Developmental Screening and Early Intervention in a Childcare Setting for Young Children At Risk for Autism and Other Developmental Delays: A Feasibility Trial

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Efforts to decrease disparity in diagnosis and treatment for under-resourced children with developmental delays, such as autism spectrum disorder, have led to increased interest in developing programs in community settings. One potential setting that has already demonstrated feasibility in conducting universal screening is the childcare setting. The current study conducted developmental screening in a total of 116 children ages 16–80 months of age in an urban low-income community childcare center. Parents of 20 children who screened positive were enrolled in the intervention phase of the study, where children received a staff-delivered targeted early intervention or a waitlist control condition. Given the small and imbalanced sample sizes, confidence intervals from mixed effect models were used to measure changes across time for each group. Of the children who received treatment, there was an average increase in child initiated joint engagement, symbolic play, and language use. This study provides initial feasibility data for the implementation of a screening and early intervention program to service a predominantly low-resource and ethnically diverse population within the childcare system in a large metropolitan city. ***Autism Res*** *2019, 00: 1–11.* © 2019 International Society for Autism Research, Wiley Periodicals, Inc.

Lay Summary: Identifying and delivering treatment services for young children with developmental delays, such as autism spectrum disorder, may be most successful in community settings, especially for those children from under-resourced areas. This study found preliminary evidence that the childcare setting is a good place to conduct screening and deliver early interventions for children at risk for autism and other developmental delays.

Keywords: children; early detection; intervention-behavioral; treatment research

Introduction

A diagnosis of autism can reliably be made in children as young as 24 months of age, yet many children are diagnosed much later [Charman & Baird, 2002]. This is particularly true for children from underrepresented (i.e., minority race or ethnicity, or low income) communities where access to developmental screening and specialty clinicians are severely limited [Mandell et al., 2008]. In response to this disparity, there is an increased effort to expand developmental screening and intervention into community settings. A review of early detection procedures in primary care and other community settings found that routine screening increased overall referral rates, and that these efforts were successful even in nonmedical settings such as schools and daycare centers [Daniels, Halladay, Shih, Elder, & Dawson, 2014]. An increase in referral rate is an important first step, but almost no studies followed the families beyond the initial referral to measure access to or attainment of diagnosis or services [Daniels et al., 2014]. In truth, we know very little about where children end up in the system and the influence of barriers to service access, such as the extent to which families are actively engaged in the process [Pellecchia et al., 2018], and availability of service resources and trained professionals, especially in underrepresented communities [Kasari, 2014].

One potential setting for identification and screening of children at risk is the childcare center. For many children, especially those from urban communities, where there is a higher potential for both parents to be in the work force, childcare centers may be the child's first point of contact with individuals outside of the family. Within the centers, childcare providers spend many hours daily with young children, which provides ample opportunity

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for informal assessment of child behaviors and development. Center-based care also provides a unique opportunity to observe the child with age mates in a more structured setting. Several studies have already demonstrated the feasibility of conducting universal screening in the childcare setting [Daniels et al., 2014; Rybski & Wilder, 2008].

It may also be a setting where young children can receive early intervention, if warranted. Several studies have already demonstrated the effectiveness of training nonprofessionals in community settings. Kaale, Smith, and Sponheim [2011] successfully trained preschool teachers to implement a social-communication intervention, adapted from the Joint Attention, Symbolic Play, Engagement and Regulation (JASPER) intervention [Kasari, Freeman, & Paparella, 2006; Kasari, Gulsrud, Freeman, Paparella, & Hellemann, 2012; Kasari, Gulsrud, Wong, Kwon, & Locke, 2010] with positive effects on joint attention initiations with teachers, which generalized to longer joint engagement with mothers. Similar results were found in an urban low-income community preschool setting where teaching assistants were taught the JASPER intervention [Shire et al., 2017]. Again, feasibility of a train-the-trainer model was established with nonprofessionals demonstrating adequate fidelity to the JASPER intervention and child improvements in joint attention, joint engagement, and play. These studies demonstrate that nonprofessionals in a school setting can implement effective interventions. Yet, rarely has a study examined whether childcare providers can deliver such interventions [Jocelyn, Casiro, Beattie, Bow, & Kneisz, 1998].

The goal of this study was to collaborate with childcare centers to increase access to developmental screening and targeted early intervention services in an urban, low income community in South Los Angeles by: (a) identifying children at risk for autism spectrum disorder (ASD) and other developmental concerns and (b) training childcare providers to implement an intervention teaching social communication and play.

This study utilizes JASPER, an evidence-based intervention developed at University of California, Los Angeles (UCLA) for teaching social communication and play to young children with ASD. JASPER is a systematic comprehensive social communication module, which incorporates developmental goals and strategies, as well as behavioral strategies. JASPER has shown good outcomes in multiple randomized controlled studies in which the intervention was applied for 30 min two to five times per week for 2 to 3 months. Studies have reported greater child improvement in social communication and play in young children with autism relative to the background nonstudy interventions that all children received [Kasari et al., 2006, 2010, 2012]. The current study is a pragmatic trial [Slagle & McCall, 2016] that pilots the use of JASPER in a childcare consortium serving underrepresented children and families living in a low-income area of South Los Angeles. A pilot study framework is believed to be the best method due to the exploratory nature of the study and the need to establish feasibility of the application of this intervention to a novel population and setting.

