Title

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Journal

Journal of Early Intervention, 46(2)

ISSN

1053-8151

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Publication Date

2024-06-01

DOI

10.1177/10538151231217483

Peer reviewed

Pilot Feasibility of a Community Inclusion Preschool Program for Children with Autism

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Author Note This project was supported by a grant from the National Foundation for Autism Research (NFAR).

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Abstract

Few studies have reported outcomes from the delivery of naturalistic developmental behavioral interventions (NDBI) in group-based community care. Further, while the importance of inclusion for autistic individuals is well established, there is little research on the feasibility of community-based inclusion programs for preschool-aged autistic children. Positive outcomes have been reported from a few model inclusion programs. However, most involved extensive training from researchers, with limited available data on self-sustaining community-based programs. This quasi-experimental study tracked outcomes for 31 autistic preschool-aged children with verbal and play skills close to age level, who were enrolled in a community inclusion preschool program utilizing NDBI. Children, aged 2.5 to 5 years of age at entry, attended the program for 8 to 36 months. Paired sample t-tests indicated statistically significant improvements from time 1 to time 2 on standardized measures of adaptive behavior, social skills, and autism characteristics. Implications for the feasibility of using NDBI for autistic children in inclusive preschool settings and directions for future research are discussed.

Keywords: autism spectrum disorders, inclusion, preschoolers

Pilot Feasibility of a Community Inclusion Preschool Program for Children with Autism

The Centers for Disease Control (CDC) estimate that 1 in 44 children have autism[1] (Maenner et al., 2020), and communities are charged with implementing effective early intervention for an increasing number of individuals. Research supports early interventions based on a combination of developmentally-based and applied behavior analytic strategies, or naturalistic developmental behavioral interventions (NDBI) (Bruinsma et al., 2020; Crank et al., 2021; Sandbank et al., 2020; Schreibman et al., 2015; Tiede & Walton, 2019). Many autistic children receive these interventions in one-to-one settings within their homes or clinics, as opposed to naturalistic settings with same-aged peers. There are fewer opportunities and demonstrations of inclusive, group-based early intervention for autism in the community, and research indicates that inclusion for young children occurs less often than recommended (Odom et al., 2012). For example, a recent report to Congress from the Office of Special Education Programs (OSEP) found that only 38.8% of children aged 3-5 served under Part B of the Individuals with Disability Education Act (IDEA) received services in regular early childhood education classes at least 10 hours per week (U.S. Department of Education et al., 2021), and these numbers have not increased significantly over the last several decades (Barton & Smith, 2015; Siller et al., 2021). Metrics on classroom placements for children receiving special education indicate that a majority of students with autism remain only partially included or within self-contained special education settings (Odom et al., 2012).

Research findings and public service agencies recommend that children with autism receive services in the least restrictive environment, with opportunities for frequent interactions with same-aged peers, and embedded within naturalistic routines and contexts. Others have emphasized the high costs of one-to-one delivery of early intervention and that this approach

may not be feasible for some families, calling for the examination of other models that are also effective (Rogge & Janssen, 2019), including group-based approaches that may be more efficient (Leaf et al., 2018; Tupou et al., 2022). Related, offering specialized supports within early childhood education settings is needed to support children and families in obtaining feasible and effective early care and education, which has been found to be a significant gap for working families (Houser et al., 2014; Vanegas & Abdelrahim, 2016). Embedding evidence-based interventions within inclusive early childhood education programs offers the potential to promote inclusive environments for the early learning and development of young children. Inclusive programming within naturalistic settings and the core components of naturalistic developmental behavioral interventions (NDBI) (Schreibman et al., 2015) are in alignment with recommended practices in early intervention(Division of Early Childhood, 2014), indicating that these approaches may be a particularly good fit for early intervention for autism.

Some research supports the efficacy of toddler and preschool inclusion programs, which has been demonstrated through a variety of intervention models, usually grounded in naturalistic behavioral and developmentally-based approaches. These include the LEAP model (Boyd et al., 2014; Strain & Bovey, 2011; Strain & Hoyson, 2000), Project DATA (Boulware et al., 2016; Schwartz et al., 2013), the Walden Early Childhood Program (McGee et al., 2000), and Alexa's PLAYC (formerly Children's Toddler School)(Akshoomoff et al., 2010; Stahmer, Akshoomoff, et al., 2011; Stahmer & Ingersoll, 2004). Other studies have tested embedding NDBI approaches within existing inclusive and self-contained classroom settings (Engelstad et al., 2020; Feuerstein & Landa, 2020) and compared implementation of NDBI, such as the Group Early Start Denver Model (G-ESDM), in inclusive and non-inclusive classrooms (Vivanti et al., 2019). Overall, these studies have found positive outcomes in social, communication, cognitive, and adaptive

