HHS Public Access

Author manuscript

Educ Train Autism Dev Disabil. Author manuscript; available in PMC 2018 April 13.

Published in final edited form as:

Educ Train Autism Dev Disabil. 2015 December ; 50(4): 397–407.

First Step to Success: Applications to Preschoolers at Risk of Developing Autism Spectrum Disorders

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Abstract

Preschool children with Autism Spectrum Disorder (ASD) may not always be recognized as such during their early years, but some of their behavioral problems may nonetheless prompt a referral for behavioral intervention. Whether such an intervention brings any benefit has not been well studied. We identified a subsample of 34 preschool children at risk for autism spectrum disorder from a large randomized controlled trial (N = 126) of the First Step to Success program. Children at risk of developing ASD demonstrated significant improvements on seven of 11 outcome measures and on a responder analyses based on symptom severity. Process and fidelity measures also suggested that First Step was both feasible and socially acceptable. Implications for early intervention for children at risk of developing ASD are discussed.

There are a variety of specific interventions for young children with Autism Spectrum Disorder (ASD) designed to control disruptive behaviors, improve school success, and increase social interactions. They include such techniques as discrete trial training, comprehensive behavioral treatment, joint-attention intervention, and self-management (Rogers & Vismara, 2008). Such techniques often serve as components of comprehensive interventions, but to date there is a notable lack of *manualized* comprehensive school-based interventions that have been evaluated in randomized controlled trials (Lopata et al., 2012; Szatmari, Charman, & Constantino, 2012). For very young children with ASD, Strain, Barton, and Bovey (2014) suggest that such treatments include family involvement and

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participation, early delivery of services, evidence-based approaches, and planned and systematic intervention.

There is considerable overlap between the core symptoms of ASD and other psychiatric disorders, such as Attention Deficit Hyperactivity Disorder, Oppositional Defiant Disorder, Conduct Disorder, Depression, and anxiety disorders (Simonoff et al., 2008; Van der Meer et al., 2012). These psychiatric diagnoses occur as comorbid conditions in preschool children with ASD at a rate of 30% to 80%, which can not only complicate their early identification, but also render them more resistant to classroom instruction and less able to manage daily school routines, particularly those involving large groups (Hayashida, Anderson, Paparella, Freeman, & Forness, 2010; Kim, Freeman, Paparella, & Forness, 2012).

Because of such significant comorbidity, early attempts to intervene with young children with ASD—particularly in school settings—often occurs prior to a formal diagnosis (Maenner et al., 2013). Recent developments in diagnostic practices suggest that acceptable diagnostic stability for ASD can be achieved as early as age 2 using state of the art technology (Kleinman et al., 2008). Unfortunately, the average age of those diagnosed with ASD is 4.5 years (Coonrod & Stone, 2004), suggesting a two- or three-year delay between possible and actual diagnosis in this critical developmental period. This delay can be even longer for some children with ASD depending on their particular constellation of symptoms. Thus, utilizing classroom–based interventions is particularly important for all teachers of young children with challenging behavior irrespective of whether they have been formally diagnosed with ASD or other related disorders.

Although the field of ASD has traditionally examined the effectiveness of interventions designed specifically for children with an ASD diagnosis, Hoagwood et al. (2012) argue that the trend in intervention services is for intensive home- or community-based interventions that may not necessarily be diagnosis specific. Similarly, Forness (2011) has noted that behavioral approaches in social intervention traditionally focus on broad-based interventions for classroom management rather than on more targeted intervention for specific diagnoses. One such intervention, First Step to Success, focuses primarily on increasing pro-social academic behaviors in young children with emotional or behavioral disorders and has been extensively validated in randomized control trials (see Walker et al., 2014). In the multi-tiered framework for prevention, First Step is viewed as being in the second tier of interventions to be used when children do not respond to usual classroom instruction or behavioral management (Dunlap & Fox, 2014). A preschool version of this program has been validated in a recent and large randomized control trial (Feil et al., 2015). That such a broad-based intervention might also prove effective specifically for preschool children at risk for ASD is based not only on its focus on enhancing pro-social behaviors but also its emphasis on academic engagement and task completion.

