

# ADHD treatment and academic performance: A case series

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## Practice recommendations

- Most new cases of attention deficit–hyperactivity disorder (ADHD) are of the predominantly inattentive subtype. Research on the use of psychostimulants in these patients has shown a high rate of nonresponders.
- Although psychostimulants showed a short-term decrease in symptoms in students diagnosed with predominantly inattentive ADHD, they did not significantly improve grade-point averages.

To evaluate psychostimulants in the treatment of attention deficit–hyperactivity disorder (ADHD), predominantly inattentive subtype with coexisting academic impairment, a consecutive sample of 35 students from a private, primary care, office-based practice was followed for 1 year. All participants received psychostimulants, multimodal interventions, and treatment of comorbid disorders. Baseline mean grade-point averages (GPAs) from the preceding

school year were compared with mean GPAs calculated at 1 year. Statistical analysis was by a paired samples *t* test.

Of 32 students who completed the study, 27 pupils' GPAs did not improve (84.4%), while 5 pupils' GPAs did improve (15.6%) ( $P=.176$ ).

These findings call for additional research to further define predominantly inattentive ADHD in patients who present with inattention and academic concerns, and the role of stimulants in the treatment of this disorder.

## ■ DIAGNOSTIC CRITERIA

In 1994, the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* redefined the full syndrome of attention deficit hyperactivity disorder as combined ADHD, and introduced 2 new subtypes: predominantly inattentive and predominantly hyperactive-impulsive.<sup>1</sup> Since publication, the majority of new cases identified by *DSM-IV* have been predominantly inattentive ADHD.<sup>2</sup> Primary care physicians manage 86% of patients with ADHD.<sup>3</sup>

## The clinical issues

The diagnostic criteria defining predominantly inattentive ADHD and the evidence supporting its

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TABLE 1

### Profile of participants in study of ADHD treatment and academic performance

	Participants	Nonparticipants	GPA not improved	GPA improved
<b>Gender</b>				
Male	23	2	18	5
Female	9	1	9	0
<b>Mean age (mo)</b>	125 ± 30	124 ± 9.2	127 ± 32	119 ± 10
<b>Race</b>				
White	28	3	24	4
African American	4	0	3	1
<b>Mean GPA</b>	2.26 ± .62	2.24 ± .54	2.26 ± .66	2.24 ± .42
<b>Family structure</b>				
Both parents	20	2	17	3
Blended	8	1	6	2
Single parent	4	0	4	0
<b>Parent psychopathology</b>	8	0	7	1
<b>Mean comorbidities</b>	1.53	1.67	1.59	1.20
GPA, grade-point average				

inclusion as a separate subtype mainly involve students with academic impairment.<sup>4</sup> Measuring the effect of pharmacologic intervention on ADHD and academic functioning is important.<sup>5,6</sup>

Research on the use of psychostimulants in patients with attention deficit disorder without hyperactivity as defined by the *DSM-III*<sup>7</sup> showed a high rate of nonresponders and no evidence of long-term effects on academic achievement and learning.<sup>8-10</sup> It is not clear whether these results apply to patients with predominantly inattentive ADHD.<sup>11</sup> A recent National Institutes of Health Consensus Statement acknowledged the need for

research that specifically targets predominantly inattentive ADHD and the effects of psychotropic therapy on school performance associated with the subtype.<sup>12</sup>

The following study was therefore designed to address these issues and determine the effect of psychostimulant treatment in patients with predominantly inattentive ADHD and academic impairment.

## ■ METHODS

The 35 participants from the author's rural, office-based practice, seen because of academic

TABLE 2

**Grade-point averages at baseline  
and at the study's conclusion\***

Student #	Baseline GPAs	Treatment GPAs	Change
1	2.29	1.59	-.70
2	3.00	2.40	-.60
3	1.80	1.25	-.55
4	2.50	1.96	-.54
5	2.50	2.00	-.50
6	1.80	1.50	-.30
7	3.50	3.22	-.28
8	2.57	2.35	-.22
9	2.43	2.29	-.14
10	3.00	2.86	-.14
11	2.25	2.12	-.13
12	2.57	2.45	-.12
13	2.47	2.37	-.10
14	2.71	2.61	-.10
15	2.20	2.10	-.10
16	2.27	2.20	-.07
17	1.66	1.59	-.07
18	1.87	1.80	-.07
19	2.43	2.36	-.07
20	.71	.67	-.04
21	2.53	2.50	-.03
22	2.10	2.07	-.03
23	.95	.92	-.03
24	2.53	2.52	-.01
25	3.29	3.29	0
26	.95	.95	0
27	2.25	2.25	0
28	2.17	2.60	+.43
29	2.66	3.09	+.43
30	2.50	3.00	+.50
31	1.57	2.12	+.55
32	2.29	2.85	+.56
<b>Mean ± SD</b>	<b>2.26 ± .62</b>	<b>2.18 ± .65</b>	