behavior domains. Further, one comparative quasi-experimental study examining varied preschool settings found greater cognitive gains in children attending preschool in inclusive settings compared to non-inclusive ones within urban areas (Nahmias et al., 2014). There is also increasing evidence in support of NDBI effectiveness within school-based settings and feasibility of training educators in these approaches (Engelstad et al., 2020; Shire et al., 2019; Stahmer et al., 2022).

Importantly, much of the evidence supporting preschool inclusion programming for autism, has been conducted within the context of funded research studies, even when conducted in community settings. This funding and support has been noted as a critical component to supporting the training of teachers to fidelity. For example, a randomized controlled trial of LEAP reported that it took two years of training and mentorship investment to deliver models with adherence (Strain & Bovey, 2011). Another study examining the G-ESDM in inclusive and non-inclusive preschool settings found that fidelity in the inclusive setting was not achieved until the 3rd year of training (Vivanti et al., 2019). Further, most 'proof of concept' studies have been conducted within university-affiliated programs, which often include greater infrastructure and training support than typical community-based programs. While studies have shown greater gains in community-based early intervention programs affiliated with universities or model programs (Nahmias et al., 2019), there is a need to also evaluate the feasibility of these approaches in routine care within community-based delivery models, which are likely to have fewer resources. These limitations are common across autism services, where a great deal of work emphasizes a significant research-to-practice gap for autism interventions. Evidence-based autism interventions are not routinely used or delivered as initially tested in usual care settings (Pickard et al., 2018; Stahmer, 2007; Stahmer et al., 2005), and community effectiveness studies

of autism interventions have documented mixed results or more modest outcomes compared to efficacy trials (Magiati et al., 2007; Perry et al., 2008).

One community-based inclusion program for autism is Alexa's PLAYC (formerly Children's Toddler School). Alexa's PLAYC is an early intervention setting for children at high likelihood of, or diagnosed with autism, and an early childhood education setting for neurotypical children. Children's Toddler School began in 1998 as a single toddler classroom partial replication of the Walden Program (McGee et al., 2000), due to the lack of inclusive options for early childhood in the region. The program was renamed Alexa's Playful Learning Academy for Young Children (Alexa's PLAYC) in 2010, expanding from one toddler inclusion classroom to a toddler and preschool program with 5 inclusive classrooms serving children between the ages of 18 months and 5 years. Approximately 1/3 of children in each classroom have autism and 2/3 are neurotypical. Of note, inclusion criteria for the preschool program includes cognitive, language, play, and behavioral entry requirements (see below), representing a subsample of autistic preschool-aged children with these readiness skills. Alexa's PLAYC is housed within a local children's hospital and is supported by public funding (i.e., California's IDEA Part C Program – California Early Start) for toddlers with autism, and health insurance or tuition for preschool children with autism and tuition for neurotypical toddlers. Alexa's PLAYC delivers evidence-based NDBI models. The specific strategies applied are described in more detail within the methods, below. The toddler program demonstrated effectiveness over its first 10 years in the community, including findings of significant gains in developmental level, adaptive behavior, and communication comparable to those reported in studies of one-to-one behavioral intervention and other inclusion programs (Stahmer, Akshoomoff, et al., 2011; Stahmer & Ingersoll, 2004), as well as a high proportion of children transitioning to general education

placements (Akshoomoff et al., 2010). These positive findings, however, evaluated outcomes for the toddler program only (for children under age 3), and no research has reported feasibility or outcomes of the preschool program for children aged 2.5-5 years of age. Thus, the goal of the current feasibility pilot study is to examine preliminary feasibility and child outcomes of the preschool inclusion program delivered at the Alexa's PLAYC community-based setting, as well as potential predictors of outcomes. The aims are to examine (1) change over time on standard scores of adaptive functioning (i.e., communication, socialization), social skills, and characteristics of autism, (2) change over time in descriptive levels in these same areas during participation in the Alexa's PLAYC community-based preschool inclusion program, and (3) potential predictors of outcome.

