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Immediate Effects of a Program to Promote School Readiness in Low-Income Children: Results of a Pilot Study

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Abstract

Children from low-income backgrounds demonstrate poorer school readiness skills than their higher-income peers. The Kids in Transition to School (KITS) Program was developed to increase early literacy, social skills, and self-regulatory skills among children with inadequate school readiness. In the present study, 39 families participated in a pilot efficacy trial conducted through a community collaboration to examine the feasibility and impact of the KITS program with families from disadvantaged neighborhoods. Participating families were demographically representative of the larger populations in the participating school districts. Children who received the intervention demonstrated significantly greater improvements in letter naming, initial sound fluency, and understanding of concepts about print than their peers who did not participate in the intervention, as well as decreases in aggressive responses to peer provocation and increases in self-regulation skills. Results suggest that a brief, focused school readiness intervention is feasible to conduct with low-income families and may improve critical skills.

Keywords

school readiness; low income; self-regulation; caregiver involvement; intervention

For decades it has been recognized that the gap in school achievement between socioeconomically advantaged and disadvantaged children is apparent as early as school entry (Entwistle, Alexander, & Olsen, 1997; U.S. Department of Health & Human Services, 2000). Children from low SES backgrounds tend to enter school with poorer literacy and social skills than their peers (Foster, Lambert, Abbott-Shim, McCarty, & Franze, 2005; Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006). Deficits in school readiness increase risks for academic and social failures which, in turn, may lead to lower rates of educational and occupational attainment, and higher rates of drug use, delinquency, and mental health difficulties (e.g., Fothergill et al., 2008; Shochet, Dadds, Ham, & Montague, 2006; Wiesner & Windle, 2004). To prevent these outcomes, researchers have attempted to improve school readiness skills through a number of early childhood learning interventions, most notably the Chicago Parent–Child Centers (Reynolds & Temple, 2008), the Abecedarian Project (Ramey & Ramey, 2004), and Head Start (Zigler, 1987). The effects of such programs have generally been positive and, in some cases, have persisted into adolescence and adulthood (Campbell et al., 2008; Ou & Reynolds, 2008; Zigler & Styfco, 2010).

School readiness interventions that have demonstrated impacts into adolescence and adulthood are typically intensive and long term (i.e., 1 year or more), leading some researchers to assert that longer-term interventions might be required to prevent behavioral and academic problems (Greenberg, Domitrovich, & Bumbarger, 2001). However, not all economically disadvantaged children can take full advantage of long-term interventions due to the high mobility of this population (Scanlon & Devine, 2001). Additionally, state spending on pre-kindergarten programs has recently declined (Barnett, Epstein, Friedman, Sansanelli, & Hustedt, 2009). Lack of funding limits the available slots for eligible children in programs, leaving some families without these services (Goerge, Dilts, Yang, Wasserman, & Clary, 2007). For example, Head Start serves fewer than 60% of all eligible children nationally (Barnett et al., 2009).

Further, few of these programs operate during the summer. Over the course of the summer, disadvantaged children might lose reading and math skills (Borman, Benson, & Overman, 2005) or fail to gain skills at the same rate as their more advantaged peers (Alexander, Entwistle, & Olson, 2001; Downey, von Hippel, & Broh, 2004). The effects of this “summer setback” become cumulative, widening the achievement gap across the school years (Alexander et al., 2001). Efforts to prevent this setback in disadvantaged children via summer programs with specific foci on academic and social skills have proven to effectively promote skill gains (Harris, Kelly, Valentine, & Muhlenbruck, 2000; Lauer et al., 2006).

The Kids In Transition to School Program was designed to be a high-intensity, short-term school readiness intervention (24 child sessions; 8 parent sessions) delivered in the summer before and first 2 months of kindergarten. The intervention was originally developed to address school readiness deficits in foster children (Pears et al., 2013). This article details the efforts of a community collaboration that included the developers of the KITS Program

at a non-profit research institute and representatives from local school districts and community organizations working to bring the KITS Program into impoverished neighborhoods in a medium-sized metropolitan area. The purpose of the present pilot study was to evaluate the feasibility of offering the intervention to families of incoming kindergarteners in these areas as well as to document the efficacy of the program with this population.

The Kids in Transition to School (KITS) Program

The KITS Program is based on the idea that a high-intensity, short-term intervention delivered just before and during the transition to kindergarten is likely to result in an immediate increase in school readiness, which will improve child school adjustment in kindergarten and first grade (Pears et al., 2013). Three principles underlie the KITS Program. The first is that efficacious interventions have to be *developmentally timed* to occur at the critical transition to school. Pianta and Cox (1999) argued that this period is optimal for intervention for two reasons: (a) children are in the process of reorganizing their competencies and might be particularly open to influence and (b) this transition might set the trajectory of the child's later school career. Additionally, at transitions, it might be easier to perceive and intervene on between-group skill gaps (Entwistle, Alexander, & Olson, 2005).

The second underlying principle of the KITS Program is a *focus on self-regulatory skills* (i.e., the capacities to voluntarily regulate and control emotions and behaviors in different situations) in addition to early literacy and social skills. This emphasis is based on the recognition that self-regulatory skills are essential for school success (Blair & Diamond, 2008). Exposure to poverty appears to be a consistent predictor of poor prekindergarten self-regulatory skills (Rhoades, Greenberg, Lanza, & Blair, 2011). Further, growth in the self-regulatory skills of low-income children during the prekindergarten year predicts growth in both literacy and numeracy skills, leading some researchers to suggest that prekindergarten programs should incorporate training in self-regulation (Welsh, Nix, Blair, Bierman, & Nelson, 2010). However, many programs to address school readiness in high-risk children do not feature such a focus (Welsh et al., 2010).

The third principle is the provision of *high-density learning opportunities*. Within many typical early learning settings, children might spend less than half of their time in instructional activities, and general instructional supports can be of fairly low quality (Hamre & Pianta, 2007). The KITS curriculum is designed to provide as many learning opportunities as possible with specific foci on critical early literacy, social, and self-regulatory skills within the ecologically valid context of the classroom. Additionally, instruction occurs within a framework of a manualized set of empirically based instructional and positive behavior management strategies. Didactic instruction and modeling techniques are used to teach skills and multiple opportunities for the children to practice those skills are embedded in the program activities.