Table 1. Screening Results of Invited Population

	PEDS				
M-CHAT-R/F	Path A[a]	Path B[a]	Path C	No risk	Total
High risk[b]	0	0	0	1	1
Medium risk[b]	2	5	9	9	25
Low risk	1	14	1[c]	0	16
Total	3	19	10	10	42

[a]Indicates a positive screening on the PEDS.
[b]Indicates a positive screening on the MCHAT-R.
[c]Note that this individual was included despite not meeting eligibility criterion due to teacher concern.

Methods

Participants

A total of 252 families were initially approached at four locations of a childcare consortium serving families living in a predominantly under-resourced area of Los Angeles. From this initial sample, 184 families provided initial consent to complete developmental screening. Of the 184 families that gave initial consent, 126 completed the subsequent screening forms, with a total of 116 children between the ages of 16 and 80 months enrolled in the screening phase. Ten children who completed the screening were under the age of 16 months and were therefore excluded. Forty-one children were defined as eligible for intervention participation by screening positive on either the Parent's Evaluation of Developmental Status (PEDS) [Glascoe, 1997] or the Modified Checklist for Autism in Toddlers, Revised, with Follow-Up (M-CHAT-R/F) [Robins, Fein, & Barton, 2009]. An additional child, who did not meet the eligibility criterion, was also invited to participate due to teacher concern, bringing the eligible population total to 42 children. Of the 42 children, 15 screened positive on the PEDS only, 19 screened positive on the M-CHAT-R/F only, 7 screened positive on both assessments, and 1 child with teacher concern screened positive on neither (Table 1). Twenty children and their parents consented to participate and were enrolled in the intervention phase of the study (Fig. 1, consort chart).

Table 2 shows demographic characteristics for screened children, parents, and childcare providers. All childcare providers involved in the study were female, and the providers were predominantly African American (50%) and Hispanic (40%). The children were on average 47 months old, ranging from 16 to 64 months, and were predominantly Hispanic (67%) and African American (29%) and female (62%). The majority (51%) of parents received a high-school diploma or less. 11% were graduates of a college, graduate school, or professional training program. Seventy-five percent of parents were currently employed