Methods

Participants

Participants included a total of 31 children who participated in Alexa's PLAYC community-based preschool inclusion program for a minimum of 6 months. This study includes all eligible children entering the preschool program between January 2014 and September 2017 with two time point measures (i.e., entry, time 2) completed (see procedures). Mean age at program entry was 42.77 months (*SD* = 7.68). The sample included 20 (64.5%) male and 11 (35.5%) female children. The majority of children were Caucasian and English-speaking and had caregivers reporting college education levels or higher, potentially a function of the program being part of a children's hospital. Most children were funded for the program through their health insurance. Demographics for children and families can be found in Tables 1 and 2.

Eligibility to enroll in the Alexa's PLAYC autism program included a prior school or medical diagnosis of autism spectrum disorder, autistic disorder, or pervasive developmental

disorder-not otherwise specified (APA, 2000, 2013) by a community-based clinician, ability to attend the program for at least 6 months, and readiness for the program based on a clinical screening. The screening involved a Ph.D. or BCBA level clinical supervisor conducting record review, an interview with the caregiver, and a brief classroom observation on-site at Alexa's PLAYC. Initial clinical eligibility included meeting most of the following criteria at entry: nonverbal cognitive functioning of at least 2 ½ to 3 years of age, consistent use of spontaneous phrases for multiple functions including requesting, protesting, and commenting (could include augmentative communication or sign language), previous involvement in treatment of any type, limited aggressive or self-injurious behavior in the group setting, the ability to play with toys appropriately and independently for 5-10 consecutive minutes, consistent participation in parallel play with other children, and engagement in group activities for 5 minutes at a time.

Program Overview

As noted, Alexa's PLAYC, is a toddler and preschool inclusion program housed within a local children's hospital.[2] The focus of this study was the preschool program, which includes 3 classrooms with children between the ages of 2.5-5 years of age. The preschool program for autistic children is primarily a social intervention program and a supplement to special education services. Many autistic children in the program are also enrolled in special education programs through their school district. Funding for the preschool program is through insurance or family self-pay. Each classroom includes 4-5 children with autism who attend a morning session and 4-5 who attend an afternoon session. Ten to fifteen neurotypical preschoolers are enrolled in each classroom, where they attend all day. Autistic children attend a total of 17.5 hours per week (3.5 hours per day). The classroom has a teacher to child ratio of 1:5 or 1:7, depending on the age

range of the classroom. This ratio is fulfilled by a blend of early childhood teacher and autism education associates (AEAs).

Early childhood teachers and AEAs possess a bachelor's degree or higher from a four-year institution in child or human development, psychology, or a related field, and prior experience working with either young neurotypical or autistic children. AEAs meet early childhood classroom licensing standards for the State of California and have prior experience with autistic children, whereas most teachers have degrees in early childhood. A board certified behavior analyst (BCBA) or licensed psychologist provides an intake program assessment, develops goals for each child, supervises the intervention program, and monitors progress on individualized goals. Initial and ongoing training and supervision are provided by BCBA or psychologist supervisors, or the program leads. All staff are trained to deliver NDBI through didactic instruction, as well as hands-on practice with coaching and feedback in the program setting. They are trained to fidelity (80% fidelity to intervention procedures across two 10-minute observational samples) and then monitored through intermittent checks by supervisors. Staff supporting parents through coaching and consultation also receive training in parent-mediated approaches.

A typical daily schedule follows what would be expected in a typical preschool classroom, including snack/mealtime, circle time, free play or center-based activities, and outside therapeutic activities or free play time on the playground. Autistic and neurotypical children participate in all activities together, with teachers providing support based upon each child’s individualized clinical or educational goals. Specific intervention strategies are implemented to provide opportunities to practice target skills with prompting and support from trained therapists. The foundational models applied in the preschool program are NDBI (Schreibman et al., 2015),

and include Project ImPACT (Ingersoll & Dvortcsak, 2019) and Classroom Pivotal Response Teaching (Stahmer, Suhrheinrich, et al., 2011). Broadly, NDBI are approaches blending contributions from developmental science and applied behavior analysis. They share adherence to the three-part contingency, focusing on naturally-occurring and contrived scenarios (within naturalistic contexts) to target intervention goals, and utilizing developmentally and behaviorally informed strategies (e.g., child choice and lead, preferred materials and direct reinforcement) to enhance motivation, as well as the acquisition, maintenance, and generalization of goals. The curriculum checklist from the Early Start Denver Model (Rogers & Dawson, 2009) is used to develop individualized goals in the four primary areas of social communication, play, social interaction, and group engagement. The program also implements environmental arrangements and structure, visual supports, and peer-based strategies to facilitate engagement and learning. Behavioral challenges are addressed through functional assessment of behaviors, antecedent based prevention strategies, and reinforcement of positive alternative behaviors. Supervisors and classroom staff provide on-site parent education, consultation, and support, with 1:1 parent consultation occurring at least once per month. Parents are encouraged to observe the classrooms via remote video cameras available during intervention hours.

