

Behavioral interventions in children and adolescents with autism spectrum disorder: a review of recent findings

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Purpose of review

The study provides an overview of recent studies on behavioral interventions for children and adolescents with autism spectrum disorder (ASD).

Recent findings

Recent reviews of the effectiveness of early intensive behavioral intervention (EIBI) conclude that EIBI can improve language and cognitive skills. The first randomized controlled trial (RCT) of a comprehensive early intervention for toddlers with ASD demonstrated gains in language, cognitive abilities, and adaptive behavior. Targeted, brief behavioral interventions are efficacious for improving social communication in young children with ASD. Parents can be taught to deliver behavioral interventions, which are associated with improvements in parent–child interaction; effects on child outcome, however, have been mixed. Several studies show that social skills interventions are efficacious for improving peer relationships and social competence. Behavioral interventions are also effective for reducing anxiety symptoms and aggression. Medication combined with behavioral intervention was found to be more effective for reducing aggression than medication alone.

Summary

Behavioral interventions are effective for improving language, cognitive abilities, adaptive behavior, and social skills, and reducing anxiety and aggression. Medication combined with behavioral intervention appears to be more effective for reducing aggressive behavior than medication alone.

Keywords

aggression, anxiety, autism, behavioral interventions, parent-mediated interventions, social skills training

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Introduction

Autism spectrum disorder (ASD) is a highly prevalent neurodevelopmental disorder that affects one in 110 children in the United States, and the American Academy of Pediatrics has recommended that all children be screened for ASD at their 18 and 24-month well baby check-up [1]. Thus, the need for effective treatments for ASD has never been greater. There are no well validated medical interventions that address the core triad of autism symptoms, which include qualitative impairments in social interaction and communication and a restricted range of behaviors and activities. Behavioral interventions, however, can be effective for improving outcomes of children with ASD [2]. This review provides an update on studies of behavioral interventions that have been published in scientific journals since January 2010. The purpose is to provide the practitioner with up-to-date information on behavioral interventions for children with ASD so that appropriate recommendations and referrals can be made for families when such children are

identified in clinical practice. Vismara and Rogers [3**] recently summarized the extensive research literature on behavioral interventions for children with ASD and concluded that both comprehensive and targeted behavioral interventions can be effective in improving communication, social skills, and management of problem behavior for children with ASD. There is new interest in developing interventions for infants at risk for ASD. Although these interventions are still in development, infant interventions have been effective in improving outcomes for other at risk populations [4]. Such interventions are typically parent-delivered, individualized to an infant's developmental level and specific needs, and focus on a broad range of learning targets, including promoting cognitive, communicative, and social development. Several studies testing the efficacy of infant–toddler interventions are underway.

This brief review focuses on new research on five types of behavioral intervention: early intensive comprehensive interventions are typically provided for at least 2 years at

an intensity of 25–40 h per week, include opportunities for working one-on-one with a therapist, and address a broad range of skills including cognitive, language, adaptive behavior, and motor skills; targeted interventions focus on improving one or two core symptom domains, such as social engagement and imitation, can be adjunctive to other interventions, and usually are completed within several months; parent-mediated interventions involve teaching parents to use therapeutic strategies, usually in the context of normal daily routines, in order to enhance generalization of skills, efficiency of delivery, and increased self-efficacy for parents; social skills interventions for elementary school-aged and adolescent children are most often delivered in a small to medium group setting and teach social skills that are used at school, home, and community, with a strong emphasis on peer relationships; and behavioral interventions addressing anxiety and aggressive behavior include both cognitive behavioral therapies and applied behavior analytic methods, such as functional behavior analysis, to reduce these common comorbid symptoms in children and adults with ASDs.

Early intensive comprehensive intervention

A systematic review of early intensive behavioral intervention (EIBI) studies published from 2000 to 2010 was conducted to evaluate the strength of the empirical evidence supporting EIBI [5**]. Of the 34 studies reviewed, one study [6*] was rated good quality, 10 were rated fair, and 23 were rated poor quality. The authors note studies based on two methods – University of California Los Angeles/Lovaas method and the Early Start Denver Model (ESDM), a comprehensive developmental intervention approach that incorporates applied behavioral analysis (ABA) principles – report clinically significant gains in language and cognitive skills. No study has compared the efficacy of these two intervention models, and there are few data to inform what approach might work better for which children. The authors of this review also suggest that less intensive parent training interventions may be useful for younger children with ASD for improving social communication and language use, and possibly reducing symptom severity, but the current research evidence is still limited.

