

Critical Review: Impact of parent-based intervention on the communication abilities of preschool children with autism spectrum disorders

Rutherford, S.A.
M.Cl.Sc. (SLP) Candidate
School of Communication Sciences and Disorders, U.W.O

This critical review examines the impact of parent-based intervention programs on the communication abilities of preschool children with autism spectrum disorders (ASD). Studies designs include: randomized control trials (3), controlled trials without randomization (2), multiple baseline study (1) and multiple case study design (1). Overall, findings indicate that parent-based intervention programs have a positive effect on the communication of preschool children with ASD. Recommendations for future research and clinical practice are provided.

Introduction

Autism spectrum disorders (ASD) are a group of neuropsychiatric developmental disorders, characterized by involvement in restricted, repetitive and stereotyped activities and varying degrees of difficulty with social interaction and communication (AACAP Official Action, 1999; Dover & Le Couteur, 2007). Areas of communication impairments associated with ASD include: expressive and receptive vocabulary, use of verbal and non-verbal language skills, articulation, oral-motor abilities and pragmatic skills (AACAP Official Action, 1999).

In recent years, the clinical definition of ASD, as outlined by the Diagnostic and Statistical Manual of Mental Disorders, has broadened (CASPLA, 2006). These changes have resulted in increased heterogeneity and reported incidence of this disorder group, with current studies suggesting that ASD affects 6 of every 1000 preschool children (McConachie, Randle, Hammal & Le Couteur, 2005). Identification of ASD in early preschool years is now more reliable due to increased awareness and established diagnostic criteria (Drew et al., 2002). Early indicators of ASD are now observable from as early as 12 months, with reliable diagnosis possible by 24 months of age (CASLPA, 2006). One clear benefit of early diagnosis is the potential for early intervention.

Speech Language Pathologists (SLPs) play a critical role in the provision of intervention services for preschool children with ASD. SLPs have the knowledge and clinical skills to plan and administer intervention for language, social communication, literacy, non-verbal and verbal communication. In addition to providing direct services, SLPs can also play a consultative role by educating and training caregivers in language-stimulation activities (CASLPA, 2006). Structured intervention programs with parental involvement have been shown to improve IQ, social-emotional ratings, social interactions and developmental skills in children with ASD, suggesting that such an approach may be

appropriate for language intervention as well (Jocelyn, Casiro, Beattie, Bow & Kneisz, 1998). In 2001, the National Research Council outlined the components of effective treatment for children with ASD, based on a systematic review of the current literature. The components included: early intervention, intensive programming, and inclusion of family members in intervention (CASLPA, 2006).

There are many challenges in providing early intensive language intervention for children with ASD, specifically wait times and availability of resources. A survey of Canadian SLPs in 2006 revealed that wait times for children with ASD, from the point of referral for assessment to the first intervention session, can be as long as two years. Furthermore, intensive educational programming, including language therapy, can be costly (CASLPA, 2006). The extensive wait times and large financial costs of providing intervention for children with ASD highlight the need for intervention programs that can provide efficacious treatment with concomitant preservation of financial resources and clinician time. Parent-based intervention programs may be one solution, but this suggestion needs to be closely evaluated in order to determine if consultative-therapy roles are warranted in the treatment of communication impairments for children with ASD.

Objectives

The primary objective of this paper is to critically evaluate the existing literature pertaining to the effects of parent-based intervention on communication outcomes for preschool children with ASD. The secondary objective is to provide evidence-based practice suggestions for future clinical work.

Methods

Search Strategy

Medline and Embase online databases were searched using the keywords: ((parent training) or (parent intervention) or (parent education) or

(caregiver training) or (caregiver intervention) or (caregiver education)) AND ((autism) or (autism spectrum disorder)) AND ((speech therapy) or (language intervention)). The search was limited to include only studies that looked at preschool-aged children. ComDisDOME and PsycINFO databases were searched using the keywords: ((parent intervention) or (parent education)) AND ((autism) or (autism spectrum disorders)). The reference lists of studies found in the databases were also searched for relevant articles.

Search Criteria

Studies selected for review included a parent-training component to intervention, outcome measurements for communication abilities, and investigation of these outcomes in preschool children with ASD.

Data Collection

The results of the literature search revealed the following study types: randomized control trial (3), controlled trial without randomization (2), multiple baseline study (1) and multiple case study design (1).

