



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

CITATION: Case-Smith, J., Heaphy, T., Marr, D., Galvin, B., Ellis, M. G., & Perez, I. (1998). Fine Motor and Functional Performance Outcomes in Preschool Children. *American Journal of Occupational Therapy*, 52(10), 788–796.

LEVEL OF EVIDENCE: IIA2a

RESEARCH OBJECTIVE/QUESTION

The purpose of this study was to evaluate fine motor and related functional outcomes in preschool children who receive regular occupational therapy services.

Research questions:

1. Do children who receive occupational therapy services in a preschool setting demonstrate significant improvement in fine motor, visuoperceptual, visuomotor, and functional performance over the course of the school year?
2. Do children with fine motor delays who receive occupational therapy services improve more than children without delays who do not receive services?
3. Do children who receive a greater number of occupational therapy sessions improve more in fine motor performance than those who receive fewer sessions, when grouped according to the number of sessions received?
4. Do children who receive more consultation improve more in fine motor performance than those who receive less consultation, when grouped according to amount of consultation provided?

DESIGN

	RCT		Single Case		Case Control
	Cohort	X	Before-After		Cross Sectional

A sample of children with fine motor delays who received occupational therapy services and a comparison sample of children without delays were tested before and after intervention.

SAMPLING PROCEDURE

	Random		Consecutive
X	Controlled		Convenience

SAMPLE

N=64	M age=NR	Male=40	Ethnicity White=36 Black=18 Hispanic=5 Other=5	Female=24
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NR = Not reported

There were 20 participants without fine motor delays and 44 participants with fine motor delays.

PARTICIPANT CHARACTERISTICS

Participants had to be 3½ to 6 years of age and had to attend preschool at least half-time.

- Criteria for the participants with fine motor delays included scoring at least 1.5 least standard deviations below the norm on the PDMS-Fine Motor (PDMS-FM), receiving weekly direct occupational therapy services, and completing the MAC test of the Sensory Integration and Praxis Tests (SIPT) with enough accuracy that it could be scored.
- Participants excluded from the study include those who had an educational or medical diagnosis indicating neurological dysfunction, a severe sensory loss, or a serious health problem.
- Participants without fine motor delays were typically developing as reported by their parents and preschool teachers and received no occupational therapy or special education.

MEDICAL DIAGNOSIS/CLINICAL DISORDER

Not specified

OT TREATMENT DIAGNOSIS

Fine motor delays

OUTCOMES

Measures	Reliability	Validity
Nine-hole peg test	Standardized	Standardized
2 subtests of the SIPT	Standardized	Standardized
2 subtests of the DTVP	Standardized	Standardized
Sensory Profile	Not standardized	Not standardized
PDMS-FM	Standardized	Standardized
Draw-A-Person	Standardized	Standardized
Functional Skills Test	Standardized	Standardized
PEDI	Standardized	Standardized
Self-esteem rating	Not standardized	Not standardized

Outcome—OT terminology

Performance components: in-hand manipulation, motor accuracy, manual form perception, visual perception, sensory processing, visuomotor skills, bilateral coordination

Performance Areas: self-care, mobility, socialization

Outcome—ICIDH-2 terminology

Impairment

Activity

INTERVENTION**Description**

No specific protocol was used. Most of the therapy focused on specific performance components/ICIDH-2 impairment level (visuomotor manipulation activities, visuoperception activities, sensory activities), with less focus on performance areas/ICIDH-2 activity level (self-care, play).

Each week, the practitioners completed forms about the services provided to the participants with fine motor delays. Data recorded included (a) the amount of time for intervention, (b) whether the participant was seen individually or in a group, (c) whether consultation was provided, (d) parent contact, (e) the participant's level of participation, and (f) goals and activities for that session.

Who delivered

- 17 registered occupational therapists
- 5 certified occupational therapy assistants

The average years of experience as an occupational therapy practitioner was 12 (range = 7 to 23) and experience in public schools was 9 (range = 4 to 17). Seventeen were school system employees, and 5 were contracted practitioners.

Setting

Schools (sites in New York, Ohio and Illinois)

Frequency

Participants received weekly occupational therapy services, with a minimum of 30 minutes per week. The amount of services received differed due to variations in start and stop dates and what comprised weekly therapy. At the two New York sites and the Illinois site, the participants often received therapy twice a week. At the Ohio sites, therapy was always once a week.

Duration

One school year. The exact number of months differs because of different start and end dates. Number of sessions ranged from 16 to 34.

Follow-up

Not reported

RESULTS

Two-way analyses of variance (ANOVA) were computed to analyze the difference between pretest and posttest scores and between the participant groups.

- Post hoc analysis revealed that the participants without fine motor delays made significant improvements in In-Hand Manipulation, MFP, Visuoperception, Draw-a-Person, Visuomotor skills, Functional Skills, and PEDI Self-Care Function. These participants made significant improvement in all but two of the measures, the Sensory Profile and Self-Esteem.
- Participants who received services improved more than the participants receiving no services on five tests: In-Hand Manipulation, MAC, Functional Skills, Draw-a-Person, and PDMS-FM.

Pretest and posttest differences were compared according to the number of sessions by creating three groups: (a) those receiving intervention less than once a week (15–19 sessions a year) (n=12), (b) those receiving intervention about once a week (20–25 sessions a year) (n=22), and (c) those receiving intervention more than once a week (26–34 sessions a year) (n=10).

- Two-way ANOVAs noted that the number of sessions made a significant difference only in the pretest and posttest comparison of visuomotor skills, $F(1,41) = 3.51$, $p = .039$.

Three groups were formed according to the number of consultations received during the year. The groups are those who received (a) no consultation (n=20), (b) consultation 25% or less of the time (n=13), and (c) consultation more than 25% of the time (n=11).

- Two-way ANOVAs indicated that this interaction effect was significant for In-Hand Manipulation, $F(1,41) = 3.27$, $p = .048$, and Draw-a-Person, $F(1,40) = 3.69$, $p = .034$.

CONCLUSIONS

- Students with fine motor delays who received regular occupational therapy services improved significantly in the fine motor parameters measured.
- Intensity of treatment does not have a strong influence on improvement in performance.
- Consultation is an effective intervention approach used by occupational practitioners.
- Children with fine motor delays make important gains with preschool services that include occupational therapy intervention, and this intervention narrows the gap between their performance and that of peers without delay.

- The two measures that did not improve, sensory responsiveness and self-esteem, may indicate that changes in a student's performance do not always result in perception of behavioral change by the parent and teacher.

LIMITATIONS

- The subjects were largely from Ohio and New York only.
 - Sites were chosen according to seven research team members trained by AOTA and AOTF.
 - Unclear how the research team was chosen to participate.
 - Unclear how the 22 practitioners were recruited.
 - Comparison to sample of children without fine motor delay.
 - The intervention was not controlled.
 - Two measures had limited evidence of reliability and validity.
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- 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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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.

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