The KITS Program has been evaluated in a randomized efficacy trial with children in foster care, and has been shown to have positive effects on school readiness when assessed just

prior to school entry (Pears et al., 2013). Within the context of that efficacy trial in a medium-sized metropolitan area in the Pacific Northwest, two of the local school districts became aware of the program. At the same time, the local United Way was launching an initiative to designate two of the most challenged neighborhoods in the county as “Promise Neighborhoods”. By doing so, United Way hoped to provide funding to attract a range of services to the neighborhoods to increase the economic, health, and educational prospects of the resident families and children. This included a focus on better preparing all of the children for school. The two Promise Neighborhoods served as catchment areas for four elementary schools, two in each of two area school districts. The two districts and the developers of the KITS Program formed a partnership and successfully applied for funding from the local United Way to pilot the KITS Program in the schools in the Promise Neighborhoods. The United Way funds covered the costs for staff to provide the intervention (including training and supervision), as well as for the supplies for the program. The United Way also organized volunteers for the canvassing efforts described below. The two school districts provided the classroom space and utilities for the intervention activities and buses to transport children and families to the activities. The non-profit research institute provided the KITS curriculum, training, and supervision of the intervention staff as well as funds to conduct assessments of the children and the families prior to and after the intervention in order to examine the efficacy of the intervention.

Goals of the Study

The pilot project had a number of goals. The first was to determine the feasibility of recruiting families into the program. This was a challenge because there was no pre-existing listing of all of the children who would be attending kindergarten at the neighborhood schools in the fall. Typically, each of the schools held a kindergarten registration in May which was generally advertised through local media and flyers sent home with students. However, school administrators were clear that this method only reached a fraction of the incoming kindergartners. Thus, a method had to be devised and tested to get information about both the upcoming registrations and the availability of the summer KITS Program to families of children who would be entering kindergarten in the fall.

The second goal of the pilot project was to determine whether the families who could be recruited would be representative of the populations of the schools that they attended. If a self-selection bias was operating, families who agreed to participate in the program might be lower risk than the larger kindergarten populations in the participating schools. This could influence subsequent evaluation results.

The third goal of the pilot study was to determine if the school readiness phase of the intervention would be efficacious in improving the literacy, prosocial, and self-regulatory skills of low SES children just prior to entering kindergarten. As is noted above, the KITS intervention was designed for children in foster care to increase school readiness prior to kindergarten entry and to promote better subsequent school functioning (Pears et al., 2013). To that end, the program occurs in two phases. The *school readiness phase* (two thirds of the curriculum) covers the 2 months before kindergarten entry and is focused on preparing children and families for school. The *transition/maintenance phase* covers the first 2 months

of kindergarten and is focused on supporting a positive transition to school. In this paper, we focused on the school readiness 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. As is noted above, positive effects of the school readiness phase of the program have been demonstrated for children in foster care. Such children typically have poorer school adjustment than their low SES peers (Pears, Fisher, Bruce, Kim, & Yoerger, 2010). Thus, while it appears to be efficacious for children in foster care, the KITS Program might not be as effective for children from low SES backgrounds.

Method

Recruitment

In the areas that United Way designated as their Promise Neighborhoods, twenty-four percent of the families with children under age 18 live below the federal poverty level (vs. 14% for the surrounding county; U.S. Census Bureau, 2010). Eighty-five percent of children attending schools in the neighborhoods qualify for free and reduced lunch (FRL). (Families receive free lunches if their income is within 130% of the poverty line and reduced price lunches if within 185%.) The overall percentage of educational attainment is also low in these neighborhoods; 16% of adults over age 25 have a bachelor’s degree (U.S. Census Bureau, 2010).

As is noted above, the designated Promise Neighborhoods served as catchment areas for four elementary schools, one pair each in the two districts. Each pair of schools served adjacent catchment areas populated by families from similar SES backgrounds. All four schools were very similar in terms of SES. For example, percentages of children receiving FRL were highly similar across schools (range = 71 to 86%). In each district, one school was randomly designated as the intervention school. Students who would be attending kindergarten in these schools in the fall were eligible to participate in the KITS Program (KITS schools). Students who would be attending the other two schools received services as usual (SAU).

As noted above, there was no pre-existing listing of all of the children who would be attending kindergarten at the Promise Neighborhood schools in the fall. In order to increase the numbers of families who were informed about the spring kindergarten registration events and to potentially increase the numbers of attendees, the local United Way organized volunteers (including those from the research institution and the school districts) to go door-to-door in neighborhoods in the catchment areas for the two intervention schools. The volunteers distributed flyers and talked to residents about the upcoming registration events and the KITS Program. The school districts opened the KITS schools on Saturday to serve as meeting places for the volunteers. United Way also supplied maps of the catchment areas divided into zones that could be easily canvassed by pairs of volunteers. Additionally, flyers were delivered to the Head Start Programs within the catchment areas. Canvassing only took

place in the catchment areas of the two KITS schools in order to enable the comparison of the number of attendees at the kindergarten registrations at the KITS schools to those at the SAU schools for which canvassing was not conducted. Attendance at the kindergarten registration events had previously been similar for each pair of schools. At all schools, flyers were distributed about kindergarten registration to all students. We sought to test the feasibility of the recruitment method by comparing the numbers of families who attended registration at the KITS schools to registration attendance at the SAU schools. If the numbers of families attending the registration events were greater in the KITS schools, this would suggest that canvassing was an effective way of getting information about the registration and the KITS Program to families and that families would follow-up by attending events.

Representatives from the KITS Program attended the registration events at each of the four schools. At the KITS schools, they described both the assessment visits (detailed below) and the KITS Program. At the SAU schools they described the assessment visits only. Families were then given the opportunity to leave their contact information in order to learn more about the study and to enter a raffle for gift certificates to local businesses. (Families were told that they did not need to participate in the study in order to enter the raffle.) A staff member contacted families who left information via phone to set up a home visit to explain the study and to obtain informed consent.