Children at risk for developing ASD were chosen for this study because this is the fastest growing category of special education; and such children, especially those with mild ASD cases, may not be identified as such, although they may in fact be identified as needing early intervention (National Autism Center, 2009). Thus, the purpose of this article is to examine use of the preschool version of the First Step to Success early intervention for children who

are at risk of being diagnosed with ASD. We attempt to determine to what extent such a broad-based intervention might potentially have benefited children at risk of developing ASD by retrospectively identifying and examining a subsample of students at risk for this disorder from the large randomized controlled trial of preschool First Step (Feil et al., 2015). We report outcomes not only on generic measures of social functioning but also on measures specific to ASD symptomatology and functional impairment. This subsample approach aligns with calls to conduct translational research that enhances access to evidence-based treatments for young children with ASD (Bregman, 2012; Freeman & Papparella, 2009; Odom, Cox, & Brock, 2013; Rothwell, 2005).

Method

Participants

Participants for this multi-site study included 34 of 126 child-parent-teacher triads who participated in the original efficacy study of pre-school First Step (Feil et al., 2015). All triads were from Head Start and preschool programs located in three counties in Oregon, one county in Kentucky, and one county in Indiana. For each participating classroom, one child who exhibited elevated externalizing behavior problems based on teacher-report was recruited and consented to participate in a randomized controlled trial examining the efficacy of the preschool version of the First Step to Success intervention program. The 34 children in this current study were subsequently screened and identified as being at risk for ASD, according to procedures described below. We first describe the study procedures and manualized intervention methods for the original controlled trial of 134 children, then describe selection and outcome measures used for the subsample of 34 preschoolers with ASD in the present study.

Procedures for the Original Trial

Project staff obtained IRB approval for the original study and then recruited and consented participating teachers. We asked teachers to identify children in their classroom who exhibited externalizing behavior using an adapted version of the *Early Screening Project*, a multi-gated behavioral screening tool (ESP; Walker, Severson, & Feil, 1995). At ESP stage one, teachers nominated and rank-ordered five children in the classroom who most closely matched a detailed description of externalizing behavior. Then, teachers completed three ESP screening stage-two rating scales – the Adaptive Behavior Index (ABI), Maladaptive Behavior Index (MBI), and Aggressive Behavior Scale (ABS) – for each of the children identified in stage one. Reliability alphas were .77, .81, and .79, respectively. Project staff scored these three scales, converted raw scores to severity scores, and then rank-ordered the five children within each classroom to identify the highest-ranked child most in need of recruitment to the study. Only one child was recruited per class because the intervention can only be administered to one student at a time. Note again that the ESP screener is for generic externalizing-type behavior problems and is not necessarily targeted for children with a specific diagnosis.

After collecting baseline data from participating parents and teachers, we randomized children to a usual-care control condition or an experimental condition. Of the 126 children

included in the final sample, 61 were randomized to the usual-care control condition and 65 were randomized to the experimental condition. Teachers with a child randomized to the usual-care control condition received a half-day training in general education classroom management strategies and the principles of positive behavior support (Sprague & Golly, 2013). Teachers with a child randomized to the experimental condition received the same half-day training in classroom management and positive behavior support, plus a half-day training in the pre-school version of First Step, and one-on-one consultation and support from a behavioral coach who worked with the teacher to implement the program. Participating coaches (eight per site) were employees of either Oregon Research Institute or the University of Louisville with a bachelor's degree or higher, and attended a two-day training session during which they received intensive training on First Step implementation. The behavioral coach also met weekly for 6 to 8 weeks with the parent or caregivers of children randomized to the experimental condition on promoting school success skills via reading, discussion, role-plays, and demonstrations. Coaches also met weekly with research staff to troubleshoot cases and were closely monitored via frequent fidelity checks during implementation.