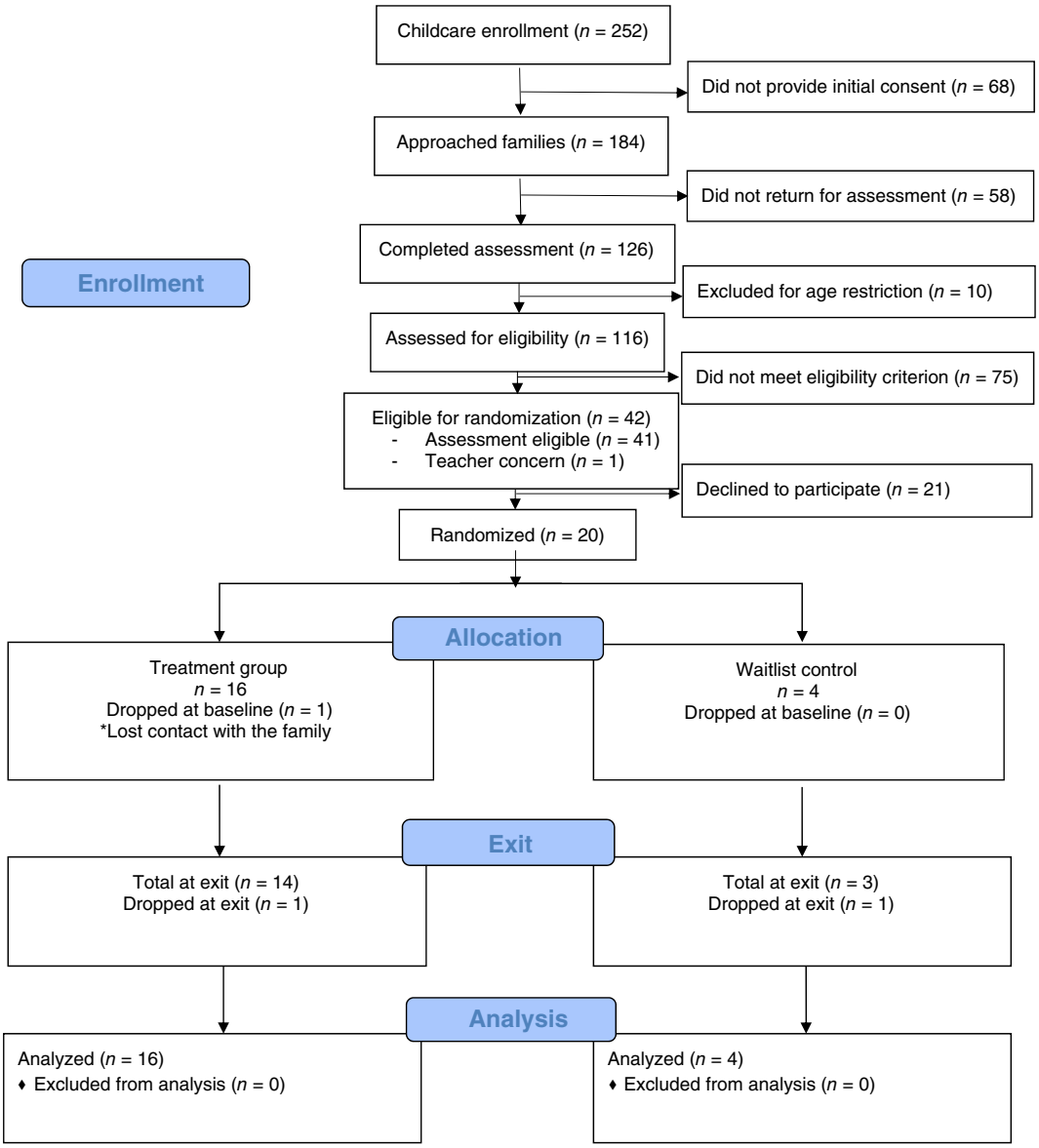

Figure 1. Consort chart.

with households consisting predominantly of both biological mother and father (54%) or biological mother only (32%).

Table 3 identifies the demographic characteristics of the intervention and control groups and shows the respective screening results for all of the randomized population. In the randomized population, the treatment group was slightly older than the control group (50 vs. 45 months), but both had a similar age range, 27 to 61 months and 18 to 61 months, respectively. Similarly, both groups were predominately male (63% vs. 75%) and Hispanic (88% vs. 75%).

Procedures

The primary goal of this study was to establish feasibility of the approach in a community childcare setting. Early screening has been found to increase referral rates in childcare settings and interventions training nonprofessionals in targeted social-communication intervention have also been found to be effective, but these two approaches have rarely been combined in a childcare setting [Jocelyn et al., 1998]. Feasibility was measured in terms of participation at each phase of the study, from screening to eligibility to enrollment and completion of the intervention, and the fidelity of provider implementation. Randomization was used to inform whether childcare center staff could improve outcomes in the child over a brief intervention period, not necessarily to test the effectiveness of JASPER.

The academic institutional review board approved the study and procedures were adapted from previous work training paraprofessionals in preschool settings [Shire et al., 2017] and in collaboration with the childcare consortium

Table 2. Demographics of the Screened Population

Population	Demographics	Baseline characteristics (n = 116)	
		Mean (SD) / N (%)	Missing
Childcare providers			
	Gender		0
	Female	10 (100)	
	Race/ethnicity		0
	African American	5 (50)	
	Hispanic	4 (40)	
	Cambodian	1 (10)	
Children			
	Age (months)	46.63 (12.37)	0
	Gender		12
	Female	65 (62)	
	Male	41 (38)	
	Ethnicity		3
	Hispanic	76 (67)	
	African American	35 (29)	
	Other	4 (4)	
Parents			
	Education		2
	<7th	5 (4)	
	Junior high	10 (9)	
	Some high school	21 (18)	
	High school	23 (20)	
	Some college	35 (31)	
	Special training after HS	8 (7)	
	College graduate	8 (7)	
	Graduate/professional training	4 (4)	
	Employment		3
	Employed	85 (75)	
	Not employed	28 (25)	
	Lives with		1
	Biological mom and dad	62 (54)	
	Biological mom only	37 (32)	
	Other	16 (15)	
	Primary language		4
	English	44 (39)	
	Spanish	28 (25)	
	English and Spanish	38 (34)	
	Other	2 (2)	

leaders. Several planning meetings between researchers and childcare consortium leadership were convened prior to study start. Members of the group worked together using principles of shared decision making [Jones & Wells, 2007]. Both academic and community leadership had equal say in the organization and implementation of the study in the childcare setting. Knowledge sharing around barriers to participation and engagement in the research process were of utmost importance. Particular attention was given on how to approach parents regarding the nature of the study, the procedures for consenting families, and childcare provider training. The leadership group discussed the importance of providing education on early identification of developmental risk and intervention to parents and establishing trust between researchers and families in order to increase participation. It was decided that familiar childcare providers would explain the purpose of the study and provide a warm introduction to research staff for consenting.

Parents were presented with initial information about the study during a monthly parent seminar presented by trusted providers at their childcare site and in the form of a written description of the study and a copy of the consent form. Study staff was available to address any questions regarding the study or their child's participation.

The study was conducted in two phases. All interested parents first provided consent for Phase 1 of the study, which consisted of two developmental screening questionnaires. Parents who rated their child as having elevated concern on either of the two developmental screeners provided in Phase 1 were invited to participate in Phase 2, the intervention phase. Study personnel consented the parents at the family's convenience before or after picking up their child from the childcare center.

Phase 1: screening. Two parent questionnaires, the PEDS and the M-CHAT-R/F, were used to assess for early indicators of developmental concern and ASD, respectively. The PEDS is a universal Level 1 screener detecting developmental and behavioral problems in young children, and the M-CHAT-R/F is an autism-specific Level 2 screener assessing for early indicators of ASD. The M-CHAT-R/F follow-up interview was conducted for any children who screened at medium risk on the original questionnaire. Positive M-CHAT-R/F responses included medium or high-risk categories, and positive PEDS responses were defined as path A or B categories. Parents were asked to complete each screener during the period in which they drop off or pick up their child from the developmental center. Completed forms were collected and scored by study staff. Parents of children who screened positive on either measure were notified that their child was identified as being at risk for developmental delay. In addition, children who screened positive were referred to the childcare consortium's psychological assessment team for further evaluation and referral and invited to participate in Phase 2 of the study.