The first randomized controlled trial (RCT) of a comprehensive developmental behavioral intervention for toddlers with ASD, the ESDM, was published in 2010 [6*]. Young children (mean age of 22 months) with ASD were randomly assigned to the ESDM intervention, a comprehensive early behavioral intervention that integrates ABA with developmental and relationship-based approaches, or to intervention available in the community. After 2 years of intense 20 h per week

Key points

- Early intensive behavioral intervention can result in significant gains in language and cognitive abilities.
- Targeted, brief behavioral interventions can improve social communication in young children with autism spectrum disorder (ASD).
- Parent-mediated interventions have been shown to improve parent–child relationships, but effects on child outcome are mixed.
- Social skills interventions can enhance peer relationships and social competence in school-aged and adolescent children with ASD.
- Behavioral interventions are effective for reducing anxiety symptoms and aggressive behavior.

intervention, including parent-delivered intervention, the ESDM group showed significant gains in IQ points (17.6 point gain compared with 7.0 points in the comparison group), language abilities, and adaptive functioning compared with the community-intervention group. Overall, the results of the study suggest that the ESDM is an efficacious treatment but replication and follow-up studies are needed.

A second study assessed the effectiveness of the Nova Scotia early intensive behavior intervention model (NS EIBI) for children with ASD in a community setting [7]. The model combines parent training and naturalistic behavioral intervention (pivotal response training) and was developed to address the core deficits in socialization and communication. Preschool-aged children with ASD younger than 6 years of age were randomly selected to receive one-to-one provider implemented intervention for up to 15 h per week for 12 months. Results indicate that children receiving this treatment showed improvements in language and communication skills, cognitive ability (mean IQ gain of 16 points), and adaptive behavior, and reductions in problem behavior and autism symptoms. This study suggests that significant improvements in functioning are possible within a year of treatment in a community-delivered model.

Targeted early behavioral interventions

In addition to comprehensive treatments, other behavioral interventions are designed to target specific symptoms. Recent studies suggest that relatively brief targeted interventions can significantly improve autism symptoms in young children and toddlers with ASD [8*,9]. Landa *et al.* [8*] conducted a RCT with toddlers with ASD in which both groups received similarly intensive, developmentally based interventions, and one group received a supplementary curriculum targeting socially engaged

imitation, joint attention, and affect sharing. Both groups made significant gains in expressive language and non-verbal functioning. Improvements in self-initiated social engaged imitation were only found for the group using the social engagement curriculum. In addition, a twofold increase in socially engaged imitation integrated with socially directed gaze was found for this group. Results suggested that a specific active ingredient, social engaged imitation, mediated the improved outcome within the 6-month study period.

Another RCT evaluated a similar, naturalistic intervention, reciprocal imitation training, in young children with ASD [9]. This intervention is designed to enhance children's motivation to engage with and imitate others. Children in the treatment groups showed increased spontaneous and elicited imitation skills. The number of spontaneous play actions at pretreatment was associated with improved imitation ability, suggesting spontaneous play may predict response to treatment.

Parent-mediated early interventions

Several intervention approaches focus on teaching parents interventions that can be used in the home and community settings. Parent-delivered interventions can enhance generalization of skills, efficiency of delivery, and increased self-efficacy for parents. In the past year, four parent-mediated randomized controlled studies [10*,11–13] and one multiple baseline study [14] were conducted with mixed results. Studies varied in terms of dosage of treatment, target of treatment (e.g. single versus multiple domains of development), and type of treatment strategy used.

Kasari *et al.* [10*] evaluated a parent-mediated 8-week intervention focused on joint attention abilities. Joint attention, which is considered a core deficit in young children with ASD, refers to the process of sharing one's experience of an event or object by following another's gaze, pointing, or showing. Higher quality of caregiver involvement, as rated by the interventionist, predicted greater child joint engagement and less child object-only focused engagement. Another study found that parental synchrony partially mediated the positive treatment effect (e.g. significant increases in child social-communication and language skills) [15]. Similarly, in a multiple baseline study, as parents' ability to implement pivotal response training techniques improved, children's communication skills also increased [14]. However, given the small sample sizes, these findings will need further replications with larger and more diverse samples.

In contrast to the positive effects found in these studies, three RCTs did not find that the parent-mediated interventions improved child outcome [11–13]. Carter *et al.*

[12] conducted an RCT of *Hanen's More than Words* intervention with toddlers with autism symptoms and found no effect on child outcome after 5 months of treatment. Similarly, an RCT of another parent-mediated intervention with older preschoolers with ASD failed to find parent training treatment effects above the comparison treatment as usual group [13]. A third study of a parent-mediated intervention focused on increasing communication in toddlers with ASD did not find an effect on ASD symptoms [11]. However, parent-child interactions did improve in the treatment group. Future studies will need to determine if these types of positive changes in parent-child interaction patterns will sustain over time, generalize to noncaregivers, and relate to long-term child outcomes as well as for the parents themselves.

Overall, these studies reveal that parents are able to successfully learn and implement intervention techniques. However, it is still uncertain if parent-mediated treatment is the most efficient delivery method, given that some of these studies failed to find treatment effects. Reasons for these null results include the possibility of low intensity of the treatment, inadequate statistical power, and high quality of interventions often provided to the 'treatment as usual' group. It is possible that providing early parent-mediated intervention before more intensive, comprehensive behavioral treatment can boost the intervention response, causing beneficial cascading effects in child outcome. This is a relatively new area of research in which future research will need to address these questions.