\*Post-treatment GPAs declined an average of  $.08 \pm .32$ , 95% confidence interval,  $-.19$  to  $.04$ . Paired samples test=1.385 (31 degrees of freedom) ( $P=.176$ ).

GPA, grade-point average; SD, standard deviation

concerns and inattention, were consecutively diagnosed with predominantly inattentive ADHD based on information obtained from parents and teachers and application of the *DSM-IV* criteria.<sup>1</sup> Clinical examinations ruled out physical or neurologic handicaps and uncorrected visual or hearing impairments (**Table 1**).

Seven participants had academic impairment as the only comorbidity with predominantly inattentive ADHD. Twenty-eight had multiple comorbidities. These included anxiety symptoms (12), dysgraphia (12), psychosomatic complaints (11), social problems (6), communication disorders (4), learning disabilities (3), enuresis (3), and dysphoria (3). Six parents of the students had a history of anxiety-depression and 2 had generalized anxiety disorder.

Anxiety symptoms, psychosomatic complaints, dysphoria, and fine-motor dyspraxia were descriptive problems and not considered disorders using *DSM-IV* criteria.<sup>1</sup> Learning disabilities and communication disorders were diagnosed by school psychologists and speech language pathologists, respectively. Social impairment was diagnosed using the asocial domain on the Conner's Teacher Rating Scale<sup>13</sup> and noting *t* scores of  $\geq 1.5$  standard deviations above the mean. Enuresis was diagnosed from information obtained from the history and physical exam.

None of the cohort met *DSM-IV* criteria for oppositional defiant disorder or conduct disorder.<sup>1</sup>

The diagnostic protocol for ADHD and coexisting disorders used in this study was consistent with the recommendations endorsed by the American Academy of Pediatrics and the American Academy of Family Physicians.<sup>14</sup>

The baseline GPA for each participant was determined by taking the GPA from each report card of the preceding school year (either four 9-week report cards or six 6-week report cards) and calculating the mean GPA. The mean GPA after the school year following psychostimulant therapy was calculated for each student in the same manner and compared with his mean baseline GPA.

Participants were assessed every 6 to 9 weeks (when they brought their report cards to the office) for compliance and possible side effects of medication. Dosage adjustments were determined by using follow-up information obtained from parents and teachers, based on *DSM-IV* criteria for predominantly inattentive ADHD.

All patients, families, and school personnel received educational information on predominantly inattentive ADHD throughout the study. This is consistent with the practice parameters for ADHD from the American Academy of Child and Adolescent Psychiatry and a national perspective on ADHD treatment in primary care practice settings, which states: "providing information about symptoms of ADHD, areas of impairment, etiology, and principles of behavior management to parents and teachers constitutes sound clinical practice."<sup>15</sup> Statistical analysis was performed by a paired samples *t* test.

## ■ RESULTS

Thirty-two of 35 students completed the study. Using a Mann-Whitney *U* test, no significant differences were found between these patients and those who did not complete the study ( $P=.80$  for baseline GPA differences and  $P=.80$  for age.)

According to follow-up information from parents and teachers, all participants exhibited

short-term improvements in *DSM-IV* criteria for predominantly inattentive ADHD at some point during the study. Five pupils who completed the study had improved GPAs (15.6%), while the remaining 27 participants showed no change or decreased GPAs (84.4%).

Using students *t* tests to compare age, baseline GPAs, and number of comorbidities and  $\chi^2$  for parental psychopathology, no significant differences were found between students with improved GPAs and those without improvement in their GPAs ( $P=.61$  for age,  $P=.93$  for baseline GPA differences,  $P=.53$  for differences in comorbidities, and  $P=.70$  for differences in parental psychopathology; see **Table 1**). Using a paired sample *t* test on data from all 32 participants showed that the overall treatment effect was not significant ( $P=.176$ ; see **Table 2**).