Phase 2: intervention. This phase of the study is a randomized controlled trial, involving pre and post assessments, and an intervention period of 4 weeks. Childcare sites were randomized to either immediate treatment or a 4-week waitlist. During the 4-week intervention, the child received 30-min JASPER treatment sessions three times per week in the classroom. Childcare staff trained in JASPER intervention techniques delivered the intervention with the support of research staff. Provider training included a 2-hr training seminar on core JASPER strategies to promote engagement, play, and social communication via PowerPoint. In addition, the

Table 3. Demographics of Randomized Population by Treatment Group

Demographics	Treatment (n = 16)		Control (n = 4)	
	Mean (SD) / N (%)	(Min, Max)	Mean (SD) / N (%)	(Min, Max)
Age (months)	50.4 (9.98)	(27, 61)	45.2 (19.40)	(18, 61)
Gender				
Male	10 (63)		3 (75)	
Female	6 (37)		1 (25)	
Ethnicity				
Hispanic	14 (88)		3 (75)	
African American	2 (12)		0 (0)	
Other	0 (0%)		1 (25)	
PEDS				
Path A[a]	1 (6)		0 (0)	
Path B[a]	9 (57)		1 (25)	
Path C	5 (31)		2 (50)	
No risk	1 (6)		1 (25)	
MCHAT-R/F				
Med risk[b]	10 (63)		3 (75)	
Low risk	6 (37)		1 (25)	

[a]Indicates a positive screening on the PEDS.
[b]Indicates a positive screening on the MCHAT-R/F.

researchers and providers selected developmentally appropriate toys from within the childcare room to use during JASPER play sessions. Staff at the waitlist sites continued to provide the regular childcare curriculum. To increase ease of implementation, childcare providers were not required to have a strict 80% or higher compliance to all aspects of the intervention delivery. Instead, a slightly more lenient threshold of 70% accuracy was selected, consistent with previous studies indicating that this level of fidelity yielded positive child outcomes in community settings and by nonprofessionals [Shire et al., 2017]. Fidelity was measured across three main categories of environment, routine building, and language. Environment included selecting developmentally appropriate play materials and the physical structure of the play setting. Routine building included turn taking and imitation of the child's play acts and language included modeling developmentally appropriate language targets and expanding the child's language. Fidelity of greater than 70% was achieved on two of the three basic components (environment 73%, routine 74%, and language 56%). In addition, research staff at high fidelity (>90%) to the treatment attended one of the three sessions per week to answer any questions and provide behaviorally based support as needed.

JASPER was adapted for use in the childcare setting in several important ways. First, by incorporating feedback from our community partners, a lower dose of training and support was chosen, compared to other community implementation models of JASPER, to increase feasibility in the childcare setting. Previous studies included week-long introductory training with continued remote support [Shire et al., 2017] or more intensive live support over 8 weeks [Chang, Shire, Shih, Gelfand, & Kasari, 2016]. The current study provided a brief introductory seminar lasting 2 hr and minimal onsite support. Second, due to the brief nature of the intervention, a subset of key treatment targets and intervention strategies were selected, including: (a) identifying developmentally appropriate play level and toy choice, and how to set up the childcare environment for success; (b) imitation and modeling of play acts to build a play routine; and (c) communication style of providers. To account for the adapted treatment targets and intervention strategies fidelity was assessed on only these specific JASPER strategies. Lastly, providers were instructed to conduct JASPER in small group settings with the child identified at risk and several other children in order to increase feasibility of delivery in the childcare setting. For further description of the JASPER intervention, please refer to Chang et al. [2016], Kasari et al. [2014], and Shire et al. [2017].

Randomization. An independent statistician at UCLA randomized children whose parents consented for their participation in the study. Based on the a priori intervention strategy, the randomization occurred by childcare site rather than by individual children in order to prevent possible treatment spillover effects within site. Due to a large disparity in the number of respondents at each site, this randomization strategy led to unbalanced treatment groups with 16 treated and 4 control individuals. We tested for differences in background characteristics between those who were eligible and did not participate and those who were eligible and were randomized using χ^2 and Fisher's exact tests. There were no significant differences with respect to gender ($P = 0.51$), ethnicity ($P = 0.26$), with whom the child lives ($P = 0.51$), parental education ($P = 0.70$), parental employment ($P = 0.72$), or primary language spoken at home ($P = 0.49$).

Measures

Childcare providers were asked to complete a brief demographic questionnaire and a childcare provider–child play interaction (PrCX) was recorded.

Demographics. Before the start of intervention, providers were asked to complete a two-page demographic form.

