

# Use of Parent Mediated Activity-Based Intervention to Promote Joint Attention and Enhance Social Communication in a Toddler with Autism: An Exploratory Pilot Study

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## Abstract

This exploratory pilot study was focused on the effectiveness of using a parent mediated activity-based intervention approach to promote joint attention and stress-free social communicative interactions between a toddler with autism and his mother. Treatment sessions included activities in which the child interacted both with his parent and with an interventionist. Results indicated that teaching this mother how to use the intervention approach to establish joint attention in everyday activities resulted in improved social communicative interactions between the parent and child and reduced stress levels. Generalization of joint attention behaviors to different settings was observed, however, the child responded less consistently to the interventionist than to his mother. No significant improvement in the child's overall language abilities occurred.

**Keywords:** Joint attention; Parent mediated activity-based intervention; Social communication; Toddler; Autism

## Introduction

The acquisition of joint attention skills has been identified as a critical phase in the social development of infants as well as the foundation on which to build language [1]. Joint attention abilities in young children indicate the emergence of social-cognitive processes and offer a solid base for later language development and social skills [2]. The failure to develop joint attention is one of the most predictive early indicators of autism in toddlers [3].

Joint attention has been described as a synchronization of attention and intellectual concentration on a similar object by at least two individuals [4]; responsiveness to the communal appeal of an object by demonstrating a shared visual connection of an object or activity with another, then commenting, not requesting [3]; and mutual appreciation or a shared awareness of an object or activity [5]. Joint attention fulfills two important functions of prelinguistic communication: protoimperatives which are used by children to gain a desired object and protodeclaratives which are used to gain an adult or caregiver's attention [1].

Several factors may contribute to heightened stress in the parent of a child with autism including lack of adequate professional support, negative social attitudes toward autism, and behaviors of the child, such as the inability to effectively communicate wants and needs [6]. The stress associated with parenting a child with autism can often impact a family's well-being [7]. Intervention that takes place in the home environment and involves the family may help reduce this familial stress and provide a more positive, nurturing environment for communicative and social interactions. Research findings support the use of parent-implemented early intervention, and have shown a link between joint attention and language development [8]. Research has also shown that weekly intervention utilizing developmentally

grounded parent-child interactions in familiar settings can be an effective approach in promoting joint attention in toddlers with autism [3]. Children with autism exhibit diverse behaviors and varied developmental skills; therefore, no single approach is effective for all children. However, early intervention is recommended for all children with autism [9,10] and sets the stage for greater long-term outcomes [3].

Parental involvement in the delivery of early intervention services to children with autism is highly effective because caregivers are able to integrate intervention into everyday family routines [8,11]. Mahoney and Perales [12] found that as mothers' responsiveness to their children with autism increased, significant improvements were noted in their children's social interactions and social-emotional functioning. Also, responsive comments made by mothers to their children with autism during play correlated with improvements in their children's vocabulary and social initiation skills [13]. These findings support relationship-focused intervention for improving the social-emotional functioning of children with autism.

Additionally, Diggle, McConachie, and Randle [14] reported that parental intervention led to increased language skills in children with autism and decreased the levels of stress experienced by their caregivers. In another study on parent mediated intervention, positive outcomes were reported when parents were involved in joint attention activities with their toddlers with autism [3]. Correspondingly, limited gains in the acquisition of joint attention skills by young children with autism were reported when this parent involvement was lacking [15].

Behavioral principles are the origin of most intervention approaches used today for individuals with autism [10]. Applied behavior analysis (ABA) is a common approach that includes philosophies and strategies which promote generalization of communication skills in various settings among different communication partners. ABA has evolved and improved over the years to include the use of more naturalistic interventions with young children with autism. Research has shown

that children with autism who are taught using “normalized” language intervention approaches show increases in their language development [16]. When naturalistic interventions are implemented by parents, outcomes for children improve significantly [3]. A parent mediated activity-based intervention approach, as described in this article, combines the strengths of two different contemporary naturalistic intervention approaches: contextually mediated practices and activity-based intervention.

