



# Behavioral Interventions for Autism Spectrum Disorder: A Brief Review and Guidelines With a Specific Focus on Applied Behavior Analysis

Kyong-Mee Chung, Eunsun Chung, and Hoomyung Lee

Department of Psychology, College of Arts and Science, Yonsei University, Seoul, Korea

We conducted a comprehensive review of behavioral and educational interventions for individuals with autism spectrum disorder (ASD). The most prominent type of intervention, Comprehensive Early Intervention, often referred to as Early Intensive Behavioral Intervention (EIBI), has been found to be particularly effective in improving intelligence and adaptive behaviors. The naturalistic developmental behavioral intervention, designed to enhance social and communication abilities, showed effectiveness in improving language, cognitive function, and social initiation. However, more studies are needed to examine its effectiveness. Intensive individualized intervention, which provides a tailored intervention for a specific target behavior, was effective in improving social skills and communication, as well as reducing sleep, eating, and toileting problems. Cognitive behavioral therapy (CBT) is the most effective method for dealing with emotional difficulties, but it has not been widely used because of the shortage of trained experts. Parent-mediated intervention (PMI) involves parents acquiring knowledge and specific skills to improve their child's functioning or reduce challenging behaviors. Speech and language therapy, sensory integration, Treatment and Education of Autistic and related Communications Handicapped Children, developmental approaches, and social stories are frequently used interventions. However, evidence of their effectiveness has yet to be well established. Based on these findings, intervention recommendations for autism include EIBI, Early Start Denver Model, intensive individualized intervention, CBT, and PMI. The choice of intervention should be tailored to the individual's needs and delivered by qualified professionals with expertise in the specific intervention.

**Keywords:** Autism spectrum disorder; Early Intensive Behavioral Intervention; Naturalistic developmental behavioral intervention; Parent-mediated intervention; Comprehensive treatment model; Focused intervention.

**Received:** March 21, 2023 / **Revised:** July 21, 2023 / **Accepted:** December 3, 2023

**Address for correspondence:** Eunsun Chung, Department of Psychology, College of Arts and Science, Yonsei University, 50 Yonsei-ro, Seodaemun-gu, Seoul 03722, Korea

Tel: +82-2-2123-4886, E-mail: eun930320@gmail.com

## INTRODUCTION

Intervention approaches for individuals with autism spectrum disorder (ASD) encompass educational practices, developmental perspectives, and behavioral strategies [1]. Among these, applied behavior analysis (ABA) is recognized as the most extensively utilized and proven effective method for addressing the behavioral and educational needs of individuals with ASD. ABA is a scientific and systematic approach rooted in learning theory, best represented by operant conditioning [2] and classical conditioning [3] to induce behavioral changes in individuals diagnosed with ASD [4]. The term ABA came in the early 50s when learning theory was applied as a treatment strategy to change behaviors in persons with developmental disabilities [5]. New terms such as behavior

intervention, behavior modification, behavior therapy, and behavior treatment were introduced in the early 70s, when learning theory was applied as a treatment method for changing behaviors of other clinical populations, including children with diverse behavior problems and persons with physical illness (e.g., diabetes, asthma, obesity, and so forth) [6]. Although these terms differ slightly, they are often used interchangeably, which can lead to confusion.

Numerous studies have established the efficacy of ABA in enhancing cognitive function, language skills, intelligence quotient (IQ), and social abilities in individuals with ASD [7,8]. Federal, state, and national organizations in the US and UK consistently recommend ABA-based interventions as the first choice of assessment and treatment guidelines for ASD. These organizations include the US Center for Disease Control [9], Australian Center for Disease Control [10], division 53 of the American Psychological Association (Society of Child and Adolescent Clinical Psychology) [11], American

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Academy of Child and Adolescent Psychiatry [1], as well as the states of NY [12], WA [13], and Maine [14]. In this study, our primary focus was on treatments with a strong recommendation, categorized according to the strictest evidence-based treatment criteria. Additionally, we introduce treatments that are widely used in clinical practice but need more accumulated evidence.

## COMPREHENSIVE TREATMENT MODEL

The comprehensive treatment model (CTM) involves intensive training in various developmental areas, including language, cognitive function, social interaction, communication, and self-help skills. This training is based on behavioral principles and is typically started soon after the diagnosis of autism [7,8]. Early intervention, ideally before the age of 3 years, is recommended soon after the diagnosis. It is conducted in a one-on-one format for a few hours daily for an average of 2–4 years.

Early Intensive Behavioral Intervention (EIBI) [15] was designed to teach specific skills in language, cognitive function, self-help, social interaction, and motor skills using discrete trial training (DTT), which follows the principles of ABA. This service is provided by a team of professional therapists and implemented face-to-face with the child in a structured environment for a few hours per day for a few years, and active parental participation is required.

Six review studies that tested the effectiveness of EIBI reported significant improvements in IQ and adaptive behaviors consistently 12 months after EIBI [16-21]. Some studies have also reported positive changes in other developmental areas. For instance, Reichow and Wolery [19] reported that the EIBI group showed additional improvements in receptive and expressive language compared to the treatment-as-usual (TAU) group. Reichow et al. [20] analyzed the effect sizes (Hedge's  $g$ ) for each area. The results showed the average of medium to large effect sizes (language [ $g=0.50-0.57$ ], daily communication [ $g=0.74$ ], social interaction [ $g=0.42$ ], and self-help skills [ $g=0.55$ ]) in the EIBI group compared to TAU group.

Recently, a few studies have explored factors affecting the effectiveness of EIBI. Caron et al. [22] found that treatment dosage (the amount of time spent on therapy) and adherence (compliance with the treatment program's contents and procedures) were positively correlated with treatment effectiveness. Based on these findings, they recommended administering EIBI for 25–40+ hours per week for 12–24 months. Zwaigenbaum et al. [23] emphasized the importance of early intervention, reporting that interventions started before the age of 3 had more positive effects than those started af-

ter the age of 5, especially when parental and family involvement was high.

However, two recent reviews reported no significant changes in symptom severity after intervention [24,25] and limited long-term effects [25], questioning the effectiveness of EIBI. Careful interpretation is needed because most studies included in the two reviews used quasi-experimental designs (e.g., clinical controlled trial) rather than randomized controlled trials (RCTs), and their sample sizes were small. Further studies are needed to establish the effectiveness of EIBI.

