Critical Review:
Does Teaching Joint Attention Improve Expressive Language Abilities in Children with Autism?

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This critical review examined the effects that training joint attention had on expressive language in children with autism. Studies included English speaking children diagnosed with autism or pervasive developmental disorder – not otherwise specified between the ages of 2 and 5 years of age. Two of the studies were randomized clinical trials and two were single-subject, multiple baseline designs. Overall, the evidence suggested that teaching joint attention to children with autism may lead to improvements in expressive language.

Introduction

Joint attention involves a variety of different behaviours (e.g., eye gaze alteration and gesturing) which are used to communicate with another person about a third entity. In general, it involves *responding* to bids for joint attention by another person or *initiating* joint attention with another person (Bruinsma, Koegel & Koegel, 2004).

Joint attention has been established as part of the developmental trajectory for learning language in typically developing children. By 9 months infants begin to share attention on an entity with another person. They first learn to respond to bids for attention from another person by directing their gaze to that object. They then learn to initiate joint attention by looking at something, and perhaps using a conventional gesture (e.g., point) to direct a person's attention to that object (Jones, Carr & Freely, 2006).

Research has shown that these shared attention events provide an opportunity to learn language (Rollins & Snow, 1998). For example, children learn object labels when the adult verbally provides the label while they both have a shared focus on that specific item. By 18 months infants learn to monitor what an adult is looking at and associate the word with that item to establish a meaning (Miller, 2006).

Autism is a spectrum of disorders, including pervasive developmental disorder – not otherwise specified (PDD-NOS), which are characterized by deficits in communication skills (Kasari, Freeman & Paparella, 2006). One of the earliest impairments noted is the lack of joint attention during infancy and early childhood (Whalen, Schreibman & Ingersol, 2006). Children with autism are also impaired in their development of language, but their strengths and weaknesses with this ability are highly variable (Kasari, Paparella, Freeman & Jahromi, 2008). Researchers have attempted to explain this variability by investigating the relationship between children's joint attention skills and language development. Studies have found a relationship between joint attention and language (Luyster, Kadlec, Carter & Flusberg, 2008). As well, longitudinal studies have shown joint attention skills can predict language ability after 1 year (Mundy, Sigman & Kasari, 1990) and 3 years (Siller & Sigman, 2008) in children with autism.

It is clear that joint attention plays a critical role in language development. Given the deficit with this skill associated with children on the autism spectrum, several researchers have questioned whether teaching joint attention would improve the language of children in this population.

The impact of this answer has significant clinical implications for professionals providing language intervention for children with autism. Studies have shown that children with autism who speak by age five have better long-term outcomes than those who do not (Lord, 2000). Evidence from studies regarding language outcomes from joint attention intervention are then critically valuable to the autism literature from which professionals base their clinical decisions.

Objectives

The primary purpose of this article is to provide a critical review of the literature examining the effects of joint attention intervention on expressive language in children with autism. A secondary purpose is to discuss the clinical implications of these findings.

Methods

Search Strategy
Computerized databases including PubMed, CINAHL, PsycINFO, Scopus and ERIC were searched. The search was limited to English journal articles, reviews

or dissertations published before October 2009. Search terms included: ((joint attention) OR (prelinguistic communication) OR (shared attention)) AND ((expressive language) OR (speech)) AND ((autism) OR (PDD-NOS)).

Selection Criteria
Studies selected included at least one group, or a single participant, where the intervention provided targeted joint attention. As well, expressive language or spontaneous speech had to be one of the outcomes measured. Participants also had to have a clinical diagnosis of autism or PDD-NOS. No limits were set on participant's demographics (e.g., age, race, gender, socioeconomic status).

Data Collection
Results of the literature review yielded four articles consistent with the selection criteria. Two randomized clinical trials and two single-subject, multiple baseline designs. The intention of the review was to focus on the effect of joint attention training on expressive language.

Results

All studies examined are considered Level 1 research evidence, indicating there is minimal potential for the results found to be affected by sources of error. Results are organized from least to most compelling evidence.

Drew et al. (2002) conducted a randomized clinical trial where parents were trained to provide joint attention intervention with their children. The authors predicted that children's language abilities would improve as a result of this intervention.

There were 24 parents who were randomly assigned to either the Parent Training group (PT) or the Local Services group (LS), which resulted in 12 parents in each group. Their children received a clinical diagnosis of autism by the research team and had a mean age of 22.5 months at study outset.

The PT group received a program using a social pragmatic approach to train joint attention during daily routines. Also included were recommendations for behaviour management and wholistic language learning. Parents were seen every six weeks, for 3 hours, by a speech language pathologist at which time consultation was provided regarding program implementation and progress was monitored. The LS group received varied combinations of community services such as speech-language pathology, occupational therapy, physiotherapy and applied behaviour analysis.