Project staff distributed baseline questionnaire packets to teachers and parents prior to training and randomization and distributed post-test packets after completion of the intervention. Packets included both demographic questions and outcome measures described below. The 126 children participating in the efficacy trial were primarily male (65%) and had an average age of 4 years (SD =0.4). Based on parent report, children were primarily either African American (31%) or Caucasian (44%). Most participating teachers were female (99%) and were either African American (18%) or Caucasian (72%). On average, teachers had taught for 14 years (SD = 9.2). Teacher-reported education levels varied. Twenty-two percent reported having a high school diploma, 33% an associate's degree, 23% a bachelor's degree, and 22% a master's degree or higher.

Intervention

First Step to Success is a collaborative home and school intervention to help at risk children in getting off to a good start in school. It focuses on children who have difficulty adjusting to routine school demands. The teacher, the child's parents, and the First Step coach work together as a triad team to teach the target child generic school success skills such as following directions, doing one's work, and getting along with peers. The three modular components of First Step are screening (described above), classroom, and home. The *school component* of the First Step intervention is based on a game that utilizes a green card, which the teacher shows to the target child to provide positive feedback for following teacher expectations. The other side of the card is red, which is used to provide non-verbal feedback when the child does not comply. One point can be awarded during every 30-second interval if the child's behavior is appropriate. When the daily performance criterion of available points is earned, a brief rewarding activity (selected by the child in collaboration with the teacher) involving the target child and peers is provided thus potentially enhancing the target child's social status. A daily note home also communicates results of the game to the parents who then provide positive reinforcement with an individual activity or reward when the child returns home. The First Step coach implements this intervention for the first 10 days then

turns it over to the teacher for 10 days, followed by a 10-day period in which the feedback card and reinforcements are gradually phased out. The *home component* of the First Step program consists of six home-visitation sessions conducted by the behavioral coach with a series of manualized lessons for the parents focusing on helping the child in terms of communication, cooperation, limit setting, problem solving, friendship-making, and confidence building. Parents, supervised by the First Step coach, teach these school success skills at home and the teacher is trained to recognize and praise their display at school. The preschool version of First Step was modified to meet the needs of younger children and preschool teachers who often have less formal training in classroom management practices. Considerably more detail on the intervention is available in Feil et al. (2014).

Selection of ASD Subsample

We identified the sample of 34 children at risk for developing ASD for this study using parent report on the Early Childhood Inventory - 4 (ECI; Gadow & Sprafkin, 2000). The ECI is a screening tool based on diagnostic criteria specified in the DSM-IV (American Psychological Association, 1994) with excellent validity and reliability for specific psychiatric or developmental diagnoses (Gadow & Sprafkin, 2000). Informants rate items on a four-point frequency scale ranging from *never* to *very often.* The ECI normative sample was used to identify a subsample of children at risk for developing ASD. A cutoff of two or more standard deviations above the mean identified a subsample of 34 of the 126 children (27%) from the larger efficacy trial who met criteria for being at risk for developing ASD. Seventeen had been randomized to the experimental condition and received the Preschool First Step intervention and 17 had been randomized to the usual-care control condition.

Table 1 summarizes the analyses comparing the sample identified as being at risk for ASD ($n = 34$) to the remaining, non-identified sample ($n = 92$) on baseline outcome measures. The two samples did not differ significantly on any of the teacher-reported outcome measures with the exception of a significantly lower SSiS Empathy score for the subsample. As expected, given that the ASD risk sample was identified using parent-reported data, the identified and non-identified participants had statistically significant differences on all parent-reported outcomes.

Outcome Measures

The early screening project behavior rating scales (ESP)—ESP stage two generic scales (Walker, Severson, & Feil, 1995) were used in the original trial and are also reported for this study. They include the ABS, MBI, and ABI, described above. All three ESP measures are rated on a 5-point frequency scale ranging from *Never* to *Frequently*. Higher scores on the ABS and MBI indicate higher levels of problem behavior whereas higher scores on the ABI indicate higher levels of social functioning.