Provider–child interaction (PrCX). The PrCX measure took place in the same context as the intervention sessions with the familiar provider. The first 10-min segment of the session was video recorded by the study staff at study entry and exit. University researchers blind to study details coded the videos for children's outcomes including joint engagement, play, and initiations of social communication. Children's engagement state (unengaged, person, object, and jointly engaged; Adamson, Bakeman, & Deckner, 2004) and play levels (simple, functional, and symbolic) were coded in 1-min intervals. Each interval was identified with one mutually exclusive engagement state and play level representing the majority of the interval (at least 31+ sec). Each interval was also denoted as adult-directed or child-initiated. The frequency of discrete social communication behaviors including initiations of joint attention (IJA) and initiations of behavior regulation (IBR) were coded. IJA behaviors include eye gaze, gestures, and language for the purpose of sharing the interaction. IBR behaviors include eye gaze, gestures, and language to request. IJA behaviors were summed to create a total IJA count and IBR behaviors were summed to create a total IBR count. Two blinded raters were trained on practice videos until reliability was established at 80%. Inter-rater reliability for IJA (Intraclass correlation coefficient [ICC] = 0.94) and IBR (ICC = 0.85) from randomly sampled videos demonstrated a high level of agreement between the coders. This coding system has been reliably used in similar classroom-based studies of preschoolers with ASD [Chang et al., 2016].

Statistical Analysis

A linear mixed model was constructed with main effects of treatment, time, and treatment by time interaction. This model included random intercepts for each child to account for inter-child correlation of the outcomes. Each outcome was treated as a continuous outcome and fit using a separate linear mixed model. For all outcomes, the fitted models were used to calculate the predicted mean at entry, exit, and the average difference between entry and exit for treatment and control subjects with 95% confidence intervals (CIs) for the difference between time points in each group. In addition, the models were used to calculate (and plot) trajectories for the mean scores of the treatment group at entry and exit. All analyses were performed using R software (R Core Team, 2018) via the lme4 package [Bates, Maechler, Bolker, & Walker, 2015].

This study was designed as a pragmatic randomized trial to test the efficacy of using JASPER in childcare centers. However, given the pilot nature of the study, and resulting unbalanced groups (16 vs. 4), our data analysis was adjusted to focus on feasibility. The primary purpose of the subsequent data analysis is not to test for efficacy and effectiveness, but rather to explore a novel application of the intervention to a yet unstudied population over a brief exposure period. As such, the statistical analysis does not perform hypothesis testing between treatment and control groups but estimates 95% CIs for the average change within group. Rather than performing hypothesis testing, calculating confidence intervals highlights the level of uncertainty associated with these outcomes given the small sample sizes, and focuses on the precision of the estimates within treatment groups rather than making inference about the effect of the

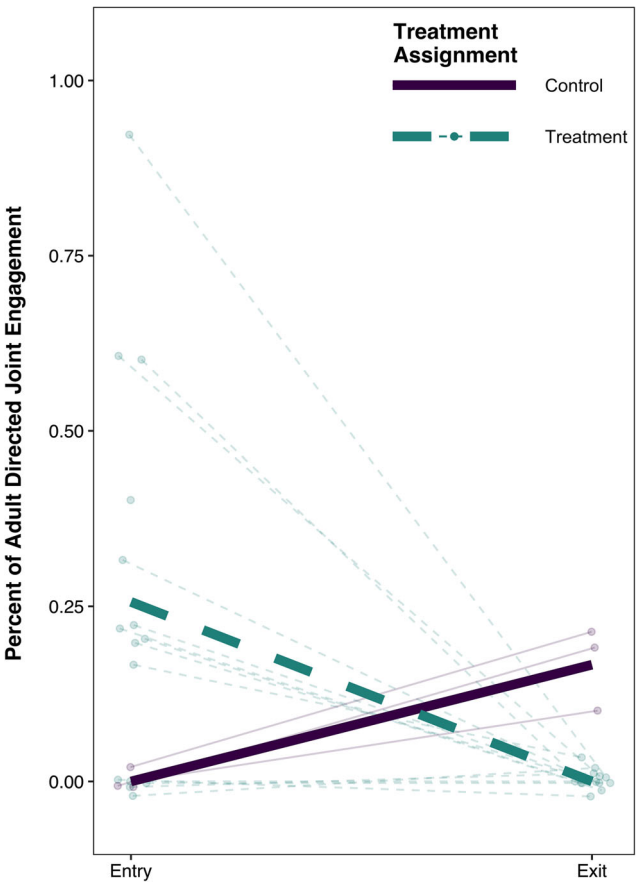

Figure 2. Adult directed joint engagement. Individual trajectories are shown in the background while the group mean changes modeled via linear mixed model is shown in the foreground. Adult directed joint engagement refers to the percentage of time that the child was in a joint engagement state that was initiated by the adult, and was coded from the provider–child interaction (PrCX).

intervention with respect to the outcome between treatment groups [Leon, Davis, & Kraemer, 2011].

By using linear mixed models, all available observations from each subject are utilized without imputing missing data and guarantees unbiased estimates assuming that any missing observations are missing at random. Further, the specification of a random intercept for each child incorporates the correlation of scores within children from entry to exit while maintaining independence between children.

Results

Recruitment and Feasibility

The primary measures of feasibility for this pilot study involved quantifying the ability to recruit children from underrepresented communities and ability to train nonprofessionals in the JASPER intervention. In Phase 1, nearly three-fourths (184/252 = 73%) of the eligible sample of 252 families provided initial consent to participate in the study. Of the families that provided initial consent, approximately 68% (126/184) returned for a formal assessment. An additional 10 children who completed the PEDS and M-CHAT-R/F were excluded for being older than 80 months or younger than 16 months. From the 116 completed assessments, 36% (42/116) of children were eligible to participate in the intervention, that is, Phase 2. Contact was attempted with all 42 eligible children, but slightly less than half (20/42) consented to participate in the intervention. In total, 11% (20/184) of the families originally approached ultimately participated in the randomized control study.

