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New directions in behavioral treatment of autism spectrum disorders

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List of peer-reviewed, social science journals searched:

- Journal of Autism and Developmental Disorders
- Focus on Autism and Other Developmental Disabilities
- Topics in Early Childhood Special Education
- Training in Mental Retardation and Developmental Disabilities
- Infant Behavior and Development
- Language Learning
- Social Development
- Journal of Communication Disorders
- European Child and Adolescent Psychiatry
- Clinical Neuropsychiatry: Journal of Treatment Evaluation
- Journal of Child Language
- Developmental Psychopathology
- Journal of Positive Behavior Interventions Developmental Disabilities Research Reviews
- Child Development
- Research in Developmental Disabilities
- Education and Treatment of Children
- American Journal of Community Psychology
- Journal of Special Education
- Journal of Early Intervention
- Young Exceptional Children
- Exceptional Child
- Journal on Research in Child Education
- Education and Training in Developmental Disabilities
- Early Childhood Education Journal
- Journal of Clinical Child and Adolescent Psychology
- Journal of Applied Behavior Analysis
- Journal of Counseling Psychology
- Journal of Educational Psychology
- Journal of Clinical Child Adolescent Psychology
- Journal of Clinical Psychiatry

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Abstract

Purpose of review—The review explores current trends in the behavioral intervention literature for children with an autism spectrum disorder (ASD) during 2008 and 2009. Noteworthy findings and intervention strategies are highlighted. Additionally, the quality of all reviewed studies is systematically evaluated.

Recent findings—During 2008 and 2009, there was nearly a quarter increase in the number of behavioral intervention studies, as well as more randomized controlled trials and approaches other than applied behavior analysis. Many of the studies investigated commonly used ASD intervention practices or novel treatments. A few were conducted with underserved populations, such as toddlers and adults with ASD. Social impairment was the focus of the largest number of intervention studies. A small percentage of studies were rated as high-quality.

Summary—Overall, the reviewed studies suggest that ASD-specific deficits can be improved through behavioral intervention. However, whereas progress continues to be made in our understanding of effective treatments for children with ASD, confidence in these findings would be improved with higher-quality studies.

Keywords

autism; behavior; intervention

Introduction

Although autism spectrum disorder (ASD) is a neurobiological disorder, behavioral interventions are currently the primary treatments for individuals with ASD. Compared to just a year ago, there has been nearly a quarter increase in the number of published behavioral intervention studies for individuals with ASD. This review explores current trends in behavioral intervention literature for children with ASD during 2008 and 2009.

Inclusion/exclusion criteria for studies

In this study we review behavioral intervention studies that were published between January 2008 and November 2009. We obtained the articles for our review by using the following search terms on the Psych Info and PubMed databases: autism and intervention; autism and treatment; autism and behavioral intervention; autism and social communication. We also manually searched through the 2008 and 2009 publications of 30 peer-reviewed social science journals. A list of these journals can be found in the Acknowledgements.

All children in the reviewed studies required an ASD diagnosis that did not coexist with other developmental disabilities, such as Down's syndrome, blindness, or attention deficit hyperactivity disorder. Our review focuses on behavioral interventions that targeted deficits characteristic of ASD [1]; consequently, studies focusing only on challenging behavior or academics were excluded. We also excluded review papers, books, book chapters,

theoretical papers, opinion papers, articles from journals that were not peer-reviewed, or articles not written in English.

Brief overview of studies

We obtained 68 studies from our search. A number of positive observations can be made regarding the studies published in this review period. First, single subject and case study designs have dominated past literature in behavioral intervention research. Recent studies include more randomized controlled trials and group designs. Additionally, more behavioral interventions than previous years are using approaches other than applied behavior analysis as well as intervention targets that focus on ASD-specific deficits. Another observation is that there are promising novel treatments that use the child's interests to improve ASD-specific deficits. These treatments involve interests such as Lego play, music, horseback riding, as well as computers. Finally, interventions that are widely used in practice are now receiving more rigorous research testing (e.g. social stories). Clearly, this review period witnessed several noteworthy improvements in experimental design, intervention focus, and breadth of intervention strategies

The studies in this review period varied in the designs utilized. The majority of studies were single-subject designs (50.0% or 34/68). Fourteen studies were randomized control trials (20.6%), 11 used a group design other than a randomized control trial (16.2%), and 9 were case studies (13.2%).

