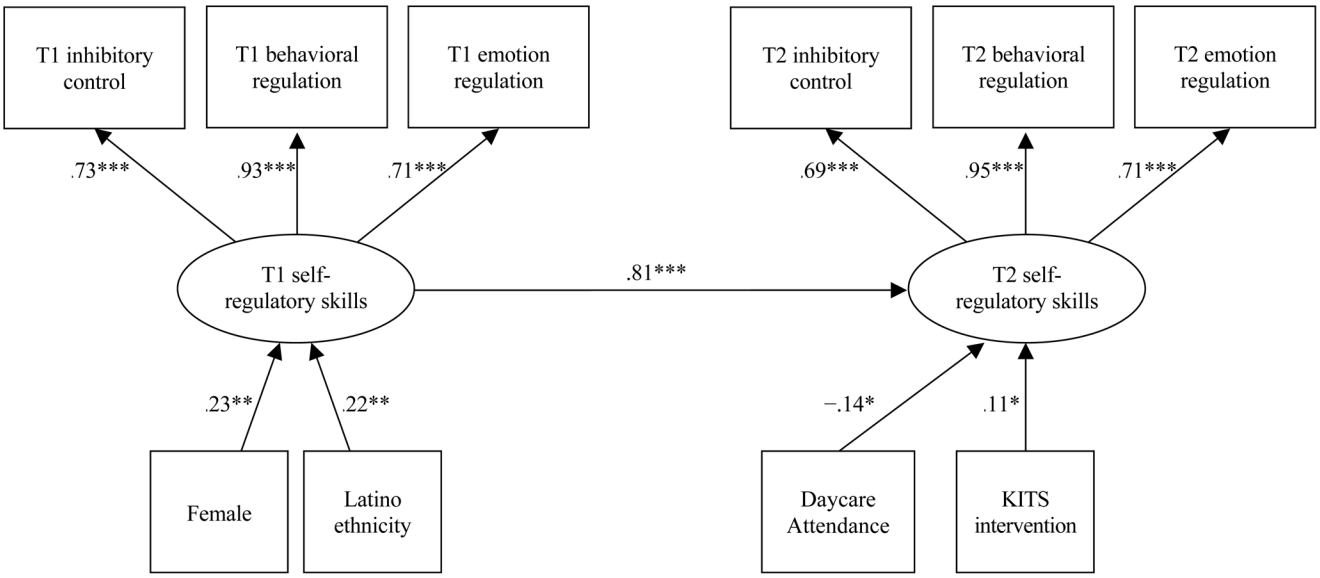

Figure 3.
Effects of the KITS intervention on self-regulatory skills
Note: All path coefficients are standardized.
* $p < .05$; ** $p < .01$; *** $p < .001$

Table 1

Demographic characteristics

Demographic variable	KITS group	FCC group
M age (years)	5.26	5.25
SD (years)	0.33	0.35
Male (%)	52	46
Nonkinship foster care (%)	62	61
Ethnicity (%)		
European American	55	51
Latino	30	31
African American	1	0
Native American	2	0
Pacific Islander	2	0
Mixed race	10	18

Note. KITS = Kids in Transition to School; FCC = foster care comparison.

Table 2

Means and standard deviations by group for the outcome indicators at T1 and T2

	KITS group				FCC group			
	T1		T2		T1		T2	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
DIBELS: Initial Sound Fluency	5.64	5.69	7.68	7.41	6.20	6.05	6.87	6.93
DIBELS: Letter Naming Fluency	6.90	9.96	8.75	11.04	7.37	9.40	8.52	10.43
Concepts About Print	4.98	3.24	7.10	3.28	5.59	3.32	6.45	3.85
Caregiver Rating of Prereading Skills[a]	−0.09	0.85	−0.06	0.87	0.11	0.80	0.07	0.81
Preschool PIPPS Score	2.73	0.47	2.73	0.40	2.80	0.41	2.78	0.42
CBCL Social Competence	4.54	1.82	4.77	1.99	4.94	1.86	4.87	2.03
Emotion understanding	9.52	3.08	10.80	2.86	8.78	3.27	11.01	2.82
Inhibitory Control[a]	−0.01	0.71	−0.01	0.69	0.05	0.70	−0.04	0.76
Behavioral Regulation[a]	−0.02	0.77	0.07	0.84	0.02	0.92	−0.07	0.89
Emotional Regulation[a]	−0.05	0.71	−0.01	0.79	0.07	0.81	−0.01	0.77

Note. T1 = Time 1; T2 = Time 2; DIBELS = Dynamic Indicators of Basic Early Literacy Skills; PIPPS = Penn Interactive Peer Play Scale; CBCL = Child Behavior Checklist.

[a]Standardized means for composite variables.