The first approach, contextually mediated practices, supports parents and other primary caregivers in the selection and use of everyday activities to support and encourage their child’s learning. Dunst [17] defines contextually mediated practices as the “provision of interest-based child learning opportunities as part of everyday family and community activities by parents (and other primary caregivers) where parent responsiveness and encouragement are used to support child learning and the development of socially-adaptive, functional capabilities.” Two central assumptions of contextually mediated practices include parents’ knowledge of their children’s likes, dislikes, interests, and strengths and how everyday activities can be used as contexts for interest-based child learning [17,18]. Parents are taught to use simple, responsive teaching techniques such as attending to their children’s communicative signals, taking turns in social interactions, responding contingently to social communicative behaviors, and providing support and encouragement for their continued involvement in activities [17].

The second approach, activity-based intervention, is a naturalistic approach in which children’s individual intervention goals and objectives are embedded in routine, planned, or child-initiated activities [19]. Interventionists and parents take advantage of the daily transactions that occur between young children and their caregivers by providing multiple and varied embedded learning opportunities within these activities [20]. Inherent rewards occur as children participate in fun and interesting activities with familiar caregivers. This approach is successful for several reasons. First, it allows for learning to take place in natural contexts; second, it includes the use of materials that are motivating and interesting to the child; and third, it provides children with opportunities to practice new skills across a range of people, settings, and conditions. Thus, generalization occurs as children are acquiring new skills [21].

The purpose of this exploratory pilot study was to explore whether use of a parent mediated activity-based intervention approach would be successful in promoting joint attention and stress-free social communicative interactions between a toddler with autism and his mother. Targeted outcomes included (a) the joint attention behaviors of the child, (b) the general language abilities of the child, (c) the quality of the interactions between the child and the parent, and (d) the stress level of the parent and child during communicative and social interactions.

## Method

### Design

This exploratory pilot study used an ABA design, which included observing and measuring joint attention behaviors before, during, and after the intervention was implemented. A parent mediated activity-based intervention approach was used to support and strengthen the mother’s ability to promote joint attention behaviors and stress-free social communicative interactions with her son. Three different

intervention contexts were chosen based on the toddler’s activity interests including the family’s home, the child’s preschool, and a park that was frequented by the mother and child. The interventionist modeled how to embed learning opportunities for the targeted joint attention behaviors across the three instructional contexts. For example, if working on focusing on faces in the home setting, the mother might sit directly across from her son when he was in his highchair before having a meal, sing a song to him, and use hand gestures in order to direct his attention to her face. In the park setting, when the child was walking with the interventionist, his mother might run from one side of the bridge to the other side, popping her face between the railings to call his name. In the preschool setting, the mother might kneel so she was face to face with her son as he sat on a bouncy ball, and when the bouncing stopped, would call his name.

Treatment sessions were conducted two days a week for a 9-week period. Each session lasted 45 minutes and consisted of three, 10-minute increments, followed by a 5-minute rest period after each 10-minute increment during which data was not collected. Probe generalization data was collected six times during the treatment phase when the intervention was implemented by an interventionist rather than the parent. Post-baseline probe generalization data was collected three months after treatment ended.

The joint attention treatment targets used in this study were based on the mediated learning model outlined by Schertz and Odom [3]. Four joint attention behaviors were targeted during the treatment: (a) focusing on faces (i.e., looking at any part of a face), (b) turn taking (i.e., child performs one of at least two actions in a turn-taking routine), (c) responding to joint attention (i.e., child responds to parent’s attempt to draw attention to an object by alternating looks between the parent’s face and the object), and (d) initiating joint attention (i.e., child alternates looks between the parent’s face and the object with the purpose of gaining the parent’s attention to the object). According to Dunst [17], parent mediated child learning is most effective when both parent and child feel empowered and confident during communicative exchanges that occur with everyday learning opportunities. Therefore, also monitored were the amount, quality, and appropriateness of the social communicative interactions between the child and the parent, the stress level of the parent and child during interactions, and the general language abilities of the child.