Recently, another line of intervention called naturalistic developmental behavioral intervention (NDBI) [26] was introduced, which combines behavioral principles with a developmental approach that emphasizes social ability and learning in a natural context. NDBI, along with EIBI, is effective in young children with ASD. The Early Start Denver Model (ESDM) [27] is a prominent example that has been extensively investigated. Compared with traditional EIBI, ESDM focuses on improving the social development and communication skills of children with ASD by facilitating their social interaction with their caregivers in daily living settings [28]. Although limited, a few review studies have reported the positive effects of ESDM on improving children's social communication, language, and adaptive behaviors. For example, Waddington et al. [29] reviewed 15 ESDM studies, and the results showed improvements in language, imitation skills, and social communication after 3 to 12 months of ESDM intervention. Fuller et al. [30] conducted a meta-analysis of 12 ESDM outcome studies (6 RCTs and 6 quasi-experimental designs). The average effect size of ESDM (Hedge's  $g$ ) was 0.357 ( $p=0.024$ ) across diverse developmental areas, which is a medium effect size, indicating moderate improvements. Among these, cognitive function ( $g=0.412$ ) and language ( $g=0.408$ ) showed significant improvements [30]. In addition to the ESDM, other models have gained attention and demonstrated similar effectiveness. These include Joint Attention, Symbolic Play, Engagement and Regulation (JASPER) [31], Early Social Interaction [32], and Pivotal Response Treatment [33].

In Korea, treatment outcome studies on EIBI and NDBIs are rare. One study [34] examined the effectiveness of 6 months of EIBI in 19 children aged 2–5 years in an EIBI center using a one-group pre- and post-test design. The study showed significant improvements in the developmental scores of the children, along with improved parental quality of life. However, it is difficult to generalize the effectiveness of the EIBI in Korea because the study lacked a comparison group and had a small sample size.

## FOCUSED INTERVENTIONS

In the focused intervention, therapists provide tailored interventions to individuals of all age groups in areas where deficits are reported, such as social skills, social communication, sleep, feeding, toilet training, and emotion regulation (e.g., anxiety, anger, and so forth). The main approach is behavioral intervention, which is typically conducted for a relatively short period with the goal of improving a specific target behavior. In this study, we reviewed effective interventions for the core symptoms of ASD, such as social skills and communication, as well as combined symptoms, including sleep, eating problems, toilet training, and emotional difficulties.

## CORE SYMPTOMS

### Social skills

Social skills training (SST) is the most widely researched intervention aimed at improving social skills, a core symptom of ASD. It is usually delivered face-to-face by experts in specialized institutions or teachers and peers in schools under the supervision of experts [35]. In SST, which is typically conducted in 8–13 sessions over 6–12 weeks, specific social skills such as greetings, initiating and responding to conversations, giving compliments, sharing, and matching facial expressions are taught through repetitive practice [36,37].

Some studies have reported limited effects of SST on improving social skills [35,36,38]. However, rigorous RCTs have recently shown promising results. Two meta-analyses found that the intervention group showed a medium (Hege's  $g=0.51$ ) [39] to large effect size (Hege's  $g=0.81$ ) [40] in improvement in social skills and social responsiveness compared to the non-intervention group.

SST has been demonstrated to improve social skills effectively in individuals of all ages, including infants (0–5 years old), children (6–14 years old), and adolescents/adults (15–22 years old) [41]. Especially for children aged three years, a social skills intervention model named JASPER has been introduced, and its effectiveness has accumulated [42,43]. JASPER aims to improve joint attention and teach play skills. A review of 19 studies on the efficacy of JASPER by Waddington et al. [44] found that those who received JASPER training showed significant improvements in at least one area, such as joint attention, joint engagement, playing skills, and language, compared with the control group. However, despite its effectiveness, the JASPER is not easy to access in Korea because of the lack of manuals or guidelines.

### Social communication

Augmentative and alternative communication (AAC) is

often used to enhance communication skills in individuals with ASD. It involves teaching the use of alternative communication methods, such as visual cues (signs, symbols, pictures, and so forth), sign language, and communication aids [45].

The picture exchange communication system (PECS) is the most widely used AAC intervention, which teaches individuals to use pictures to communicate their needs (e.g., request items and name objects). The PECS follows six steps for each communication skill using various ABA strategies, such as shaping, differential reinforcement, and stimulus control [46]. Two review studies, which included 27 and 15 studies, respectively, found that PECS was effective in enhancing communication, such as initiating conversations and making demands [47,48]. Additionally, the PECS has shown particular effectiveness for children aged 0–5 years (toddlers to preschool) and 6–14 years (school-age) [41]. However, a meta-analysis of 11 studies found that the PECS had small to medium effect sizes in improving overall speech abilities [49]. Additionally, few studies have reported the spontaneous development of verbal speech during PECS training. However, further evidence is required [46].

## COMBINED SYMPTOMS

### Sleep

Individuals with autism and their parents frequently report sleep problems as a comorbid symptom. A recent review found that behavioral interventions increased sleep time and sleep efficiency, as well as a decrease in sleep latency, compared to the control group [50,51]. Another review that analyzed behavioral interventions for sleep problems found that different techniques were recommended depending on the specific sleep problem [52]. For instance, a faded bedtime<sup>1)</sup> is effective in initiating and maintaining sleep, whereas extinction<sup>2)</sup> and scheduled awakening<sup>3)</sup> are effective during night-waking and night terror attacks, respectively. In terms of age, faded bedtime was applied to children aged 5–9 years, and the extinction technique was applied to children aged 2–12 years, both of which were effective [52]. Sleep hygiene and behavior interventions for improving sleep habits, such as bedtime routines and sleep schedules, are not sufficient but necessary components of most behavioral sleep interventions [52,53].

1) Bedtime fading is a technique that involves temporarily adjusting a child's bedtime to coincide with their natural sleep onset time. This helps ensure that the child falls asleep quickly. Over time, the bedtime is gradually moved to the targeted sleep onset time. Various behavioral techniques can be used during this process to facilitate sleeping.

2) Standard extinction involves parents ignoring all disruptions that occur during bedtime. This means that the parent puts the child to bed and does not interact with them until the morning.

3) Parents wake up their child approximately 15 minutes before the usual time that the child experiences spontaneous night wakings.

### Eating problem

Approximately 50% of individuals diagnosed with autism report eating problems, such as food refusal or food selectivity. Similar to sleep, behavioral interventions based on ABA are effective in addressing these eating problems. A meta-analysis of 23 intervention studies [54] reported an increase in food intake when contingent reinforcement (CR)<sup>4</sup> and non-removal of the spoon (NRS)<sup>5</sup> were used in combination (improvement rate difference [IRD]=0.69) in children with ASD under 6 years. However, a small effect size was reported for the reduction of mealtime problem behaviors, such as tantrums (IRD=0.39). For severe food selectivity and related mealtime problem behaviors, a treatment package that includes both antecedent manipulation (such as stimulus fading) and consequence-based procedures (such as NRS and differential reinforcement) has been reported to be effective [55].