Table 3

Correlations among the indicator variables for the outcomes at T1 and T2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. T1 DIBELS: Initial Sound Fluency	—																		
2. T1 DIBELS: Letter Naming Fluency	.28***	—																	
3. T1 Concepts About Print Test	.32***	.49***	—																
4. T1 Caregiver Rating of Prereading Skills	.21	.61***	.43***	—															
5. T2 DIBELS: Initial Sound Fluency	.41***	.40***	.36***	.23	—														
6. T2 DIBELS: Letter Naming Fluency	.39***	.84***	.54***	.54***	.51***	—													
7. T2 Concepts About Print Test	.26	.46***	.62***	.47***	.40***	.57***	—												
8. T2 Caregiver Rating of Prereading Skills	.20	.53***	.51***	.65***	.32***	.56***	.49***	—											
9. T1 Preschool PIPPS Score	.01	.23	.14	.28***	.12	.24	.27***	.27	—										
10. T1 CBCL Social Competence	.03	.16	.08	.14	−.01	.12	.09	.08	.35***	—									
11. T1 Emotion Understanding	.14	.18	.29***	.24	.19	.17	.31***	.32***	.22	.00	—								
12. T2 Preschool PIPPS Score	−.05	.16	.16	.28***	−.04	.12	.19	.25	.64***	.39***	.17	—							
13. T2 CBCL Social Competence	−.04	.15	.10	.13	−.07	.10	.02	.13	.36***	.58***	.03	.40***	—						
14. T2 Emotion Understanding	.19	.18	.33***	.34***	.27	.24	.38***	.34***	.27	.03	.36***	.27	.08	—					
15. T1 Inhibitory Control	.13	.28***	.19	.34***	.10	.27	.15	.23	.36***	.32***	.19	.31***	.36***	.19	—				
16. T1 Behavioral Regulation	.08	.16	.03	.19	.04	.16	.08	.06	.33***	.25	.07	.26	.29***	.08	.69***	—			
17. T1 Emotional Regulation	−.04	.22	.12	.28***	.03	.24	.23	.25	.53***	.33***	.18	.48***	.36***	.14	.55***	.65***	—		
18. T2 Inhibitory Control	.03	.24	.09	.21	.07	.25	.12	.19	.24	.23	.15	.23	.28***	.15	.73***	.54***	.37***	—	
19. T2 Behavioral Regulation	−.05	.15	−.13	.07	−.05	.12	−.02	.04	.20	.20	−.03	.25	.29***	.02	.59***	.73***	.51***	.64***	—
20. T2 Emotional Regulation	−.04	.18	.08	.18	−.04	.16	.17	.19	.42***	.23	.09	.50***	.34***	.07	.46***	.53***	.68***	.48***	.68***

Note. T1 = Time 1; T2 = Time 2; DIBELS = Dynamic Indicators of Basic Early Literacy Skills; PIPPS = Penn Interactive Peer Play Scale; CBCL = Child Behavior Checklist.

*** $p < .001$ (two-tailed).

Table 4

Correlations between the outcome indicators and control variables

	Female gender	General Cognitive ability	Kinship Foster care	Latino ethnicity	Head Start time	Daycare time
1. T1 DIBELS: Initial Sound Fluency	.03	.24	−.01	−.08	.05	.01
2. T1 DIBELS: Letter Naming Fluency	.12	.37***	.14	−.18	.07	.08
3. T1 Concepts About Print Test	−.03	.46***	−.08	−.10	.16	.03
4. T1 Caregiver Rating of Prereading Skills	.14	.37***	.17	−.09	.16	−.02
5. T2 DIBELS: Initial Sound Fluency	.12	.24	.00	−.03	−.08	.02
6. T2 DIBELS: Letter Naming Fluency	.19	.32***	.08	−.12	.01	.10
7. T2 Concepts About Print Test	.09	.42***	−.02	−.13	.04	.12
8. T2 Caregiver Rating of Prereading Skills	.09	.35***	.09	−.02	.23	.08
9. T1 Preschool PIPPS Score	.24	.17	.24	.09	.20	.04
10. T1 CBCL Social Competence	.04	−.01	−.01	.07	.17	−.01
11. T1 Emotion Understanding	.08	.39***	.10	−.08	.06	.14
12. T2 Preschool PIPPS Score	.11	.17	.26	.11	.15	−.01
13. T2 CBCL Social Competence	−.01	−.02	.09	.22	.10	−.03
14. T2 Emotion Understanding	.10	.41***	.20	−.07	.12	.19
15. T1 Inhibitory Control	.26***	.22	.13	.17	.06	−.06
16. T1 Behavioral Regulation	.19	.03	.17	.18	.01	−.04
17. T1 Emotional Regulation	.13	.07	.10	.17	−.06	−.02
18. T2 Inhibitory Control	.30***	.21	.18	.02	.03	−.07
19. T2 Behavioral Regulation	.21	−.08	.21	.18	.04	−.20
20. T2 Emotional Regulation	.06	.09	.23	.10	.00	−.11

Note. T1 = Time 1; T2 = Time 2; DIBELS = Dynamic Indicators of Basic Early Literacy Skills; PIPPS = Penn Interactive Peer Play Scale; CBCL = Child Behavior Checklist.

*** $p < .001$ (two-tailed).