Social skills improvement system rating scales (SSiS)—For this study, we also examined specific outcomes for ASD symptomatology as well as measures related to ASD functional skills. We used the symptom subscale from both teachers and parents as well as the teacher-reported and parent-reported *communication*, *cooperation*, and *empathy* subscales from the SSiS social skills rating system (Gresham & Elliott, 2008). The SSiS

autism subscale focuses on ASD symptoms, and the other three focus on related forms of functional impairment. Items are rated on a 4-point frequency scale (*Never, Seldom, Often, Almost Always*). The Autism symptom subscale includes 15 items assessing impairment in social interactions and communication, as well as repetitive and stereotyped behavior patterns (α = .83 for teacher report; α = .77 for parent report), with higher scores indicating higher levels of impairment. The communication subscale includes seven items assessing the child's verbal and non-verbal communication skills (α = .76 for teacher report; α = .69 for parent report). The six-item cooperation subscale examines the child's ability to follow directions, participate appropriately, pay attention, and complete tasks (α = .79 for teacher report; α = .83 for parent report). The six-item empathy scale assesses the child's ability to comfort, forgive, and show kindness toward others (α = .92 for teacher report; α = .89 for parent report).

Process Measures

We collected First Step coach and teacher implementation fidelity data related to the school component and data to identify dosage, parent fidelity, and parent compliance. We also collected indicators of teacher and coach alliance, as well as parent and teacher satisfaction data for participants randomized to the intervention condition. The *Implementation fidelity checklist* (*IFC*) assessed the adherence and quality of classroom implementation and was collected once during the coach phase and twice during the teacher phase with an inter-rater reliability of .82. The *Classroom monitoring form* (*CMF*) recorded the target child's compliance during the classroom component such as daily points earned, whether the daily criterion was met, or if the program day was repeated because the child did not meet the daily reward criterion. Classroom dosage is the proportion of program days out of 30 completed.

The *Home monitoring form* (*HMF*) was used to compute dosage, parent fidelity, and parent compliance for the home component of First Step and is completed by the First Step coach after each session. The *Alliance survey* was completed by the coach and teacher at post intervention to assess various aspects of their working relationship. Coefficient alpha was .94 for the coach version and .95 for the teacher version. The *Satisfaction survey* was collected by teachers and parents at post intervention, and assessed the perception of training and support received, program usability, and program effectiveness, with alphas of .91 and .94, respectively. Further details on all of the above measures are available in Sumi et al. (2013) and Walker et al. (2009).

Statistical Analysis

For each outcome we estimated a linear regression model using the full information maximum likelihood estimator in Mplus 6.0 (Muthèn & Muthèn, 2010), which utilizes all available data to calculate unbiased parameter estimates and standard errors. For each model, we regressed the baseline value of the outcome and a dichotomous predictor for intervention condition (1 = First Step intervention, 0 = wait-list control) on the post-intervention outcome. We report Hedges' g as a measure of effect size (What Works Clearing-house, 2011). Effect sizes of .2 are considered small and effect sizes of .5 and .8 are considered medium and large effects, respectively. Due to its small sample size, this

study has low power. Although we examined 11 outcome measures we chose not to apply a correction to adjust for multiple comparisons because it would be an overly conservative approach for an already underpowered study.

To identify clinically significant post-intervention responses of study participants, we conducted a responder analysis utilizing Jacobson and Truax's (1991) Reliable Change Index (RCI). Jacobson and Truax define change based on a two-step criterion addressing magnitude of change (i.e., the RCI) and change in functioning (i.e., movement across a specified cutoff). Since we did not collect our autism screening measure, the ECI, at post-intervention, we utilized normative data for the SSiS Autism subscale. Specifically, we identified children from the ASD subsample who were one standard deviation or more above the normative mean at baseline and specified our cutoff as movement into the normative range (i.e, within 1 SD). We utilized the cutoff and RCI to classify children into one of four categories. Children were classified as having (a) *responded* if they moved into the normative range at post intervention *and* had a RCI less than −1.96, (b) *improved* if they *did not* move into the normative range but had an RCI less than −1.96, (c) *remained unchanged* if they did not meet the RCI criterion (i.e., RCI < −1.96), or (d) *deteriorated* if the RCI criterion worsened (i.e, RCI > 1.96). We discuss methods and issues related to responder analysis in a recent paper for those wishing more detail (Small et al., 2015).