Prior to the initiation of treatment, the parent of the child in this study participated in training sessions to ensure her understanding of the joint attention behaviors and the correct implementation of the intervention approach. The components of a parent mediated activity-based intervention approach were explained and different interaction styles for supporting and encouraging the toddler’s mastery of joint attention were modeled by the investigator. Specifically, the parent was taught how to use the following responsive teaching techniques (i.e., focusing on the child’s interests, following the child’s lead, and responding contingently to behaviors). When the parent was proficient in promptly and appropriately responding to her child’s communicative behaviors and signals, she was taught how to embed joint attention behaviors within the context of familiar activities (i.e., family’s home, the child’s preschool, and a park) and how to provide multiple opportunities to establish joint attention within these activities. Finally, the parent was taught when and how to provide the necessary support to encourage her child’s continued participation in the activities.

## Participants

The participants in the study included a single mother and her son who was diagnosed with autism at 25 months of age. At the time of enrollment in the study, the child was 31 months old. The mother was a full-time undergraduate student at a local university and also held a part-time job. The child attended a full-day preschool program where he received physical, occupational, and speech-language therapy. The child had no significant vision or hearing impairments.

Upon enrollment in the study, the toddler was assessed using the following three instruments: an adapted version of the *Parent/Caregiver Involvement Scale* (PCIS; [22]), a structured interview, and the *Bayley Scales of Infant and Toddler Development B Third Edition* [23]. The PCIS, used with children aged birth to five years, is designed to provide a global assessment of both the amount and quality of involvement between a parent and a child. The scale is divided into eleven areas. All items are rated on a 5-point Likert scale according to the amount, quality, and appropriateness of the involvement between the parent and the child. This assessment tool was adapted and used to measure the social communicative interactions between the mother and child. A structured interview was developed by the investigator and consisted of questions relating to how the child communicated, and the amount of stress or frustration experienced by the mother when communicating with her child. The Bayley - III is designed to measure the receptive and expressive language skills of children ages 1 to 42 months of age.

## Procedures

Direct observational recording was used to quantify the occurrence of targeted joint attention behaviors during observational periods that were held consistent. The point-by-point event recording [24] entailed tallying every time the child demonstrated one of the targeted behaviors (i.e., focusing on faces, turn taking, responding to joint attention, and initiating joint attention). The PCIS was administered to determine the amount and quality of the interactions between the mother and child and the structured interview was used to examine the stress levels of the parent and child during social communicative interactions. Both of these tools were administered before treatment, halfway through treatment, and a third time after treatment had ended. The Bayley-III was used to assess the child's general language abilities before and after treatment.

A procedural validity measure was used to determine the extent to which the treatment was accurately implemented by the mother. A 5-point Likert scale was used where a rating of 1 indicated the lowest level of implementation of the treatment approach and a rating of 5 indicated the highest level of implementation. Behavioral anchors (i.e., 2 and 4) were used if the parent or interventionist (i.e., investigator) completed all of 1, but not all of 3, or all of 3, but not all of 5.

## Data Analysis

Procedures utilized for data analysis included graphic presentation, visual analysis, and computation of interrater reliability agreement. Data collected during baseline, treatment, and post-baseline sessions were plotted to provide a graphic presentation of the child's joint attention behaviors. Acquisition data were plotted separately for the child's interactions with his parent and the child's interactions with an interventionist. All data were inspected visually to determine if a relationship existed between the pattern of responses and the treatment. In addition, pre-, mid-, and post-test data from the PCIS

were examined to determine changes in the social and communicative interactions between the child and the parent. Data were plotted separately for amount, quality, and appropriateness of the interactions. The stress level of the parent during communicative and social interactions was determined by examining the parent's responses to interview questions. Parental responses were compared before, during, and after treatment. Pre- and post-test scores from the Bayley- III were compared to determine any changes in the general language abilities of the child.