While experts typically lead interventions, there are reports that active participation by parents can be more effective in generalizing and maintaining the effects of eating interventions [55,56].

### Toilet training

Evidence has accumulated from diverse ABA-based toilet training programs for individuals with autism [57]. A review of 28 toilet training intervention studies found that techniques such as shaping<sup>6</sup>, graduated guidance<sup>7</sup>, scheduled toileting<sup>8</sup>, and stimulus control<sup>9</sup> were effective. In clinical practice, these techniques are often used in combination and are tailored to the age and cognitive abilities of individuals [58,59].

The most typical toilet training for children with autism is a modification of rapid toilet training (RTT), originally devised by Azrin and Foxx [58,60,61]. The RTT is an intensive training method that combines positive reinforcement, positive punishment, and scheduled toileting, typically lasting 8 hours a day for 1–2 weeks [62,63]. This method has been reported to be particularly effective for individuals with autism and intellectual disabilities [64]. Specifically, it was initially designed for infants and toddlers aged 2–4 years, and a recent review showed promise for use in the age range of

3–12 years. However, further evidence is required [65]. Urine training should be continued until children reach 24 months of age, followed by bowel training when the urine training is completed.

### Emotional difficulties

As children with autism grow into adolescence and adulthood, they often report emotional difficulties, such as depression, anxiety, and anger, in addition to ongoing behavioral problems [66]. Recent studies have shown that cognitive behavioral therapy (CBT), an evidence-based treatment for depression, anxiety, and anger, can be successfully applied to adolescents and adults with autism [67–69]. However, considering that CBT requires significant verbal and cognitive skills, it is important to assess the verbal, cognitive, and emotional abilities of adolescents and adults with autism before implementing CBT [70,71]. In Korea, access to CBT for individuals with autism is limited because very few experts provide CBT for adolescents and adults with autism.

## PARENT EDUCATION

Parental education refers to the provision of either information or specific skills or both to parents to support their children appropriately. Psychoeducation provides knowledge and strategies to deal with autism issues. However, its effectiveness has yet to be investigated [72]. In contrast, parent-mediated interventions (PMI) involve training parents to implement various intervention techniques directly with their children. They have been frequently used for comprehensive early intervention and intervention of challenging behaviors [73].

### PMI for comprehensive early intervention

PMI has been actively pursued as a means of providing interventions to young children with autism, typically in combination with EIBI [15]. However, PMIs may also serve as primary services in regions with limited accessibility to EIBI [74]. While the quality of intervention and service hours for PMIs may not be comparable to those of therapist-led interventions, their advantages include high accessibility to treatment and high generalizability, mainly because treatment is provided by parents almost every day in diverse real-life settings [75]. Numerous studies have reported improvements in children's communication skills, expressive and receptive language, and adaptive behaviors upon the implementation of PMI [41]. Additionally, its collateral effects on parental adjustment and mental health, including maternal depression and parenting stress, are well-documented [76]. However, a review of 17 studies questioned the effectiveness of PMI due

4) Contingent reward refers to when the child receives positive reinforcement for completing a desired behavior.

5) Non-removal of spoon involves an adult holding the spoon in front of the child's mouth until he or she takes a bite of food.

6) In stimulus shaping, positive reinforcement is presented contingent on completion of steps in the stimulus shaping hierarchy.

7) Therapist first provides the controlling prompt (e.g., physical prompt) and allows the learner to react independently by gradually removing the controlling prompt in the subsequent sessions.

8) A procedure where individuals are placed on the toilet with scheduled time and then positively reinforced when voiding occurs.

9) A procedure used to detail circumstances where a behavior is triggered by the existence or absence of a stimulus.

to inconsistencies in results across studies [77]. Another recent meta-analysis study, including 19 RCTs, also reported small effect sizes (Hedge's  $g=0.18-0.27$ ) [78]. However, these review studies included trials using diverse intervention techniques, such as floor time, massage, and ABA. Therefore, caution should be taken when interpreting the effectiveness of PMIs.

More recently, a parent-implemented Early Start Denver Model (P-ESDM) has gained attention as an alternative to therapist-led ESDM, whose effectiveness has been well-documented [79]. In P-ESDM, certified ESMD trainers teach parent-specific behavioral skills, such as joint attention and imitation, to facilitate social interaction with their child. Parents are then encouraged to apply these skills to their children's everyday routines and activities in their homes and other daily living settings [80]. Although no systematic review of the effectiveness of P-ESDM is available, individual studies have reported improvements in children's parental interaction skills [81], social communication skills [82], language development [83], and a reduction in autism symptoms [84]. Due to high parental preference for P-ESDM, more efforts have been made to disseminate it, including the development of internet-based P-ESDM, which has also demonstrated effectiveness [83,85].

In Korea, single-subject design studies have reported increased joint attention [86] and improvements in social interaction and communication behaviors [87,88] for PMI. However, further studies with better experimental designs are required to conclude their overall effectiveness.

### PMI for challenging behaviors

Studies investigating the effectiveness of PMI for challenging behaviors, such as aggression and self-injurious behaviors, have been actively conducted. In this type of PMI, a certified ABA therapist (e.g., BCBA or BCaBA<sup>10</sup>) runs individual or small-group sessions for 4–16 weeks to teach parent-specific behavioral skills to deal with challenging behaviors, which include both didactic lectures and hands-on training [89]. A meta-analysis reported that PMI reduced challenging behaviors (standardized mean difference [SMD]=0.67) and hyperactivity (SMD=0.31) in children, as well as parenting stress (SMD=0.37) [90]. Recently, a study reported that telehealth-based PMI could be as effective as in-person PMI in reducing challenging behaviors [91]. Social distancing policies implemented during the COVID-19 pandemic have facilitated the adoption of long-distance service delivery methods, including telehealth and internet-based services. These are expected to continue even after the pandemic ends be-

cause of their cost-effectiveness and accessibility.

PMIs are also recommended for managing sleep-related problems, which are reported in 40%–80% of children with autism [92]. PMI for sleep typically includes psychoeducation and hands-on training in recording a daily sleep diary, setting up a sleep hygiene routine, and applying faded bedtimes to reduce sleep problems [93]. A review of 11 PMI studies found that PMI is effective in reducing sleep-related maladaptive behaviors, such as sleep resistance and waking at night, and in improving overall sleep time in children with autism [92].

In Korea, there have been a few PMI studies focused on reducing challenging behaviors. These studies have reported a decrease in challenging behaviors in children [94,95], as well as a reduction in parenting stress and an improvement in parental self-efficacy [94,96].