Results

Preliminary Analyses

We compared the intervention condition and control condition on child, parent, and teacher baseline demographics and on the 11 outcome measures examined in this study to evaluate the equivalency of children in the two conditions at baseline As can be seen in Table 2, there were no statistically significant differences between the intervention and control conditions on these variables. There were, however, trend-level differences on the racial/ethnic composition of the two groups. The intervention condition had a higher percentage of African American children (47% vs. 18%, respectively) and a smaller percentage of Caucasian children (41% vs. 71%, respectively) as compared to the control group.

The intervention and control groups did not differ significantly on parent demographic measures (not shown in Table 2) including percent living in a two-parent household (24% for both groups), number of children in the household (*M[SD]* = 2.5[1.0] vs. 2.6[1.1]), percent with a bachelor's degree or higher (18% vs. 6%), or age of participating parent (*M[SD]* = 31.1[7.6] vs. 33.8[9.5]). Neither did the two groups differ on examined teacher and classroom characteristics. Across both groups, all teachers were female, primarily Caucasian (88% and 77%, respectively), and had attained a bachelor's degree or higher (53% and 59%, respectively). Although non-significant, teachers in control classrooms had more years teaching experience (*M[SD]* = 16.0[8.0]) as compared to teachers in intervention classrooms (*M[SD]* = 11.1[8.2]). Additionally, there were no statistically significant differences between children with ASD in the intervention and control conditions on any of the 11 baseline parent-reported and teacher-reported outcome measures although there were two trend-level differences on the teacher-reported MBI and ABS. Children in the intervention condition had non-significant lower MBI scores (*M[SD]* = 27.4[5.3] vs.

30.9[6.4], $p = .094$) and lower ABS scores (*M[SD]* = 17.2[5.0] vs. 21.9[8.4], $p = .055$) as compared to children in the control condition.

Attrition and Missing Data

Of the 34 children in the ASD subsample, baseline questionnaire data were available for 97% of teachers and 100% of parents. At post-intervention, we obtained questionnaire data from 97% of teachers and parents. One child was lost to follow-up but was retained in the sample in accordance with an intent-to-treat approach. Although parent-reported and teacher-reported data were obtained for most children at baseline and post-intervention, missing item-level data occasionally precluded subscale scoring. At baseline, two children (6%) were missing data for at least one parent-reported outcome and another child was missing data for at least one teacher-reported outcome. Thus, at baseline, 12% of the sample was missing data for at least one outcome measure. At post-intervention, complete scale-level data were available for all 33 children for whom we collected questionnaire data. We tested the assumption that data were missing completely at random (MCAR) using Little's MCAR test. The test was non-significant ($\chi^2 = 62.17$, $p = .542$) suggesting that data were missing completely at random.

Fidelity, Program Compliance, Alliance and Satisfaction

In terms of process measures, coaches and teachers adhered to at least 95% of observed core program components. School implementation quality (fidelity) was excellent for coaches (.94; range = .88 to 1.00) and good for teachers (.82; range = .41 to 1.00). As for dosage, children received 96% (range = 73% – 100%) of program days and families received 89% (range = 53% – 100%) of home sessions. On average, child compliance was excellent (.92) but parent compliance (.59) and quality of implementation (.62) were only moderately satisfactory. Coaches (*M[SD]* = 4.57 [.54] on a 5-point scale) and teachers (*M[SD]* = 4.86 [.32]) rated highly their working alliance with one another. On average, teachers and parents reported high levels of satisfaction with the First Step program (*M[SD]* = 4.44[.42] and 4.34[.55], respectively, on a 5-point scale).

