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The Efficacy of a Home-School Intervention for Preschoolers With Challenging Behaviors: A Randomized Controlled Trial of Preschool First Step to Success

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Abstract

The field of early intervention is currently faced with the challenge of reducing the prevalence of antisocial behavior in children. Longitudinal outcomes research indicates that increased antisocial behavior and impairments in social competence skills during the preschool years often serve as harbingers of future adjustment problems in a number of domains including mental health, interpersonal relations, and academic achievement. This article reports the results of a cross-site randomized controlled trial, in which 128 preschool children with challenging behaviors were assigned to either a Preschool First Step to Success (PFS) intervention (i.e., experimental) or a usual-care (i.e., control) group. Regression analyses indicated that children assigned to the Preschool First Step intervention had significantly higher social skills, and significantly fewer behavior problems, across a variety of teacher- and parent-reported measures at postintervention. Effect sizes for teacher-reported effects ranged from medium to large across a variety of social competency indicators; effect sizes for parent-reported social skills and problem behaviors were small to medium, respectively. These results suggest that the preschool adaptation of the First Step intervention program provides early intervention participants, staff, and professionals with a viable intervention option to address emerging antisocial behavior and externalizing behavior disorders prior to school entry.

Keywords

positive behavior support; intervention; First Step; randomized controlled trial

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Declaration of Conflicting Interests

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Introduction

Developing and disseminating evidence-based interventions for children in preschool and the primary elementary grades for promoting child social-emotional development have emerged as a high priority for schools (see Detrich, Keyworth, & States, 2008; Domitrovich, Moore, & Greenberg, 2012; Dunlap & Fox, 2011; Dunlap, Smith, Fox, & Blase, 2014; Hoagwood et al., 2004; Hoagwood et al., 2007). In part, this is due to substantial evidence suggesting that early intervention has protective qualities and public health benefits well into adulthood (Hawkins, Kosterman, Catalano, Hill, & Abbott, 2005; Reynolds, Temple, Robertson, & Mann, 2001). Children who display behavior problems in preschool are likely to continue displaying them in elementary school and are at significantly higher risk for ongoing problem behavior and long-term detrimental outcomes (Bulotsky-Shearer, Domínguez, Bell, Rouse, & Fantuzzo, 2010; Caspi & Moffitt, 1995; Odgers et al., 2008). National survey results indicate that preschool-age children are expelled at 3 times the rate of K-12 students (Gilliam & Shahar, 2006).

Not surprisingly, younger children in school settings who display challenging behavior patterns severely stress the management skills of teachers (Powell, Fixsen, Dunlap, Smith, & Fox, 2007). The scope of this problem is reflected in epidemiological findings suggesting that children diagnosed with Emotional or Behavioral Disorders (EBD) comprise about 10% of overall preschool samples (Forness, Freeman, Paparella, Kauffman, & Walker, 2012) while *low-income* preschool samples often have an EBD prevalence of 20% or more (Qi & Kaiser, 2003). Such numbers can have a profound impact on the preschool classroom's ecology, particularly as mandated mental health or special education services are rarely available in preschool settings (Forness, Kim, & Walker, 2012; Powell et al., 2007).

This problem is compounded by the fact that many more children in preschool settings are at risk for EBD than are actually diagnosed (Brown, Odom, & McConnell, 2008; Bulotsky-Shearer et al., 2010; Odgers et al., 2008). There is, in fact, considerable evidence that early childhood onset of EBD, as opposed to later childhood or adolescent onset, is more likely to result in a persistent disorder that is more severe, less responsive to standard interventions, and more likely to result in long-term negative outcomes (Moffitt, 2008; Moffitt & Caspi, 2001). The longer term outcomes of EBD are well documented via individual problems experienced in academic development, peer-related adjustment, conflict with authority, and a host of other difficulties that extend well beyond the school years (Brennan, Shaw, Dishion, & Wilson, 2012; Campbell, Spieker, Burchinal, & Poe, 2006; Odgers et al., 2008). The developmental psychopathology of these early disorders, moreover, typically involves relatively trivial oppositional or acting out behaviors initially, such as minor peer adjustment problems, noncompliance to parental directives, or slight tendencies toward disengagement in daily routines at home. If managed poorly, they may then begin to be behaviorally expressed in day care or preschool settings, becoming increasingly more serious or disruptive over the preschool years. These trajectories have been well documented empirically (see Luby et al., 2012; Nock, Kazdin, Hiripi, & Kessler 2007; Reid, Patterson, & Snyder, 2002; Shaw, Owens, Giovannelli, & Winslow, 2001; Webster-Stratton & Taylor, 2001).

For this reason, there has been a growing appreciation for multitiered models for preschool prevention and intervention that disrupt or offset these trajectories. These approaches begin with “primary” or universal strategies to support a positive and predictable class-wide environment, “secondary” strategies to target children who begin to show evidence of risk behaviors, and “tertiary” strategies for children with diagnosable disorders who require more intensive interventions to prevent their disorders from getting worse (Branson & Demchak, 2011; Dunlap & Fox, 2011; Fox, Carta, Strain, Dunlap, & Hemmeter, 2010; Hemmeter, Snyder, Kinder, & Artman, 2011; Walker et al., 1996).

At the primary prevention or universal tier, there are various programs of classroom-wide positive behavioral support that emphasize modeling and praise for specified student positive behavior (Conroy, Dunlap, Clarke, & Alter, 2005; Fullerton, Conroy, & Correa, 2009; Stormont, Smith, & Lewis, 2007). At the secondary prevention tier, there are such programs as (a) the Dina Dinosaur curriculum component of the Incredible Years program that focuses on a series of vignettes for social-emotional learning (Webster-Stratton, Reid, & Hammond, 2004), (b) the Preschool Promoting Alternative Thinking Strategies (PATHS) curriculum that stresses self- regulation and problem solving (Domitrovich, Cortes, & Greenberg, 2007), and (c) the second tier of the Teaching Pyramid Model that uses a social-emotional assessment tool to identify preschoolers who need more specific learning opportunities that can be embedded in their daily activities (Hemmeter & Fox, 2009). The tertiary prevention tier includes such interventions as the Parent–Child Interaction Therapy (PCIT) program that uses clinical coaching during parent- and child-directed interactions to enhance their relationship (Zisser & Eyberg, 2010) and the Regional Intervention Program (RIP) that places parents in the classroom setting as interventionists while successful parent graduates of RIP act as coaches (Strain & Timm, 2001). The reader should note that there are several other such programs at both the second and third tiers that primarily involve parents of young children in the home, such as Nurse–Family Partnership (Eckenrode et al., 2010), but the emphasis in this article is primarily on center-based interventions.