## OTHER INTERVENTIONS

### Speech-language therapy

Speech and language therapy (SLT) is the most common special education program for children with autism [97]. SLT is not a specific intervention but rather a general term encompassing a wide range of therapies implemented by speech-language pathologists (SLPs). Therefore, the targeted skill development areas of SLT are highly diverse, and SLPs may employ various heterogeneous intervention models depending on their trained practice area. A recent review reported that the developmental-naturalistic model is the most extensively studied approach, followed by ABA, in SLT for individuals with autism [97]. Therefore, it is recommended that parents seeking SLT services first evaluate whether the intervention goals of a prospective SLP are appropriate for their child's needs and whether the intervention model employed is evidence-based [98].

### Sensory integration therapy

Sensory-based interventions aim to enhance children's levels of arousal and behavioral control through activities such as wearing weighted vests or swinging [99]. Although it is often used as an intervention to improve core symptoms in children with autism, there is currently limited evidence supporting its efficacy [99,100].

### Developmental approaches

Developmental approaches prioritize child-led spontaneous play and joint attention with adults to enhance the communication skills of young children with autism. In Korea, the DIR/FloorTime [101] and Hanen's More than Words [102] programs have been introduced, but scientific evidence for

10) BCBA, Board Certified Behavior Analyst; BCaBA, Board Certified Assistant Behavior Analyst. See [bach.com](http://bach.com) for more information.

their effectiveness needs to be more consistent or sufficient [75,103].

### Treatment and Education of Autistic and Related Communication-handicapped Children

According to Wong et al. [41], the CTM category includes the Treatment and Education of Autistic and Related Communication-handicapped Children (TEACCH). Along with ABA, it is one of the most widely recognized comprehensive intervention models [104]. The TEACCH emphasizes the importance of creating a highly structured environment and actively using visual support to facilitate communication and learning based on the theorized profile of the unique strengths and needs of individuals with ASD [100]. While TEACCH has been widely used in clinical settings, such as special education or clinics, evidence for its effectiveness has been mixed. An earlier meta-analysis reported limited effectiveness [105]. However, more recent research has reported that it can improve cognitive and language skills, as well as reduce stress in caregivers [106]. Further research is required to establish the effectiveness of TEACCH in autism interventions.

### Social stories

Social stories teach social cognition and appropriate social behaviors for children with autism by using stories that describe specific social situations in simple sentences for children with autism [107]. Some single-subject design studies have found that social stories are effective in reducing inappropriate behaviors. However, recent systematic reviews have consistently concluded that there still needs to be more evidence to consider social stories as evidence-based practice [107,108].

### Newly introduced interventions

Newly introduced interventions are considered promising, but further research is required to establish their evidence base. These interventions include PEERS, Pediatric Autism Communication Therapy (PACT), Research Units in Behavioral Intervention (RUBI), and Unstuck and On-target interventions. The PEERS program targets teenage adolescents to improve their social competence and social skills, leading to enhancements in social skills, knowledge, social responsiveness, and overall social skills, encompassing social communication and social cognition [109]. PACT uses specific video feedback techniques to help recognize, respond to, and enhance parent-child communication [110]. RUBI is a parent training program developed to decrease challenging behaviors in children with ASD [111]. Unstuck and On-target is a classroom-based intervention approach for high-func-

tioning students that provides lessons promoting cognitive and behavioral flexibility in everyday situations [112].

## FUTURE DIRECTION

The traditional model of evidence-based practice has primarily relied on comparing averages from group comparison studies, such as RCTs. Although this approach provides valuable information about the effectiveness of treatments, it does not reveal individual effects and differences. The mixed results often observed in group-comparison studies may be due to the heterogeneity of ASD symptoms. Hence, there is a growing need for personalized assessment and treatment approaches.

In recent years, advancements in information and communication technology and the Research Domain Criteria model have facilitated the collection of digital phenotyping, behavioral, and neurobiological data, and these datasets are rapidly accumulating in the ASD population. These developments promise to enable individualized assessment, treatment customization, and real-time monitoring. Consequently, as tailored assessments and interventions become more accessible in the near future, guidelines should reflect on the implications of this transformative shift.

Additionally, there have been recent developments in research models, such as the Autism Europe Project and the Autism Innovative Medicine Studies-2 (AIMS-2) Trials Project, which are currently underway. It is essential to incorporate the relevant results from these new models into future guidelines, as they demonstrate promising outcomes and provide solid research results that support their efficacy.

## SUMMARY

### CTM

- EIBI provides comprehensive intervention in most developmental areas, including language, cognition, self-help skills, social skills, and adaptive behaviors. It typically begins before the age of 3 and involves receiving intervention for at least two years. Previous studies have reported significant improvements in the outcomes of children receiving EIBI.

- In addition to the basic principles of EIBI, NDBIs, which emphasize interacting with children in natural settings and developing communication skills, have also been shown to improve language, imitation, and social initiation. However, more rigorous research is required to confirm the effectiveness of NDBIs.

### Focused intervention

- Social skills: SST, which teaches specific social skills based

on behavioral principles, has consistently been shown to be effective in improving social skills in individuals of all ages, including infants, children, adolescents, and adults.

- **Social communication:** PECS, which uses picture cards to teach communication skills, is a well-established intervention that is effective in teaching individuals how to make requests or initiate conversations. However, further research is needed to establish its effectiveness in speech development.

- **Sleep:** While the most effective techniques may vary depending on the specific sleep problem, behavioral interventions such as delaying sleep time, gradual extinction, and scheduled awakening have been reported to be effective in reducing sleep problems in individuals with autism.

- **Eating problems:** As with sleep problems, behavioral interventions have been shown to reduce eating problems among individuals with autism. Contingent rewards and NRSs are the most commonly used and reported to be effective.

- **Toilet training:** Behavioral interventions such as shaping, gradual guidance, scheduling, toileting, and stimulus control have been reported to be effective in toilet training in individuals with autism.

- **Emotional difficulties:** CBT is the most effective treatment for emotional problems such as depression, anxiety, and anger in individuals with autism. Assessment of verbal and cognitive abilities is required before CBT can be applied.

### Parent education and other non-behavioral interventions

- **PMI,** for comprehensive early intervention, which trains parents to implement various intervention techniques with their children directly, has been widely used, either in combination with EIBI or as a standalone approach. In recent years, P-ESDM has emerged as an effective intervention method for improving functions in children, such as parent-child interactions and language.

- **PMI for challenging behaviors,** which teaches parent-specific behavioral skills to deal with the behaviors of their children, has consistently been shown to be effective in reducing challenging behaviors, hyperactivity, and parenting stress.

- **When considering an intervention method with uncertain evidence,** it is important to have thorough discussions between parents and experts using the most up-to-date scientific knowledge available.

### Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

### Author Contributions

Conceptualization: Kyong-Mee Chung. Data curation: all authors. Formal analysis: Eunsun Chung, Hoomyung Lee. Funding acquisition: Kyong-Mee Chung. Investigation: Eunsun Chung, Hoomyung Lee. Methodology: all authors. Project administration: Kyong-Mee Chung. Resources: Kyong-Mee Chung. Software: Kyong-Mee Chung. Supervision: Kyong-Mee Chung. Validation: Kyong-Mee Chung. Visualization: all authors. Writing—original draft: Eunsun Chung, Hoomyung Lee. Writing—review & editing: Kyong-Mee Chung.

### ORCID iDs

Kyong-Mee Chung <https://orcid.org/0000-0002-1197-4156>  
 Eunsun Chung <https://orcid.org/0009-0005-8419-5195>  
 Hoomyung Lee <https://orcid.org/0009-0003-8382-3044>

### Funding Statement

This study was supported by the Ministry of Health and Welfare, Behavior and Development Center, and the Headquarters of the National Autism and Developmental Disorders Centers.

### REFERENCES

- 1) **Hyman SL, Levy SE, Myers SM; COUNCIL ON CHILDREN WITH DISABILITIES, SECTION ON DEVELOPMENTAL AND BEHAVIORAL PEDIATRICS.** Identification, evaluation, and management of children with autism spectrum disorder. *Pediatrics* 2020;145:e20193447.
- 2) **Skinner BF.** The experimental analysis of behavior. *Am Sci* 1957; 45:343-371.
- 3) **Watson JB.** Behaviorism. Chicago, IL: University of Chicago Press; 1930.
- 4) **Lovaas OI, Schreibman L, Koegel RL.** A behavior modification approach to the treatment of autistic children. *J Autism Child Schizophr* 1974;4:111-129.
- 5) **Whitman TL, Scibak JW, Reid DH.** Behavior modification with the severely and profoundly retarded: research and application. New York: Academic Press;1983.
- 6) **Cooper JO, Heron TE, Heward WL.** Applied behavior analysis. 2nd ed. Upper Saddle River, NJ: Pearson Education;2007.
- 7) **Bradshaw J, Steiner AM, Gengoux G, Koegel LK.** Feasibility and effectiveness of very early intervention for infants at-risk for autism spectrum disorder: a systematic review. *J Autism Dev Disord* 2015;45:778-794.
- 8) **Volkmar F, Siegel M, Woodbury-Smith M, King B, McCracken J, State M.** Practice parameter for the assessment and treatment of children and adolescents with autism spectrum disorder. *J Am Acad Child Adolesc Psychiatry* 2014;53:237-257.
- 9) **Centers for Disease Control and Prevention.** Treatment and intervention services for autism spectrum disorder [Internet]. Atlanta, GA: Centers for Disease Control and Prevention [cited 2023 Mar 3]. Available from: <https://www.cdc.gov/ncbddd/autism/treatment.html>.
- 10) **Prior M, Roberts J.** Early intervention for children with autism spectrum disorders: 'guidelines for good practice' 2012 [Internet]. Canberra: Australian Government Department of Social Services [cited 2023 Mar 3]. Available from: [https://www.dss.gov.au/sites/default/files/documents/08\\_2014/6006\\_-\\_accessible\\_-\\_early\\_intervention\\_practice\\_guidelines\\_0.pdf](https://www.dss.gov.au/sites/default/files/documents/08_2014/6006_-_accessible_-_early_intervention_practice_guidelines_0.pdf).
- 11) **Society of Clinical Child and Adolescent Psychology.** Autism spectrum disorder [Internet]. Washington, DC: Society of Clinical Child and Adolescent Psychology [cited 2023 Mar 3]. Available from: <https://effectivechildtherapy.org/concerns-symptoms-disorders/disorders/autism/>.