Language was measured using the MacArthur Communicative Development Inventory (CDI) and the Autism Diagnostic Interview-Revised (ADI-R) at baseline and at 12 month follow-up. An analysis of variance (ANOVA) was used to compare group means. Data showed that at baseline the PT group had a higher nonverbal IQ ($p < .001$) thus an analysis of covariance (ANCOVA) was used to compare groups at follow-up while controlling for this variable. It was found that the PT group increased in word use as measured by the ADI-R ($p < .05$) but no significant differences were found using the CDI.

Interpretations of these results should be approached with caution. First, the PT program included other aspects beyond teaching joint attention skills. This made it difficult to determine if it was the direct teaching of joint attention, this additional instruction, or the combination that had an effect on language. Second, the program did not follow standardized procedures for consistency of implementation. No data was collected to track progress, goals were not outlined and no mastery criteria were specified. As well, no information was collected regarding the amount of time parents engaged in this training per day. As a result it was unclear if each child received the same quantity and/or quality of intervention and if differences in these variables influenced the results. Third, since no blinding procedures were employed, subjective bias could have influenced the internal validity of the study. It was not reported whether the parents were blind to the study hypothesis, which was relevant since measures used to evaluate the outcomes relied on parent report. In this respect, it would have also been beneficial for researchers to have included an objective measure of language as well. If significant results were found using both tools this would have increased confidence in the findings and additional support for the study hypothesis. This was especially relevant considering only the ADI-R showed statistically significant improvements in expressive language.

Although this study had several methodological limitations, it was interesting to note that children's expressive language improved significantly more if they received joint attention training. Replication using more rigorous research methods would add validity to the results. However, based on the current findings, this study provided equivocal evidence that joint attention intervention improves expressive language abilities in children with autism.

Jones, Carr and Feeley (2006) conducted a single-subject, multiple baseline design across the intervention skills of responding to and initiating joint attention. Four participants were included between the ages of 2

and 3 years old. Two of the participants were diagnosed with PDD-NOS, one with autism and one was described as having "likely autism spectrum disorder".

Intervention was incorporated into the preschool program the children attended and implemented by teachers at this school. Target responses and mastery criteria were outlined *a priori* and treatment used a combination of discrete trial and pivotal response training. Between one and four treatment sessions were done per day, with each session consisting of 10 trials. Intervention continued until each child mastered all requirements of the program. Procedural reliability ranged from 98% to 100%.

Language was measured by totaling the number of vocalizations (e.g., phonemes or words) that occurred during joint attention trials. Children produced between zero and four vocalizations at baseline and at study completion produced between 24 and 86 new phonemes and 1 to 18 new words.

This study had some critical limitations. Primarily, by not employing a multiple baseline procedure across participants it was possible that maturation accounted for the improvements in language. Secondly, the authors did not include a description of any other therapies the children were involved in at the time intervention occurred. Therefore, it was possible that an extraneous variable associated with this factor contributed to the outcomes found. Third, only informal measures were used to assess expressive language. The addition of a standardized measure would have strengthened the findings since there were no blinding procedures were used. As a result subjective biases could have lead to inaccurate observations which may have distorted the findings.

There were several points of merit to this study. First, because the authors included phonemes as an outcome measure, results were able to reveal subtle improvements to verbal output that may not otherwise have been seen. This added support to the possibility that teaching joint attention does improve expressive language for these children. Also, since teaching was generalized across materials, people and settings it increased confidence that a nuisance variable associated with the teaching conditions did not influence the results. In addition, the study also had good procedural fidelity which increased certainty that all children received the same intervention.

The study outcomes showed that improvements were seen in expressive language for all three children. However the limitations of the study made it difficult to be confident this outcome is a direct result of the

intervention. Therefore, overall this study provided equivocal evidence as to whether teaching joint attention improves expressive language in children with autism.

Whalen and Schreibman (2003) completed a single-subject, multiple baseline study across four participants. Children involved all had a clinical diagnosis of autism or PDD-NOS with a mean age of 4 years, 2 months.

The intervention procedure used a combination of discrete trial and pivotal response training (PRT) and consisted of two phases: response training and initiation training. Target behaviours were specifically outlined *a priori* and fidelity of implementation ranged from 93% to100%. Intervention was conducted in a laboratory setting by the researchers one day per week which included three, 25-minute sessions. All children mastered both training phases in an average of 5weeks.

Whalen, Schreibman and Ingersoll (2006) reported the effects this training had on spontaneous speech. Language probes were administered which consisted of 10-minute PRT sessions. No changes in language were observed during baseline for any child; however all four increased in spontaneous speech by post-treatment and 3-month follow-up. The average rate of spontaneous speech at baseline was 20% (range 0% to 65%) and the post-treatment average was 55% (range 25% to 80%).