At the KITS schools, 42 families attended the registration events and entered the raffle, and 28 families agreed to participate in the study. Of these families, 25 completed the pre-intervention assessments and thus were in the KITS group. At the SAU schools, 17 families who attended the registration events entered the raffle and 15 agreed to participate. Of these, 14 completed at least one of the assessments and thus comprised the SAU group. In total, 39 children and their families were involved in the current study.

Demographic information for the families is in Table 1. There were no significant differences between the KITS and SAU groups on any of the demographic variables except for the significantly higher proportion of girls in the SAU group than in the KITS group, $\chi^2(1) = 4.36, p < .05$. In general, it is clear that the families had low educational attainment and low incomes.

Procedures

In order to test the efficacy of the program for improving children's literacy, social, and self-regulation skills, the children and their parents were assessed at the beginning of the summer before kindergarten, prior to the start of the intervention (Time 1; T1) and at the end of the summer just prior to kindergarten entry but after the school readiness phase of the intervention (Time 2; T2). At both T1 and T2, children completed a battery of standardized tests and parents completed computer administered questionnaires. T2 was timed so that the children's readiness skills could be measured before any formal elementary school instruction began and before potential differences between the children's schools and classes could have effects on their skills. Consistent with the third goal of the study, we focused on intervention effects on school readiness skills using T1 and T2 data.

KITS protocol—KITS consists of two primary components: a 24-session school readiness group focused on promoting early literacy and social-emotional skills in children and an 8-session parent group focused on promoting parent involvement in early literacy and school. The intervention covers the 2 months prior to kindergarten entry and the first 2 months of kindergarten. During the school readiness phase, the focus of the present study, the school readiness groups meet for 2 hr twice a week (sessions 1-16); and parents meet for 2 hr every other week (sessions 1-4).

School readiness group structure and curriculum—Like a typical kindergarten schedule, school readiness sessions have a highly structured, consistent routine with many transitions between activities. The routine includes circle times at which students engage in games and musical activities designed to promote language, rhyming, and self-regulation skills, instructional periods during which the students focus on learning social and early literacy skills, project times during which children complete art and science activities designed to reinforce the literacy and social-emotional target skills, and snack time during which children practice their conversational and other social skills. The sessions were held in classrooms in the schools. The curriculum objectives are clearly specified for each session regarding the early literacy, prosocial, and self-regulatory skills to be emphasized. The activities are designed to promote specific skills. Instruction is also strategically sequenced to teach the simplest skills first and build toward more complex skills over subsequent sessions. A lead teacher and two assistant teachers conduct the groups of 20-25 children. The high staff-to-child ratio provides children with high levels of support and feedback. A key component of the school readiness groups is the classroom behavior management system. Teachers are trained to use evidence-based behavioral support strategies.

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). Two components of socioemotional readiness are targeted in the KITS curriculum: prosocial skills (sharing, making a new friend, joining a game, cooperating, recognizing intentions and feelings, choosing prosocial responses to peer provocation) and self-regulatory skills (being a good sport, handling feelings, problem-solving, and using work-related skills). These skills are taught using a blend of direct instruction, role-playing, and activity-based intervention; 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.

Parent group structure and curriculum—The parent group meetings coincide with the school readiness group meeting times. Food is provided, and childcare is available for siblings of intervention children. Each group is led by one or two facilitators. Each facilitator presents information pertinent to preparing children for school such as how to practice literacy activities in the home and how to establish routines that will ease the transition to school and support positive adjustment. The parents also learn evidence-based, positive behavior management skills that parallel those used in the school readiness groups. The facilitator leads structured group discussions of the materials and addresses questions.

Skill acquisition is reinforced via role-plays and opportunities to practice new skills. For primarily Spanish speaking parents, there is an interpreter who translates the discussion simultaneously. Parent group handouts are also available in Spanish. If a parent misses a group session, the facilitator visits or calls the parent to deliver the missed curriculum.

The KITS school readiness group teachers and parent 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. More information about the development of the curriculum may be found in previous publications (Pears et al., 2013).

Additional curriculum and data collection—The caregivers and children 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 for the parents.

Attendance at school readiness groups and caregiver groups was tracked. On average, the children attended 72% of the group sessions in the school readiness phase of the intervention, and 64% of the children attended 75% or more of those sessions. The caregivers received an average of 65% of the session contents in the school readiness phase. Sixty-four percent of caregivers received 75% or more of those sessions.

Implementation fidelity for both the school readiness groups and the parent groups was determined by trained coders in vivo or via videotape who coded the presence or absence of key elements of the curricula. For the school readiness groups, 99% of the curriculum components were covered (range = 83 – 100%) and for the parent groups 98% of the curriculum components were covered (range = 90 – 100%). Additionally coders rated whether the teachers and parent group facilitators appropriately implemented key behavior or group management strategies (e.g., “Pre-taught expectations”, “Ignored or re-directed child non-compliance” for the school readiness groups and “Engaged parents in conversation” and “Redirected conversations when necessary” for the parent groups) on a 3-point scale: 1 ‘none of the time’, 2 ‘some of the time’, and 3 ‘all of the time’. On average, teachers received a rating of 2.86 and the parent group facilitators received a rating of 2.90, indicating that they used the behavioral management strategies almost all of the time.

Services as usual comparison group—Children in this group received the services that are typically offered to children in low-income families, including camp activities, reading in the park activities, free summer lunch programs, and the receipt of financial assistance, such as food stamps. No attempt was made to influence the type or amount of services given to the children and their families.

Measures

Literacy skills—Three basic literacy skills that are considered to be foundations of early reading were measured: letter naming, phonemic awareness (e.g., initial sound recognition), and understanding of concepts about print (National Institute for Literacy, 2009). Children’s

letter naming skills and *initial-sound recognition* were assessed using measures from the Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002). These DIBELS tests are designed to assess the development of reading ability from kindergarten through sixth grade. To assess children's *letter-naming skills* the DIBELS Letter Naming Fluency (LNF) measure was used during which children are asked to identify as many letters as possible from a randomly ordered array of upper- and lower-case letters. The score is the number of correct letters identified in 1 min. This subtest shows good alternate form reliability ($r = .72$; Good & Kaminski, 2002) and across studies has been shown to be predictive of reading fluency and reading level in later grades (Burke, Hagan-Burke, Kwok, & Parker, 2009). The benchmark score for the fall of kindergarten is 8 or above.