Fidelity of provider implementation was also compared across providers who received the JASPER intervention and those that did not. For the providers who underwent JASPER training, fidelity of greater than 70% was achieved on two of the three basic components (environment 73%, routine 74%, and language 56%). Those in the control condition demonstrated lower fidelity on all components of the intervention, environment (62%), routine (49%), and language (52%).

Joint Engagement

The treatment group spent on average 47% of time in child initiated joint engagement at entry and increased to 74% at

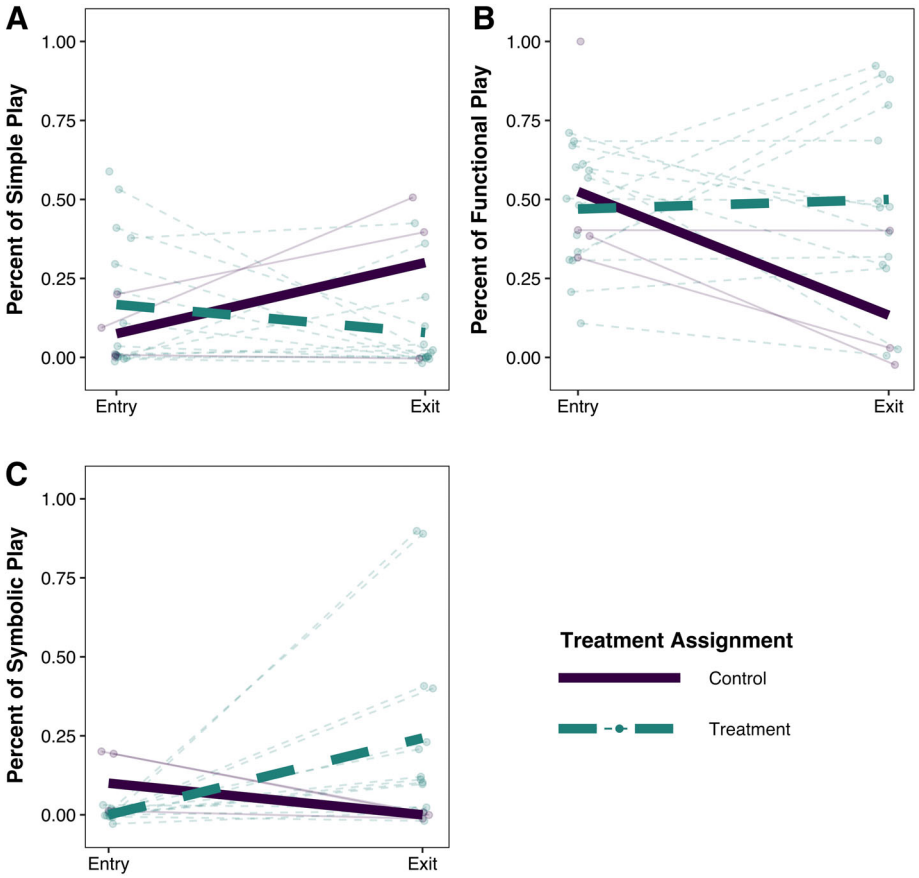

Figure 3. Play level by treatment group. (**A–C**) Individual trajectories are shown in the background and the average group changes are shown in the foreground modeled via linear mixed models for percent of time spend in each respective play level coded from the provider–child interaction (PrCX). Functional play is the total of combo/presymbolic, general combination, and presentation combination play level states. Symbolic play is the total of symbolic and thematic play level states.

exit (average increase +26% with 95% CI: +12%, +41%), while the control group initially spent 100% of time in child initiated joint engagement and decreased to 77% (average decrease −23% with 95% CI: −54%, +7%). In terms of adult directed joint engagement, a variable that should decrease with treatment as children begins to initiate more, the treatment group initially averaged 26% at entry and decreased to 0% at exit (average decrease −26% with 95% CI: −38%, −13%), while the control group initially had no adult directed joint engagement, 0%, and increased to 17% at exit (average increase +17% with 95% CI: −9%, +42%; Fig. 2).

Play Levels

Percentage of time spent in various play levels (i.e., simple, functional, and symbolic) was analyzed as secondary outcomes of interest. In general, positive play outcomes include a decrease in simple forms of play and an increase in more sophisticated (i.e., functional and symbolic) play. For simple play, the treatment group averaged 17% at entry and decreased to 9% at exit (average decrease −8% with 95% CI: −19%, +3%), while the control group began at 8% and increased to 29% at exit (average increase +22% with 95% CI: −1%, +45%). Alternatively, for functional play, the control group had higher entry levels compared to the treatment (53% vs. 47%) and the treatment group increased slightly to 50% at exit (average increase +3% with 95% CI: −13%, +19%), while control groups decreased considerably to 17% at exit (average decrease −35% with 95% CI: −68%, −3%). Finally, symbolic play for the treatment group started off lower at entry than the control group (0% vs. 10%) with the treatment group jumping up to 24% at exit (average increase +24% with 95% CI: +11%, +38%), while the control group dropped to 0% at exit (average decrease −10% with 95% CI: −38%, +18%; Fig. 3).