All children in the study showed some improvement in verbal output which supports the idea that teaching joint attention will improve expressive language in children with autism. The study design also provided support for this idea. By staggering baseline across participants the researchers were able to account for any developmental changes that may have occurred during treatment. Since no changes in language occurred during baseline for any child, it was more likely that the changes seen at post-treatment were a result of the joint attention intervention. Also, the clearly outlined procedures and mastery criteria led to strong fidelity of implementation. Therefore it was fairly likely that each child received the same dose and type of intervention and that the researchers themselves did not introduce an extraneous factor that may have influenced the results.

There were a few limitations to this study which decreased confidence that the intervention led to the outcomes. Most importantly, the researchers did not specify what they did during PRT probes or provide a clear definition for spontaneous speech. Due to this it was difficult to fully understand what was specifically being measured and therefore the exact changes that occurred to language. In addition, this will make replication of these findings challenging. Finally, none

of the researchers were blind to the study purpose which allowed the possibility for subjective bias to have tainted the results. There was also no report of the other interventions the children were involved in therefore it was possible that other therapies could have influenced the improvement seen in expressive language.

In general, however, Whalen et al. (2006) provided a methodologically sound study where all four children showed improvement in expressive language post-intervention. Considering this, the outcomes found provided suggestive evidence that joint attention training with children with autism does have some improvement on expressive language.

Kasari, Freeman and Paparella (2006) completed a randomized clinical trial in which 58 children were randomly assigned to either the joint attention (JA), symbolic play (SP) or control (CO) group. There were no significant differences for each group pre-treatment in regards to mental age, developmental quotient, expressive and receptive language or gender. Participants were 3 or 4 years old with a diagnosis of autism.

Trained graduate students provided intervention. The assignment of these students to child and treatment condition was randomized. Intervention was provided for 30 minutes each day, for a five to six week period. Therapy was incorporated into the Early Intervention Program (EIP) all the children attended for 6 hours per day, 5 days per week, which followed the typical preschool curriculum. A treatment manual was developed for each intervention with a list of goals and mastery criteria. Treatment began with discrete trial instruction and was followed by floor time using milieu teaching. Procedural fidelity ranged from 92% to 95%. According to parent report no other interventions were undertaken by any of the children during treatment.

Kasari, Paparella, Freeman and Jahromi (2008) reported the effects this intervention had on children's expressive language abilities. They hypothesized that improvements in joint attention would result in improvements in language post-intervention. Also, they thought that greater improvement in expressive language would be seen in children with stronger expressive language abilities at study outset.

Follow-up at 6 and 12 months included 56 and 53 participants, respectively. Each child's language was assessed using the Reynell Developmental Language Scales by testers blind to the study purpose. Statistics were run based on the assumption of a Poisson distribution. An ANCOVA revealed there were significant differences between groups post-treatment after controlling for mental age ($p < .01$). Analysis revealed both the JA ($p < .01$; Cohen's $d = .59$) and SP ($p < .01$; Cohen's $d = .71$) groups had significantly greater language growth compared to controls. Growth curve analysis showed children whose language abilities were above 20 months of age at study outset had the greatest expressive language growth ($p < .001$; Cohen's $d = 2.0$) which confirmed one of the study hypotheses. For children whose language was less than 20 months at outset, those in the JA group had greater expressive language improvements compared to those in the other groups ($p < .01$; Cohen's $d = .63$). These results suggested that joint attention intervention does improve expressive language in children with autism and that the extent of the improvement is dependent on pre-intervention language abilities.

In general this study employed a strong research paradigm. However, since both experimental conditions had similar effects on language there was a potential the responses taught in each condition targeted similar skills. It can, therefore, not be determined if joint attention intervention was specifically responsible for improvement in expressive language. Blinding and randomization procedures eliminated potential subjective bias. The use of a control group and the fact that the groups did not differ significantly at treatment outset increased confidence that the results found were attributable to the intervention. Statistical methods were also appropriate given sample size and research design. In addition, statistical manipulation of the data to account for nonnormality and missing data was considered. A major strength of this study was that the researchers controlled for the dose and quality of intervention with the predetermined treatment manual and report that no other interventions were done at that time. This eliminated the possibility that an extraneous variable contributed to the findings. Also important was that reliable and valid standardized measurement tools were used therefore it is probable that the assessment of language abilities was accurate.

Given the rigorous methodological study design, and the fact that the outcomes found supported the hypotheses, this study provided suggestive evidence that targeting joint attention improves expressive language abilities in children with autism.

Discussion

Overall, the critical appraisal of relevant research material suggests teaching children with autism joint attention skills may result in improvement to expressive language.