All providers embed NDBI delivery throughout daily classroom activities. To promote appropriate supervision of children and ongoing instruction, teachers have different roles throughout the day (e.g., lead to greet children/parents and address specific needs, free play to facilitate play and social skills, snack to promote opportunities for functional communication with peers). The classroom is setup with a range of toys and activities to motivate child interest, and a range of preferred materials are identified for center- or other group-based activities to engage children with the materials and their peers. NDBI-based strategies are employed

systematically to enhance motivation and create opportunities to target goals. As an example, a teacher may set up a center-based art activity involving miniature cars, figurines, and finger paint. The teacher may follow the child's lead, joining in making sound effects for the cars and animating their movement. They limit the number of available cars to promote turn taking between peers and restrict access to figurines by having one peer 'in charge' of the materials. Upon prompted or spontaneous use of target skills, children are reinforced by continuing the activity or gaining access to their preferred materials. Specific opportunities are set up throughout the day within meaningful daily routines (e.g., mealtime, outdoor play, centers) to learn new skills in several different contexts. The most naturalistic procedures are applied, with increasing prompting and structure provided based on child needs.

Teachers are primarily responsible for developing the weekly curriculum appropriate for all children in the classroom and developmentally appropriate practices, with feedback from AEAs to integrate opportunities for individualized child goals and motivating and preferred materials that work within weekly themes/activities, in line with tenets of NDBIs. AEAs, under supervision, are responsible for maximizing opportunities to target intervention goals, as well as data collection (2 times per month). The supervisors are available to classroom staff to develop behavior plans for in-program behavioral challenges, provide support in targeting intervention goals, and facilitate weekly team meetings to discuss programming and intervention. Monitoring and refinement of goals is conducted by the supervisor.

Procedures

Pre-treatment measures were completed as part of entry into the program and within 3 months of program initiation. Children then participated in Alexa's PLAYC for a minimum of six months. As part of clinical procedures, assessment measures were repeated after at least

every 12 months of intervention, or sooner as required by funders, and at exit from the program as part of program evaluation and progress monitoring for enrolled children. Due to the community-based nature of the program, which includes the individual nature of funding for each child, there was variation in duration in the program and length of time between assessments. Further, as participants varied in their duration in the program, some had multiple assessment timepoints. Data are reported between entry (T1) and the first assessment time point (T2) for enrolled children from whom entry and time 2 data were available. This represents 49.2% of children enrolled during this time. Reasons for exclusion were missing assessment data (93.8%) and enrollment for less than 6 months (6.2%). The mean duration between T1 and T2 was 12.53 months (*SD*=3.52), with a range of 6 to 25 months. Of note, while data are reported between the first two assessment points, the average total duration of program enrollment was 19.83 months (*SD*=7.59), with a range of 8 to 36 months. Measures included in this analysis were parent report on the Vineland Adaptive Behavior Scales (VABS)(Sparrow et al., 2005), Social Skills Improvement System (SSIS)(Gresham & Elliot, 2008), and Social Responsiveness Scale (SRS)(Constantino, 2012).

Measures

Demographics. Caregivers completed a demographic questionnaire at enrollment into the program, providing family and child demographic information.

Vineland Adaptive Behavior Scales. The Vineland Adaptive Behavior Scales, second edition (VABS-II) (Sparrow et al., 2005) is a standardized measure of adaptive behavior that measures adaptive functioning in the domains of communication, daily living skills, socialization, and motor skills. The VABS-II has been used extensively as a measure of adaptive behavior and has strong psychometric properties. Either the rating or interview version of the

VABS-II was completed by the child's caregiver at T1 and T2, due to changes in clinical procedures. Each domain yields a standard score (*M*=100, *SD*=15) from which adaptive level categories can be derived, ranging from low to high adaptive levels. Standard scores and adaptive level categories on the communication and socialization subdomains of the Vineland were evaluated in this study.

