AOTA Evidence Briefs
Attention Deficit/
Hyperactivity Disorder
Structured Abstracts
A product of the American Occupational Therapy Association's
Evidence-Based Literature Review Project

Cognitive training combined with medication may reduce impulsivity in children with Attention Deficit/Hyperactivity Disorder (ADHD)

CITATION: Hall, C. W., & Kataria, S. (1992). Effects of two treatment techniques on delay and vigilance tasks with attention deficit hyperactive disorder (ADHD) children. *Journal of Psychology, 126,* 17–25.

LEVEL OF EVIDENCE: IIA1a

RESEARCH OBJECTIVE/QUESTION
To ascertain the effects of 2 interventions, behavior modification and cognitive training, under on-medication (Ritalin) and off-medication conditions on the hyperactive behavior patterns of children; assessing the acceptability of the 2 interventions from the children's and parents' perspectives.

DESIGN

X	RCT		Single case		Case control
	Cohort		Before–after		Cross-sectional

RCT = randomized control trial
Non-RCT 3 groups, 2 conditions

SAMPLING PROCEDURE

X	Random		Consecutive
	Controlled		Convenience

Random assignment to 3 groups: behavior modification, cognitive training, control.

SAMPLE

N = 21	*M* age = 7.7	Male = 18	Ethnicity: Black = 3, White = 18	Female = 3

PARTICIPANT CHARACTERISTICS
- Diagnosed as having ADHD

- Between ages 6 and 12 years

MEDICAL DIAGNOSIS/CLINICAL DISORDER
ADHD

OT TREATMENT DIAGNOSIS
Not specified

OUTCOMES
Treatment techniques on delay and vigilance tasks

Measures	Reliability	Validity
Gordon Diagnostic System (GDS) (child's ability to sustain attention and exert self-control) [computer game]	NR	NR
Children's Intervention Rating Profile (CIRP) (positive and negative statements about intervention)	NR	NR
Intervention Profile–Parents	NR	NR

NR=Not reported

Outcome—OT terminology
Performance components:
- Cognitive integration and components

Outcome—ICIDH-2 terminology
Impairments

INTERVENTION
<u>3 treatment groups:</u>
Control
Behavior modification
Cognitive training
<u>2 conditions:</u>
On and off medication (they were counterbalanced for the 2nd and 3rd sessions for each of the 3 treatment groups).
Off medication: A minimum of 24 hours before testing

Description
<u>Behavior modification:</u>
Children received direct reinforcement for correct responses during delay and vigilance portions of the GDS under both off- and on-medication conditions.
<u>Cognitive:</u>

The group received training in how to approach the GDS delay and vigilance tasks under on- and off-medication conditions.
Control:
Standard procedures for the GDS under on- and off-medication conditions.

Who delivered
- Pediatrician
- Psychologist
- Educator
- 3 graduate assistants

Setting
Clinical setting

Frequency
Each child was evaluated 3 times over a 6- to 8-week period.

Follow-up
N/A

RESULTS
- 3 separate factorial designs were used to analyze the GDS data (GDS scores = dependent variables; 3 treatment groups = independent variables)
- 1º analysis considered the efficiency ratio from the delay task as the dependent measure 2º and 3º analyses considered correct responses and errors of commissions as dependent variables from the vigilance task.
- Analyses of variance (ANOVAs) were performed on the CIRP and the Intervention Profile–Parents data.
- 1º analysis: No significant main effects for either group or condition. There was a significant interaction effect for group X condition [$F(4, 36) = 3.21$, $p = .024$]. When the cognitive intervention was combined with medication, as opposed to medication alone or intervention alone, the efficiency ratio improved significantly [$M = 102.43$, $SD = 5.56$; $M = 85.14$, $SD = 17.18$; $M = 87.00$, $SD = 8.89$, respectively].
- 2º analysis: No significant effects were found for group or condition. Although not significant, there was a trend toward better performance when the intervention was combined with medication as compared with medication only or intervention only [$M = 94.52$, $M = 89.52$, $M = 88.67$, respectively].
- 3º analysis: No significant main effects were found for group or condition.
- ANOVAs: There were no significant differences in how the children rated the 3 interventions. However, results of the parent's acceptability ratings indicated significant differences, [$F(2, 18) = 3.59$, $p = .049$]. Follow-up Scheffe tests showed that the parents with children in the cognitive intervention group gave higher acceptability ratings than did parents with children in the control group. There were no significant differences between parent ratings of children in either the cognitive and behavioral or behavioral and control groups.

CONCLUSIONS

- Results partially support the combined approach of medication and intervention. Significant additive effects were seen when the cognitive intervention was combined with medication on the delay task. This combination proved beneficial in helping children diagnosed with ADHD control impulsivity.
- Some children with ADHD may become so excited over the possibility of reinforcement that their performance actually deteriorates. This was noted with participants in the behavioral group.
- Results of the children's acceptability ratings did not indicate any significant differences among the behavioral, cognitive, or control groups.
- Results showed significantly higher parent ratings for those children participating in the combination of medication and a cognitive intervention strategy than for those children receiving medication only.

Limitations

- Long-term effects need to be assessed with a larger sample.
- The cognitive and behavior approaches used in the study represent only a very small segment of what is labeled cognitive or behavioral interventions.

- 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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