## ■ DISCUSSION

Psychostimulant therapy did not significantly improve the outcome measures (GPAs) in the cohort diagnosed with predominantly inattentive ADHD and academic impairment. Additional comorbidities were diagnosed and treated, but differences among participants were not statistically significant. Short-term decreases in *DSM-IV* symptoms of predominantly inattentive ADHD did not translate into academic gains.

Limitations to the present study include the small sample size and lack of a control group. Thus, the findings should be considered preliminary. GPAs are not standardized scores and are sensitive to varying influences. However, the American Academy of Pediatrics notes that even when standardized instruments are used to assess stimulant treatment for ADHD, there is "frequently no association with improvements in academic achievement."<sup>16</sup> Only short-term gains in academic efficiency have been reported.<sup>17</sup>

The average doses employed (methylphenidate 16.7 mg/d, dextroamphetamine 11 mg/d) were smaller than the starting doses used successfully in the Multimodal Treatment Study of Children with ADHD (methylphenidate 30.5 mg/d,

dextroamphetamine 15.25 mg/d).<sup>18</sup> However, this study excluded patients with predominantly inattentive ADHD.<sup>19</sup> The lower dosages used in the present study are compatible with the practice parameters of the American Academy of Child and Adolescent Psychiatry for ADHD without hyperactivity.<sup>20</sup>

All participants in the study received educational assistance. Those students not attending resource classes qualified for accommodations and modifications under Section 504 of the Rehabilitation Act of 1973 guidelines. The small sample sizes precluded an analysis of the effects of these different educational interventions on GPAs. The input from multiple teachers and classroom settings could not be delineated. However, GPAs have the advantage of being readily accessible. In addition, the findings obtained from a community-based practice with patients and families in their natural environment support the study's results.

How do the results of the present study correlate with the literature on predominantly inattentive ADHD, and how should clinicians incorporate these data into their evaluations of students who have inattention and academic concerns? Results from the Pediatric Research in Office Settings and the Ambulatory Sentinel Practice Network<sup>21</sup> note that there is "a lack of standardization in the primary care evaluation of attentional problems." Inattention is not unique to predominantly inattentive ADHD. Children and adolescents with language/learning disorders,<sup>22-24</sup> anxiety/depression,<sup>25</sup> and family dysfunction<sup>26</sup> are also described as inattentive.

It is difficult to define accurately what is meant by inattention in predominantly inattentive ADHD because the psychological construct of attention is not the same as that being measured behaviorally in predominantly inattentive ADHD.<sup>27</sup> In addition, the unifying theory on ADHD, which involves deficits in behavior inhibition and executive function, does not include predominantly inattentive ADHD in the definition.<sup>28,29</sup> The American Academy of Pediatrics concludes that

with ADHD the need "to develop more valid and precise diagnostic criteria is essential."<sup>30</sup>

The present study should be considered an introductory step in the evaluation of psychostimulant treatment in predominantly inattentive ADHD. GPAs are easily obtained by busy clinicians and are time-efficient measures of treatment outcomes. Clearly, additional research, using larger groups and controls, is needed.

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## Evidence-based medicine terms

THE JOURNAL OF FAMILY PRACTICE uses a simplified rating system derived from the Oxford Centre for Evidence-based Medicine. More detailed definitions may be found at its website: [http://www.cebm.net/levels\\_of\\_evidence.asp](http://www.cebm.net/levels_of_evidence.asp).

**Level of Evidence** characterizes the validity of a study while making no specific practice recommendation

- 1a Systematic review of randomized controlled trials
- 1b Individual randomized controlled trial with narrow confidence interval
- 1c All or none—all patients died before therapy was available, but now some survive; or, some patients died before therapy was available, but now all survive
- 2a Systematic review of cohort studies
- 2b Individual cohort study, or low-quality randomized controlled trial
- 2c “Outcomes” research
- 3a Systematic review of case-control studies
- 3b Individual case-control study
- 4 Case series, or poor quality cohort or case-control studies
- 5 Expert opinion

**Strength of Recommendation** translates a given level of evidence into a practice recommendation

- A Includes 1a–c levels of evidence
- B Includes levels 2a–c and 3a, b
- C Includes levels 4 and 5

Strength-of-recommendation ratings do not always reflect a direct one-to-one correspondence with levels of evidence, as depicted above, but may take into account such variables as intervention cost, ease of use, and impact of the disease in the population.

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