Results

Jocelyn, et al. (1998) used a randomized controlled trial design to evaluate an early intervention program for children with autism. An experimental group, consisting of 14 preschool children, was enrolled in a day-care program and treatment program which included caregiver education seminars. A control group, consisting of 19 children attended a day-care program only. Outcome measures included evaluation of the caregivers' knowledge of autism, family stress and arousal levels, client satisfaction and autistic symptomatology. Developmental and linguistic measures were assessed using the Early Intervention Developmental Profile and Preschool Developmental Profile. Data was analyzed using repeated measure ANOVA and least squares mean tests. Results revealed that the treatment group demonstrated significantly more language growth ($p=.008$) on post-treatment measures, than the control group.

The Aldred, Green and Adams (2004) study employed a randomized control design to assess differences between a control and treatment group as well as differences between children at different functional levels within those groups. The 14 children in the treatment group were enrolled in a treatment program which included parent workshops and parent-child training. The 14 participant control group received only routine educational and therapeutic care. Language outcome measures included the Autism Diagnostic Observation Schedule (ADOS), the

MacArthur Communicative Developmental Inventory (MCDI) and a video-coding procedure of parent-child interaction to assess child communication acts and joint attention. Other outcomes measures included the Vineland Adaptive Behaviour Scales (VABS) and a parental stress questionnaire. Post-treatment data were analyzed using ANOVAs. Results revealed significantly higher performance levels in the treatment group, compared to the control, on the expressive language section of the MCDI ($p<.001$), the social interaction section of the ADOS ($p=.01$), and in use of child communication acts ($p=.041$). These changes were seen across all levels of functioning. No significant between group differences were found in receptive language, shared attention or on the communication section of the ADOS.

The study conducted by Drew et al. (2002), investigated a parent-intervention program using a randomized control trial study design. The intervention program, received by 12 participants, focused on training parents to teach communication precursors. A control group of 12 participants received local services only. Outcome measures included MCDI and Autism Diagnostic Interview-Revised (ADI-R), used to assess expressive and receptive language and overall language respectively. Non-verbal IQ, symptom severity and parental stress were also measured. Upon follow-up, results were analyzed using an ANCOVA (with pre-treatment scores used as a covariate) and Fisher exact test. The MCDI results showed a non-significant trend towards higher levels of language comprehension for the treatment group ($p=.09$) and ADI-R scores indicated that a significantly higher number of children in the treatment group moved from being non-verbal to verbal ($p<.05$). However, there were no significant differences in expressive vocabulary, words produced or gestures produced.

Salt et al. (2002) used a controlled trial design to evaluate an early intervention program, attended by 12 children, that included individual therapy, parent-child sessions, and parent workshops in facilitative communication (Salt et al. 2001). A five participant wait-list control group received routine therapeutic care. Communication-related outcome measures included the Pre-Verbal Communication Schedule, VABS, MCDI and Early Social Communication Scale, used to assess verbal imitation, overall communication, vocabulary and non-verbal social communication respectively. The study also investigated behaviour, motor imitation, play skills and parental stress. Results were analyzed using a repeated measures multivariate ANOVA and revealed significant improvement for the treatment group, compared to the control group, on measures of verbal imitation ($p<.05$), joint attention ($p<.05$) and social interactions ($p<.05$). There was also a non-significant trend towards improved requesting

behaviours for the treatment group ($p < .06$). No differences were found between groups on the MCDI or the communication scale of the VABS.

In 2005, McConachie et al. evaluated the effectiveness of the 'More Than Words' program, developed by the Hanen Centre. The intervention program, received by 26 children, focused on teaching parents how to structure their environments and communication to facilitate language. A wait-list control group, consisting of 25 children, was allowed to receive other therapeutic services. Outcome measures used to assess parental change included questionnaires on stress and adaptation, and evaluation of parental communication strategies. Child outcome measures included the MCDI to assess vocabulary, the ADOS to measure social communication skills and a parental questionnaire regarding behavioural problems. Post-treatment results were analyzed using an ANCOVA, with pre-treatment scores, interval between assessments, behaviour and diagnosis used as covariates. Findings indicated that the treatment group had a significantly larger vocabulary ($p = .019$) compared to the control group following intervention. No significant differences were found in social communication.