- 12) **Anderson SR, Cohen I, Cohen S, Cook T, Decker L, Grant C, et al.** Clinical practice guideline on assessment and intervention services for young children with autism spectrum disorders (ASD): 2017 update [Internet]. Albany, NY: New York State Department of Health [cited 2023 Mar 3]. Available from: <https://www.health.ny.gov/publications/20152.pdf>.
- 13) **Autism Task Force; Washington State Department of Health.** Autism guidebook for Washington State: a resource for individuals, families, and professionals [Internet]. Tumwater, WA: Washington State Department of Health [cited 2023 Mar 3]. Available from: <https://www.doh.wa.gov/Portals/1/Documents/8340/970-NonDOH-AutismGd-en-L.pdf>.
- 14) **Maine Autism Institute for Education and Research.** Maine parent guide to autism spectrum disorders. Booklet 3: resource guide for Maine families [Internet]. Orono, ME: Maine Autism Institute for Education and Research [cited 2023 Mar 3]. Available from: <https://umaine.edu/autisminstitute/wp-content/uploads/sites/150/2016/02/MAIER-Parent-Booklet-3.pdf>.
- 15) **Lovaas OI.** Behavioral treatment and normal educational and intellectual functioning in young autistic children. *J Consult Clin Psychol* 1987;55:3-9.
- 16) **Eldevik S, Hastings RP, Hughes JC, Jahr E, Eikeseth S, Cross S.** Meta-analysis of early intensive behavioral intervention for children with autism. *J Clin Child Adolesc Psychol* 2009;38:439-450.
- 17) **Makrygianni MK, Reed P.** A meta-analytic review of the effectiveness of behavioural early intervention programs for children with autistic spectrum disorders. *Res Autism Spectr Disord* 2010;4:577-593.
- 18) **Peters-Scheffer N, Didden R, Korzilius H, Sturmey P.** A meta-analytic study on the effectiveness of comprehensive ABA-based early intervention programs for children with autism spectrum disorders. *Res Autism Spectr Disord* 2011;5:60-69.
- 19) **Reichow B, Wolery M.** Comprehensive synthesis of early intensive behavioral interventions for young children with autism based on the UCLA young autism project model. *J Autism Dev Disord* 2009;39:23-41.
- 20) **Reichow B, Barton EE, Boyd BA, Hume K.** Early intensive behavioral intervention (EIBI) for young children with autism spectrum disorders (ASD). *Cochrane Database Syst Rev* 2012;10:CD009260.
- 21) **Reichow B, Barton EE, Boyd BA, Hume K.** Early intensive behavioral intervention (EIBI) for young children with autism spectrum disorders (ASD): a systematic review. *Campbell Syst Rev* 2014;10:1-116.
- 22) **Caron V, Bérubé A, Paquet A.** Implementation evaluation of early intensive behavioral intervention programs for children with autism spectrum disorders: a systematic review of studies in the last decade. *Eval Program Plann* 2017;62:1-8.
- 23) **Zwaigenbaum L, Bauman ML, Choueiri R, Kasari C, Carter A, Granpeesheh D, et al.** Early intervention for children with autism spectrum disorder under 3 years of age: recommendations for practice and research. *Pediatrics* 2015;136(Suppl 1):S60-S81.
- 24) **Reichow B, Hume K, Barton EE, Boyd BA.** Early intensive behavioral intervention (EIBI) for young children with autism spectrum disorders (ASD). *Cochrane Database Syst Rev* 2018;5:CD009260.
- 25) **Rodgers M, Marshall D, Simmonds M, Le Couteur A, Biswas M, Wright K, et al.** Interventions based on early intensive applied behaviour analysis for autistic children: a systematic review and cost-effectiveness analysis. *Health Technol Assess* 2020;24:1-306.
- 26) **Schreibman L, Dawson G, Stahmer AC, Landa R, Rogers SJ, McGee GG, et al.** Naturalistic developmental behavioral interventions: empirically validated treatments for autism spectrum disorder. *J Autism Dev Disord* 2015;45:2411-2428.
- 27) **Rogers SJ, Dawson G.** Early start Denver model for young children with autism: promoting language, learning, and engagement. New York: Guilford Press;2010.
- 28) **Fulton E, Eapen V, Crnčec R, Walter A, Rogers S.** Reducing maladaptive behaviors in preschool-aged children with autism spectrum disorder using the early start Denver model. *Front Pediatr* 2014;2:40.
- 29) **Waddington H, van der Meer L, Sigafos J.** Effectiveness of the early start Denver model: a systematic review. *Rev J Autism Dev Disord* 2016;3:93-106.
- 30) **Fuller EA, Oliver K, Vejnoska SE, Rogers SJ.** The effects of the early start Denver model for children with autism spectrum disorder: a meta-analysis. *Brain Sci* 2020;10:368.
- 31) **Kasari C, Freeman S, Paparella T.** Joint attention and symbolic play in young children with autism: a randomized controlled intervention study. *J Child Psychol Psychiatry* 2006;47:611-620.
- 32) **Wetherby AM, Guthrie W, Woods J, Schatschneider C, Holland RD, Morgan L, et al.** Parent-implemented social intervention for toddlers with autism: an RCT. *Pediatrics* 2014;134:1084-1093.
- 33) **Koegel RL, Koegel LK.** Pivotal response treatments for autism: communication, social, & academic development. Baltimore, MD: 2006 Paul H Brookes Publishing;2006.
- 34) **Koo BK, Chung KM.** Effectiveness of an early intensive behavior intervention for infants with ASD: a preliminary study. *J Korean Assoc Persons Autism* 2018;18:1-30.
- 35) **Cappadocia MC, Weiss JA.** Review of social skills training groups for youth with Asperger syndrome and high functioning autism. *Res Autism Spectr Disord* 2011;5:70-78.
- 36) **Bellini S, Peters JK.** Social skills training for youth with autism spectrum disorders. *Child Adolesc Psychiatr Clin N Am* 2008;17:857-873.
- 37) **Rao PA, Beidel DC, Murray MJ.** Social skills interventions for children with Asperger's syndrome or high-functioning autism: a review and recommendations. *J Autism Dev Disord* 2008;38:353-361.
- 38) **Williams White S, Keonig K, Scahill L.** Social skills development in children with autism spectrum disorders: a review of the intervention research. *J Autism Dev Disord* 2007;37:1858-1868.
- 39) **Gates JA, Kang E, Lerner MD.** Efficacy of group social skills interventions for youth with autism spectrum disorder: a systematic review and meta-analysis. *Clin Psychol Rev* 2017;52:164-181.
- 40) **Soares EE, Bausback K, Beard CL, Higinbotham M, Bunge EL, Gengoux GW.** Social skills training for autism spectrum disorder: a meta-analysis of in-person and technological interventions. *J Technol Behav Sci* 2021;6:166-180.
- 41) **Wong C, Odom SL, Hume KA, Cox AW, Fettig A, Kucharczyk S, et al.** Evidence-based practices for children, youth, and young adults with autism spectrum disorder: a comprehensive review. *J Autism Dev Disord* 2015;45:1951-1966.
- 42) **French L, Kennedy EMM.** Annual research review: early intervention for infants and young children with, or at-risk of, autism spectrum disorder: a systematic review. *J Child Psychol Psychiatry* 2018;59:444-456.
- 43) **Shire SY, Gulsrud A, Kasari C.** Increasing responsive parent-child interactions and joint engagement: comparing the influence of parent-mediated intervention and parent psychoeducation. *J Autism Dev Disord* 2016;46:1737-1747.
- 44) **Waddington H, Reynolds JE, Macaskill E, Curtis S, Taylor LJ, Whitehouse AJ.** The effects of JASPER intervention for children with autism spectrum disorder: a systematic review. *Autism* 2021;25:2370-2385.
- 45) **Mirenda P.** Toward functional augmentative and alternative communication for students with autism: manual signs, graphic symbols, and voice output communication aids. *Lang Speech Hear Serv Sch* 2003;34:203-216.
- 46) **Charlop-Christy MH, Carpenter M, Le L, LeBlanc LA, Kellet K.** Using the picture exchange communication system (PECS) with children with autism: assessment of PECS acquisition, speech,