Social skills interventions for elementary school age and adolescent children with autism spectrum disorder

A recent review of studies published in the past 5 years summarized the evidence for efficacy of social skills interventions [16**]. It was concluded that group-based social skills training for school-aged children with ASD was effective for improving peer relationships. In the past year, four RCTs evaluating the efficacy of social skills interventions were published. One study examined the efficacy of adding a social skills program specifically designed for high functioning children to treatment as usual [17]. Children receiving the added social skills program showed higher mastery of social skill concepts and their parents reported increased social competence as well. An RCT of a parent-assisted treatment for elementary-aged students with ASD also found that children who received the treatment showed higher levels of self-control, decreased conflict on play dates, and decreased internalizing and externalizing symptoms. Children who received the intervention reported improved perceptions of popularity and decreased loneliness [18*]. The study had

the largest sample size to date in a social skills intervention ($N=68$ randomized) and shows promising results for direct intervention for friendship problems and loneliness in elementary children with ASD. A third RCT targeted multiple domains including the development of social skills, interest expansion, face-emotion recognition, and interpretation of nonliteral language [19]. This comprehensive treatment grouped children by age (7–8-year-olds, 9–10-year-olds, and 11–12-year-olds) and included parents in weekly parent training groups to promote generalization of skills to the home environment and other settings. Strengths of this study included utilization of direct child measures as well as parent rating measures for both groups, intensive and integrated treatment, and a manualized program that targeted core ASD symptoms and individualized child needs. Compared with a wait list control group, children receiving this intervention showed improved knowledge of social skills and parents reported lower levels of ASD symptoms and withdrawal behaviors and higher levels of social skills. The fourth RCT demonstrated efficacy of an intervention using peer mentors, based on parent report [20]. Methodological strengths include use of a manual, assessments of fidelity, and characterization of the children pretreatment.

A preliminary study of a social competence intervention for adolescents with ASD using cognitive behavioral principles showed improvement in social skills, executive functioning, facial expression recognition, theory of mind, and problem solving [21]. The program taught skills in a structured and naturalistic environment that includes teacher instruction, skill modeling and opportunities to practice activities, and parent education in an effort to promote generalization and maintenance. The results suggest that this comprehensive program in a clinical setting leads to improvements in multiple domains. A follow-up of this study modified the intervention for school-aged children with ASD and found similar results [22].

Behavioral interventions addressing anxiety and aggressive behavior

Anxiety symptoms are relatively common in children and adolescents with ASD and are often cited by parents as one of the most distressing symptoms. Reviews of behavior interventions designed to reduce anxiety symptoms in children and adolescents with ASD indicate that cognitive behavioral therapy combined with social skills instruction may be most effective for treating high functioning individuals, whereas systematic desensitization is more effective for individuals with ASD who have intellectual disability [23^{••},24]. Research also suggests that teaching social skills, incorporating visual aids and family involvement, rewarding treatment compliance, and using

the child's reinforcing interests may improve the effectiveness [24]. A recent study of a cognitive behavioral intervention aimed at reducing anxiety and improving social competence in adolescents with ASD demonstrated that the children were able to adhere to the treatment [25].

Behavioral interventions have long been used to decrease aggression and other challenging behavior. A comprehensive review of intervention studies using applied behavior analysis reported that all evaluated studies reported a decrease in aggression [26^{••}]. One of the main elements contributing to efficacy was the inclusion of a functional behavior assessment and teaching alternate appropriate behavior to replace the aggressive behavior. The RCT to examine behavioral treatment in conjunction with medication found that intense behavioral treatment combined with antipsychotic medication was the most effective for reducing aggressive behaviors in children with ASD, whereas mood-stabilizing and nonstimulant attention deficit hyperactivity disorder/sleep medications did not help reduce aggressive behaviors [27[•]]. Moderators of outcome include functioning level of the child, such that older, nonverbal children tended to require a longer intervention period to maintain sustained treatment effects.

Conclusion

Behavioral interventions can be effective for improving a wide range of skills, including cognitive and language abilities, adaptive behavior, and social skills, and for reducing anxiety symptoms and aggressive behavior. It is encouraging that recent studies tend to be more rigorously designed, include manuals, measure fidelity of implementation, and have more objective outcome measures. Most RCTs now include comparison groups that control for nonspecific factors such as amount of therapy hours. Future work should focus on defining the key active ingredients, comparing different treatment options, and elucidating predictors of response to treatments. Studies that include longer-term follow-up and determine what is needed to maintain positive effects are also needed. Finally, dissemination research aimed at identifying cost-effective, exportable, and scalable methods for training professionals and parents in the use of effective behavioral interventions will be crucial for meeting the needs of children and adolescents with autism spectrum disorder.

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Conflicts of interest

G.D. is a co-author of *Early Start Denver Model for Young Children with Autism* (2009), Guilford Press, New York, from which she receives royalties.

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. 702–703).

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