Social Communication

The last area of interest covered social communication variables, which also showed positive trends for the treatment group. The main outcomes of interest were total

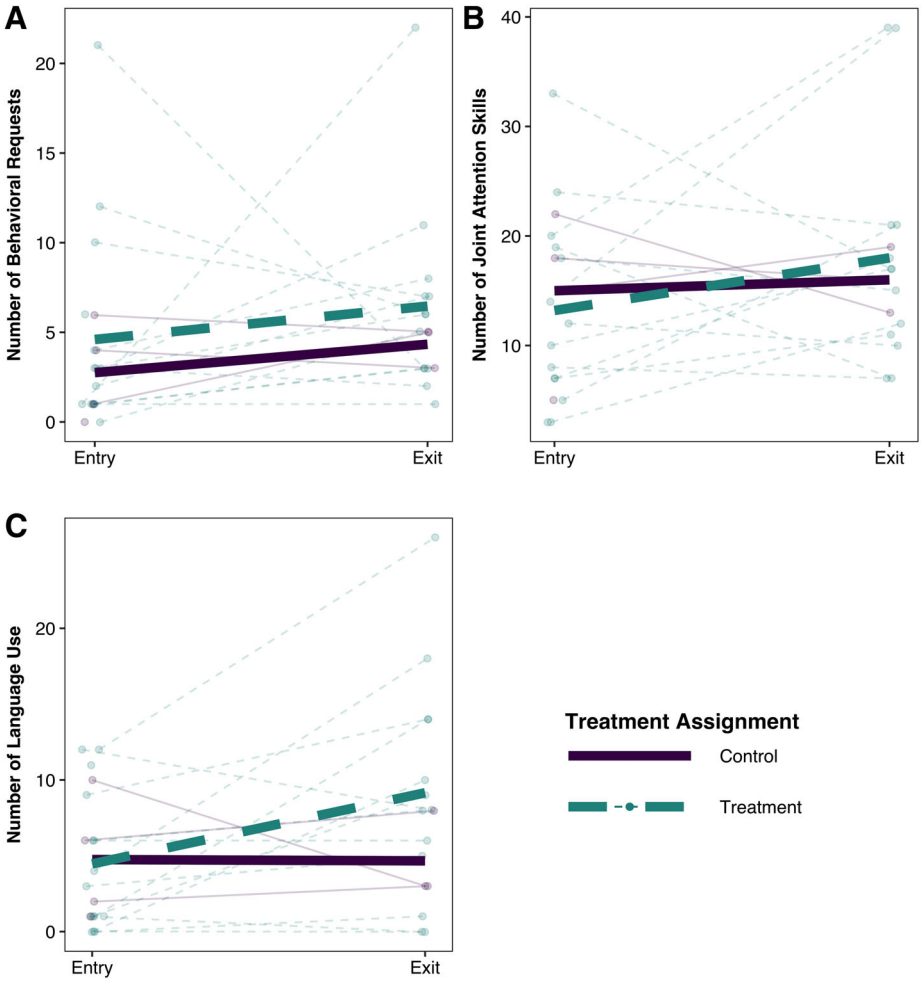

Figure 4. Joint attention by treatment group. (**A–C**) Individual trajectories are shown in the background and the average group changes are shown in the foreground modeled via linear mixed models for joint attention count outcomes coded from the provider–child interaction (PrCX).

number of behavioral requests, number of joint attention initiations, and counts of language use. In terms of the number of behavioral requests, the treatment group started off at a higher average level than the control group (4.6 vs. 2.8), but both groups increased with exit levels of 6.4 and 4.3, respectively (average increases +1.9 vs. +1.6 with 95% CI: [−1.8, +5.5] vs. [−5.7, +8.9]). Furthermore, the average number of joint attention initiations for the treatment group was initially lower than the control group (13.2 vs. 15.0), but the treatment group increased to 17.8 at exit (average increase +4.6 with 95% CI: −0.9, +10.2) while the control group remained, relatively, the same at exit (average increase +0.3 with 95% CI: −11.0, +11.6). Finally, the average count of language use started off at similar levels for treatment and control groups (4.5 vs. 4.8), but the treatment group increased to 9.2 at exit (average increase +4.8 with 95% CI: +1.8, +7.8) while the control group decreased slightly to 4.1 at exit (average decrease −0.7 with 95% CI: −6.8, +5.5; Fig. 4).

Conclusions

This study provides initial feasibility data for the implementation of a screening and early intervention program to serve a predominantly low-resourced and ethnically diverse population within the childcare system in a large metropolitan city. Several important findings of the study include the feasibility of identifying children during the developmental screening phase, and the promising pilot data exploring community childcare provider implementation of an adaptation of a well-established early intervention approach to low income, primarily minority children in childcare centers.

The National Survey of Children's Health [Centers for Disease Control and Prevention, National Center for Health Statistics, State and Local Area Integrated Telephone Survey, 2011-2012] finds that one in four (28%) children in the state of California under the age of 6 years are at moderate to high risk for developmental, behavioral, or social delays and about 40.7% of parents in the state report having some concern about their child's development. These findings are consistent with the current study, which found that parents reported some level of developmental concern in approximately 36% of the children surveyed. These broad developmental concerns can also give rise to concerns for specific disorders, such as ASD. Research finds that parents recognize signs of autism far earlier than it is diagnosed, with a substantial minority reporting initial concern in the first year of life [e.g., De Giacomo & Fombonne, 1998; Ozonoff et al., 2009].