- social-communicative behavior, and problem behavior. *J Appl Behav Anal* 2002;35:213-231.
- 47) **Preston D, Carter M.** A review of the efficacy of the picture exchange communication system intervention. *J Autism Dev Disord* 2009;39:1471-1486.
  - 48) **Ostryn C, Wolfe PS, Rusch FR.** A review and analysis of the picture exchange communication system (PECS) for individuals with autism spectrum disorders using a paradigm of communication competence. *Res Pract Pers Sev Disabil* 2008;33:13-24.
  - 49) **Flippin M, Reszka S, Watson LR.** Effectiveness of the picture exchange communication system (PECS) on communication and speech for children with autism spectrum disorders: a meta-analysis. *Am J Speech Lang Pathol* 2010;19:178-195.
  - 50) **Cuomo BM, Vaz S, Lee EAL, Thompson C, Rogerson JM, Falkmer T.** Effectiveness of sleep-based interventions for children with autism spectrum disorder: a meta-synthesis. *Pharmacotherapy* 2017;37:555-578.
  - 51) **Keogh S, Bridle C, Siriwardena NA, Nadkarni A, Laparidou D, Durrant SJ, et al.** Effectiveness of non-pharmacological interventions for insomnia in children with autism spectrum disorder: a systematic review and meta-analysis. *PLoS One* 2019;14:e0221428.
  - 52) **Vriend JL, Corkum PV, Moon EC, Smith IM.** Behavioral interventions for sleep problems in children with autism spectrum disorders: current findings and future directions. *J Pediatr Psychol* 2011;36:1017-1029.
  - 53) **Weiskop S, Richdale A, Matthews J.** Behavioural treatment to reduce sleep problems in children with autism or fragile X syndrome. *Dev Med Child Neurol* 2005;47:94-104.
  - 54) **Marshall J, Ware R, Ziviani J, Hill RJ, Dodrill P.** Efficacy of interventions to improve feeding difficulties in children with autism spectrum disorders: a systematic review and meta-analysis. *Child Care Health Dev* 2015;41:278-302.
  - 55) **Sharp WG, Burrell TL, Jaquess DL.** The autism MEAL plan: a parent-training curriculum to manage eating aversions and low intake among children with autism. *Autism* 2014;18:712-722.
  - 56) **Ingersoll B, Dvortcsak A.** Including parent training in the early childhood special education curriculum for children with autism spectrum disorders. *Topics Early Child Spec Educ* 2006;26:179-187.
  - 57) **Perez BC, Bacotti JK, Peters KP, Vollmer TR.** An extension of commonly used toilet-training procedures to children with autism spectrum disorder. *J Appl Behav Anal* 2020;53:2360-2375.
  - 58) **Kroeger KA, Sorensen-Burnworth R.** Toilet training individuals with autism and other developmental disabilities: a critical review. *Res Autism Spectr Disord* 2009;3:607-618.
  - 59) **Coucovanis JA.** The potty journey: guide to toilet training children with special needs, including autism and related disorders. Shawnee, KS: AAPC Publishing;2008.
  - 60) **Azrin NH, Foxx RM.** A rapid method of toilet training the institutionalized retarded. *J Appl Behav Anal* 1971;4:89-99.
  - 61) **Matson JL, Hattier MA, Belva B.** Treating adaptive living skills of persons with autism using applied behavior analysis: a review. *Res Autism Spectr Disord* 2012;6:271-276.
  - 62) **Doan D, Toussaint KA.** A parent-oriented approach to rapid toilet training. *Int Electron J Elem Educ* 2016;9:473-486.
  - 63) **Richardson D.** Toilet training for children with autism. *Nurs Child Young People* 2016;28:16-22.
  - 64) **Anderson JR.** Acquisition of cognitive skill. *Psychol Rev* 1982; 89:369-406.
  - 65) **Simon M, Wilkes-Gillan S, Chen YWR, Cordier R, Cantrill A, Parsons L, et al.** Toilet training interventions for children with autism spectrum disorder: a systematic review. *Res Autism Spectr Disord* 2022;99:102049.
  - 66) **Ambler PG, Eidels A, Gregory C.** Anxiety and aggression in adolescents with autism spectrum disorders attending mainstream schools. *Res Autism Spectr Disord* 2015;18:97-109.
  - 67) **Menezes M, Harkins C, Robinson MF, Mazurek MO.** Treatment of depression in individuals with autism spectrum disorder: a systematic review. *Res Autism Spectr Disord* 2020;78:101639.
  - 68) **Sukhodolsky DG, Bloch MH, Panza KE, Reichow B.** Cognitive-behavioral therapy for anxiety in children with high-functioning autism: a meta-analysis. *Pediatrics* 2013;132:e1341-e1350.
  - 69) **Sofronoff K, Attwood T, Hinton S, Levin I.** A randomized controlled trial of a cognitive behavioural intervention for anger management in children diagnosed with Asperger syndrome. *J Autism Dev Disord* 2007;37:1203-1214.
  - 70) **Lickel A, MacLean WE Jr, Blakeley-Smith A, Hepburn S.** Assessment of the prerequisite skills for cognitive behavioral therapy in children with and without autism spectrum disorders. *J Autism Dev Disord* 2012;42:992-1000.
  - 71) **Rotheram-Fuller E, MacMullen L.** Cognitive-behavioral therapy for children with autism spectrum disorders. *Psychol Sch* 2011;48: 263-271.
  - 72) **Kasari C, Gulsrud A, Paparella T, Helleman G, Berry K.** Randomized comparative efficacy study of parent-mediated interventions for toddlers with autism. *J Consult Clin Psychol* 2015;83:554-563.
  - 73) **Bearss K, Burrell TL, Stewart L, Scahill L.** Parent training in autism spectrum disorder: what's in a name? *Clin Child Fam Psychol Rev* 2015;18:170-182.
  - 74) **Lee JD, Meadan H.** Parent-mediated interventions for children with ASD in low-resource settings: a scoping review. *Rev J Autism Dev Disord* 2021;8:285-298.
  - 75) **Smith T, Iadarola S.** Evidence base update for autism spectrum disorder. *J Clin Child Adolesc Psychol* 2015;44:897-922.
  - 76) **Karst JS, Van Hecke AV.** Parent and family impact of autism spectrum disorders: a review and proposed model for intervention evaluation. *Clin Child Fam Psychol Rev* 2012;15:247-277.
  - 77) **Oono IP, Honey EJ, McConachie H.** Parent-mediated early intervention for young children with autism spectrum disorders (ASD). *Evid-Based Child Health* 2013;8:2380-2479.
  - 78) **Nevill RE, Lecavalier L, Stratis EA.** Meta-analysis of parent-mediated interventions for young children with autism spectrum disorder. *Autism* 2018;22:84-98.
  - 79) **Rogers SJ, Estes A, Lord C, Vismara L, Winter J, Fitzpatrick A, et al.** Effects of a brief early start Denver model (ESDM)-based parent intervention on toddlers at risk for autism spectrum disorders: a randomized controlled trial. *J Am Acad Child Adolesc Psychiatry* 2012;51:1052-1065.
  - 80) **Vismara LA, Rogers SJ.** Coaching parents of young children with autism. In: Siller M, Morgan L, editors. *Handbook of parent-implemented interventions for very young children with autism*. Cham: Springer;2018. p.191-208.
  - 81) **Rogers SJ, Estes A, Vismara L, Munson J, Zierhut C, Greenson J, et al.** Enhancing low-intensity coaching in parent implemented early start Denver model intervention for early autism: a randomized comparison treatment trial. *J Autism Dev Disord* 2019;49: 632-646.
  - 82) **Zhou B, Xu Q, Li H, Zhang Y, Wang Y, Rogers SJ, et al.** Effects of parent-implemented early start Denver model intervention on Chinese toddlers with autism spectrum disorder: a non-randomized controlled trial. *Autism Res* 2018;11:654-666.
  - 83) **Vismara LA, Young GS, Rogers SJ.** Telehealth for expanding the reach of early autism training to parents. *Autism Res Treat* 2012; 2012:121878.
  - 84) **Rooks-Ellis D, Howorth SK, Kunze M, Boulette S, Sulinski E.** Effects of a parent training using telehealth: equity and access to early intervention for rural families. *J Child Educ Soc* 2020;1:141-166.
  - 85) **Vismara LA, McCormick CE, Wagner AL, Monlux K, Nadhan A, Young GS.** Telehealth parent training in the early start Denver