Harris, Wolchik and Weitz (1981) used a multiple baseline design to investigate the effectiveness of parent-training for pre-speech and speech skills. The intervention program focused on teaching parents behaviour modification and speech facilitation techniques. The 11 participants were assessed twice before treatment, immediately after treatment as well as two, four, and 13 months after treatment. Assessments consisted of a three part behavioural assessment, including the administration of a 21-step language skill hierarchy. Repeated measures ANOVA, mixed ANOVA and Duncan multiple-range tests were used to analyze the results. Findings indicated that the participants achieved significantly higher levels on the language hierarchy during post-treatment assessment compared to pre-treatment assessments ($p < .05$), and that they had significantly more positive ratings ($p < .05$) on each level of the hierarchy following therapy. However, there were no significant differences between post-treatment measures, indicating that changes reached a plateau following removal of the program. Further analysis revealed that children who were verbal before treatment achieved significantly higher language levels ($p < .030$) and significantly more positive ratings on each level ($p < .04$) in post-treatment assessments compared to those who were non-verbal at baseline.

The Girolametto, Sussman & Weitzman (2007) study used a multiple case study design to evaluate the previously described 'More Than Words' program. Three participants were assessed on measures of parental interaction, vocabulary size, lexical diversity,

rate of child communicative acts, as well as engagement and initiation of social interaction. The MCDI, parental reports of progress, and coded videotapes of parent-child interactions were used as outcomes measures. Results were compared to a priori data, and demonstrated that all three children made gains in vocabulary size, rate of communication acts and social interaction sequences. Results for social initiation were mixed, with two children improving and one declining.

Discussion

When modifying clinical practices based on the results of current literature, it is important to critically evaluate the evidence presented.

Sample Size and Participant Selection

All of the studies, with exception of the McConachie et al. (2005) study, had a sample size of 35 or less participants; and none of the studies reported power calculations. These issues may affect the generalization of results to the larger population, as well as the ability of the studies to detect change.

Another concern was the lack of random selection and distribution of the subjects. The control trials conducted by Salt et al. (2002) and McConachie et al. (2005) used wait-list control groups rather than random group selection. An inherent problem with non-randomized distribution is the potential for baseline differences that could affect the results of the study. These types of comparisons also increase the risk of systematic bias. Similarly, the Girolametto et al. (2007) paper did not use randomized methods of selection of case study subjects, but rather chose participants based on the similarity of factors such as age and language abilities. This method of subject selection affects the generalizability of the study's results to the larger population.

The diagnostic criteria for ASD, was an area of concern for two of the studies. Harris et al. (1981) relied on parental report of an autism diagnosis, which resulted in the removal of a participant from the analysis as direct observation did not confirm the reported diagnosis. The McConachie et al. (2005) study did not require participants to have a confirmed ASD diagnosis, and therefore included several children with alternative diagnoses. The issues regarding clear and specific diagnostic criteria impact the validity of the studies, their ability to generalize findings to the larger ASD population and their ability to detect change.

A further area of consideration was the lack of data on parental characteristics. None of Drew et al. (2002), Salt et al. (2002), Jocelyn et al. (1998) or McConachie et al. (2005) reported levels of parental education, and although a general statement of

parental education was made in the Aldred et al. (2004) study, there was no comparison made between control and experimental groups. Since the outcomes of these studies relied on parental comprehension of material and implementation of techniques, level of parental education would likely impact the results of outcome measures. Furthermore, if the research participants had a higher level of education than that of the larger population, the ability to generalize findings would be affected. Similarly, neither Drew et al. (2002) nor Girolametto et al. (2007) reported measures of subject socioeconomic status; and although Aldred et al. (2004) reported general findings, no specific data was given and no comparison was made between control and experimental groups. McConachie et al. (2005) found that the socioeconomic status of their participants was significantly higher than that of the total recruitment population. These issues pertaining to socioeconomic status limit the ability to generalize findings to a larger population.

Methodology

Several of the studies (Aldred et al., 2004; Girolametto et al., 2007; McConachie et al., 2005) completed post-treatment measures immediately following intervention. Similarly, Drew et al. (2002) investigated the effectiveness of a six week treatment program with a pre/post assessment interval of 12 months, and Jocelyn et al (1998) did not specify the time interval between initial and follow-up assessments. These methods of assessment resulted in a limited ability to determine the immediate versus long-term effects of intervention. Lastly, the mean point of post-treatment measures in the Salt et al. (2002) study was approximately 10 months into an 11 month intervention program, likely reducing the power of the study to detect change.

