AOTA Evidence Briefs
Autism Spectrum Disorder

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Randomized Trial of Intensive Early Intervention for Children with Pervasive Developmental Disorder

Smith, T., Groen, A. D., & Wynn, J. W. (2000). Randomized trial of intensive early intervention for children with pervasive developmental disorder. *American Journal on Mental Retardation, 105*(4), 269–285.

Level I

Randomized control trial

Why research this topic?

Research studies of **discrete trial training** (see *Glossary*) using **applied behavioral analysis (ABA)** (see *Glossary*) theory with children with autism have demonstrated substantial effect on IQ. In studies of ABA published in the 1980s and 1990s, children who received ABA discrete trial training were placed in less restrictive classrooms than children in **control groups** (see *Glossary*). However, these studies had design limitations, including lack of **random assignment** (see *Glossary*) of the participants and selection criteria that limited participation to only children with high IQs. These early studies used intensive intervention of 40 hours per week, limiting the generalizability, because not all families can afford the expense and tolerate the stress of this protocol. The current study was conducted to address the limitations of previous studies by (a) using random assignment into groups, (b) using a wide range of children with a wide range of ability, and (b) applying an intervention less intensive than 40 hours per week.

What did the researcher do?

This study was a Level I randomized controlled trial with a sample that was recruited from the University of California at Los Angeles (UCLA) Young Autism Project between 1989 and 1992. Twenty-eight children met the criteria for inclusion in the study (i.e., they were between 18 months and 42 months of age, had an IQ between 35 and 75, had a diagnosis of **autism or pervasive development disorder** (see *Glossary*), and did not have major medical problems).

Of the 28 participants, 14 were diagnosed with autism and 14 with pervasive developmental disorders. After matching pairs, children were randomly assigned to one of two groups: one group received intensive treatment using the ABA protocol and one group received parent training. The average age when entering the study was 36 months and the boy-to-girl ratio was 23 to 5. Fifteen children were placed in the intensive treatment group and 13 in the parent training group.

The intensive treatment group received 30 hours per week of discrete trial training from four to six trained college students for 2 to 3 years. Each parent was asked to conduct 5 hours per week of treatment with a student therapist for the first 3 months of treatment. Initially the treatment was at home, then after the child met basic criteria in play and self-care (about a year into intervention), the sessions were provided at school. Treatment progressed gradually and systematically from relatively simple tasks (e.g., basic requests) to more complex skills, such as carrying on a conversation. Treatment was phased out after 18 months for children who were not progressing, although these children were included in the data analysis.

In the parent training group, the ABA treatment methods were implemented by the parents. The parents received two sessions of training and consultation for 5 hours total per week in their homes over 3 to 9 months. Parent trainers had a minimum of 1 year of experience with the treatment protocol at the UCLA Young Autism Project, including 6 or more months instructing novice therapists. The child's goals were established by the parent trainer and the parents, and then the parents were trained to implement ABA discrete trial training. **Treatment fidelity** (see *Glossary*) for both groups was assured through extensive training of the student therapists, individual supervision of the parent trainers by the first author, and written documentation of each treatment or training session.

At the intake and follow-up, each participant's IQ was measured using several standardized measures. Language performance, adaptive function, social-emotional function, and academic achievement also were measured at intake and follow-up. In addition, class placement, progress in treatment, and parent satisfaction were documented.

What did the researchers find?

After the intervention, 3 to 4 years after treatment was initiated, the children who received intensive behavioral treatment demonstrated higher IQ scores, visual-spatial skills, and language development than the children who received parent training. Also at follow-up, children who received the behavioral treatment were placed in less restrictive school placements; that is, they were more likely to be in regular education classrooms. Four of the intensively treated group were placed in regular education without supports and two of these achieved IQ scores within normal limits.

In contrast to these positive effects, the intensive behavioral treatment group did not demonstrate greater improvement in adaptive behavior and groups did not differ in number of behavioral problems. In both groups, children with PDD tended to obtain higher scores; however, intake IQ did not predict outcomes and the relationships between intake IQ scores and follow-up scores were small.

Parents' ratings of their child's improvement correlated with the test results. Parents in both groups tended to give favorable ratings regarding the quality of treatment and impact of treatment on family life.

What do the findings mean?

Children who received intensive discrete trial training improved more than children who received parent training as reflected by higher scores in academic achievement measures and less restrictive school placements. A percentage of the children who received intensive treatment made substantial gains in the normal range for cognitive functioning. The children who received discrete trial training did not improve more in behavior problems or adaptive functioning. When children participate in intensive discrete trial training programs, improvement in academic performance can be expected, and when the child's initial IQ is relatively high, these changes may be dramatic. In contrast, discrete trial training may not result in improvements in behavior, self-care, and other adaptive skills.