Social Skills Improvement System. The Social Skills Improvement System (SSIS) (Gresham & Elliot, 2008) is a norm-referenced, psychometrically sound rating scale of social skills, problem behaviors, and academic competence. The SSIS was completed by the child's caregiver at T1 and T2. This measure yields standard scores (*M*=100, *SD*=15) in these domains, as well as behavior levels (i.e., well below average to well above average). Standard scores and behavior levels from the social skills subscale was evaluated in this study.

Social Responsiveness Scale, 2nd edition. The Social Responsiveness Scale, second edition (SRS-2) (Constantino, 2012) is a norm-referenced parent rating scale assessing autism symptom severity. Strong psychometric properties have been described in the literature (Bruni, 2014; Constantino, 2012). The SRS generates a total severity score and five subscale scores. T scores are derived (*M*=50, *SD*=10) which can be classified into severity ranges (i.e., normal, mild to moderate, severe). The SRS-2 was completed by the child's caregiver at T1 and T2. Standard total scores were evaluated in this study, with a higher score indicating greater symptom severity.

Data Analytic Plan

Paired sample t-tests were used to determine significant changes from T1 to T2. Both statistical significance and effect sizes are reported. Based on a priori hypotheses of subdomains that would be expected to change following treatment, the communication and socialization subdomains of the VABS, social skills domain of the SSIS, and total score of the SRS were

included in analyses. Analyses were run with and without outliers, which did not influence the findings. Thus, the full dataset was included in final analyses. To further examine the clinical significance of changes during participation, percent of children in each descriptive category of these measures (e.g., low, moderately low, adequate, high average functioning) were also compared between the two time points. Given the small sample and cell sizes limiting statistical analysis, differences in observed frequency distributions were analyzed descriptively. Multiple regression analyses were run to examine age at entry and duration between assessment timepoints as predictors of difference scores on the outcome measures.

Results

Results for the VABS-II, SSIS, and SRS-2 are summarized in Table 3.

Adaptive Behavior. Data on the VABS-II were missing for five participants. Thus, analyses report on 26 participants for this measure. Statistically significant improvements were found from T1 (*M*=90.81, *SD*=9.89) to T2 (*M*=96.08, *SD*=10.99) on standard scores in the VABS-II communication domain, $t(25) = -2.17$, p=.040. Cohen's *d* value (*d* = -.425) indicated a medium effect size. Similarly, statistically significant improvements were found in the socialization domain between T1 (*M*=78.65, *SD*=9.43) and T2 (*M*=86.73, *SD*=9.59) $t(25) = -3.04$, p=.005. Cohen's *d* value (*d* = -.596) indicated a medium effect size. Changes over time in adaptive level (i.e., descriptive category) are reflected in Figure 1 and 2 for Communication and Socialization, respectively. Overall, 80.8% of children were in the adequate range at T2 compared to 69.2% at T1 for the communication domain. In the area of socialization, 61.5% of children were functioning in the adequate range or higher at T2 compared to 23.1% at T1.

Social Skills. Scores are reported on 28 participants, as data were missing for three children. Statistically significant improvements were found from T1 (*M*=84.54, *SD*=11.60) to T2

(*M*=95.11, *SD*=8.72) on standard scores in the social skills domain, $t(27) = -4.78$, $p<.001$. Cohen's *d* value (*d* = -.903) indicated a large effect size. In regards to descriptive categories at T1 and T2, 57% of participants were in the average range or higher on the social skills subdomain at T1 compared to 89.3% at T2 (Figure 3).

Characteristics of Autism. Due to missing data, analyses for the SRS-2 included 23 participants. Statistically significant reductions were seen from T1 (*M*=62.17, *SD*=12.01) to T2 (*M*=54.61, *SD*=6.97) in the total score standard score, indicating fewer autism characteristics $t(22) = 2.80$, $p=.011$. Cohen's *d* value (*d* = .583) indicated a medium effect size. The same pattern of changes were seen in descriptive category, as well, where 78.3% of participants were in the average or mild range at T1 compared to 91.3% at T2 (Figure 4).

Predictor Analyses. None of the multiple regression models were statistically significant. Neither age at program entry nor duration between timepoints predicted difference scores for the VABS-II communication, $R^2 = .122$, $F(2, 22) = 1.534$, $p = .238$, VABS-II socialization, $R^2 = .008$, $F(2, 22) = .089$, $p = .915$, SSIS social skills, $R^2 = .027$, $F(2, 24) = .330$, $p = .722$, or SRS-2 total score, $R^2 = .020$, $F(2, 20) = .201$, $p = .820$.