Posttest Differences on Outcome Measures

Results from the covariate-adjusted regression models are reported in Table 3. Children at risk for developing ASD who received the First Step intervention improved on all teacher-reported measures assessing symptoms (autism, maladaptive, and aggressive behavior) and on two of the four measures of functioning compared to children in the control condition. Hedges' *g* effect sizes ranged from −.65 to −1.12 for teacher-reported reductions in symptoms and from .29 to 1.18 for teacher-reported improvements in functioning. Parents of children in the intervention condition reported significantly greater reductions on the SSiS Autism subscale (Hedges' $g = -.77$) and significant improvements on the SSiS Empathy subscale (Hedges' $g = .57$) as compared to the control group. Although non-significant, effect sizes were also in the medium range for parent-reported improvement on the Communication (Hedges' $g = .52$) and Cooperation (Hedges' $g = .52$) subscales.

Responder Analysis

To assess participant response, we examined movement into the normative range on the SSiS Autism subscale, as well as the magnitude of change (i.e., the RCI). We examined responses for children who were above the SSiS normative cutoff at baseline. Of the 34 children in the ASD sample, 13 of 17 (76%) children in the intervention condition and 13 of 17 (76%) children in the control condition were 1+ SDs above the mean based on teacher report. Based on parent report, 13 intervention (76%) and 14 control (82%) children were above the normative range. Based on teacher report at post-intervention, four intervention children *recovered* (31%), two children *improved* (15%), and seven children (54%) remained *unchanged* on the SSiS Autism subscale. For the comparison condition, two children *recovered* (15%), two children *improved* (15%), eight children (62%) remained *unchanged*, and one did not have post-intervention teacher-reported data on the Autism subscale. Thus, based on teacher report, six (46%) children from the intervention condition *recovered* or *improved* as compared to four (31%) children in the control condition ($\chi^2 = 0.43$, $p = .513$, *OR[95% C.I.]* = 1.7[0.4,8.7]). Based on parent report at post intervention, two intervention children *recovered* (15%), three children *improved* (23%), and eight children remained *unchanged* (62%). For children in the control condition, one improved (7%), 12 remained unchanged (86%), and one did not have parent-reported post-intervention data on the Autism subscale. Overall, based on parent report, five intervention children (38%) *recovered* or *improved* as compared to one (7%) comparison child ($\chi^2 = 3.47$, $p = .063$, *OR[95% C.I.]* = 7.5[0.7,76.8]). No children displayed deterioration on these measures.

Discussion

The First Step intervention was implemented with similar levels of fidelity and program compliance for the at risk for ASD subsample and for the non-ASD First Step sample. Further, child compliance/dosage, coach- and teacher-reported alliance, and teacher and parent levels of satisfaction were all relatively similar between these two samples. Preschool children at risk for developing ASD showed significant improvement on a broad range of teacher and parent outcome measures in this study, with almost all effect sizes in the medium-to-large category. These effect sizes are comparable to those identified in the non-ASD sample, suggesting the First Step intervention is similarly effective for both. Additionally, although First Step was not designed to target specific disorders such as ASD, it nonetheless appears to improve both the symptoms of ASD and at least some of the impairment associated with this disorder. Note, however, that long-term outcomes of children with ASD suggest that symptoms may improve with age but that impairments tend to linger (Howlin, Moss, Savage, & Rutter, 2013).

To be clear, however, we are not proposing the First Step intervention as either a comprehensive or specific treatment for young children with ASD. Children who are known to have ASD require a comprehensive intervention designed to address all of the core symptoms of the disorder, such as language and restrictive or repetitive behaviors. However, it does address some deficits in social and related domains using recommended strategies for ASD instruction. For example, it relies on direct instruction of functional communication skills (attending to adults/peers), engages children in meaningful activities in multiple

settings (classroom, and home), and is grounded in an ecological approach with specific roles and responsibilities for peers, teachers, and parents. The First Step intervention at the very least appears to provide a vehicle to begin services prior to formal diagnosis, and offers a structured environment (school) with extensive learning opportunities to practice new skills– both of which have been identified as moderators of treatment effectiveness (Rogers & Vismara, 2008; Strain et al., 2014).