- model: results from a randomized controlled study. *Focus Autism Other Dev Disabil* 2018;33:67-79.
- 86) **Nam BR, Lee SH.** The effects of mother mediated joint attention-focused play on precursors of joint attention and joint attention behaviors of toddlers with autism spectrum disorders. *J Korean Assoc Persons Autism* 2014;14:21-45.
  - 87) **Lee HM, Chung KM.** Effects of an early start Denver model-based parent training for parents of children with autism: a preliminary study. *J Korean Assoc Persons Autism* 2020;20:23-49.
  - 88) **Lim HS, Kim EK.** Effects of parent-mediated pivotal response training on social communicative behaviors of preschooler with autism spectrum disorder. *J Emot Behav Disord* 2013;29:121-148.
  - 89) **Bearss K, Johnson C, Smith T, Lecavalier L, Swiezy N, Aman M, et al.** Effect of parent training vs parent education on behavioral problems in children with autism spectrum disorder: a randomized clinical trial. *JAMA* 2015;313:1524-1533.
  - 90) **Tarver J, Palmer M, Webb S, Scott S, Slonims V, Simonoff E, et al.** Child and parent outcomes following parent interventions for child emotional and behavioral problems in autism spectrum disorders: a systematic review and meta-analysis. *Autism* 2019;23:1630-1644.
  - 91) **Lindgren S, Wacker D, Suess A, Schieltz K, Pelzel K, Kopelman T, et al.** Telehealth and autism: treating challenging behavior at lower cost. *Pediatrics* 2016;137(Suppl 2):S167-S175.
  - 92) **Kirkpatrick B, Louw JS, Leader G.** Efficacy of parent training incorporated in behavioral sleep interventions for children with autism spectrum disorder and/or intellectual disabilities: a systematic review. *Sleep Med* 2019;53:141-152.
  - 93) **Johnson CR, Turner KS, Foldes E, Brooks MM, Kronk R, Wiggs L.** Behavioral parent training to address sleep disturbances in young children with autism spectrum disorder: a pilot trial. *Sleep Med* 2013;14:995-1004.
  - 94) **Shin HY, Chung KM.** Effects of behavioral parent training for parents of children with developmental disabilities: comparison of theory-based training and practice-based training. *Kor J Clin Psychol* 2014;33:221-242.
  - 95) **Chung KM, Lee Y, Park S, Suh YJ.** The effect of behavioral parent training on problem behaviors of persons with DD and collateral effects on mothers: a single-group pre-post treatment design. *Kor J Clin Psychol* 2021;40:352-364.
  - 96) **Park HO, Kim JH.** The effects of parental education program focused on problem behavior of infants with developmental disabilities. *J Dev Disabil* 2021;25:83-105.
  - 97) **Binns AV, Smyth R, Andres A, Lam J, Oram Cardy J.** Looking back and moving forward: a scoping review of research on pre-school autism interventions in the field of speech-language pathology. *Autism Dev Lang Impair* 2021;6:23969415211033171.
  - 98) **Ebbels SH, McCartney E, Slonims V, Dockrell JE, Norbury CF.** Evidence-based pathways to intervention for children with language disorders. *Int J Lang Commun Disord* 2019;54:3-19.
  - 99) **Case-Smith J, Weaver LL, Fristad MA.** A systematic review of sensory processing interventions for children with autism spectrum disorders. *Autism* 2015;19:133-148.
  - 100) **Sandbank M, Bottema-Beutel K, Crowley S, Cassidy M, Dunham K, Feldman JI, et al.** Project AIM: autism intervention meta-analysis for studies of young children. *Psychol Bull* 2020;146:1-29.
  - 101) **Greenspan SI, Wieder S.** Developmental patterns and outcomes in infants and children with disorders in relating and communicating: a chart review of 200 cases of children with autistic spectrum diagnoses. *J Dev Learn Disord* 1997;1:87-142.
  - 102) **Sussman F, Lewis RB.** More than words: a guide to helping parents promote communication and social skills in children with autism spectrum disorder. Toronto: Hanen Centre;1999.
  - 103) **Carter AS, Messinger DS, Stone WL, Celimli S, Nahmias AS, Yoder P.** A randomized controlled trial of Hanen's 'more than words' in toddlers with early autism symptoms. *J Child Psychol Psychiatry* 2011;52:741-752.
  - 104) **Humphrey N, Parkinson G.** Research on interventions for children and young people on the autistic spectrum: a critical perspective. *J Res Spec Educ Needs* 2006;6:76-86.
  - 105) **Virues-Ortega J, Julio FM, Pastor-Barriuso R.** The TEACCH program for children and adults with autism: a meta-analysis of intervention studies. *Clin Psychol Rev* 2013;33:940-953.
  - 106) **Sanz-Cervera P, Fernández-Andrés I, Pastor-Cerezuela G, Tárrega-Minguez R.** The effectiveness of TEACCH intervention in autism spectrum disorder: a review study. *Pap Psicol* 2018;39:40-50.
  - 107) **Qi CH, Barton EE, Collier M, Lin YL, Montoya C.** A systematic review of effects of social stories interventions for individuals with autism spectrum disorder. *Focus Autism Other Dev Disabil* 2018;33:25-34.
  - 108) **Wahman CL, Pustejovsky JE, Ostrosky MM, Santos RM.** Examining the effects of Social Stories™ on challenging behavior and prosocial skills in young children: a systematic review and meta-analysis. *Topics Early Child Spec Educ* 2022;41:267-279.
  - 109) **Laugeson EA, Frankel F, Gantman A, Dillon AR, Mogil C.** Evidence-based social skills training for adolescents with autism spectrum disorders: the UCLA PEERS program. *J Autism Dev Disord* 2012;42:1025-1036.
  - 110) **Green J, Charman T, McConachie H, Aldred C, Slonims V, Howlin P, et al.** Parent-mediated communication-focused treatment in children with autism (PACT): a randomised controlled trial. *Lancet* 2010;375:2152-2160.
  - 111) **Edwards GS, Zlomke KR, Greathouse AD.** RUBI parent training as a group intervention for children with autism: a community pilot study. *Res Autism Spectr Disord* 2019;66:101409.
  - 112) **Cannon L, Kenworthy L, Alexander KC, Werner MA, Anthony L.** Unstuck and on target! An executive function curriculum to improve flexibility for children with autism spectrum disorders. Baltimore, MD: Brookes Publishing;2011.