Discussion

Our findings support the feasibility and preliminary positive outcomes of a community-based inclusion program utilizing NDBI strategies for verbal preschool-aged autistic children. Overall, autistic children had positive outcomes in the areas of adaptive behavior, social skills, and characteristics of autism as reported on standardized parent assessments. This mirrors results found in evaluations of the toddler program of Alexa's PLAYC (Akshoomoff et al., 2010; Stahmer, Akshoomoff, et al., 2011; Stahmer & Ingersoll, 2004), providing support for the continued promise of the program after growth and expansion in ages served. This study adds to

the evidence base for the feasibility of inclusive early intervention programs for children with autism in community-based settings, and serves as important proof-of-concept for larger scale effectiveness and implementation trials.

While many young children with autism receive early intervention in home-based settings and segregated special education classrooms, group-based inclusion models offer a more naturalistic and less restrictive alternative. Embedding evidence-based approaches within early childhood education settings may enhance opportunities for early development and learning (Maye et al., 2022; Siller et al., 2021). It is important to note that outcome measures in this study were grounded in the medical model that focuses primarily on deficits associated with a diagnosis of autism. While research has found links between early adaptive behavior and long-term quality of life (Tomaszewski et al., 2020), these results are limited in their ability to measure the impact of this program on other important outcomes, such as quality of life, individual well-being, and mitigating disabling aspects of autism (McConachie et al., 2018). While NDBI have the potential to more closely align with the neurodiversity paradigm than more structured ABA-based approaches (Schuck et al., 2022), improvements are still needed to ensure strategies are implemented using person-centered approaches. Recent commentaries recommend partnership and co-creation of intervention programming with autistic individuals and family members, as well as reflection and adaptations to goal selection and measurement practices, prioritizing those that are meaningful to the individual and family and focused on improving well-being rather than symptom reduction (Dawson et al., 2022; Fletcher-Watson et al., 2019; Leadbitter et al., 2021; Mottron, 2017; Pellicano & den Houting, 2022; Schuck et al., 2022).

This study contributes to the emerging literature examining evidence-based inclusive early intervention programs that are self-sustaining and fully embedded in community-based preschool

settings, as well as the effectiveness of group-based NDBI delivery in such settings (Eapen et al., 2013; Vivanti et al., 2014). Identifying barriers and facilitators of early childhood inclusion is another area of need, although some key factors identified include shared visions around inclusion, policy support, organizational factors, and provider training/support (Barton & Smith, 2015; Lieber et al., 2000).

This study has a number of important limitations that warrant discussion. First, this quasi-experimental study lacked a control or comparison group. Thus, changes in adaptive and developmental domains, and characteristics of autism, may not be reflective of change due to the intervention itself, but rather natural trajectories in certain subsets of the autistic population. In addition to the lack of experimental control, longitudinal research indicates adaptive functioning improvements of similar magnitude to what was found in this study could be expected for young autistic children with moderate adaptive abilities (Szatmari et al., 2015). However, the presence of an 'improving' developmental trajectory has not been found in all studies (Farmer et al., 2018), demonstrated in all areas measured in this study (e.g., autism characteristics, social skills), or for all children with similar baseline profiles. While the findings of this study indicate positive outcomes, further research is needed to evaluate whether observed changes were due to the intervention itself.

Additionally, systematic information on outside interventions or educational programs was not available for this sample, limiting our ability to understand the differential or additive effects of early intervention and educational programming. Although fidelity data were maintained clinically in the program, the lack of fidelity data on NDBI delivery is a weakness, especially in regard to understanding the key mechanisms of change. Finally, results are presented for a self-selected or referred community sample, limiting the generalizability of findings. Parents of the

children in this sample were, on average, highly educated and white. The children had communication scores in the average range at entry, as well as higher cognitive and play skills than what was seen in prior publications of the toddler program. This sample represents a segment of the broad autism spectrum and reflects the profile of children identified by caregivers or Alexa's PLAYC staff as appropriate for the program.

These limitations highlight important areas of future research in inclusive ECE programming. For example, there is a need for further research regarding eligibility considerations, including profiles of children who are most likely to benefit and levels of support needed in inclusive settings for children of varying abilities. While this study did not find age or time to predict child outcomes, these findings should be interpreted with caution given the small sample size and limited number of predictors examined. Early research on the toddler program of Alexa's PLAYC (Ingersoll et al., 2001), for example, and more recent work by Vivanti and colleagues found peer social interest to predict greater intervention gains (Vivanti et al., 2022).