In review of studies on early detection for ASD, very few actually followed up to determine if screening actually resulted in referral for services (Daniels, Halladay, Shih, Elder, & Dawson, 2014). A survey of early intervention service coordinators also reported that most do not see autism specific screening actually completed in preschool settings (Pizur-Barnekow, Muusz, McKenna, O'Connor, & Cutler, 2012). Thus, children at risk for ASD may not always be identified as such during their early school years, as we have noted in the introduction, but some of their behavioral problems and symptoms may nonetheless prompt a referral for generic behavioral intervention. While it may not be ideal, such children could at least participate in helpful interventions such as First Step without having to wait until their symptoms are confirmed diagnostically.

This study has several strengths. Most notably, the randomized design controls for threats to internal validity. Additionally, our measurement protocol consisted of relatively reliable and valid measures that are well-established and respected in broad-based intervention research for young children at risk for ASD and other challenging behavior. There was also substantial evidence that our sub-sample of children at risk for ASD, though small, was relatively well matched between intervention and control conditions on a variety of baseline variables. Our outcome variables, furthermore, included not only generic behavioral measures but also measures specific to ASD.

This study has some noteworthy limitations as well. First, our interest in examining the potential efficacy of the preschool version of First Step for children at risk for ASD did not begin with an *a priori* hypothesis but was a relatively small subsample selected after the fact. Second, our screening targeted children with externalizing disorders. Thus, although our sample is at risk for developing ASD, it may not be representative of all children with ASD in that it is likely overrepresented by externalizers and underrepresented by children with internalizing behaviors and/or limited or no language. Third, as Table 1 suggests, our subsample at pre-testing was not viewed by teachers as significantly more impaired on most ASD measures compared to the remaining sample, although parents did view them as significantly different.

Rogers and Vismara (2008) suggest that new readily accessible interventions for children with ASD need to be developed. The evidence in this article suggests a possible new "tiered" model for interventions such as First Step in which broad-based groups of children with a variety of behavioral or developmental problems are not only provided with a generic tier-two intervention, but "non-responders" are then provided with additional screening designed to select those who might benefit from various, tier-two interventions augmented with components of more specific interventions for certain disorders that have already been demonstrated to be evidence-based (Weisz et al., 2013).

Acknowledgments

Research supported by grants from NICHD (#R01HD055334 and #R21HD43765) and ACYF (#90YD0098). We would also like to thank our partners in the Jefferson County Public School District (Louisville, KY).

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TABLE 1

Baseline Means and Standard Deviations of Child Outcome Measures for Sample Identified as at Risk of ASD and the Remaining Non-Identified Sample

	Identified Sample (n = 34)	Non-Identified Sample (n = 92)	Test Statistic	
	M (SD)	M (SD)	t	p-value
Teacher report				
Symptoms				
SSiS Autism	20.5 (6.3)	19.3 (6.4)	−0.96	.337
ESP MBI	29.0 (6.0)	29.4 (6.8)	0.28	.778
ESP ABS	19.5 (7.8)	20.5 (6.0)	0.81	.421
Functioning				
SSiS Communication	10.0 (3.2)	10.3 (3.3)	0.35	.725
SSiS Cooperation	7.4 (2.6)	7.0 (2.6)	−0.81	.422
SSiS Empathy	5.7 (3.9)	7.6 (4.2)	2.19	.030
ESP ABI	23.4 (3.9)	22.4 (5.1)	−1.07	.287
Parent report				
Symptom				
SSiS Autism	21.7 (4.3)	13.6 (5.1)	−8.19	<.001
Functioning				
SSiS Communication	11.2 (2.7)	14.3 (2.9)	5.48	<.001
SSiS Cooperation	7.6 (2.5)	10.5 (3.0)	4.99	<.001
SSiS Empathy	8.6 (3.6)	12.5 (3.6)	5.28	<.001