Occupational therapy practitioners can be members of the team providing the intensive discrete trial training or may provide services that complement the behavioral program. Occupational therapists tend to provide consultation to the program's design and to provide evaluation data helpful in understanding the children's sensory processing and developmental levels. When the program is implemented in preschool or school settings, occupational therapists provide services as defined by the Individuals with Disabilities Education Act that reinforce goals of the program while contributing play-based interventions that complement the behavioral programming.

What were the study's strengths and limitations?

As Level I research evidence, this study had a number of assets. The sample was randomly assigned, evaluation was **blind** (see *Glossary*), and treatment fidelity was measured. Limitations included a sample size that was relatively small and comprised children with autism and PDD. Outcomes were measured 3 to 4 years after the intervention was initiated, demonstrating the long-term effects of the intervention. Although it is an asset that the intervention was implemented over a long period of time, it was also a limitation, because lengthy trials allow other variables to interfere with the results. In the 3- to 4-year period after original selection of the groups, naturally occurring events and the environment not controlled by the researcher would influence the child's development, diminishing or enhancing the effects of the intervention.

Glossary

Applied behavior analysis (ABA)—Applied behavior analysis is the process of systematically applying interventions based on the principles of learning theory to improve socially significant behaviors to a meaningful degree, and to demonstrate that the interventions used are responsible for the improvement in behavior. "Socially significant behaviors" include reading, academics, social skills, communication, and adaptive living skills.

Autism—Autism Spectrum Disorder—Pervasive Developmental Disorders (PDD) is the diagnosis used in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.), text revision (DSM-IV-TR; American Psychiatric Association [APA], 2000), and in the International Classification of Diseases (ICD-10; World Health Organization, 1993) to describe children with a cluster of symptoms that vary widely in type and severity. The symptoms are grouped into three broad categories: (a) qualitative impairment in social interaction; (b) communication disorders; and (c) stereotyped, repetitive patterns of behaviors or a restricted range of interests. Depending on the level and distribution of impairment across these categories, a child can be diagnosed with Autistic Disorder, Asperger syndrome, or Pervasive Developmental Disorder—Not Otherwise Specified (PDD—NOS). All three of these diagnoses are usually included under the umbrella term *autism spectrum disorders* (ASDs).

The Individuals with Disabilities Education Improvement Act of 2004 (IDEA, Pub. L. 108-446) also includes autism as a disability category under which children might be eligible for special education and related services. The IDEA regulations define *autism* as "a developmental disability significantly affecting verbal and nonverbal communication and social interaction generally evident before age 3 that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences" (34 C.F.R., §300.7[c][1][i]).

Blinded/blinding—Blinding refers to the practice of keeping members of the research study unaware of which group a participant is assigned to (treatment or control) in the study. Single blinding usually refers to keeping study participants unaware of whether they are receiving the experimental or the sham treatment. Double blinding usually refers to keeping the participants and those who are administering the treatment unaware of who is receiving the experimental and who is receiving the sham treatments. In some cases, where it is impossible to blind those administering treatment, the individuals who are administering the outcome measures can be blinded to group status.

Studies in which blinding does not occur can have significant biases. When the participants know that they are receiving the experimental treatment, they often get better because they think they ought to (this is often referred to as the placebo effect). When researchers know that a participant is receiving the experimental treatment, they often subconsciously favor those participants when evaluating them on outcome measures. For instance, when timing a participant in the treatment group, researchers may unknowingly stop the watch a little faster or slower so the treatment participant seems to do better.

Control group—A group that received special attention similar to that which the treatment group received, but did not receive the treatment.

Discrete trial training—Discrete trial training involves breaking a behavior into its most basic functional units and presenting the units in a series. A discrete trial usually consists of the following: The antecedent, possibly combined with a prompt (a nonessential element used to assist learning or correct responding), the behavior of the student, and a consequence. If the student's behavior is what is desired, the consequence is something positive: food, candy, a game, praise, etc. If the behavior was not correct, the teacher offers the correct answer, then repeats the trial, possibly with more prompting if needed.

Randomization (random assignment)—Randomization refers to the practice of assigning participants to either the treatment or control group using random allocation. Random allocation methods include flipping a coin or using a random number table. Randomization is meant to prevent the possibility that the experimenter might subconsciously let his or her opinions and preferences influence into which group a participant goes. Randomization also helps to ensure that the two groups are essentially equal on many demographic variables, although randomization does not always create equal groups.

Nonrandomized studies are not considered to be true experiments but are often referred to as quasi-experimental. Serious biases can occur when studies are nonrandomized.

Treatment fidelity - Treatment fidelity refers to the methodological strategies used to monitor and enhance the reliability and validity of behavioral interventions.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.—Text Revision). Washington, DC: Author.

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For more information about the Evidence-Based Literature Review Project, contact the Practice Department at the American Occupational Therapy Association, 301-652-6611, x 2040.