Overall, there is a need for more rigorous study design for autism intervention studies, and early inclusive intervention is no exception (Sandbank et al., 2020). While a systematic review found inclusive preschool intervention models to be effective, they also suggested the need for more rigor in study design in several areas (Tupou et al., 2019). In particular, there is a need for further study of inclusive programming delivered within community-based settings, as well as measurement of intervention fidelity, broader and longer-term outcomes, and improved understanding of eligibility considerations and how to effectively bring group-based models to scale. Research both comparing inclusive programming to 1:1 approaches of early intervention, as well as evaluating how to embed evidence-based approaches into existing community-based early childhood programs is also critical (see Landa et al., 2020, for example).

In sum, this study contributes to the evidence supporting the feasibility and potential positive outcomes of inclusive early childhood programming utilizing NDBI for young autistic children. The findings also indicate the viability of such a program in a community-based setting without additional research funding to support clinical and educational procedures. Programs such as Alexa's PLAYC may offer an effective, more naturalistic alternative to intensive in-home behavioral intervention. Further research using prospective experimental designs and a larger sample will be important to replicate this work, as well as the application of implementation science to improve understanding of key determinants to the implementation and sustainment of inclusive early intervention services in the community.

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[1] In effort to be inclusive of the current range of preferences for describing autism among our stakeholders, we use both identity- and person-first language throughout this manuscript (Botha et al., 2021; Bottema-Beutel et al., 2021; Vivanti, 2020).

[2] Further information regarding the Alexa's PLAYC Program is available from the first author upon request.

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Table 1

Participant Demographics

Participant Demographic Information

	M (*SD*)	*Range*
Age at program entry (mos)	42.77 (7.68)	29-59
Duration from T1 to T2 (mos)	12.53 (3.52)	6-25
Duration in Program (mos)	19.83 (7.59)	8-36
Gender	# (%)	
Male	20 (64.5%)	-
Female	11 (35.5%)	-
Race/Ethnicity		
White Non-Latinx	17 (54.8%)	-
Hispanic/Latinx	4 (12.9%)	-
Other/Multiple	8 (25.8%)	-
Unknown	2 (6.5%)	-
Primary language		
English	26 (83.9%)	-
Spanish	1 (3.2%)	-
Multi-language	4 (12.9%)	-

Table 2

Other Demographics

Other Demographic Information		
Caregiver Marital Status	# (%)	
Together	25 (80.6%)	
Not Together	1 (3.2%)	
Separated	1 (3.2%)	
Unknown	4 (12.9%)	
Caregiver Education	Mother	Father
High School	2 (6.5%)	2 (6.5%)
Associates degree	0 (0%)	2 (6.5%)
Bachelor's degree	13 (41.9%)	13 (41.9%)
Master's degree	9 (29.0%)	11 (35.5%)
Doctoral degree	7 (22.6%)	3 (9.7%)
Type of Funding		
Insurance	28 (90.3%)	
Self-Pay	3 (9.7%)	

Table 3

Children's Mean Scores on Standardized Assessments at Program Time 1 and Time 2

Scale	T1 *M* (*SD*)	T2 *M* (*SD*)	*t*	*p*	Cohen's *d*
Vineland Adaptive Behavior Scales (2nd ed.)					
Communication	90.81 (9.89)	96.08 (10.99)	-2.17	.040	-.425
Socialization	78.65 (9.43)	86.73 (9.59)	-3.04	.005	-.596
Social Skills Improvement System					
Social Skills	84.54 (11.60)	95.11 (8.72)	-4.78	<.001	-.903
Social Responsiveness Scale (2nd ed.)					
Total Score	62.17 (12.01)	54.61 (6.97)	2.80	.011	.583

