



AOTA Evidence Briefs

Developmental Delay in Young Children

**A product of the American Occupational Therapy Association's Evidence-Based Literature Review Project*

DD #11

Occupational therapy improves fine motor skills and related functional performance in preschool children

Case-Smith, J., Heaphy, T., Marr, D., Galvin, B., Koch, V., Ellis, M. G., & Perez, I. (1998). Fine motor and functional performance outcomes in preschool children. *American Journal of Occupational Therapy*, 52, 788–796.

Level: IIA2b

Nonrandomized controlled trial, two groups, 20 or more participants per condition, moderate internal validity, moderate external validity

Why research this topic?

The authors' earlier studies of the effects of occupational therapy services on development of fine motor skills in preschool children suggested that benefits were possible. These studies were limited, however, in focusing on a small number of children in one setting and in comparing the children only with themselves. To make conclusions from studies like these generalizable to a larger group of children, more broad-based, controlled research was needed.

What did the researchers do?

Case-Smith and her colleagues (1998), variously of Ohio State University (Columbus), Utica College (Syracuse, NY), and Touro College (Dix Hills, NY), and in private practice, built on the previous studies. They increased the sample size, included children from eight locations, obtained specific information about the occupational therapy services provided to the children, and used a **control group** (see *Glossary*) of children who did not receive occupational therapy services.

There were 64 children who completed both pre- and posttesting: 40 boys and 24 girls. Their average age was 4.7 years. Forty-four (the treatment group) were experiencing delays in fine motor development; 20 (the control group) were not. All were attending preschool at least half-time. All the children in the treatment group had scored at least 1.5 standard deviations below the norm on the fine motor section of the Peabody Developmental Motor Scales, were receiving occupational therapy weekly, and had completed the motor accuracy (MAC) test of the Sensory Integration and Praxis Tests with enough accuracy that it could be scored. Children who had a neurological dysfunction, a severe sensory loss, or a serious health problem were excluded. The children in the control group were developing typically according to their parents and teachers and were not receiving occupational therapy or special education.

The intervention involved occupational therapists and occupational therapy assistants providing services to the treatment group. The therapists completed weekly forms about the services they provided, reporting (a) how much time they devoted to intervention, (b) whether they saw the child individually or in a group, (c) whether they provided consultation to the child's teacher, (d) what contact they had with parents, (e) what the child's level of participation was, and (f) the goals and the activities for the session. The amount of services that the children received differed across sites. For example, at the sites in Illinois and New York, the children received therapy twice a week; at the sites in Ohio, once a week. The intervention lasted for one school year.

The outcome areas of interest were as follows:

- Basic performance components, specifically *in-hand manipulation* (as measured by the Nine-Hole Peg Test); *eye-hand coordination* (as measured by the MAC test); *stereognosis* (recognition by touch) (as measured by the Manual Form Perception test of the Southern California Sensory Integration Test); *visual perception* (as measured by the Position in Space [PS] and Figure Ground [FG] subtests of the Developmental Test of Visual Perception); and *sensory responsiveness* (as rated by each child's parent using the Sensory Profile)
- Functional performance related to fine motor components, specifically *overall performance* (as measured by the Fine Motor section [FMS] of the Peabody Developmental Motor Scales); *visuomotor skills* (as measured by the Spatial Relations and Copying subtests of the Developmental Test of Visual Perception); *visuomotor integration* (as measured by the Draw-a-Person test); *functional skills* (grasping a pencil and scissors, cutting, buttoning, etc., as measured by the Functional Skills test); *self-care, mobility, and social function* (as measured by the corresponding scales of the Pediatric Evaluation of Disability Inventory [PEDI]); and *self-esteem* (as rated by each child's primary teacher on 19 items)

The research team administered the various assessments at the beginning and the end of the school year.

What did the researchers find?

In their comparison of children with and without delays across performance components, results revealed **significant** (see *Glossary*) differences after 1 year in in-hand manipulation for both samples, MFP for both samples, MAC for children with delays, and visual perception (PS and FG) for both samples. No differences were found for sensory profile for both samples and MAC for children without delays.

In their comparison of children with and without delays across functional performance after 1 year, results revealed significant differences in Draw a Person for both samples, visuomotor integration for both samples, PEDI for both samples, Functional Skills for both samples, and Peabody FMS for children with delays. No differences were found for self-esteem in either sample or for Peabody FMS for children without delays.

The sample of children with delays improved more than the children without delays on 5 tests: MAC, Draw a Person, Peabody FMS, and Functional Skills.

Within the treatment group, the researchers compared performances among three groups corresponding with the frequency of intervention: less than once a week, about once a week, and more than once a week. Frequency made a significant difference only in visuomotor skills.

The researchers also compared performances among three groups in the treatment group corresponding to the number of consultations received: none, 25% of the time or less, and more than 25% of the time. This factor made a significant difference for in-hand manipulation and Draw a Person.

What do the findings mean?

- The findings support the use of occupational therapy with preschool children experiencing delays in fine motor development. Those who received regular occupational therapy improved significantly in fine motor skills and related functional performance. Intensity of treatment influenced visual motor performance.
- The findings should boost confidence in funding occupational therapy interventions with preschool children who are experiencing delays in fine motor development.

What are the study's limitations?

- It used multisites with half of the sample from Ohio.
- Sites were chosen according to seven research team members trained by AOTF/AOTF.
- Unclear how the research team was chosen to participate.
- Unclear how 22 practitioners were recruited.
- The recruitment process of subjects is unclear.
- The year of the cohort is unknown.
- Lack of comparison to sample of children without fine motor delays.

Glossry

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

significance (or significant)—a statistical term; this refers to the probability that the results obtained in the study are not due to chance, but to some other factor (such as the treatment of interest). A significant result is one that is likely to be generalizable to populations outside the study.

Significance should not be confused with clinical effect. A study can be statistically significant without having a very large clinical effect on the sample. For example, a study that examines the effect of a treatment on a client's ability to walk may report that the participants in the treatment group were able to walk significantly longer distances than the control. However, if you read the study you may find that the treatment group was able to walk, on average, 6 feet, whereas the control group was able to walk, on average, 5 feet. Although the outcome may be statistically significant, a clinician may not feel that a 1-foot increase will make his or her client functional.

■ Terminology used in this document is based on two systems of classification current at the time the evidence-based literature reviews were completed: *Uniform Terminology for Occupational Therapy Practice—Third Edition* (AOTA, 1994) and *International Classification of Functioning, Disability and Health (ICIDH-2)* (World Health Organization [WHO], 1999). More recently, the *Uniform Terminology* document was replaced by *Occupational Therapy Practice Framework: Domain and Process* (AOTA, 2002), and modifications to *ICIDH-2* were finalized in the *International Classification of Functioning, Disability and Health* (WHO, 2001).

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