Joseph and Strain (2003) reviewed 10 such social-emotional curricula along nine dimensions: treatment fidelity, treatment generalization, treatment maintenance, social validity, acceptability of interventions, replication across investigators, replication across clinical populations, evidence for ethnic/racial diversity, and replication across settings. Of the 10 programs reviewed, only First Step to Success (Walker et al., 1998) and The Incredible Years: Dinosaur School program (Webster-Stratton, 1998; Webster-Stratton, Reid, & Hammond, 2001) received a high confidence rating (i.e., seven of the nine rating criteria having been met).

The research project described herein focused on evaluating a downward adaptation of this intervention developed originally for primary grade students. First Step to Success (Walker et al., 1998) is a collaborative home and school early intervention designed to assist behaviorally at-risk children in getting off to a good start in their school careers (Walker et al., 1997; Walker et al., 2014). First Step is classified as a secondary-level intervention that uses in-classroom coaching of teachers to cue sustained engagement in prosocial and adaptive activities using a reinforcement system that is designed to enhance the target child’s social desirability and peer interactions. It targets children who enter elementary school not

ready to learn, many of whom bring very challenging behavior patterns with them. This selected intervention forges a home and school partnership in which the teacher, the child's parents, and the First Step behavioral coach work together in teaching the target child school success skills and a prosocial behavior pattern that fosters friendship making. As noted above, the First Step early intervention program was developed originally for application with behaviorally challenged students enrolled in the primary grades, but the present study extends this downward into the preschool years (Walker et al., 1997, 1998; Walker et al., 2009).

The aim of the research reported herein was to determine, via a randomized controlled trial, whether the efficacy of the Preschool Adaptation of First Step to Success can be documented by improvements in child behavior and social skills outcomes of preschool children who are at high risk for the development of oppositional or conduct disorders. A secondary goal was to examine its impact on teacher and parent program adherence and satisfaction through extensive fidelity-of-treatment measures.

Method

Participants

After securing Human Subjects Institutional Review Board approval, the primary investigators and lead program trainers recruited preschool programs in implementation sites located in Oregon, Indiana, and Kentucky. We obtained consent to conduct the study from the program directors of 32 Head Start and preschool programs in two counties in Oregon and 31 Head Start and preschool programs located in two counties in Kentucky and Indiana. We then gave brief presentations to school personnel at these sites to recruit individual teachers as study participants. As noted below in Figure 1, this recruitment was done in three cohorts; thus, the process took place over a 3-year period on three separate occasions. We invited teachers from 149 Head Start, state-funded, tuition-based, and private preschool classrooms to enter the study across the 3 years. If there was more than one teacher in a classroom, both teachers were invited to participate; however, only the lead teacher's data were used in the analyses presented herein. Across three cohorts, 138 of 149 consented teachers (93%) participated in the screening and student recruitment phase of the study (see Figure 1).

Prior to screening, teachers distributed a waiver of consent letter to the parents of each student in his or her classroom. The waiver of consent letter explained the proposed study, described the class-wide screening procedure, and detailed steps for declining participation in the screening process. Parents who declined participation returned a prepaid postcard to the teacher within 2 weeks. If the postcard was returned, the child was excluded from the screening process.

Participating teachers completed an adapted version of the Early Screening Project (ESP; Walker, Severson, & Feil, 1995). At Screening Stage 1, teachers were given a detailed description of externalizing behavior and asked to nominate and rank-order five children in their classrooms who most closely matched the description of student behavioral characteristics provided them. Teachers then completed three Stage-2 ESP rating scales—the

Adaptive Behavior Index (ABI), Maladaptive Behavior Index (MBI), and Aggressive Behavior Scale (ABS)—for each of the children identified in the previous stage. These scales are described in greater detail in the Pre-/Postoutcome Measures section. The 138 teachers who participated in the screening procedure completed Stage-2 rating scales for 625 students (M = 4.5 students per classroom). For each scale, we converted total scores to severity scores corresponding to 1 *SD*, 1.5 *SD*, and 2 *SD* from the normative mean (Feil, Severson, & Walker, 1998). Severity scores for each scale ranged from 0 (within 1 *SD* of mean) to 3 (2+ *SD* from mean). We summed the three severity scores (range = 0–9) and rank-ordered the five nominated students within each classroom. Children with a scale score of at least 1 *SD* above the mean met eligibility criteria. Of those, we recruited only one student from each classroom to participate in the study, due to limits imposed by the scope of the design and data collection costs. Forty-four of the 625 screened students (7%) did not meet eligibility criteria and were excluded from the parent recruitment procedures.

Within each classroom, project staff rank-ordered the remaining 581 eligible students according to severity, and invited parents of the highest ranked child in each classroom to participate in the study. If the parents of the highest ranked child declined, project staff contacted the parents of the next highest ranked child in the classroom. This process was repeated until either parent consent was obtained for 1 eligible child in each classroom or the families of all eligible children had declined participation. After screening, 7 teachers declined continued participation in the study and project staff members were unable to obtain consent from the parents of any eligible students in five additional classrooms. Thus, we randomized 126 of the 149 recruited classrooms (85%) with 1 student and 1 teacher from each classroom to either a Preschool First Step intervention or usual-care control group condition.