There were similarities in the targets of intervention. More than half of the articles focused on ameliorating social impairments (57.4% or 39/68). Sixteen studies targeted communication (23.5%), seven studies targeted restricted and repetitive behaviors as well as emotion (10.3%), and six studies were comprehensive interventions (8.88%). Below we will review the studies from each of these four areas.

Social impairment interventions

Given that social impairments are a core ASD deficit, it should come as no surprise that most reviewed studies targeted social skills. Researchers paid attention to core ASD difficulties in interpersonal relationships, used multiple techniques to teach children, and a few included others, such as peers and parents, in the child's treatment. As a result, in comparison to previous review periods, we are beginning to see improved social skill outcomes for children with ASD. In fact, the majority of reviewed studies reported improvements in nearly all targeted social skills.

The majority of these studies focused on children who were in elementary school or older [2–6,7*,8–15,16*,17–26]. These treatments were primarily conducted with children who had high-functioning autism (HFA) or Asperger's syndrome. There were similarities in the social skills that were taught: recognition of emotions and affect [7*,11,14,16*], conversation skills [4,7*,13,16*], theory of mind [4,7*], and bullying/teasing [13,16*]. Many interventions utilized a group format and reported improvements in these social skills as a result of the experimental intervention.

Some social impairment interventions were conducted with younger children. These studies focused on deficits of joint attention [27–29], imitation [30,31], scripted and unscripted social vocalizations [32], eye contact [33*], peer relationships [34–37], as well as emotional, motivational and interpersonal responsiveness [38]. Most studies were carried out in one-on-one interventions rather than groups. Interventions that targeted peer relationships were often carried out in dyads or small groups.

Whereas these studies note significant changes in children's social behavior, there are some noteworthy concerns with this class of research studies. In several studies, children seemed to have been 'trained' to produce specific operationalized behaviors that may not have truly reflected the targeted construct. That is, the form was taught, but the function may not have been. Contributing to this possibility is that generalization was rarely tested so it was often unclear whether the new skills taught in one context generalized to new environments, particularly to the child's natural environment of school. Another limitation of reviewed studies was the absence of inclusion and exclusion criteria regarding child participants (both typical and the child with ASD). It may be the case that not all children with ASD or their peers are the best candidates for a social skills intervention. Having more information on who may be most responsive to a social skill intervention could inform participant selection for future social skill treatments.

Communication and language interventions

Communication and language has also been a target of many behavioral interventions during this review period [39*,40–45,46*,47,48*,49,50*,51–53,54*,55,56]. The vast majority of communication and language interventions utilized a single-subject design and focused on the development of spoken communication. In terms of the studies regarding spoken communication, almost all utilized applied behavior analysis and reported improvements in spoken communication. Also, nearly all targeted skills were taught by first recruiting the child's attention. For example, in order to target word acquisition, Koegel *et al.* [50*] had children orient to an individualized cue, and then produce a word that was modeled by the interventionist.

The only communication and language study that employed a randomized controlled trial compared two social communication treatments to applied behavior analysis (ABA) intervention alone [39*]. Using a developmentally based behavioral intervention, one of the experimental interventions targeted initiation of joint attention and the other focused on symbolic play skills. Both experimental interventions resulted in better joint engagement between caregiver and child, as well as improved joint attention and play skills. Children in the ABA condition did not change significantly and made only minimal progress in language development over the follow-up period of 1 year. Interestingly, a subgroup of children who were minimally verbal (less than five functional words) made the greatest gains if they were randomized to the joint attention intervention. These data are among the first to find long-term changes in language abilities and also indicate a treatment by aptitude interaction for a communication intervention for children with autism.

