

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

Methylphenidate and behavior modification may have complementary effects in children with Attention Deficit/Hyperactivity Disorder (ADHD) and either Oppositional Defiant Disorder (ODD) or Conduct Disorder (CD)

CITATION: Kolko, D. J., Bukstein, O. G., & Barron, J. (1999). Methylphenidate and behavior modification in children with ADHD and comorbid ODD or CD: Main and incremental effects across settings. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38, 578–586.

LEVEL OF EVIDENCE: IIB1a

RESEARCH OBJECTIVE/QUESTION

To evaluate the separate and incremental effects of methylphenidate (MPH) and behavior modification (BMOD).

MPH, and to a lesser extent BMOD, would produce significant improvements in externalizing and social behaviors, and each modality would show "incremental effects" beyond the effects of the other one.

DESIGN

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

RCT = randomized control trial

SAMPLING PROCEDURE

	Random	Consecutive
Χ	Controlled	Convenience

22 of the 70 patients met criteria for ADHD and either ODD or CD and study criteria (ages 7–13, no other medications, assent/consent); 16 of these patients completed the study.

SAMPLE

N = 16 M age = 9.6 years, SD Male = 16 Ethnicity: African Female = 0
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5.1 years	American = 12	
J		

PARTICIPANT CHARACTERISTICS

- 7 had comorbid CD
- 9 had comorbid ODD

MEDICAL DIAGNOSIS/CLINICAL DISORDER

ADHD

Comorbid CD and ODD

OT TREATMENT DIAGNOSIS

N/A

OUTCOMES

Main and incremental effects of medication and BMOD in children with ADHD

Measures	Reliability	Validity
Symptom rating scales:		
Inattentive/Overactive (IOWA/Conners) Rating	NR	NR
Scale (abbreviated)		
Overt Aggression Scale (OAS)	NR	NR
3-item Positive Mood/Behavior Scale	NR	NR
4-item Peer Conflicts Scale	NR	NR
Behavioral frequencies:		
Observation of 6 positive and 8 negative individual		
behaviors	NR	NR
Side effects:		
Stimulant Drug Side Effects Rating Scale	NR	NR

NR = Not reported

Outcome—OT terminology

Performance components:

Psychosocial skills and psychological components

Outcome—ICIDH-2 terminology

Impairment

INTERVENTION

Partial hospitalization (summer treatment and enrichment program, or STEP) consisting of hourly, structured therapeutic, educational, and recreational activities (e.g., skills group, classroom, enrichment, gym)

Intervention:

- Children grouped by age/developmental level and managed by 3 or 4 counselors who worked with a treatment team
- 2 behavioral conditions (BMOD and no behavior modification [NBMOD])
- Stimulant medication, MPH; only 1 of the following 3 MPH conditions was applied per day: placebo, low-dose MPH (0.3 mg/kg per dose), or high-dose MPH (0.6 mg/kg per dose)

Description

- BMOD: Points system
- NBMOD: Contingencies limited
- MPH: 2-week baseline (non-MPH); 1 of 3 MPH conditions per day; twice-daily dosing

Who delivered

- Child/adolescent psychiatrist
- Clinical psychologist
- Special educator
- Social workers
- Nurses

Setting

Clinical setting

Frequency/Duration

Program 5 days per week, 8 hours per day

Follow-up

N/A

RESULTS

ANOVAs to document the simple main effects of the MPH (placebo, low-dose, high-dose) or BMOD (absent vs. present), with 2 planned contrast (placebo vs. any MPH; low-dose vs. high-dose MPH)

Symptoms rating scales:

Classroom:

Main effects: MPH led to lower inattentive/overactive ratings and higher positive mood/behavior ratings; high- and low-MPH conditions differed from placebo in inattentive/overactive, OAS, and positive mood/behavior ratings, but the 2 MPH conditions did not differ from each other. BMOD was associated with reductions in inattentive/overactive, oppositional/defiant, and peer conflicts ratings and an increase in positive mood/behavior ratings.

<u>Enrichment room</u>: MPH reduced inattentive/overactive, oppositional/defiant, and peer conflicts and increased positive mood/behavior. High and low MPH differed from placebo in inattentive/overactive, oppositional/defiant, peer conflicts, and positive mood/behavior but they did not differ from each other. BMOD reduced oppositional/defiant only.

<u>Incremental effects:</u> None in the classroom. In the enrichment room, MPH added to the effects of BMOD on increasing positive mood/behavior ratings.

Behavioral frequencies:

Main effects: MPH was associated with more contributing to group discussion and positive behaviors in social skills group, fewer negative behaviors in gym, and more positive behaviors on the field. Comparisons showed that the 2 MPH conditions differed from placebo but not from each other. No incremental effects for MPH; BMOD was found to decrease negative behaviors in the gym.

Side effects ratings:

Main effects: No main effects

Incremental effects: MPH for the number of side effects. Follow-up tests revealed fewer side effects for high-dose MPH than for either low-dose MPH or placebo. Individual differences: In the classroom, the combined treatment was more effective than was MPH in reducing oppositional/defiant and OAS ratings, but the reverse was true for peer conflicts ratings. The combination was more effective than BMOD alone in reducing inattentive/overactive and oppositional/defiant. MPH alone and BMOD alone were not significantly different from one another on any of the measures. In the enrichment room, the combination of MPH and BMOD was more effective than was BMOD alone but not MPH alone in reducing inattentive/overactive and OAS (Overt Agression Scale) symptoms. MPH alone was more effective that BMOD alone in decreasing the scores on these 2 scales.

CONCLUSIONS

- There were no incremental effects of MPH in the classroom. Incremental effects were demonstrated in the enrichment room on positive mood/behavior.
- BMOD was associated with main effects that included improved oppositional behavior in the classroom and enrichment room and improved inattention/hyperactivity, positive behavior, and peer conflicts in the classroom. The relative absence of incremental effects where main effects were found indicated that MPH enhanced the impact of BMOD more often than vice versa.
- General findings also highlight setting or situational differences in the effects of both MPH and BMOD. The effects of BMOD on core symptoms were much stronger in the classroom than in the enrichment room and had an effect on individual behaviors in 2 of the 3 settings.
- The effects of both treatment modalities also varied by clinical target or domain. MPH had a greater effect on positive social behavior, whereas BMOD was more effective for oppositional behavior and peer conflicts in the classroom.

Clinical implications:

BMOD procedures and stimulant medication may have complementary effects in children with ADHD and various negative behaviors, such as aggression and poor social behavior.

LIMITATIONS

• No follow-up data

- Small sample size
- Highly specialized partial program differed from regular classroom

Biases

	Attention	Masking/blinding	Drop outs
Χ	Contamination	Co-intervention	

All participants were previously exposed to BMOD with potential carryover effects.

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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