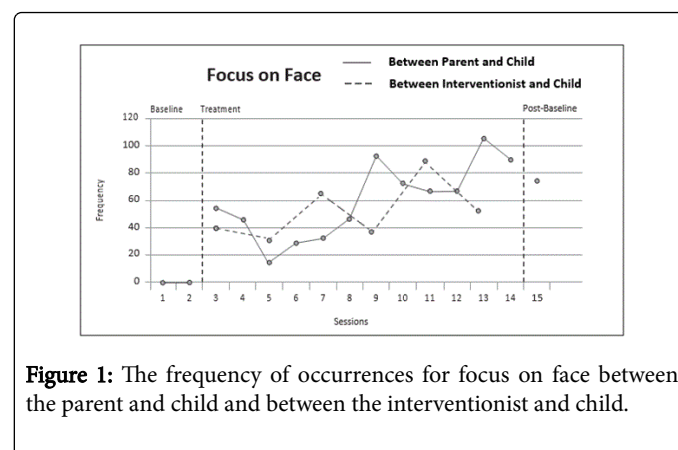
Inter-rater reliability data were collected on the child's acquisition of targeted joint attention behaviors. A point-by-point agreement ratio was calculated to evaluate observer agreement each time the child demonstrated a targeted behavior [25]. Overall mean interrater agreement between observers was calculated separately for each of the four joint attention behaviors. For focusing on face, the mean was 96.3% (range 85.9% to 100.0%); for turn taking, the mean was 91.65% (range 0.0% to 100.0%); for responding to joint attention the mean was 100.0% (range 100.0% to 100.0%); for initiating joint attention the mean was 98.7% (range 84.6% to 100.0%). Procedural validity data was collected on the correct implementation of the treatment approach by the parent. Fidelity data, where a rating of 1 indicated the lowest level of implementation of the treatment approach and a rating of 5 indicated the highest level of implementation, was collected during baseline (a fidelity score of 1), treatment sessions (a fidelity score of 5), and a post-baseline session (a fidelity score of 4).

## Results

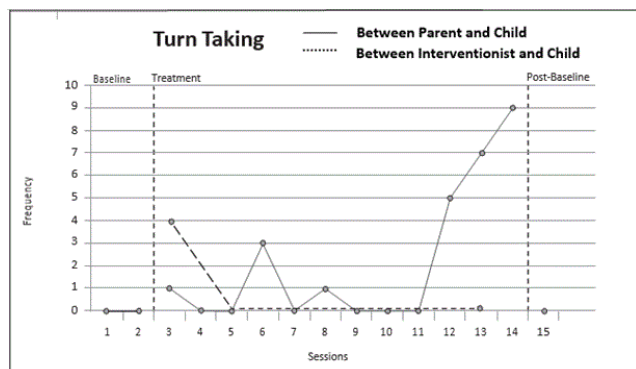
The results of this exploratory pilot study are organized according to these four areas: (a) the joint attention behaviors of the child, (b) the quality of the social interactions between the child and the parent, (c) the stress level of the parent and child during social communicative interactions, and (d) the general language abilities of the child.

### Joint attention behaviors of the child

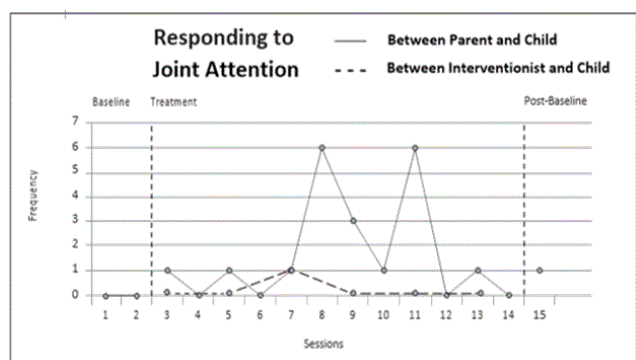
The targeted joint attention behaviors included focusing on faces, turn taking, responding to joint attention, and initiating joint attention. Figures 1 through 4 contain graphs showing the child's joint attention behaviors when interacting with his parent, and his joint attention behaviors when interacting with an interventionist. Data on joint attention behaviors were plotted separately to enable a comparison between the toddler's responses to his parent and his responses to the interventionist (Figures 1-4).



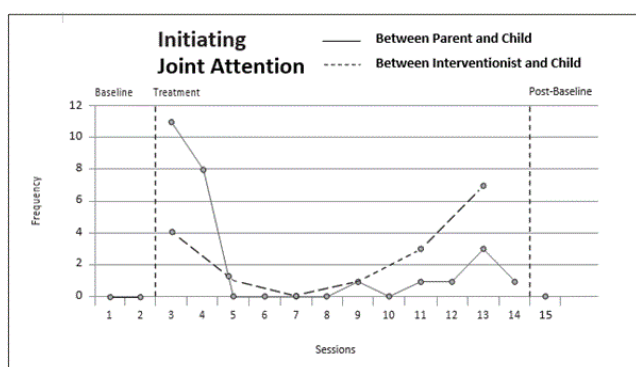
**Figure 1:** The frequency of occurrences for focus on face between the parent and child and between the interventionist and child.