To assess children's *initial sound recognition*, the DIBELS Initial Sound Fluency (ISF) measure was used. 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. Alternate form reliability estimates range from .88 to .93 (Good, Simmons, & Kame'enui, 2001) and the subtest shows predictive validity with measures of early reading such as oral reading fluency and sight reading (Burke et al., 2009). The benchmark score for the fall of kindergarten is 8 or above.

Understanding of concepts about print was measured using the 24-item Concepts About Print Test (CAPT; Clay, 2005, 2013), 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 (alphas = .81 at both assessment timepoints). The test shows good internal reliability with estimates ranging from .69 to .87 across studies and scores on the CAPT correlate well with scores of reading ability in later grades (Clay, 2013). There is no benchmark score for the CAPT. However, in a large sample of English speaking 5-year-olds entering school, a score of 9 and above indicated average or better performance with 66% of children scoring within this range (Clay, 2013). Thus, in the present study, a score of 9 was used as a benchmark for performance.

Social skills—Children's reactions to problematic social situations were measured using the intention attribution stories (Dodge, Pettit, Bates, & Valente, 1995). These stories were used as a measure of social skills as they are one of the few easily-administered direct measures for young children that index how children respond to social situations (Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002). In these stories, read to the children by a staff person and accompanied by pictures, children are asked to imagine that same-sexed peers cause negative things to happen to the child. However, the peers' intentions are ambiguous. For example, in one story the child is asked to imagine that a peer is throwing a ball and hits the child in the back. After each story the child is first asked to tell the staff person why the peer did what they did. Answers are coded as reflecting either accidental or hostile intent. Then the child is asked what he or she would do about the situation. The child's reaction was coded as being nothing, prosocial (e.g., "I would ask him/her to stop") or aggressive (e.g., "I would hit him/her back"). The proportion of each kind of response was calculated. The proportions of children's hostile intention attributions

and hypothetical aggressive responses were used as outcome measures in the current study. The intention attribution stories have shown good internal structure (Dodge, Laird, Lochman, Zelli, & Conduct Problems Prevention Research Group, 2002). Additionally, they show strong predictive validity to children's later aggressive behavior towards peers (Orobio de Castro et al., 2002) as well as links to children's prosocial behavior (Ziv, 2013). There are no published benchmarks for this measure.

Self-regulatory skills—Children's self-regulatory skills were assessed using the Head Toes Knees and Shoulders (HTKS) Test (McClelland et al., 2007). This direct measure of behavioral regulation focuses on attention, working memory, and inhibitory control. For the HTKS, children play a 5- to 10-min game that requires them to do the opposite of what the experimenter says. For the first part of the task, which consists of 10 items, children are instructed to touch their toes when the experimenter says "Touch your head" and to touch their head when the experimenter directs them to "Touch your toes". In the second half of the task (10 items) the children are additionally directed to touch their shoulders when the experimenter says "Touch your knees" and their knees when the experimenter says "Touch your shoulders". Children receive 2 points if they touch the correct body part, 1 point if they first touch the wrong part but then self-correct, and 0 if they do not touch the correct body part. For this study, the proportions of times that the child touched the correct body part (i.e., scored 2 points) were averaged across the two parts of the task. Recent research has shown that the HTKS is a reliable and valid measure of children's regulation in diverse populations, including Spanish-speaking children (McClelland et al., 2007; Ponitz et al., 2007) with high levels of interrater reliability ($Kappa = .91$; Ponitz et al., 2007). The HTKS is significantly associated with teacher ratings of classroom behavior over time (Ponitz et al., 2007) and predicts language and math achievement (Wanless et al., 2011). There are no published benchmarks for this measure. In the present study, we used a correct score of 50% as the benchmark, reasoning that children who scored 50% or above were performing above chance in the task.

Verbal ability—To control for the possibility that children's general verbal abilities might affect their performance, their scaled scores on the vocabulary subscale of the Wechsler Preschool and Primary Scales of Intelligence-Third edition (Wechsler, 2002) were used.

Early childhood education experiences—To examine the possibility that children's experiences in Head Start or other early childhood education programs might affect their performance, parents were asked to indicate on a scale from 1 "Less than one school year" to 5 "More than two school years" how long the child had attended either Head Start or daycare. The length of time that the children attended Head Start and/or daycare was used in analyses. When parents indicated that their children had never been to Head Start and/or daycare, the children received a score of "0".

Demographic information—Parents answered a number of questions about family income, the parents' highest levels of education, parent and child ethnicity, family size, and parent marital status on a questionnaire.

Analysis Plan

The first goal of the study was to examine the feasibility of recruiting families into the study prior to entry into school. As is described above, we utilized a canvassing method in the current study. To determine if this method was effective, analyses focused on whether the numbers of families entering the raffle at the kindergarten registration events were significantly greater at the schools in the areas that had been canvassed to inform residents about the registration events. Next, comparability of the study sample to the general population from the participating schools was examined. Finally, to determine if there were effects of the intervention on literacy, social, and self-regulation skills, repeated measures analyses of covariance (RM-ANCOVAs) were used. In each analysis, the main effect of time was tested. A significant effect of time would indicate that, in general, children's scores changed from the beginning to the end of summer. To test for intervention effects, interactions between time and the child's group status (KITS vs. SAU) were tested. Significant interactions indicated that the groups were changing in different ways over time. The statistics for these analyses are presented in Table 2.

If interaction effects were significant, simple main effects were then examined. These allowed us to determine if scores in each individual group changed significantly over time. A significant change in the expected direction in the scores of children in the KITS group would indicate an intervention effect. These are described below. For all analyses, effect sizes using partial eta-squared (η_p^2) are presented. Partial eta-squared is one indication of the amount of variance in the outcome explained by the predictor. It has been recommended that values of .0099, .0588, and .1379 be interpreted as small, medium, and large effects, respectively (Cohen, 1969; Richardson, 2011).