Augmentative communication

The period of review also witnessed a number of studies investigating augmentative communication. These studies targeted requests or mands (usually for highly preferred items) and almost always reported treatment efficacy. What remains unclear from these studies is the extent to which improvement resulting from augmentative communication use generalizes to environments other than the one in which the augmentative communication is taught. Questions also exist regarding whether augmentative communication leads to improvement in other developmental abilities, such as the understanding and production of spoken communication.

Whereas there are limitations in the quantity and scope of these investigations, these studies should be applauded for attempting to target an underserved population – children who are minimally verbal, and/or who make slower gains in language development despite access to appropriate intervention services. Future studies will need to continue to develop novel interventions and test them specifically in this group of children who are minimally verbal if we are to achieve the goal set by the Autism Task Force for 90% of all children with ASD to become verbal [57].

Interventions targeting restricted and repetitive behaviors as well as emotion

Over the past 2 years, there were fewer interventions targeting restricted and repetitive behaviors [58] and more focusing on aspects of emotions. Whereas some interventions included teaching emotional knowledge within social skills curricula, others targeted anxiety and emotion regulation.

Anxiety

Several recent studies have adapted traditional cognitive behavior treatment (CBT) for use with populations who have HFA or Asperger's syndrome. Three research groups examined the application of CBT to populations with ASD. These research teams found that CBT can significantly reduce anxiety symptoms, particularly as reported by parents [59–61,62*,63*].

One notable randomized controlled study by Wood and colleagues [62*] used a modular CBT approach with children who had ASD and high anxiety. Wood and colleagues reported that nearly 80% of the children in treatment made significant improvement as reported by a clinical global impressions scale and that 65% no longer met criteria for an anxiety disorder. The data from this study are especially promising in suggesting that decreases in anxiety after intervention may result in changes in the social symptoms characteristic of ASD.

Given the high anxiety that adolescents and adults with ASD experience, it is important to determine if CBT interventions are as effective for older populations. White and colleagues [61] reported pilot data that their CBT and social skills intervention was able to significantly reduce anxiety for three of four adolescents with ASD.

Emotion regulation

A relatively new focus of ASD research is emotion regulation. Emotion regulation, particularly early in development, may have implications for reducing the presence of later anxiety-related disorders. One study during this review period focused on treatment-induced changes in the emotion regulation abilities of toddlers with autism [64]. In this study, a randomized wait-list design of a parent-mediated intervention on joint engagement was employed. Over the course of an 8-week, 24-session intervention, child negativity decreased and maternal strategies that supported children's development of effective emotion regulation strategies increased. Interventions that focus on the development of emotion and behavior regulation strategies of young children appear to be a promising direction of future research.

Comprehensive interventions

The review period has also seen an increase in the number of comprehensive intervention evaluations [65–69,70*]. Comprehensive interventions are treatments that target all areas of the child's development. All reviewed comprehensive treatment studies focused on young children, except one with school-aged children. Almost every study reported using methods that relied on ABA, and most studies were conducted at centers. Treatments typically consisted of short play sessions, discrete trial training, and/or functional communication training.

One noteworthy comprehensive study used ABA principles, developmental strategies and parent involvement [70*]. This study was one of the first methodologically rigorous randomized controlled trials of a comprehensive intervention for toddlers. Data from this study suggest that very young children with ASD may achieve higher cognitive scores, higher adaptive scores, and better autism diagnoses through a comprehensive intervention that includes developmental strategies and family involvement.