Of the parents reporting concern in the current study, less than half consented to enroll their child in intervention. This drop in participation from screening to service likely reflects the challenges in engaging families, especially those from underrepresented communities [Pellecchia et al., 2018]. Well established in the literature is the fact that families from minority communities are less likely to engage in services (Carr & Lord, 2016; Dickson, Zeedyk, Martinez, & Haine-Schlagel, 2017; Gopalan, Cavaleri, Bannon, & McKay, 2010), but the reasons are complex. Several studies have identified effective strategies for engaging families, which include peer support, culturally informed practices, collaborative partnerships, and incentives [e.g., Carr & Lord, 2016; Fung & Fox, 2014; Gross, 2015; Knoche, Cline, & Marvin, 2012; Reeves et al., 2015]. A recent review found that attrition was reduced when interventions were delivered in the community setting and utilized peer pairing [Pellecchia et al., 2018]. Although the current study was based in a community setting, delivery of service was through the childcare provider and not parent, perhaps leading to less parental engagement and lower rates of consent to participate in the intervention. Parents may also have been worried about participation, and potential labeling of their child in this setting, or future implications for special education.

Preliminary results from the intervention were positive and point to the advantage of implementing a targeted intervention for this population in the childcare setting. This pilot study mirrors findings from other studies of the JASPER intervention, including increased child initiations of social communication, language, and play and positive changes in adult behavior (i.e., decreased adult-directed engagement). What is perhaps most striking was the ability to detect these changes despite limited provider training (each childcare staff member received 2 hr of informational training), a small dose of intervention (three sessions weekly for only 4 weeks), and a small sample size (16 children in treatment group). However, due to the design limitations of the current study, we cannot be certain that the benefits seen in the JASPER group are due to the intervention alone or are above what you might expect for children who did not participate in the intervention.

Both universal screening and intervention were successfully employed in this novel community setting as evidenced by the high number of families who consented and participated in the screening procedures. Of the 184 families initially approached to participate, 126 consented and 116 filled out the screening forms. In addition, principles of shared decision-making were used to co-adapt the screening and intervention procedures to the needs of the childcare center. Both center leadership and childcare providers commented to research staff on their satisfaction with the collaborative process and training of staff, lending further support, although very preliminarily, for implementing these methods in the community setting.

Limitations

One of the key limitations was the unbalanced distribution of the treatment and control groups. This disparity in

allocation was due to two main factors. First, the need for randomization at the site level to prevent contamination of the treatment and control groups, and second the unexpected response rate disparity between sites with one site representing the majority of the randomized population. In future studies, additional steps should be taken to protect against this imbalance. For example, the addition of more study sites could assist with the fluctuation in site enrollment and/or stratification by site size could further protect against these imbalances.

As a pragmatic community study, this result showed the potential negative side effects when using site randomization, and subsequently limited the statistical power for inference of the treatment. With such small comparison groups, it is difficult to properly describe the magnitude of the treatment effects. Thus, reporting confidence intervals rather than hypothesis tests reflect the effectiveness within each treatment group, rather than comparing between the treatment groups. In addition, due to the disparity in sample size between the groups, the estimated effect within the treatment arm is more precise with confidence intervals that are generally half as wide as the control arm. It is also important to note that when estimating effects with such small groups that the underlying modeling assumptions play a significant role in the resulting estimates of the average change over time.

Additional limitations include difficulties with recruitment as less than half of the children who were invited to participate in the intervention subsequently enrolled in the treatment. This highlights the difficulty of conducting this type of research in the community setting. It is unclear why parents who initially expressed interest in the study did not participate in the intervention phase because very few of the parents could be reached for the secondary consenting process. It is possible that they did not believe the results of the screening or that the screening did not accurately reflect their child's current development. However, we cannot discount the fact that the group of parents who did participate is different from those who did not on a factor not measured in the current study; thus, these pilot results should be interpreted with caution.

Lastly, this study highlights the challenges in training nonprofessional providers in intervention delivery. Although promising that these providers could learn key aspects of the intervention through a 2-hr seminar, they were limited in their breadth of knowledge and failed to establish >70% fidelity in one of the three core strategies of intervention. It is unclear why providers were unable to achieve fidelity in the language strategy, but this appears to be a more difficult skill to acquire. Perhaps this is due to the fact that JASPER encourages caregivers to tailor their own language to the developmental level of the child. For adults who are accustomed to narrating over what the child is doing or asking test questions of the child (e.g., What color is it?), this may be a very different approach to teaching language than what the childcare providers are taught or do naturally. Future studies should consider allotting additional time for language concepts in the training and provide more live feedback for strategies that may be more difficult to acquire.

Initial feasibility of a two-phased early detection and intervention model in the community childcare setting has yielded promising results. Further research across childcare agencies, with a larger sample of participants and more rigorous research methods, is warranted. By partnering with the community in which the child resides to implement appropriate screening and intervention models, one may begin to break down barriers to timely identification and service.

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Conflict of Interest

The authors do not report any conflict of interest.

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