**Figure 2:** The frequency of occurrences for turn taking between the parent and child and between the interventionist and child.



**Figure 3:** The frequency of occurrences for responding to joint attention between the parent and child and between the interventionist and child.



**Figure 4:** The frequency of occurrences for initiating joint attention between the parent and child and between the interventionist and child.

Visual inspection of the data contained in Figures 1 through 4 reveal that the child learned to focus on his mother's face and to take turns in

conversation. Inconsistent progress was noted in his ability to respond to and initiate joint attention bids. Generalization of joint attention behaviors was observed, however, the child responded less consistently to an interventionist than to his mother. In general, the child attended to his mother more consistently when she was playing with him (without toys) while seated in close proximity directly in front of him. The child focused on his mother's face, engaged in turn taking, responded to joint attention, and initiated joint attention the greatest number of times when he was seated in his highchair and his mother sang to him using hand motions. The child sustained attention for longer periods of time when games such as Pat-a-Cake were played and accompanied by singing and clapping. In addition, the child was more likely to demonstrate the targeted behaviors when dyadic play was used rather than when the mother and child played with noise-making toys (i.e., his talking piano or talking drum that flashed the letters of the alphabet). This supports Schertz and Odom's [3] findings that turn taking facilitates joint attention when dyadic play is used, rather than when play is centered on the use of toys.

### Quality of social communicative interactions

The PCIS utilizes eleven areas to provide a global assessment of the amount and quality of involvement between the parent and the child. Each area was rated according to the amount, quality, and appropriateness of the parent's interactions with the child according to an adapted rubric. The tool uses a 5-point Likert scale where a rating of 1 indicates the lowest level of performance and a rating of 5 indicates the highest level of performance. Table 1 contain pre-, mid-, and post-Likert scale rating scores for the eleven areas on the PCIS. Overall, the PCIS test data revealed improvement in the amount, quality and appropriateness of social interactions between the child and his mother.

Amount ratings were related to how much the parent demonstrated a behavior [22]. As shown in Table 1, the amount of interaction between the parent and child increased from pre- to post-testing in seven areas (i.e., Physical Involvement, Verbal Involvement, Play Interaction, Teaching Behavior, Positive Statements, Negative Statements, and Goal Setting). The parent's rating in one area, Teaching Behavior, increased at the mid-test, then declined slightly, but still showed an increase in post-test scores. No change was noted in post-test scores from pre-test scores (i.e., ratings of 5 in both) in four of the areas (i.e., Responsiveness of Caregiver to Child, Control over Child's Activities, Directives and Demands, and Relationship Among Activities).

The quality ratings referred to the degree of warmth and acceptance the caregiver showed during the interaction with the child [22]. As illustrated in Table 1, the quality of the interactions between the parent and child from pre- to post-testing increased in ten areas (i.e., Physical Involvement, Verbal Involvement, Responsiveness of Caregiver to Child, Play Interaction, Teaching Behavior, Control over Child's Activities, Relationship Among Activities, Positive Statements, Negative Statements, and Goal Setting). The quality of caregiver interactions for the remaining area (i.e., Directives and Demands) increased at the mid-test, then dropped back to the pre-test score (i.e., rating of 4) during the post-test.

	Amount			Quality			Appropriateness		
	Pre	Mid	Post	Pre	Mid	Post	Pre	Mid	Post
Physical Involvement	4	5	5	4	5	5	4	5	5
Verbal Involvement	3	5	5	4	5	5	4	5	5
Responsiveness of Caregiver to Child	5	5	5	3	4	5	4	5	5
Play Interaction	4	5	5	3	4	5	5	5	5
Teaching Behavior	3	5	4	4	5	5	5	5	5
Control over Child's Activities	5	5	5	4	5	5	5	5	5
Directives, Demands	5	5	5	4	5	4	5	5	5
Relationship Among Activities	5	5	5	3	5	5	4	5	5
Positive Statements	3	4	5	3	5	5	3	5	5
Negative Statements	3	5	5	4	5	5	5	5	5
Goal Setting	4	5	5	4	5	5	5	5	5