The classroom was our unit of randomization. Teachers could participate in the study only 1 time and were not allowed to be re-recruited. There were no exclusion rules for teachers or classrooms. Classroom settings were 61% Head Start, 41% state-funded preschools, and 6% private preschools. As reported in Table 1, participating children had a mean age of 4 years, were predominantly male (65%), and African American (31%), Caucasian (44%), or Hispanic (5%). Participating teachers were primarily female (99%) and were African American (18%) or Caucasian (72%). Teachers reported having taught for an average of 14 years (SD = 9.2). Education levels varied with 22% reporting having a high school diploma, 33% an associate's degree, 23% a bachelor's degree, and 22% a master's degree or higher. Baseline equivalence across conditions and cohorts is discussed in the "Results" section.

Usual-Care Control Condition

Teachers in classrooms randomized to the usual-care control group received a half-day of training in general classroom management strategies and the principles of positive behavior support. The half-day workshop training in the universal principles of classroom management was based on principles of Positive Behavior Support (Golly, 2006; Sprague & Golly, 2013). Strategies for promoting a positive classroom environment, including positively reinforcing appropriate behaviors, were described. Teachers participated in discussions of their experiences with positive behavior support. This workshop was intended

to provide some degree of intervention and enhance equivalency between groups, but was in essence much more general in nature (and lacked specific intervention strategies) than that given in the first half of the training for teachers in the experimental intervention group described below. Teachers in the usual-care control group were eligible for specific training in the Preschool First Step program beginning the following academic year.

Experimental Condition

The Preschool First Step to Success (PFS) intervention includes a daylong workshop training session in which the universal principles of classroom management are taught (Golly, 2006; Sprague & Golly, 2013) along with training in the PFS intervention. In the first half of the workshop, teachers were taught to (a) develop behavior expectations (i.e., rules); (b) create strategies to teach these behavioral expectations to their preschool students through use of examples and nonexamples, feedback, and debriefing processes; (c) make plans to positively reinforce the behavioral expectations including use of formal motivational systems (e.g., charts, graphs, and group reward activities); and (d) review classroom organization to provide routines for entering and exiting, transitions, and quiet-time areas. In the second half of the daylong workshop, teachers learned about First Step to Success's classroom and home components. Adaptations to the elementary school version of First Step for preschool-age children are described below, but for more detail, see Frey et al. (2013), Feil et al. (2009), and Frey, Boyce, and Tarullo (2009). A behavioral coach followed up with each participating teacher and was available for one-on-one consultation in his or her respective classroom during instructional hours.

Classroom-based component—Implementation of the PFS classroom component has three phases: (a) the coach phase, (b) the teacher phase, and (c) maintenance. The classroom intervention component teaches the participating child an adaptive behavior pattern that enhances school success as well as friendship making skills for the improvement of peer relations. After the first 10 days of the PFS program "coach phase" (i.e. first 10 program days) in which coaches work directly with the child and model the correct implementation procedure for the teacher, he or she then assumes primary program responsibility ("teacher phase"), which lasts 20 days. The PFS coach assumes a supervisory and trouble shooting role for the remainder of the program.

The First Step to Success program provides feedback to the student using a green and red card—green displayed by the coach or teacher for positive classroom behavior and red for negative behavior. Group dependent contingencies are used to motivate the participating child and peers at school, and individual contingencies and home rewards provide incentives for mastery of school success skills at home along with their display in school contexts. When a reward criterion is met in the classroom, as determined by the teacher and coach, the participating child earns a brief activity reward (e.g., classroom game, extra recess) for peers. The participating child selects an individualized reward from a menu of home rewards preapproved by his or her parents. The PFS focus student (i.e., participating student) receives points and praise for engaging in appropriate classroom behavior (e.g., following classroom rules, cooperating, sharing, sitting quietly and attentively during circle time).

Note that the classroom component of the intervention for this study was modified for younger children in the preschool setting via (a) classroom management training and (b) increasing the coach's time with the child. Before one-on-one intervention starts with the target child, the coach and teacher identify general positive classroom management strategies organized around the five universal principles of positive behavior support that are central to First Step: (a) establish clear expectations, (b) teach the expectations, (c) reinforce the expectations, (d) minimize attention for minor inappropriate behaviors, and (e) enforce clear consequences for unacceptable behavior (Feil et al., 2009; Sprague & Golly, 2013). We have found in this downward extension of First Step that younger children require additional practice in understanding and mastering these behavioral skills and expectations. As a result, the coach role-plays with the child before each implementation session. The Preschool First Step coach provides more supervision and problem-solving more often during the intervention than is the case for the regular First Step program. For example, if the child's behavior is inappropriate and he or she does not respond to feedback, the coach determines whether the child understands the expectations and, if not, takes that opportunity to role-play one-on-one the expected behavior in a quiet place and encourages the child to comply. These modifications often result in a longer coach phase (up to 10 days) compared with the elementary version (5 days).

Home-based component (homeBase)—Over a 6- to 8-week period, parents meet weekly with the First Step coach, usually in their home, to learn how to teach the school success skills via reading, discussion, role-plays, and demonstrations. Each week's parent-coach meeting focuses on one skill, with review and discussion of previously learned skills as needed. The specific homeBase skills taught are: communication and sharing, cooperation, limits setting, problem solving, friendship making, and self-confidence. Parents are provided with a manual containing all the information and accompanying materials needed to implement homeBase. These materials provide a useful reference guide for parents, caregivers, and the coach during and following the PFS program. The coach provides support, supervision, and trouble shooting of any problems and issues that arise during and following the program's implementation and also serves as a communication bridge between the teacher and school. In addition, two modifications were made to the home component in this study. First, parent meetings were conducted with the child present so that the coach could model for the parents how to interact positively with the child during completion of program activities. Second, the home component began earlier in the intervention timeline. In the Grades K-3 version, the home component begins after Day 10, whereas in the preschool version, the home component starts after Day 2.

First Step Implementation

First Step was implemented under the guidance of a "coach." First Step coaches were employees of Oregon Research Institute or the University of Louisville. Each site employed eight coaches. All coaches had a bachelor's degree or higher. Coaches attended a 2-day training session during which they received intensive training on First Step program implementation using various interactive activities. Coaches role-played (a) conducting consent meetings with parents, (b) meeting with the focus student, (c) introducing the program to the class, and (d) implementing both the first program day of the school

intervention and the homeBase module. Coaches also learned problem-solving strategies and how to use the daily summary chart and timing device to track awarding praise and earned points. During implementation, clinical supervisors monitored coaches closely and frequent fidelity checks were conducted to ensure program implementation quality. At each site, coaches attended weekly meetings with lead implementers to discuss and troubleshoot cases. The lead interventionist from the Oregon site trained staff from the PFS implementation sites and also participated in weekly meetings via conference calls to promote implementation consistency across sites.