Experts have pointed out that the interpretation of statistical effect sizes is not always straightforward (Richardson, 2011). Thus, particularly in education research, it can be helpful to complement statistical representations of effect size with descriptive information, for example, the number of children meeting the benchmark for a given skill (Lipsey et al., 2012). Following the RM-ANCOVA results, we present information on the percentages of children in each group meeting the benchmark before and after the school readiness phase of the intervention. The exception to this is the intention attribution measure for which there are no established benchmark criteria.

Results

Differences in Attendance at Kindergarten Registration

To evaluate the feasibility of using neighborhood canvassing to recruit incoming kindergarteners, the numbers of families attending registrations at the KITS schools were compared to the numbers of families attending registration events at the SAU schools. At the registration events, families could place their names in a raffle to win a gift certificate and could also indicate that they would like to receive more information about the KITS project (including assessment and intervention at the KITS schools or an assessment only opportunity at the SAU schools). Although this was not an exact count of the total number of families who attended the events, almost all families attending the registrations put their

names in the raffle. In the KITS schools, on average, 46% (42) of the kindergarten families who entered school in the fall attended the registration and placed their names in the raffle, whereas in the SAU schools, 20% (17) of the incoming kindergarten families attended and entered the raffle. A Z-test for two proportions indicated that the proportion of incoming kindergarten families attending the registrations and entering the lottery in the KITS schools were significantly higher than the proportions in the SAU schools in neighborhoods where canvassing efforts had not occurred, $Z = 3.51, p < .01$.

Comparability of the Families Recruited into the Sample

The second goal of the study was to determine if the families who were recruited into the project were representative of those in the wider population from which students at the schools were drawn in terms of economic indicators and ethnicity. Z-tests for two proportions were used in these analyses. Statistics on the number of families receiving FRL were available for each of the schools during the previous school year. For each family participating in the pilot study, the parent report of family income and size was used to determine eligibility for FRL using the federal eligibility levels for the previous school year. For example, a child in a family of five whose annual income was at or below \$47,712 would qualify for FRL. There were no significant differences between the proportions of FRL eligible families in the KITS group in the general population of the KITS schools (87 and 84%, respectively; $Z = 0.01, p = ns$) or between families in the SAU group and the general population in the SAU schools (84 and 76%, respectively; $Z = 0.30, p = ns$). Additionally, there were no differences between the ethnicities of children in the KITS group and children in the schools from which the KITS group sample was drawn (European American = 50 and 62%; Hispanic = 42 and 29%; and other = 8 and 9%; $Z_s = 0.97, 1.14, \text{ and } -0.20, p_s = ns$, respectively). For the SAU group, there were significantly more Hispanic children in the SAU sample than in the wider school populations (46 and 14%, respectively; $Z = 2.82, p < .05$), while there were no significant differences between the SAU group and the general population of the SAU schools in European American children (46 and 73%, respectively; $Z = 1.84, p = ns$) and those of other ethnicities (8 and 13%, respectively; $Z = 0.11, p = ns$).

Group Differences in Gains Made Over the School Readiness Phase of the Intervention

Before repeated measures were conducted, bivariate correlations were run in order to determine if the children's verbal abilities as measured by the WPPSI-III vocabulary score and the length of time that they had attended Head Start or daycare were associated with the outcome variables. The children's literacy, social, and self-regulation abilities at both pre- and post-intervention T1 and T2 were all significantly correlated with their verbal abilities ($r_s = -.41 \text{ to } .51, p_s < .05$) except for hostile attribution bias at T1 and the proportion of aggressive responses at T1 and T2 ($r_s = -.003, .04, \text{ and } .13$, respectively, $p = ns$). Neither the length of time that the children had attended Head Start nor the length of time that they had attended daycare were significantly correlated with the children's skills ($r_s = -.17 \text{ to } .23, p_s = ns$) with the exception of a significant correlation between length of time in daycare and hostile attribution bias at T1 ($r = -.44, p < .05$). Thus, length of time in daycare was used as a covariate only in the analyses of hostile attribution bias while length of time in Head Start was not used as a covariate in the analyses.

Forty-three percent of the children and 38% of the parents were bilingual English-Spanish speakers as measured by parental report. Whether the child was bilingual was strongly negatively correlated with the child's score on the WPPSI-III vocabulary subscale ($r = -.63$, $p < .001$). Thus, it was decided to use the WPPSI-III vocabulary score to control for both verbal abilities and bilingualism in all of the analyses described below. Preliminary analyses also indicated that there were no statistically significant differences by gender on the outcome measures. As is explained above, the scores of children in the KITS and SAU groups on literacy, social skills, and self-regulatory skills were compared using RM-ANCOVAs, controlling for the children's verbal abilities as measured by the WPPSI-III vocabulary score.

Literacy skills—Three separate RM-ANCOVAs were conducted in which the mean scores on the DIBELS LNF and ISF subtests, and the CAPT served as the dependent variables. As can be seen in Table 2, there was a significant main effect of time on the DIBELS LNF score indicating that, overall, the children's scores on the task changed over time. There was also a significant interaction between intervention condition and time with a large effect size as measured by η_p^2 . Examination of the simple main effects indicated that the children in the KITS group showed a significant positive change over time in their LNF scores, $F(1,33) = 4.50$, $p < .05$, partial $\eta^2 = .12$, while the change in scores for the SAU group, although negative, was not significant, $F(1,33) = 2.61$, $p = ns$, partial $\eta^2 = .07$. In terms of the number of children meeting the benchmark (a score of 8 or above), as seen in Figure 1a, there was an increase in the percentage of children who met the benchmark in the KITS group from T1 to T2 (52% to 65%, respectively), while there was a slight decrease in the SAU group (39% to 36%, respectively).