Figure 1

Adaptive Levels at Time 1 and Time 2 for the VABS-II Communication Domain

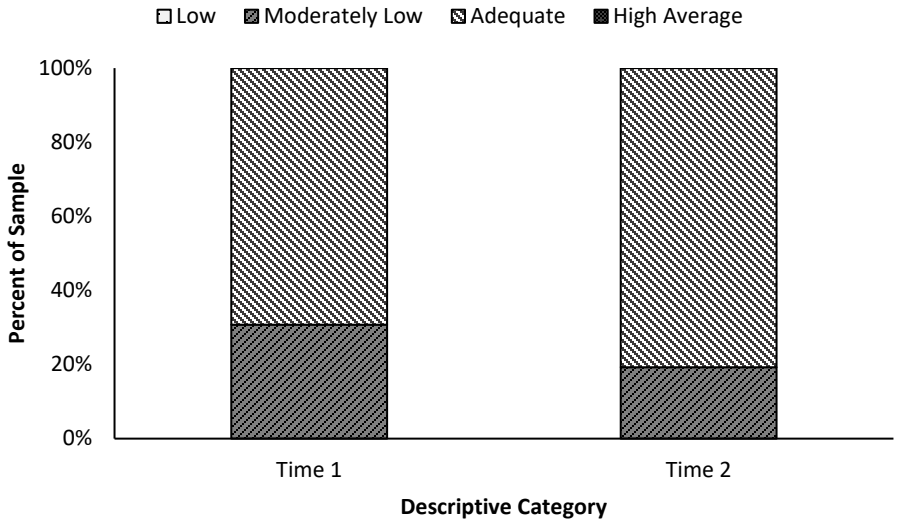

Figure 2

Adaptive Levels at Time 1 and Time 2 for the VABS-II Socialization Domain

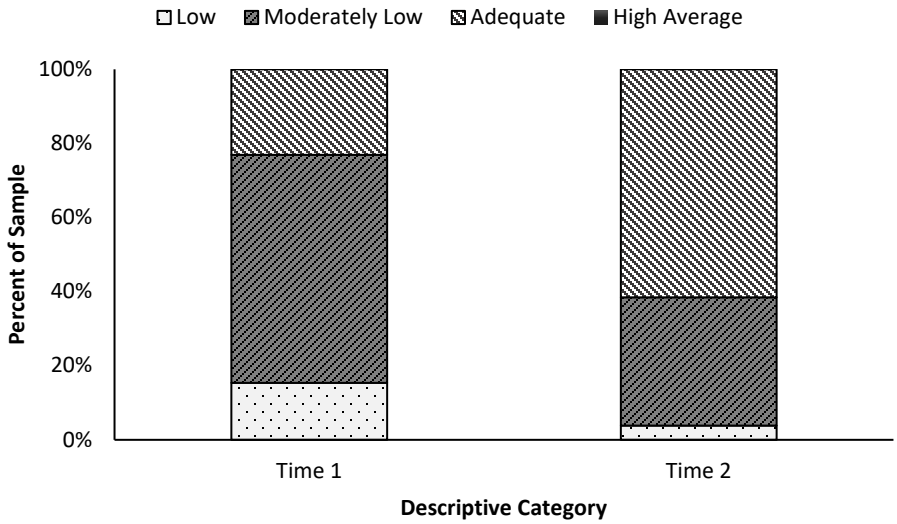

Figure 3

Descriptive Categories at Time 1 and Time 2 for the SSIS

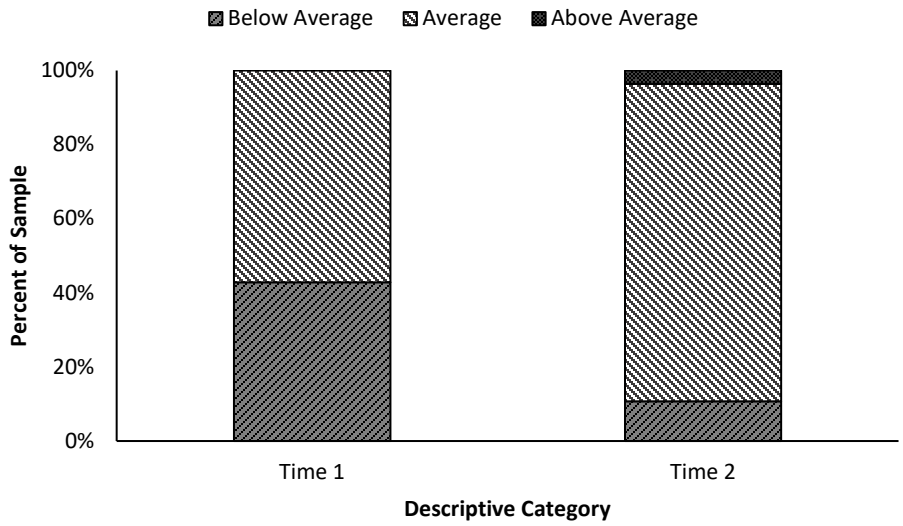

Figure 4

Descriptive Categories at Time 1 and Time 2 for the SRS-2