Data Collection Procedures

Prior to PFS randomization, training, and implementation, project staff distributed baseline questionnaire packets to teachers and parents. Packets were sent by mail or hand-delivered to participants. We provided a postage-paid envelope for returning questionnaires and offered to pick up packets if needed. We distributed postintervention questionnaire packets using the same procedures. For intervention students, packets were distributed after completion of the First Step intervention. To approximate an equivalent window of time between baseline and postintervention data collection for the usual-care control condition, we used data from ESP Stage 2 screening scale to yoke each child in the control group to a child in the intervention group. The average number of days between baseline and postintervention data collection did not differ between conditions, $t(122) = 0.87$, $p = .386$. For intervention students, post packets were collected an average of 128 days ($SD = 28.6$) after the baseline assessment; for students in the usual-care/control group, post packets were collected an average of 133 days ($SD = 28.1$) following baseline. Parents and teachers were each paid US$50 for the questionnaire packet they returned (i.e., screening, baseline, and follow-up data packets). Spanish-speaking parents were given the option to complete questionnaires in Spanish. Eight parents (6%) completed Spanish versions of the questionnaires.

Pre-/Postoutcome Measures

Social Skills Improvement System (SSiS) rating scales—Teacher-reported and parent-reported SSiS social skills and problem behavior scales were the primary outcome measures for this study. This instrument is designed to assess progress in these skills over time. The social skills scale assesses behaviors that promote positive interactions and minimize negative interactions with adults and peers, whereas the problem behavior scale assesses behaviors that impede prosocial behavior (Gresham & Elliott, 2008). The social skills scale has 46 items for teacher-reported ($\alpha = .93$) and parent-reported versions ($\alpha = .95$). The problem behavior scale includes 30 items for teacher-reported ($\alpha = .89$) and 33 items for parent-reported ($\alpha = .92$) versions. Items are reported on a 4-point frequency scale (i.e., *never, seldom, often, almost always*). We converted raw scale scores to standard scores using gender-specific normative data from the SSiS manual.

ESP Scales: ABI, MBI, and ABS—Stage 2 ESP subscales were used as secondary outcome measures in this study (Feil & Becker, 1993; Feil et al., 1998). The ABS has nine items ($\alpha = .79$) measuring the frequency of aggressive behavior. The ABI ($\alpha = .77$) and MBI ($\alpha = .81$) have eight and nine items, respectively. These indices assess the child's teacher-related and peer-to-peer behavioral adjustments. All three ESP measures are rated on a 5-

point frequency scale ranging from *never* to *frequently*. Raw scale scores were computed for each measure. While the ESP was developed originally as a screening measure, Stage 2 subscales from the ESP have also been used as outcome measures in other research studies with preschool children (Gunn, Feil, Seeley, Severson, & Walker, 2006; Serna, Nielsen, Lambros, & Forness, 2000; Sumi et al., 2013; Walker et al., 2009) and have been shown to be sensitive to change as well as having robust concurrent validity. The MBI and ABS, for example, have been strongly correlated with established measures such as the Teacher Report Form of the Achenbach System of Empirically Based Assessments. The Externalizing subscale of the Achenbach, for example, was correlated with the MBI and ABS, with Pearson's *r*s of .88 ($p < .001$) and .83 ($p < .001$), respectively (Feil, Walker, & Severson, 1995).

To facilitate interpretation and discussion, we grouped outcome measures into two domains: prosocial behavior and problem behavior. The prosocial behavior domain includes three scales: the ABI and teacher- and parent-reported social skills scales (*M* intercorrelation = .29). The problem behavior domain includes four scales: the ABS, MBI, and teacher- and parent-reported problem behavior scales (*M* intercorrelation = .41).

Process Measures

Project staff collected implementation fidelity data, measures of teacher-coach alliance, estimates of child and parent compliance, measures of parent fidelity and dosage, and satisfaction data from participants assigned to the intervention condition to determine whether (a) coaches and teachers implemented the program as intended; (b) teachers and coaches were satisfied with their working relationship as it pertained to program implementation; (c) children and parents complied with program requirements; (d) parents were involved and engaged in the homeBase component of the program; and (e) teachers and parents were satisfied with program implementation, support, and outcomes. Descriptions of each measure follow.

Implementation Fidelity Checklist (IFC)—The IFC is a measure adapted to the preschool setting from Walker et al. (2009) to assess delivery and implementation quality of the preschool classroom component. The IFC assesses 16 implementation tasks such as whether the implementer elicits cooperation from the entire class, informs the class of the activity reward, gives the target student points when prompted, provides positive feedback to the target student during the green card game, uses verbal reminders, redirects or makes other comments to prompt the student, and records the day's results on the classroom monitoring form (CMF). For each item, the fidelity checklist assesses (a) delivery of the component and (b) quality of delivery using a 5-point scale from 0 = *very poor*, .25 = *poor*, .50 = *okay*, .75 = *good*, to 1.0 = *excellent* ($\alpha = .89$). Observers collected data on three occasions: once during the coach phase and twice during the teacher phase. Interrater reliability collected on 20% of the fidelity checks conducted was acceptable, Intraclass (ICC) (3,1) = .82. These data were used to compute adherence and implementation quality scores for the coach, teacher, and overall classroom. Adherence scores represent the proportion of critical program features implemented by the coach and teacher. The mean of teacher and coach adherence scores was calculated as a measure of overall classroom

adherence. Average quality ratings for the coach and teacher were calculated as measures of implementation quality; the combined scores for the two implementers were used as a measure of overall classroom implementation quality.