When the results of the RM-ANCOVA for the DIBELS ISF scores were examined, there was no significant main effect for time but there was, however, a significant interaction between intervention condition and time, controlling for verbal ability. Examination of simple main effects to explore the interaction revealed for the KITS children, the positive change over time in their ISF scores was significant, $F(1,32) = 11.24$, $p < .01$, partial $\eta^2 = .26$. On average, the KITS children gained about 4.5 points on the ISF. The change over time was not significant for children in the SAU group, $F(1,32) = 0.45$, $p = ns$, partial $\eta^2 = .01$.

While at T1, fewer than 50% of the children in each group met the benchmark for the ISF (score of 8 and above), by T2 sixty-four percent of the children in the KITS group met the criterion (an 18% increase). For the SAU, there was a 10% decrease in the percentage of children meeting the benchmark (from 46% to 36%). These results are pictured in Figure 1b.

Finally, the results of the RM-ANCOVA for the CAPT showed that there was no significant main effect of time. However, there was a significant interaction between intervention condition and time. Analyses of the simple main effects of time revealed that the change for children in the KITS group was significant, $F(1,33) = 31.22$, $p < .01$, partial $\eta^2 = .49$. The children in the KITS group gained an average of 3 points on the task. The children in the SAU group did not show significant change in their scores over time, $F(1,33) = 2.27$, $p = ns$, partial $\eta^2 = .06$.

When the percentages of children meeting the benchmark selected for this paper (scores of 9 and above) were examined, it can be seen from Table 1c that only a small percentage of children in both the KITS (24%) and SAU (23%) groups met the benchmark at T1. By T2, however, over half (57%) of the KITS children met the benchmark, a 33% increase, while there was only a 6% increase in the SAU group (to 29%).

Social skills—To examine potential intervention effects on social skills, two repeated measures RM-ANCOVAs were conducted using proportion of hostile attributions and proportion of hypothetical aggressive responses as the dependent variables. There was a significant effect for time on the proportion of hostile attributions that children made. However, the interaction between time and intervention condition was not significant. For proportion of hypothetical aggressive responses, results indicated that the main effect for time was not significant. However, there was a significant interaction between intervention condition and time. Examination of the simple effects showed that there was a significant increase in the proportion of aggressive responses in children in the SAU group, $F(1,32) = 7.64, p < .01$, partial $\eta^2 = .19$. The children in the KITS group showed a modest decrease in the proportion of aggressive responses that they gave although this change over time was not significant, $F(1,32) = 1.31, p = ns$, partial $\eta^2 = .03$. Figure 2 illustrates the interaction of time and condition, showing that while the children in the SAU increased their proportion of aggressive responses from 6 to 21% the proportion of aggressive responses offered by the KITS children decreased from 11 to 6%.

Self-regulation skills—As shown in Table 2, there was not a main effect of time for performance on the HTKS. The interaction between time and group showed a trend towards significance and because of the small sample size, the simple effects of this trend were examined. For children in the KITS group, the change over time in proportion of correct responses was significant, $F(1,33) = 15.27, p < .01$, partial $\eta^2 = .32$, while the change in the SAU group was not significant, $F(1,33) = 0.62, p = ns$, partial $\eta^2 = .02$.

For the HTKS, the benchmark used in the study was whether the child achieved a correct score of at least 50% across the HTKS Tests. The percentage of children in the KITS group who were able to meet the benchmark increased from 28 to 61% while in the SAU group the percentage decreased from 46 to 43%, as shown in Figure 3.

Discussion

Children who begin school with foundational skills for reading, the skills necessary to make prosocial responses to peers, and the abilities to pay attention and control their behavior and responses are more likely to learn to read earlier, form positive relationships with peers and teachers, and exhibit appropriate behavior in the classroom (Pianta, Cox, & Snow, 2007). Children from low SES backgrounds are less likely than their higher SES peers to enter school with these essential skills (Foster et al., 2005; Hair et al., 2006). Although early intervention programs for low-income children exist, most are quite resource intensive and time consuming. Moreover, few provide services during the summer, a period when disadvantaged children may fall behind their peers in academic functioning (Alexander et al., 2001). Brief and focused interventions for low-income children are needed to address

these concerns. This pilot study demonstrates that, through a coalition of community agencies, schools, and non-profit research institutions, it is feasible and advantageous to bring a summer school readiness program to economically disadvantaged children and their families.

Evidence of Feasibility

Before beginning wide scale implementation of any program to help children prepare for kindergarten, it is important to establish that families from the target population can be reached and recruited. This may be particularly difficult with a program that starts before those children have entered formal schooling as there is typically no central listing of all of the potential incoming kindergarteners in public school systems. In this pilot study, we utilized canvassing to recruit families from targeted disadvantaged neighborhoods: volunteers from multiple organizations knocked on doors and talked to residents about kindergarten registration activities. Results suggest that this was an effective way to alert families to the availability of programs to prepare children for kindergarten. In neighborhoods in which canvassing activities had taken place, more than twice as many families attended kindergarten registration activities and entered a raffle for door prizes. This suggests that even without a pre-existing list of children eligible to enter kindergarten in the fall, families can be recruited for a pre-transition, summer school readiness intervention. It should be noted that the advertising efforts that the schools made by themselves were not strictly equal. However, they tended to be similar across schools.

Evidence of Representativeness of Participating Families

In implementing any program, it is also vitally important to establish that the families most in need of services can be recruited. It was possible that only the families who were not as economically challenged might respond to the canvassing efforts. However, results suggest that families who attended registration events and entered a raffle were similar in demographic characteristics to other families attending the same schools in terms of eligibility for FRL. Additionally, families who were in the intervention group were similar in terms of ethnicity to families in the school from which the intervention group was drawn. The comparability of the intervention group to the general school populations suggests that it is possible to recruit the at-risk families who may be in most need of school readiness training.

Intervention Effects

Results demonstrated that families benefitted from the intervention. Children in the KITS intervention showed greater gains in literacy skills, namely letter naming fluency, initial sound fluency, and understanding of concepts about print, than their peers who did not participate in the intervention. Not only did they make greater gains in their absolute scores, but also by the end of the summer, a greater percentage of children in the KITS groups met the benchmarks for these tests of early literacy. Thus, fewer children in those groups are likely to need additional services to help with their reading skills. This might lead to cost savings for the school districts. There were also greater increases in the percentages of children meeting the selected benchmark for self-regulation skills. Finally, the children in

the intervention group showed a slight, though non-significant, decrease in hypothetical aggressive responses to a peer provocation.

