AOTA Evidence Briefs

Attention Deficit/Hyperactivity Disorder

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

A#9

Study results confirm effectiveness of combined treatment and medication management in reducing children's ADHD symptoms

MTA Cooperative Group. (1999b). Moderators and mediators of treatment response for children with attention-deficit/hyperactivity disorder: The multimodal treatment study of children with attention-deficit/hyperactivity disorder. *Archives of General Psychiatry, 56,* 1088–1096.

Level: IA1a

Randomized control trial, 20 or more participants per condition, high internal validity, high external validity

Why research this topic?

Research has shown the short-term effectiveness of drugs and behavior therapy as treatments for attention-deficit/hyperactivity disorder (ADHD). However, there have been few long-term studies comparing the two treatments individually or in combination. The MTA Cooperative Group (1999a) conducted such a study. (MTA is an abbreviation for the Multimodal Treatment Study of Children with Attention-Deficit/Hyperactivity Disorder.) Among other interests, the group wanted to identify patterns of response among subgroups of the participating children.

What did the researchers do?

The MTA Cooperative Group (1999b) examined patterns of response in subgroups that were defined by moderators and mediators. The "moderators" were five baseline variables: the sex of the child, whether the child had previously received medication, whether the child had any other disruptive disorder, whether the child had any anxiety disorder, and whether the family was receiving public assistance. Analysis of moderators reveals the types of participants who respond best to each intervention. The "mediators" were two variables related to treatment implementation: the family's acceptance of the child's treatment assignment and family attendance at treatment sessions. Analysis of mediators helps identify links between the different treatments and particular outcomes.

The researchers recruited study participants from a variety of sources: mental health settings, pediatricians, advertisements, and school notices. To be eligible, participants had to be between 7 and 9.9 years of age, in grades one through four, and residing with the same primary caretaker for at least the previous 6 months. They also had to meet the criteria for ADHD Combined Type specified in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.). From a pool of 4,541 children, the researchers identified 579 (465 boys and 114 girls) who met their criteria. The average age of the sample was 8.5 years.

The children were randomly assigned to one of four interventions, each lasting 14 months:

1. Behavioral treatment, which involved 27 group sessions (six families per group) and 8 individual (one family) sessions of parent training; 8 weeks of child-focused treatment in a summer camp, 5 days per week, 9 hours per day; and school-based treatment, which included 10–16 sessions of biweekly teacher consultation and 12 weeks of a part-time paraprofessional aide working directly with the child.

2. Medication management, which started with administration of methylphenidate three times a day for 28 days. During this period, the researchers determined the appropriate dose using five randomly ordered repeats each of a placebo (5 milligrams, 10 milligrams, and 15 or 20 milligrams [the higher dose for children who weighed more than 25 kilograms]). Full-strength doses were given at breakfast and lunch; a half-dose in the afternoon. Within the 28 days, the researchers established the best dose for each child and continued with that. Children who were not responding well to methylphenidate received alternative medications, as appropriate (e.g., dextroamphetamine, pemoline, imipramine).
3. Combined treatment, which involved behavioral treatment and medication management. The researchers integrated the two treatments, rather than administering them separately.
4. Community care, which involved providing participants with a list of community mental health resources. Most of the participants in this group received medication through those resources.

In their analyses of moderators and mediators, the researchers were interested in the following outcome areas: *ADHD symptoms* (inattention as rated by teachers and parents; and hyperactivity/impulsivity as rated by teachers and parents using SNAP, an instrument named using the initials of its developers' names, and a classroom observer using the Classroom Observation Code); *oppositional/aggressive symptoms* (as rated by teachers and parents using SNAP); *social skills* (as measured by teachers and parents using the Social Skills Rating System); *internalizing symptoms*—for example, anxiety and depression (as measured by teachers and parents using the Social Skills Rating System, and by the children themselves, using the Multidimensional Anxiety Scale for Children); and *parent-child relations* (power assertion and personal closeness, as measured by a questionnaire). Assessments were made before the intervention and at 3, 9, and 14 months (the end of the study).

What did the researchers find?

For gender, prior medication, and coexisting disruptive disorder, there was only one **significant** (see *Glossary*) interaction with each outcome. Thus the results of the study did not differ for boys and girls, children who had and had not previously received medication, and children who had or did not have a coexisting disruptive disorder.

For coexisting anxiety disorder, however, there were three significant interactions: with parents' rating of hyperactivity/impulsivity, with parents' rating of internalizing symptoms, and with children's rating of internalizing symptoms. In children who did not have a coexisting anxiety disorder, combined treatment and medication management proved to be better than community care on these measures. In children who did have a such a disorder, combined treatment, medication management, and behavioral treatment all were better than community care.

For family receipt of public assistance, there were significant interactions with teachers' rating of social skills and with the parent-child relationship measure of personal closeness. In families receiving public assistance, combined treatment was better than the other treatments on the social skills measure, whereas in families not receiving assistance there was no difference among the treatments. On the personal closeness measure, in families receiving public assistance, medication management showed decreases in parent-reported positive interchange across the 14 months of treatment, whereas the other three treatments showed increases or no change.

For acceptance/attendance, there was a significant difference across treatment groups. Acceptance/attendance was higher in medication management than in behavioral treatment or combined treatment. It did not differ between the latter two.

What do the findings mean?

For therapists and other providers, the findings suggest that the MTA's results are generalizable for boys and girls, for those who have and have not previously received medication, and for participants who have and do not have a coexisting disruptive disorder. They also suggest that for children who do not have a coexisting anxiety disorder, combined treatment and medication management are more effective than community care in reducing hyperactivity/impulsivity and internalizing symptoms, as rated by parents, and in reducing internalizing symptoms as rated by the children themselves. For children who do have a such a disorder, combined treatment, medication management, and behavioral treatment all are more effective than community care in these areas.

Further, the findings suggest that acceptance/attendance is highest in medication management.

What are the study's limitations?

The results of this study are regarded as exploratory rather than confirmatory by the authors themselves "because the sample size does not yield sufficient statistical power to examine fully moderator- or mediator-defined subgroups and because of repeated statistical testing" (p. 1090).

Glossary

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 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 group. 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 believe that a 1-foot increase will improve his or her client's function.

■ 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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