CLASS Monitoring Form (CMF)—The CMF (Walker et al., 2009) is used by the PFS coach and teacher to track the child's compliance with daily goals during the 30 program days of the classroom component. On the CMF, the teacher records daily (a) the number of points required to meet the reward criterion, (b) the number of points earned, and (c) whether the focus child met criterion or a recycle day was necessary (i.e., the child did not meet the daily criterion and the program day was repeated). In accordance with previous studies (Sumi et al., 2013; Walker et al., 2009), we calculated classroom component dosage as the proportion of program days successfully completed (out of 30) and child compliance as the proportion of successful program days to total program days. Computed dosage and compliance scores ranged from 0 to 1. For example, a child who completed 30 program days without recycling would have a compliance score of 1.0; whereas a child who completed 30 days but recycled 7 days would have a compliance score of .81 (i.e., 30/37).

homeBase Monitoring Form (HMF)—Coaches completed the HMF (Walker et al., 2009) after each homeBase session to record (a) whether a session was completed, (b) the parent's estimated level of fidelity, and (c) whether the parent completed the weekly homework assignment. The HMF data were used to compute measures of homeBase dosage, parent fidelity, and parent compliance. Program dosage was computed as the proportion of treatment units (i.e., homeBase sessions) delivered. Scores ranged from 0 (no sessions delivered) to 1 (all sessions delivered). The coach rated parent fidelity on a 3-point scale: *high* (1), *medium* (0.5), and *low* (0). If high, parents participated in and implemented all procedures effectively. If medium, parents demonstrated moderate levels of skill and enthusiasm. If low, parents exhibited limited skill, interest, and cooperation. Parent fidelity was calculated as the mean fidelity score across the completed sessions. Scores ranged from 0 to 1, with higher scores indicating greater levels of fidelity. At the end of home-Base Session 1 and each subsequent session, parents were assigned a brief homework activity corresponding with the week's topic. We calculated parent compliance as the proportion of homework assignments completed across sessions (range = 0–1).

Alliance survey—After completing the classroom component, the coach and teacher also responded a 10-item alliance measure (Walker et al., 2009) to assess their partnership as it related to program implementation. Coefficient alpha for this scale is excellent for the coach version ($\alpha = .94$) and teacher version ($\alpha = .95$). The survey evaluates aspects of alliance such as the respondent's perception of their partner's approachability, shared goals, communication skills, willingness to collaborate, and overall effectiveness. Alliance items were rated on a 5-point scale ranging from *never* to *always*. The total alliance score for each informant is the mean rating across the 10 items. Thus, the score range is from 0 to 5 with higher scores indicating higher mean alliance ratings.

Satisfaction survey—We collected teacher and parent satisfaction data after completion of the school and home components, respectively. The teacher satisfaction report is a 13-

item measure (α = .91), scored on a 5-point Likert-type scale from *strongly disagree* to *strongly agree*. The survey assesses the teacher's perception of training and support received, program usability, and program effectiveness. The parent satisfaction report is scaled in the same manner as teacher satisfaction. The report includes 12 items (α = .94) examining the parent's perceptions of program usability, effectiveness, and value based on impact within the home setting. Both scales have been used in previous studies of First Step (Sumi et al., 2013; Walker et al., 2009). For each measure, we calculated a mean rating across items to assess program satisfaction. Scores ranged from 0 to 5 with higher scores indicating higher levels of satisfaction.

Analysis

Using Mplus 6.0 statistical software (Muthèn & Muthèn, 1998–2010), we estimated a series of linear regression models. Each outcome was regressed on one predictor and one covariate: a dichotomous predictor indicating intervention condition (1 = First Step intervention, 0 = usual-care control) and the baseline value of the outcome. We centered the baseline value of the outcome (i.e., the sample mean was subtracted from each observed value) to facilitate interpretability and calculation of covariate-adjusted, postintervention means. For each outcome, we estimated three preliminary models. One model included the predictor, the covariate, and an interaction term (i.e., Intervention condition × Baseline value of the outcome) to test the equivalence of the slopes of the regression lines for each group. We tested whether the site (i.e., Oregon and Kentucky) moderated program effects by including an interaction term between intervention condition and site. Finally, we tested for cohort effects by creating two dummy-coded variables and testing for a cohort by condition interaction effect for each model. If nonsignificant, we removed these interaction terms from the model to estimate the main effect of the program condition for each outcome.

We used the robust maximum likelihood (RML) estimator in Mplus 6.0 to address missing data in the regression models. Maximum likelihood estimation uses all available data to calculate unbiased parameter estimates and standard errors and is considered a state-of-the-art technique for handling missing data (Schafer & Graham, 2002). To improve the accuracy of RML estimation, we included eight auxiliary variables in the models as potential correlates of missingness: child's ESP rank, child's sex, Spanish-speaking parent, current marital status, parent's education level, estimated annual household income, number of children in the household, and parental distress as reported on the Parenting Stress Index–Short Form (PSI-SF; Abidin, 1995) via questionnaire. Given the higher rate of missing data among parent informants, we included auxiliary variables in the models which have been shown to be predictive of subsequent dropout (Beauchaine, Webster-Stratton, & Reid, 2005; Herman et al., 2012; Reinke et al., 2012) and which indicate higher levels of familial stress or might be perceived as potential impediments between families and research staff (i.e., Spanish-speaking participants). Inclusion of auxiliary variables is recommended as part of an inclusive analysis strategy because potential correlates of missingness increase statistical power, reduce bias, and strengthen the missing at random assumption without altering the interpretation of parameter estimates (Collins, Schafer, & Kam, 2001; Enders, 2010).

As a measure of effect size, we report Hedges' *g*, which the What Works Clearinghouse (WWC) recommends as the preferred measure of effect size for continuous outcomes. Hedges's *g*, the standardized mean difference, is calculated by taking the difference between the mean outcome of each group and dividing it by the pooled within-group standard deviation (WWC, 2011). Effect sizes of .2, .5, and .8 are considered small, medium, and large effects, respectively. To correct for multiple comparisons, we applied the Benjamini–Hochberg (B–H) correction to statistically significant outcomes (Benjamini & Hochberg, 1995). To calculate a B–H correction, statistically significant outcomes are ranked in ascending order within domains based on *p* values and a cutoff for each is calculated. For the prosocial behavior domain, which contains three outcomes, rank-ordered intervention effects are considered significant at a .05 alpha level if *p* values are less than .017, .033, and .05, respectively. For the problem behavior domain, which includes four outcomes, rank-ordered intervention effects are significant at a .05 alpha level if *p* values are less than .013, .025, .038, and .05.