Conversely, confirming the observation that over the summer children may fail to gain or lose critical skills (Alexander et al., 2001), the children in the SAU group showed a significant increase in the proportion of aggressive responses that they suggested in response to a hypothetical provocation by a peer. In the SAU group there were also decreases (albeit slight) in the percentages of children meeting the benchmarks for DIBELS Letter Naming Fluency and Initial Sound Fluency as well as self-regulation.

As is noted above, this paper focused on the immediate effects of the intervention after the school readiness phase of the intervention. Future research should focus on whether the intervention positively affects school adjustment after the transition to school. In trials of the KITS Program with children in foster care, effects of the intervention have been demonstrated through the end of kindergarten (Pears, Kim, & Fisher, 2012). Additionally, data are currently being collected on a large scale randomized controlled trial of typically developing children and their families in the socioeconomically disadvantaged neighborhoods discussed here. The design of that trial will allow us to examine the effects of both phases of the intervention and the mechanisms through which the effects of the school readiness phase impact later academic and social functioning in school.

Community Collaboration

This study also illustrates the benefits of forming collaborative relationships across community agencies, school districts, and research institutions. By partnering with the developers of a school readiness program, the school districts were able to bring an evidence-based preventive intervention to the families of children entering kindergarten. Funding for the effort came from multiple sources including the local United Way, the research institution, and in-kind provision of space and transportation from the districts. In an era of budget cuts for schools and human services, such weaving together of different funding streams and sources may be an efficient method of providing services to the most needy families. The concept of localizing multiple services for families in neighborhoods (here given the designation of Promise Neighborhoods) also has great potential for improving the lives of families and children in economically disadvantaged areas. In this way, a continuum of services for both parents and children across development periods may be centralized at local schools and community agencies but may also involve larger, less localized institutions such as universities and research centers. The service continua for the Promise Neighborhoods described here are still in their initial stages of development but, as shown in this pilot study, families in the neighborhoods will take advantage of the services offered.

The collaborative partnership model might be particularly effective for other districts wanting to implement a program such as KITS. In the particular case of the KITS Program, districts would need to support a KITS team consisting of the school readiness group teachers, parent group facilitator or co-facilitators, and a program supervisor, all trained to fidelity on the curriculum and behavior management strategies. Additionally, the district would need to provide materials, incentives for the families, space and transportation for the

groups. As is noted above, through partnerships between school districts, funders such as United Way or other foundations, and research institutions, the resources needed for the program can be derived from multiple sources, making it more likely that a district could launch and sustain a KITS Program.

Limitations and Future Directions

Although the results of this study suggest that an intervention to improve school readiness skills in low SES children can be successful, several limitations should be noted. First, the sample was small. While this is not surprising for a pilot study, a larger scale randomized efficacy trial such as the one currently underway is needed to provide further confirmation of the utility of this intervention. Second, the sample sizes were unequal. This was a result of the more successful recruitment strategies for the intervention schools. ANCOVA is relatively robust to differences in sample sizes when variances are homogeneous across samples. When they are not, the potential difficulty is that statistical power may be too low to detect group differences (Ho & Weerahandi, 2007). Thus, it is unlikely that unequal sample sizes led to overestimation of the success of the intervention.

Overall, this study suggests that it is possible to positively affect the school readiness of children from low SES backgrounds just prior to kindergarten entry. Results also suggest that low-income, multi-ethnic families who are representative of the populations of the schools that they will attend can be successfully recruited to intervention programs. Through such intervention, it may be possible to positively affect the school trajectories of children from low-income backgrounds.

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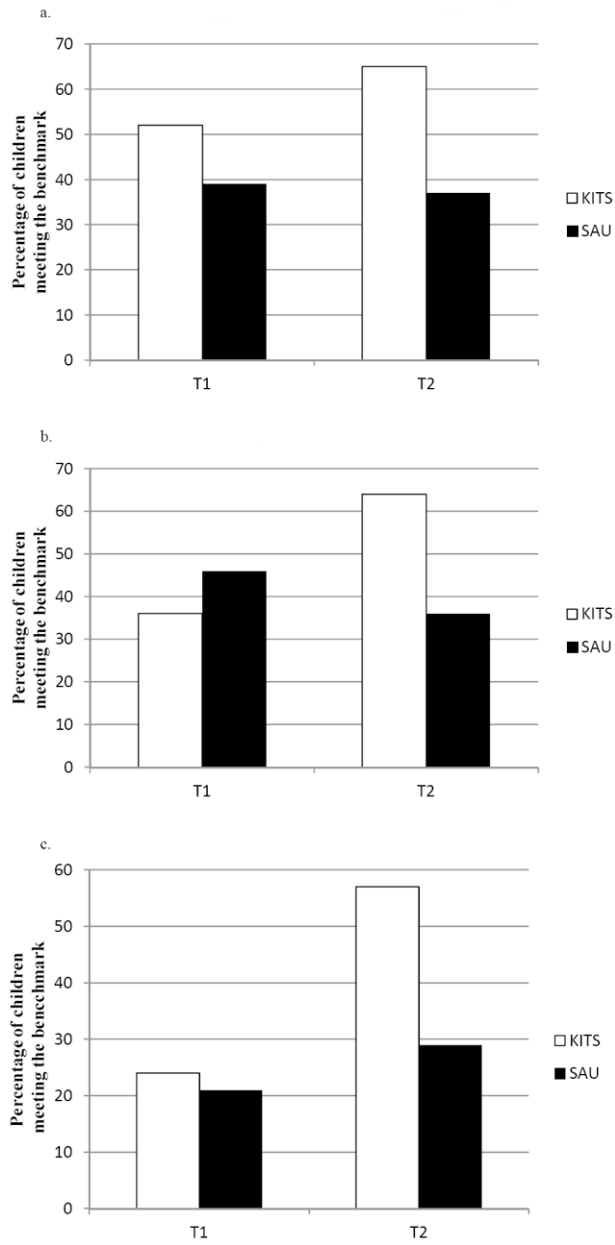