Although studies reported improvement, there continue to be some of the same limitations as noted in previous reviews [71]. For example, the studies often failed to control for dose, both in length of treatment and density of sessions. Just two were a randomized controlled trial [69,70*]. Also, nearly all comprehensive treatment studies reported a minimum dose of 20 h per week; however, it is not clear whether the 20 h were that similar in approach and content because only a few studies used a treatment manual. Additionally, it is difficult to compare treatments that vary so drastically in terms of agent (parent or therapist mediated) and mode of delivery (1:1, group, home or clinic).

Despite these limitations, some interesting findings emerge. Children with less impaired cognition and/or language ability are reported to make significant IQ gains – up to 20 points over the course of approximately a year. This is consistent with previously published reports of children engaged in comprehensive interventions [72]. Another finding is that the following factors may decrease the efficacy of a comprehensive treatment at improving cognition and/or adaptive performance: treatments of shorter durations, treatments that are less intense (such as ones focused on training parents about behaviors) and children with more impaired cognition and/or language ability. These distinctions highlight the need to

more closely monitor the moderators of treatment outcomes (e.g. children's pretreatment characteristics) as well as to better understand dose and content-related differences.

An essential question concerns the match between intervention focus and outcome variable. Despite differences in treatment content, IQ was a major outcome for all studies. Using IQ as a primary outcome may be problematic because it is not clear whether reported changes in IQ result from true improvements in cognitive skills or simply better test-taking ability. Therefore, other aspects of cognition will be important to assess in future studies. Additionally, it will be important for future studies to target those behaviors that are core to an ASD diagnosis, such as language ability, social skills, and nonverbal communication (e.g. joint attention) [73,74].

A relatively new trend is the addition of parent training to comprehensive treatments. Incorporating parent training into comprehensive treatments may help with the maintenance and generalization of targeted skills. Including parents in comprehensive interventions could also be a way to increase the density of treatment.

Quality ratings of intervention studies

We evaluated the quality of the articles in this review using the Evaluative Method for Determining Evidence-Based Practices (EBP) in Autism by Reichow *et al.* [75].

This instrument has been used in other reviews of behavioral interventions for young children with autism [76,77]. The instrument categorizes behavioral intervention studies as strong, adequate, or weak based upon whether the study satisfies a specified number of quality indicators. Examples of quality indicators include detail regarding participant characteristics, the experimental intervention, as well as the dependent variables.

The Evaluative Method for Determining EBP in Autism demonstrates high concurrent validity, content validity, and face validity. In previously published studies, inter-rater agreement has ranged from 84.4 to 100% and kappa has ranged between 0.65 and 1.00. The second author rated each article using the instrument and a research assistant familiar with behavioral intervention research rated 30% of the articles. Percentage agreement was good (85.7%).

The majority of studies were rated as adequate or weak. Nineteen percent of the articles using a group or a prepost design were classified as strong (5/26), 46.2% (12/26) were classified as adequate, and 34.6% (9/26) were classified as weak. In regards to the single subject or case review studies, 14.3% (6/42) were rated as strong, 54.8% were rated as adequate (23/42), and 40.0% (13/42) were rated as weak. The articles categorized as strong are noted in the reference section.

The studies showed common areas of strength and weakness. Most studies received a high-quality rating for their detailed description of the experimental treatment and dependent variable. The majority of studies using a group or prepost design did not conduct treatment fidelity, assess generalization and/or maintenance, or report effect sizes. Most single-subject or case studies did not conduct kappa or have blind raters.

Conclusion

Although we have made much progress in intervention research during the review period, we still have a distance to go. We have only begun to address the multiple priorities in the autism research matrix including randomized controlled trials of intervention, isolation of active ingredients, identification of mediators and moderators, and treatment of core deficits [57]. Additionally, we are still in need of more studies with high methodological rigor. Continued research on behavioral interventions is critical so that one day we can more effectively match treatments to the unique characteristics of the individual with ASD.

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References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

* of special interest

** of outstanding interest

Additional references related to this topic can also be found in the Current World Literature section in this issue (pp. 000–000).

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