In addition, we report the WWC (2011) improvement index as a measure of practical significance. The improvement index is calculated through a two-step process. First, the effect size estimate is converted to a Cohen's U3 index using a standard normal distribution *z*-score table. Then, the U3 index, which represents the percentile rank of an average child from the First Step intervention condition in the distribution of the control condition, is subtracted from 50%, the percentile rank of an average child in the control condition. The WWC improvement index can be interpreted as the expected change in percentile rank for an average control group child if the child had received the PFS intervention.

Results

Baseline Equivalence

To evaluate the equivalency of the cohorts as well as intervention and control conditions at baseline, we examined between-group differences on the seven outcome measures at baseline and the equivalence of the two groups on child, parent, and teacher baseline demographics. Child baseline and demographic characteristics are reported by condition in Table 1. The First Step intervention group and business-as-usual group did not differ significantly on parent demographic measures including percent living in intact household (27% vs. 26%), number of children in the household, *M* (*SD*) = 2.3 (1.2) versus 2.5 (1.3), percent with a bachelor's degree or higher (13% vs. 11%), or levels of parental distress, *M* (*SD*) = 24.8 (9.9) versus 26.7 (12.0). There was also no difference between groups on teacher and classroom characteristics including the percent of teachers with a bachelor's degree or higher (36% vs. 45%), the number of years teaching, *M* (*SD*) = 12.8 (8.8) versus 16.0 (9.6), and the number of early childhood personnel in the classroom, *M* (*SD*) = 2.3 (1.0) versus 2.3 (1.7). As can be seen from this table, the two groups differed on one demographic variable, the percentage of Hispanic/Latino children. There were a larger percentage of Hispanic/Latino children randomized to the control condition than to the intervention condition (23% vs. 7%, respectively). In addition, we examined cohort effects and all results were nonsignificant. In other words, all three cohorts were equivalent at baseline.

Attrition and Missing Data

Of the 126 participating classrooms, project staff collected baseline packets from 125 teachers (99%) and 120 parents (95%). At postintervention, 124 teachers (98%) and 114 parents (91%) returned a questionnaire. At the scale-level, missing data rates ranged from 1% to 4% for teacher-reported outcomes and from 7% to 9% for parent-reported outcomes. At postintervention the percent of missing data on teacher-reported outcomes ranged from 2% to 5%. For parent-reported outcomes at postintervention, data were missing for 10% of the sample.

To test the assumption that data were missing completely at random (MCAR), we used a two-step approach. We first examined patterns of missing data and Little's MCAR test, a global test of MCAR. Then, given that Little's test has low power and is susceptible to Type II errors (Enders, 2010), we conducted univariate *t* tests for continuous variables and contingency table analysis for categorical variables to examine whether, for each outcome, cases with missing data differed from those without missing data on other relevant variables including program condition, child and parent demographics, and baseline values on screening and outcome measures. Little's MCAR test was nonsignificant ($\chi^2 = 212.45$, $n = 126$, $p = .200$) and none of the examined variables were significantly associated with missing data groups, suggesting that data were MCAR.

Fidelity, Program Compliance, Alliance, and Satisfaction

Table 2 summarizes descriptive statistics for the process measures collected for students, parents, teachers, and coaches assigned to the intervention condition. Adherence to core protocol components of the program was excellent during both coach (95%) and teacher (95%) phases of the study. The quality of the classroom-based component implementation was excellent during the coach phase ($M = 0.92$; range = 0.77–1.00) and good during the teacher phase ($M = 0.78$; range = 0.41–1.00). On average, students received 88% of the requisite program days and families received 84%, on average, of homeBase sessions. During the classroom-based component, student compliance, on average, was excellent (.88); whereas during homeBase, parent compliance and fidelity were in the moderate range (.59 and .60, respectively). Therapeutic alliance was rated highly by both coaches ($M = 4.34$ on a 5-point scale) and teachers ($M = 4.83$). As well, parent- and teacher-reported satisfaction ratings were favorable. Mean teacher-reported scores were 4.36 and mean parent-reported were 4.34 on a 5-point scale. Mean item-level ratings were above 4.0 for 12 of 13 teacher-reported items and 11 of 12 parent-reported items. For both informants, the only item rated below 4.0 pertained to the amount of time spent implementing the program (teacher: $M = 3.93$; parent: $M = 3.95$).

Posttest Differences on Outcome Measures

Preliminary models examined whether site or cohort moderated program effects were nonsignificant. For all models the slopes of the regression lines were equivalent for both experimental and control conditions. Table 3 summarizes baseline and posttest intervention means and standard deviations for the intervention and control conditions, as well as results from the covariate-adjusted regression models. For the prosocial behavior domain, the intervention group differed from the control group on the three parent- and teacher-reported

outcomes, with informants reporting statistically significant improvement at posttest in the prosocial functioning of children receiving PFS as compared with children in the control condition. Hedges's *g* effect sizes for the three prosocial outcomes ranged from .29 to .88. Across the four outcomes in the problem behavior domain, children who received the PFS intervention had significant reductions in problem behavior across both school and home settings as compared with children who did not receive the program. The Hedges's *g* effect sizes for the four outcomes ranged from −.45 to −.79. The B–H correction when applied to the three outcomes in the prosocial domain requires that the rank-ordered, statistically significant outcomes remain significant at the .05 level if *p* values are less than .017, .033, and .05. For the four outcomes in the problem behavior domain, rank-ordered, statistically significant outcomes remained significant at the .05 level and *p* values were less than .013, .025, .038, and .05, respectively. According to these criteria, all 7 outcomes remained statistically significant at the .05 level after applying the B–H adjustment.