Figure 1.
 a. Percentage of Children Meeting the Benchmark for Letter Naming Fluency
 b. Percentage of Children Meeting the Benchmark for Initial Sound Fluency
 c. Percentage of Children Meeting the Benchmark for Concepts About Print

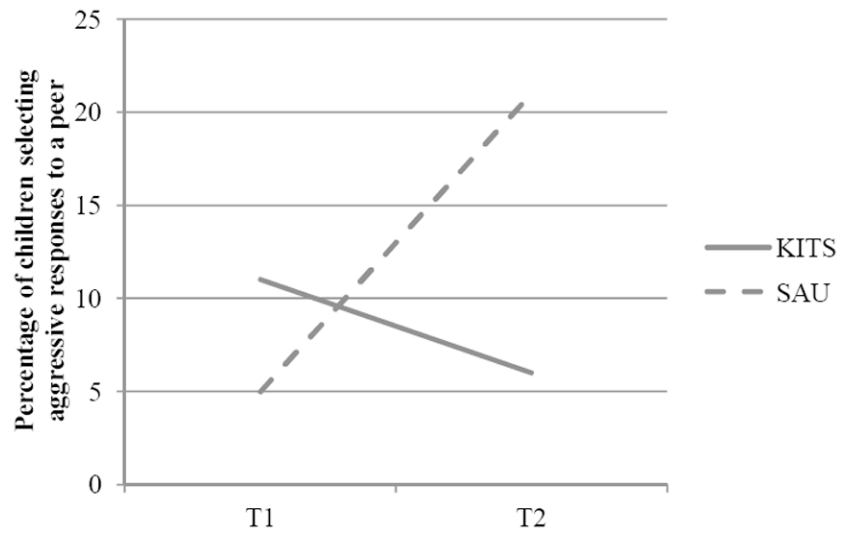


Figure 2.
Percentage of Children Selecting Hypothetical Aggressive Responses to a Peer Provocation

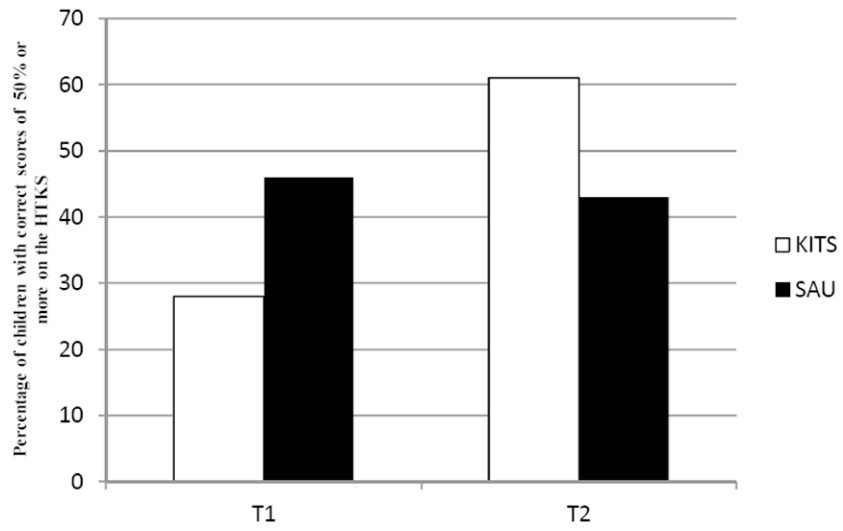


Figure 3. Percentage of Children with Correct Scores of 50% or More on the Head Toes Knees Shoulders (HTKS) Task

Table 1

Participant Demographic Information by Group (N = 39)

	KITS group	Services as Usual Group
Number of females	11 (44%)	11 (79%)
Child ethnicity		
European American	50%	46%
Latino	42%	46%
Native American	4%	--
Mixed race	4%	8%
Median highest level of caregiver education	GED completion	High school completion
Median gross annual household income	\$20,000 - 24,999	\$25,000 - 29,999
Median number of people living in the household	5	5
Caregiver is married	67%	85%

Table 2

Repeated Measures ANCOVA Results for Literacy, Social Skills, and Self-Regulation Outcomes

	df	F	η_p^2	<i>p</i>
Letter Naming Fluency				
Time	33	5.54	.14	.03
Condition \times Time	33	6.58	.17	.02
Initial Sound Fluency				
Time	32	1.25	.04	.27
Condition \times Time	32	6.63	.17	.02
Concepts About Print				
Time	33	2.73	.08	.11
Condition \times Time	33	4.64	.12	.04
Hostile attributions				
Time	29	4.53	.14	.04
Condition \times Time	29	.05	.002	.83
Proportion aggressive responses				
Time	32	.03	.001	.86
Condition \times Time	32	8.06	.20	.01
HTKS proportion correct responses				
Time	33	1.09	.03	.31
Condition \times Time	33	2.95	.08	.10

Note: HTKS = Head Toes Knees Shoulders Task

Table 3
Means and Standard Deviations for Measures of Literacy, Social, and Self-Regulation Skills by Group at Each Timepoint

	KITS Group (<i>n</i> = 25)			SAU Group (<i>n</i> = 14)		
	Pre-Intervention <i>M</i>	Post-Intervention <i>SD</i>	<i>M</i>	Pre-Intervention <i>M</i>	Post-Intervention <i>SD</i>	<i>M</i>
Mean score on Letter Naming Fluency	11.26	11.21	13.26	9.93	14.90	10.69
Mean score on Initial Sound Fluency	6.06	5.60	10.54	7.69	6.34	7.50
Mean score on Concepts About Print	5.91	3.49	8.91	3.19	3.60	6.23
Mean proportion hostile attributions	0.52	0.35	0.50	0.25	0.40	0.41
Mean proportion aggressive responses to peers	0.11	0.22	0.06	0.17	0.13	0.21
Mean proportion correct responses on the HTKS	0.30	0.24	0.47	0.28	0.25	0.42

Note: HTKS = Head Toes Knees Shoulders Task