There are, however, some points of appraisal which

make this argument less compelling. Most relevant is the extent to which children vary on the autism spectrum. Drew et al. (2002) and Kasari et al. (2006) did not report the severity levels of the autism diagnoses so it is unclear if the groups compared were a representative sample of this population. Whalen et al. (2003) did report this data, which included children with 'mildly moderate' and 'average probability of autism'. Jones et al. (2006) included children with varying degrees of autism but severity levels were not reported. Since improvements were seen across participants the possibly is raised that joint attention training could improve expressive language regardless of autism severity. However, examination of available information from these studies indicates that most of the participants were within the mild to moderate range of autism. Therefore the effects of this training remain unknown for children in the more severe range.

Participants across studies also had varying language abilities at outset. This makes it difficult to determine if any pre-treatment language abilities would influence the success a child could have with this intervention. Three studies reported receptive language abilities which ranged from 6 months to 2 years of age. Some children were completely nonverbal while others used expressive language in some contexts. Kasari et al. (2008) provided evidence that children with stronger expressive language at baseline may make the most gains in this area post-intervention. More interestingly, she found that for children whose expressive language was lower than 20 months of age at baseline, joint attention intervention had the most benefit on expressive language. Since all participants did make gains in expressive language across studies, it is possible that improvements may not be dependent upon pre-treatment language abilities. However, Kasari's findings suggest that the degree of improvement is dependent upon pre-treatment language abilities.

One factor which may be a prerequisite is mental age. Children in all studies had a mental age of at least 12 months. It is suggested by Whalen et al. (2006) that this should potentially be a requirement for intervention as joint attention does not develop in typical children until approximately this age. Future research investigating this topic would be beneficial.

Additional factors to consider are the validity and reliability of the measures used to assess language. Only one study used a standardized measurement tool with testers who were blind. All others used parent report and informal measures without blinding procedures. As a result there is a potential that bias could have led to inaccurate observations and the language outcomes seen were not a true representation

of children's abilities. Regardless of this, it cannot be overlooked that improvements in expressive language were seen across studies, no matter what assessment measure was used. Therefore, when considering the evidence collectively, there is greater confidence that expressive language will improve after joint attention intervention.

The best intervention method is also still in question. All studies used a combination of treatment approaches which included different definitions for target behaviours. Sessions took place in different settings, the individuals providing treatment had varying expertise and the amount of time spent in treatment varied for each child. The consistent factor was that all interventions taught children to both respond to and initiate joint attention. Since each child made improvements in expressive language perhaps the quantity and type of training used is less important than what is taught. The current evidence suggests that teaching both responsive and initiative joint attention behaviours is important for improvements to expressive language. However, it is still unclear which treatment approach is the most efficacious.

Furthermore, it remains unclear if teaching joint attention alone improves expressive language or if the outcomes found are a result of this intervention being conducted in conjunction with other therapies. Jones et al. (2006) and Whalen et al. (2003) did not report what other interventions the children were involved with. Drew et al. (2002) reported that the children who received joint attention intervention also received local services. Only Kasari et al. (2006) conducted a study which controlled for other interventions. From a clinical perspective it is unrealistic that a client will only participate in one intervention at a time. There are also ethical implications regarding withholding necessary treatment. Yet from a research perspective it would be valuable for additional research to follow a similar format to Kasari to be certain of the exact impact of joint attention training on its own.

Recommendation for Future Research
a) Studies should report the level of autism severity to improve understanding of the effects of this intervention across the autism spectrum.
b) Research should be done to investigate potential prerequisite skills that may be needed to help determine the best candidate for this intervention type.
c) Blinding procedures should be employed for assessment and intervention to eliminate potential bias.
d) Both formal and informal assessment measures should be used to strengthen the validity of the results.
e) Treatment approaches should be isolated and compared to determine the most efficacious

intervention method.

Clinical Implications

The current evidence suggests that joint attention training does improve expressive language abilities in children with autism. However, due to the fact that there were only four studies that examined this question, and the heterogeneity of the autism population, it is difficult to be overwhelmingly confident that this training will improve expressive language for all children with autism. Future studies finding improvements in expressive language after joint attention training for children with varying autism severities would make this evidence more compelling. However, based on evaluation of the above research, clinicians may responsibly decide to include this intervention into their current practice.

When deciding to include this therapy into a treatment plan, clinicians should also take into consideration other research. For example, studies suggest there is a relationship between joint attention and expressive language. Also, there is strong evidence that joint attention skills can predict future language abilities for children with autism. Joint attention has also been proven to be one of the earliest developing skills in typical children and part of normal language development. Taken collectively, research is suggestive that strong joint attention skills do have a beneficial effect on expressive language.

Additional research would be helpful to determine more specifically which children would be the best candidates for this intervention. However, based on the current evidence, clinicians could feel comfortable providing joint attention training to children in the mild to moderate range of autism, who have poor joint attention and expressive language abilities, as an intervention strategy to improve expressive language.

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