A methodological weakness present in all the studies was the absence of a measurement of parental implementation of intervention strategies and adherence to treatment principles outside of treatment sessions. Without this information it is difficult to determine the amount of intervention received by each child, which will likely impact the ability to find differences in outcome measures.

Another common methodological weakness was the involvement of study participants in external treatment programs. Several studies (Girolametto et al., 2007; Harris et al., 1981; Jocelyn et al., 1998) did not measure the participants' involvement in external treatment, educational or social programs, and therefore were unable to determine potential effects of these programs on their results. Although Aldred et al. (2004) did measure involvement in external programs, they did not compare the rates of external intervention between groups, nor did they adjust for these findings upon analysis. McConachie et al. (2005) also

measured involvement in external therapy programs and compared these measures between groups; however they only included services received in the last three months of their seven month program in their analysis. Children in the control groups of the Aldred et al. (2004) and McConachie et al. (2005) studies were found to receive other forms of autism-specific interventions and parent-training respectively. These issues may limit the ability of the studies to detect changes in outcome measures and affect the validity of their results.

An issue that pertained to all control trial studies was the variability of treatment between control and experimental groups. In all of these studies the intervention groups spent more time with the clinicians and/or more time in the clinic setting compared to the control groups. Increased time spent in these setting may have had an effect on outcome measures, especially those collected through parent report, as participants that have consistent contact with therapists are more likely to experience and report change simply due to frequent clinician contact.

All studies, with the exception of Harris et al. (1981) and Jocelyn et al. (1998) used parental reports (e.g. MCDI, VABS) as language outcome measures. Use of parental reports to measure the effectiveness of parent-based intervention creates the potential for parental bias, due to the fact that parents enrolled in the intervention programs had a personal investment in therapy and may have felt responsible for their child's development during that period. Some studies (Aldred et al., 2004; Drew et al., 2002; Salt et al., 2002) used additional outcomes measures for language (e.g. ADI-R), however none of the measures were language-specific and therefore, their ability to detect smaller changes in language abilities is limited. Similarly, Jocelyn et al. (1998) relied solely on general developmental measures to assess language abilities, which limited the depth of analysis possible and their ability to report specific areas of language growth following intervention.

The methods of statistical analysis used by some of the studies also raised concerns about the strength of evidence provided. Aldred et al. (2004), Drew et al. (2002), Salt et al. (2002) and Harris et al. (1981) all used parametric tests, despite their small sample sizes. The use of parametric tests with small sample sizes can result in a greater chance of finding significant results. Furthermore, Harris et al. (1981) also used the Duncan multiple-range test, which is associated with an increased chance of Type 1 error (Duncan, 1955). Lastly, Girolametto et al. (2007) did not use a measure of statistical analysis and instead compared their results with a priori data from the studies conducted by Aldred et al. (2004) and McConachie et al. (2005). This method assumes the results from the other studies were conclusive and prevented the authors from

making any statements regarding the effect of intervention.

Lastly, none of the studies, with the exception of Drew et al. (2002), used an intention-to-treat approach throughout their studies. By omitting this analysis, the nature of the experimental and/or control groups can be altered, therefore biasing results, as individuals that drop-out or do not comply with studies may have different characteristics than those that do.

Recommendations

Research Recommendations

Current literature suggests that parent-based intervention programs, aimed at increasing communication abilities in preschool children with ASD, have a positive affect on communication abilities. However, the strength of the evidence provided is affected by several sample size, participant selection and methodology concerns. Furthermore, although all studies reported positive language outcomes, there was considerable variability in reported areas of growth (i.e. expressive, receptive, and social). The inconsistent findings may be due to empirical weaknesses and/or differences in treatment programs. In order to establish more definitive results, it is recommended that future research employ: more objective outcome measures, larger sample sizes, better measurements of parental compliance, comparisons between treatment programs, and longer follow-up times to determine long-term effects of intervention.

Clinical Recommendations

Based on the findings of this literature review the following clinical conclusions can be made:

- The evidence suggests that parent-based language intervention programs have a positive effect on the communication abilities of preschool children with ASD.
- Positive outcomes were found for a number of different program structures, suggesting that a variety of approaches to parent-based intervention may be effective.
- Due to empirical limitations, there is a need for ongoing monitoring of communication outcomes of preschool children with ASD when employing this type of collaborative therapeutic model.

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