Practical Significance of Preschool First Step Intervention Effects

We calculated an improvement index for each outcome to evaluate the practical significance of the PFS program on changes in child behavior. That is, we estimated the mean improvement if an average child from the control group had received the intervention. With respect to the prosocial behavior domain, the mean improvement index score was +23 percentile points (i.e., an average control student receiving the intervention would be predicted to have a mean improvement of 23% on social skills outcomes). Scores on the teacher-reported ABI and SSiS social skills scale were +31 and +28 percentile points, respectively. The improvement index score for parent-reported social skills was +11 percentile points. Similarly, the mean improvement index score for the problem behavior domain was +24 percentile points. Teacher-reported problem behavior outcomes—the MBI, ABS, and SSiS problem behavior scale—ranged from +26 to +29 percentile points. For the parent-reported SSiS problem behavior scale, the improvement index score was +17 percentile points. There were positive improvements on all outcomes and across both the school and home setting; however, greater mean improvement was reported across domains in the school setting (+28 percentile points) as compared with mean improvements in the home setting (+14 percentile points).

Discussion

Considerable progress has been made in the past decade in developing and promoting evidence-based interventions designed to prevent or reduce existing behavior problems among preschool-age children (Barnett et al., 2006; Daley, Jones, Hutchings, & Thompson, 2009; Dunlap & Fox, 2011; Forness et al., 2000; LaForett, Murray, & Kollins, 2008; McCabe & Altamura, 2011). The present research study extends the possible options for efficacious interventions to reduce preschoolers' problem behavior and improve their social skills. The outcomes from this randomized controlled trial evaluation of the PFS intervention showed significant improvements in prosocial behavior as well as significant decreases in problem behavior. Our fidelity results also indicate that we affected the classroom environment for the target child and possibly his or her status with peers in ways that

appeared to increase important positive child outcomes (i.e., parent- and teacher-reported social skills).

This study builds on the considerable body of evidence documenting the efficacy of the original First Step intervention (see Loman, Rodriguez, & Horner, 2010; Seeley et al., 2009; Sumi et al., 2013; Walker et al., 2009; Walker et al., 2014) by replicating these findings with preschool children, their parents, and their teachers. It also lends empirical support for the preschool version of the intervention. Specifically, in the prosocial behavior domain, the intervention group differed from the control group on all three parent- and teacher-reported outcomes with informants reporting statistically significant improvement at posttest in the prosocial functioning of children receiving PFS as compared with children in the control condition. Our fidelity and parent/teacher satisfaction results replicated our previous findings with preschoolers (Feil et al., 2009; Frey et al., 2013; Gunn et al., 2006). There seems to be a substantial foundation of support for the use of First Step to Success with preschool-age children and their families.

However, this study was not without limitations, and additional research is needed to expand our understanding of the impact of the PFS intervention. Although we were able to detect intervention results in parent and teacher ratings, we did not show effects on direct observations of child behavior; and this should be a priority for further study and documentation. We recognize that relying only on participant ratings of child behavior limits the conclusions that can be drawn from these results. That is, there is the potential for participant bias, thereby possibly inflating the achieved effects (Hoyt, 2002). Gresham and Elliott (2014), however, while acknowledging direct in vivo observations as a gold standard in behavioral research, have reviewed the pros and cons in this regard and concluded that “rating scale technology today represents one of the primary and most efficient methods used by researchers to describe and categorize children’s behavior and attitudes and identify target behaviors in need of intervention” (pp. 158–159). In addition, we should note here that we used only subtests from two rating instruments for outcome measures, and one was not originally designed as an outcome measure. Nevertheless, the study’s outcomes would have been more robust and generalizable if we had (a) been able to demonstrate positive effects on direct observation measures and (b) teachers and parents had not been aware of which children were the focus of the PFS intervention.

In the current study, we also only report short-term pre-/postoutcomes. Future studies should therefore not only include replication(s) of these findings but should also examine longer term outcomes for maintenance effects persisting beyond the intervention year with follow-up into kindergarten and the primary grades (Flay et al., 2005). Given also that this was an efficacy trial, the behavioral coaches who implemented PFS with teachers and families were part of our core research team and had worked previously in the preschool field as behavioral consultants or teachers. Feldstein and Glasgow (2008) reported that utilizing a “bridge researcher,” as in this case, facilitated the extension and use of empirically supported programs beyond the confines of the immediate research. In subsequent work, we plan to hire behavioral coaches whose profiles and characteristics more closely resemble those of endogenous providers who would likely implement the intervention in a real-world setting and also assess the durability of intervention effects within and across these contexts.

It was not possible to tease out which component(s) of the PFS intervention were particularly responsible for the outcomes of this study. However, our green/red card cue system and the target child's opportunity to earn rewards for his or her entire class appear to be somewhat unique features as compared with most other two-tier programs mentioned above. As noted by Forness, Walker, and Serna (2014), a recent trend has emerged, especially in pharmacologic school-based, effectiveness research, in which a new intervention is directly compared with the next best existing intervention but simultaneously within the same study. Such an approach, despite its complexity and possible logistical difficulties, would provide essential information in assisting professionals to choose evidence-based practices that might better meet the needs of their preschool children.

Although research in the area of prevention and intervention of behavior problems in preschoolers is limited, there are encouraging signs that coordinated adoption of validated practices could substantially reduce preschoolers' challenging behaviors and thereby enhance the social and emotional well-being of at-risk preschoolers (Powell, Dunlap, & Fox, 2006). This study shows that we can successfully replicate PFS intervention effects across geographically and culturally different implementation sites with powerful effects in terms of child outcomes and consumer satisfaction. Implementation of the preschool adaptation of the First Step to Success intervention program could assist early childhood educators in achieving the goal of greater adoption of empirically validated interventions. In comparison with other interventions noted above, the PFS intervention is easy to use for teachers, with a tool that is simple and accessible (i.e., green and red construction paper glued together), guidelines for implementation that are straightforward, and the provision of consultation with behavioral coach inherent throughout the program implementation. This study has shown that PFS has the potential to help early childhood professionals mitigate problem behavior among high-risk children and further promote positive classroom ecologies in preschool settings.