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TABLE 2

Baseline Equivalence of Child Demographic Characteristics and Screening Measures for Children with ASD

	Total (n = 34)	Control (n = 17)	Intervention (n = 17)	Test Statistic	p-value
Demographic characteristic					
Age *M(SD)*	4.1 (0.4)	4.1 (0.4)	4.1 (0.3)	−0.45	.658
Percent Female	8 (23.5)	4 (23.5)	4 (23.5)	0.00	1.000
Percent African American	11 (32.4)	3 (17.6)	8 (47.2)	3.35	.066
Percent Caucasian	19 (55.9)	12 (70.6)	7 (41.2)	2.98	.084
Percent on IFSP	12 (35.3)	6 (35.3)	6 (35.3)	0.00	1.000
Screening measures					
Percent ranked 1st on ESP	31 (91.2)	15 (88.2)	16 (94.1)	0.37	.545
ESP ABS *M(SD)*	22.1 (6.7)	23.2 (7.0)	21.0 (6.3)	0.98	.337
ESP ABI *M(SD)*	21.4 (4.1)	21.9 (3.5)	20.9 (4.8)	0.70	.490
ESP MBI *M(SD)*	30.8 (6.3)	30.8 (5.4)	30.8 (7.2)	−0.03	.979

Note. Reported test statistics are t for continuous and χ^2 for dichotomous measures.

IFSP = Individualized Family Service Plan, ESP = Early Screening Project, ABS = Aggressive Behavior Scale, ABI = Adaptive Behavior Index, MBI = Maladaptive Behavior Index

TABLE 3

Baseline and Post-Intervention Means and Standard Deviation for Outcome Measures by Condition and Regression Results

	Control (n = 17)			Intervention (n = 17)			Condition Effect		Effect Size
	Baseline	Post-Intervention		Baseline	Post-Intervention				
Domain/Measure	**M(SD)**	**M(SD)**	**M_{Adj}**	**M(SD)**	**M(SD)**	**M_{Adj}**	**Test Statistic**	**p-value**	**Hedges' g**
Teacher report									
Symptoms									
SSiS Autism	19.7 (6.3)	16.9 (6.3)	17.2	21.4 (6.6)	13.8 (8.0)	12.5	−2.39	.020	−0.65
ESP MBI	30.9 (6.4)	28.4 (7.0)	28.3	27.4 (5.3)	20.4 (5.6)	21.2	−2.75	.006	−1.12
ESP ABS	21.9 (8.4)	21.4 (10.6)	22.0	17.2 (5.0)	12.0 (2.4)	14.5	−2.87	.004	−0.98
Functioning									
SSiS Communication	10.0 (2.9)	12.1 (3.3)	12.0	10.2 (3.6)	14.1 (3.7)	13.7	1.52	.128	0.48
SSiS Cooperation	6.9 (3.2)	9.1 (2.6)	9.3	7.9 (2.0)	12.2 (2.5)	12.3	3.46	.001	1.18
SSiS Empathy	6.5 (4.0)	9.3 (3.8)	8.5	5.4 (3.7)	9.9 (4.6)	9.8	1.14	.254	0.29
ESP ABI	23.4 (4.7)	25.8 (6.0)	25.4	23.5 (3.2)	30.6 (4.7)	29.7	2.10	.036	0.80
Parent report									
Symptoms									
SSiS Autism	21.4 (4.3)	19.2 (4.5)	18.9	21.8 (4.6)	16.1 (5.9)	14.8	−2.49	.013	−0.77
Functioning									
SSiS Communication	11.2 (3.0)	12.6 (3.0)	12.8	10.8 (2.1)	13.5 (3.1)	14.3	1.73	.084	0.52
SSiS Cooperation	6.8 (2.2)	8.3 (2.9)	9.1	8.1 (2.4)	10.7 (3.3)	10.8	1.83	.068	0.52
SSiS Empathy	8.1 (3.5)	9.3 (3.2)	9.9	9.2 (3.7)	11.9 (4.8)	12.2	2.12	.034	0.57