

Early intervention improves social skills and brain activity in preschoolers with autism, study finds

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This is the Autism Speaks logo. Credit: Autism Speaks

The Early Start Denver Model (ESDM), a comprehensive behavioral early intervention program that is appropriate for children with autism spectrum disorder (ASD) as young as 12 months, has been found to be effective in improving social skills and brain responses to social cues in a randomized controlled study published online today in the *Journal of the American Academy of Child & Adolescent Psychiatry*.

"So much of a toddler's learning involves social interaction, and early

intervention that promotes attention to people and social cues may pay dividends in promoting the normal development of the brain and behavior," said Geraldine Dawson, Ph.D., Autism Speaks chief science officer and the study's lead author. This is the first controlled study of an intensive early intervention that demonstrates both improvement of social skills and [brain responses](#) to social stimuli resulting from intensive early intervention. Given that the American Academy of Pediatrics recommends that all 18- and 24-month-old children be screened for autism, "it is vital that we have effective therapies available for young children as soon as they are diagnosed," continued Dr. Dawson.

"This may be the first demonstration that a behavioral intervention for autism is associated with changes in brain function as well as positive changes in behavior," said Thomas R. Insel, M.D., director of the National Institute of Mental Health. "By studying changes in the neural response to faces, Dawson and her colleagues have identified a new target and a potential biomarker that can guide treatment development."

ESDM, which combines applied behavioral analysis (ABA) teaching methods with developmental 'relationship-based' approaches, was previously demonstrated to achieve significant gains in cognitive, language and daily living skills compared to children with ASD who received commonly available community interventions. On average, the preschoolers receiving ESDM for two years improved 17.5 standard score points compared to 7.0 points in the community intervention comparison group.

This study sought to address whether the lack of early social engagement associated with ASD could have negative secondary effects on behavioral and brain development. The ESDM approach is novel not only because it is effective in very young children, but it also blends the rigor of applied behavioral analysis (ABA) with play-based routines that focused on building a relationship with the child. During reciprocal

social interactions, engagement with a social partner such as a parent, caregiver or therapist is believed to stimulate brain activity associated with the ability to recognize and perceive social information and language. In measuring EEG activity while viewing both social stimuli (faces) and non-social stimuli (toys) this study found that early intervention designed to enhance social attention and social engagement served to alter a child's brain development toward a more positive developmental trajectory. The authors also examined the relationship between EEG activity and behavior outcomes. Previous studies have found that typical babies and young children show more robust brain activity when they view social stimuli, such as faces, than when viewing objects. Children with autism have been found to show the opposite pattern.

"Children receiving ESDM had greater brain activity while viewing faces and also had fewer social-pragmatic problems and improved social communication, such as the ability to initiate interactions, make eye contact, and imitate others," said MIND Institute researcher and co-author Sally Rogers, Ph.D.

Forty-eight children with ASD between 18- and 30-months-old were recruited through pediatric practices, Birth-to-Three centers and state and local autism organizations. These children had a diagnosis of autistic disorder or pervasive developmental disorder not otherwise specified (PDD-NOS). These children were randomly assigned to receive either ESDM or community intervention for a period of two years. The EEG activity was measured at the end of the intervention period. These children were matched by chronological age to typically-developing children at the time of the EEG assessment. The children studied included Asian, white, Latino and multi-racial ethnicities and the male-to-female ratio was 3.5:1. About 60 percent of children in each group provided adequate EEG data for analysis. A group of typical four year olds were also tested for comparison.

Those children receiving ESDM intervention were provided the services of trained therapists for 20 hours a week and parents also were trained to deliver the intervention. Children in the comparison group received treatment as usual in the community and were given evaluations, referrals, and resource manuals and reading materials at the beginning of services and twice annually.

On an individual level, 11 of 15 children with ASD in the ESDM group (73 percent) and 12 of 17 children (71 percent) in the typically-developing or control group showed higher levels of brain activation when viewing faces than when viewing objects compared to only 5 of 14 (36 percent) in the community intervention group of children with ASD. At the end of the study, the children with ASD in the ESDM group exhibited brain activity comparable to age-matched typically-developing children and significantly different from the children with ASD who received community interventions.

"We know that infant brains are quite malleable and had previously demonstrated that this therapy capitalizes on the potential of learning that an infant brain has in order to limit autism's deleterious effects," said Sally Rogers, Ph.D., a professor of psychiatry and behavioral sciences, a study co-author and a researcher at the UC Davis MIND Institute in Sacramento, Calif. "The findings on improved behavioral outcomes and the ability to normalize [brain activity](#) associated with social activities has tremendous potential for children with ASD," Rogers explained.

"For the first time, parents and practitioners have evidence that early intervention can result in an improved course of both [brain](#) and behavioral development in young children. It is crucial that all children with autism have access to early intervention which can promote the most positive long-term outcomes," concluded Dr. Dawson.

Rogers and Dawson developed the ESDM intervention.

Provided by Autism Speaks

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