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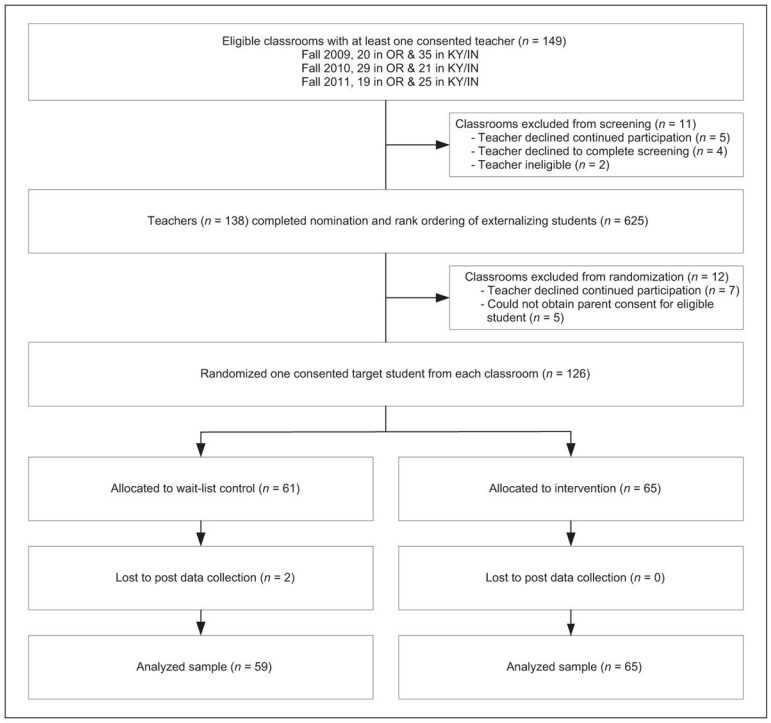

Figure 1.

Schematic overview of participation and sample definition through screening, consent, randomization, and data collection intervals.

Table 1

Baseline Equivalence of Demographic Characteristics and Screening Measures.

Item	Total (*N* = 126)	Control (*n* = 61)	Intervention (*n* = 65)	Test statistic	*p* value
Demographic characteristic					
Age, *M* (*SD*)	4.1 (0.4)	4.1 (0.4)	4.0 (0.4)	0.78	.436
% female	44 (34.9)	24 (39.3)	20 (30.8)	1.02	.313
% African American	39 (31.0)	16 (26.2)	23 (35.4)	1.23	.267
% Caucasian	56 (44.4)	27 (44.3)	29 (44.6)	0.01	.968
% Hispanic	16 (12.7)	11 (18.0)	5 (7.7)	3.04	.081
Screening measures					
ESP rank				0.25	.884
% ranked first	95 (75.4)	45 (73.8)	50 (76.9)		
% ranked second	22 (17.5)	11 (18.0)	11 (16.9)		
% ranked third	9 (7.1)	5 (8.2)	4 (6.2)		
Aggressive Behavior Scale, *M* (*SD*)	22.3 (5.8)	22.8 (5.9)	21.8 (5.7)	0.94	.347
Adaptive Behavior Index, *M* (*SD*)	21.8 (4.8)	22.3 (5.0)	21.4 (4.6)	0.97	.334
Maladaptive Behavior Index, *M* (*SD*)	30.9 (6.1)	31.4 (5.5)	30.4 (6.6)	0.96	.341

Note. Reported test statistics are *t* for continuous and chi-square for dichotomous measures. ESP = Early Screening Project.

Table 2

Descriptive Statistics for Process Measures.

	Classroom, *M* (*SD*)			homeBase, *M* (*SD*)	
Measure	**Coach**	**Teacher**	**Combined**	**Parent**	**Overall**
Protocol adherence	0.95 (0.07)	0.95 (0.09)	0.95 (0.07)	—	0.95 (0.07)
Quality of implementation	0.92 (0.06)	0.78 (0.15)	0.85 (0.09)	0.60 (0.35)	0.77 (0.14)
Dosage	—	—	0.92 (0.19)	0.84 (0.26)	0.88 (0.17)
Compliance	—	—	0.88 (0.15)	0.59 (0.40)	0.78 (0.22)
Alliance	4.34 (0.63)	4.83 (0.40)	—	—	4.59 (0.42)
Satisfaction	—	4.36 (0.54)	—	4.34 (0.65)	4.35 (0.47)

Table 3

Baseline and Postintervention Means and Standard Deviation for Outcome Measures by Condition and Regression Results.

	Control (n = 61)			Intervention (n = 65)					
	Baseline)	Postintervention)		Baseline)	Postintervention)		Condition effect)		Effect size)
Domain/measure	*M* (*SD*)	*M* (*SD*)	M_{Adj}	*M* (*SD*)	*M* (*SD*)	M_{Adj}	*t*	*p* value	Hedges's *g*
Prosocial behavior									
ESP-ABI	22.9 (5.3)	25.3 (6.2)	25.3	22.4 (4.4)	30.4 (5.6)	30.5	5.59	<.001	.88
SSiS-Social Skils-Teacher	76.8 (11.3)	83.3 (13.8)	83.5	77.4 (11.4)	94.5 (13.7)	94.1	5.06	<.001	.77
SSiS-Social Skills-Parent	91.1 (15.0)	94.8 (15.2)	95.1	93.7 (12.2)	100.1 (12.9)	99.3	2.17	.030	.29
Problem behavior									
ESP-MBI	29.6 (7.2)	27.3 (7.3)	27.1	29.0 (6.1)	21.7 (7.4)	21.9	−4.58	<.001	.71
ESP-ABS	21.0 (7.1)	19.8 (8.1)	19.4	19.5 (5.4)	14.5 (4.5)	14.9	−4.50	<.001	.70
SSiS-Problem Behavior-Teacher	128.2 (15.2)	125.3 (16.1)	124.7	125.8 (11.0)	112.2 (14.0)	112.9	−4.82	<.001	.79
SSiS-Problem Behavior-Parent	119.4 (17.3)	118.7 (18.1)	118.4	116.7 (16.0)	109.9 (15.1)	110.9	−3.19	.001	.45

Note. ESP = Early Screening Project; ABI = Adaptive Behavior Index; SSiS = Social Skills Improvement System; MBI = Maladaptive Behavior Index; ABS = Aggressive Behavior Scale.