**Table 1:** Amount, quality, and appropriateness ratings for interaction between the parent and child.

Appropriateness ratings were related to how closely the caregiver's interactions were matched to the child's development, interest level, and motoric capabilities [22]. Table 1 shows that the appropriateness of the interactions between the parent and child increased in five areas (i.e., Physical Involvement, Verbal Involvement, Responsiveness of Caregiver to Child, Relationship among Activities, and Positive Statements). No change was noted in post-test scores from pre-test scores (i.e., ratings of 5 in both) in the remaining six areas (i.e., Play Interaction, Teaching Behavior, Control over Child's Activities, Directives and Demands, Negative Statements, and Goal Setting).

### Stress level of parent and child

According to interview data collected after treatment ended, the mother reported a marked difference in her child's ability to make eye contact, establish joint attention, and in the frequency and consistency in which he responded to his name. The mother noted that her child had a tendency to respond to his name more consistently or make eye contact more frequently when his daily routine was consistent and when someone was working with him. She also noticed that when large breaks in intervention occurred, such as winter vacation, his joint attention behaviors would decrease slightly.

Pre-interview data revealed that when the parent could not understand what her child wanted, both she and her child became frustrated. Post-interview responses showed that while the mother wanted her child to be able to communicate verbally, she was pleased that he appeared to understand her, that he looked at her during social communicative interactions, and that he pointed to things. In contrast to the initial interview, the parent no longer expressed feelings of impatience or frustration.

### General language abilities of the child

The Bayley-III was used to measure the child's language abilities before and after treatment. Pre- to post-test scores on this assessment did not indicate any significant improvement in the child's overall

language abilities. However, it was noted that the child made progress with eye-contact, social skills, and joint attention skills.

### Discussion

The purpose of this exploratory pilot study was to explore whether use of a parent mediated activity-based intervention approach would be successful in promoting joint attention and stress-free social communicative interactions between a toddler with autism and his mother. Teaching this mother how to use responsive teaching techniques and embedding learning opportunities to establish joint attention behaviors in everyday activities resulted in improved social communicative interactions between the parent and child. Improvements in the amount, quality and appropriateness of social interactions between the child and his mother were observed.

Interview data revealed the stress level of the parent during social communicative interactions decreased, thus showing a slight improvement in the mother's perception of communication. While the mother was still frustrated that her child did not use signs or words to communicate, she felt he understood her better when she communicated with him. Interview data also revealed a marked difference in joint attention between the child and his mother, along with improved eye contact and name recognition, as noted when the mother said, "His eye contact has increased tremendously, my grandmother [the child's great-grandmother] who doesn't see him that often, and my mom [the child's grandmother] were talking about how his eye contact was a lot better with them."

Although the child learned only two of the targeted joint attention behaviors (i.e., focusing on his mother's face and take turns in conversation), according to parent report, overall joint attention between the parent and child improved. The parent, in the post interview, commented, "He [the child] will follow my finger sometimes now, if I tell him 'look,' he'll turn to look." The frequency and consistency with which the child responds to his name also improved. The mother noted, "He'll respond to his name, the first time [it is

called], most of the time now [which was not the case pre-intervention].”

## Conclusions

Children with autism often exhibit severe communication difficulties. One difficulty encountered by these children is the inability to establish joint attention. This exploratory pilot study focused on the effectiveness of using a parent mediated activity-based intervention approach to strengthen joint attention behaviors and support stress-free social communicative interactions between a mother and toddler with autism. The following conclusions have been drawn based on the results of this study. First, joint attention behaviors exhibited by this child were greater when he interacted with his parent as compared to when he interacted with the interventionist. Second, the use of parent mediated activity-based intervention appeared to positively influence the amount and quality of the social communicative interactions between this mother and child. Third, the stress levels of the parent and the child were reduced during routine interactions, which the parent attributed to the knowledge she gained from the training she received on how to use parent mediated activity-based intervention. And finally, the increase in joint attention behaviors exhibited by the child did not appear to impact the child's general language abilities.

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