

## Children With Attention Deficit Hyperactivity Disorder: Are There Gender Differences in School Functioning?

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*Abstract.* Few studies have comprehensively examined possible gender differences in the school functioning of children with attention deficit hyperactivity disorder (ADHD). This study investigated differences in academic, social, and emotional and behavioral functioning between 133 male and 42 female elementary school students who met research diagnostic criteria for ADHD. School functioning was assessed using teacher ratings, direct observations of classroom behavior, and a standardized, norm-referenced achievement test. Results indicated that participants, regardless of gender, experienced impairment across all functioning domains. The few gender differences obtained varied across areas of functioning and were dependent, in part, on the type of score and comparison group used. Specifically, although girls were less likely to have ADHD than were boys, when they did exhibit this disorder, their impairments were as severe, or possibly more severe, than for boys relative to non-ADHD peers of the same gender. Implications of these findings for school-based practice and research are discussed.

Attention deficit hyperactivity disorder (ADHD) is a disorder of childhood onset that is characterized by developmentally inappro-

priate levels of inattention and/or hyperactivity-impulsivity (American Psychiatric Association, 2000). ADHD affects approximately

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The preparation of this manuscript was supported by National Institute of Mental Health Grant R01-MH62941. We gratefully acknowledge the efforts of all teachers and students who participated in this project; Kristi Cleary, who served as a coordinator for this project in its early stages; and Anuja Divatia, Lauren Dullum, Karen Hailstones, Jilda Hodges, Milena Keller, Jayne Leh, Erin Post, Eve Puhalla, Hillary Rogers, Timothy Scholten, Cotie Strong, Deanna Tipton, and Yan Ping Xin, who served as data collectors for this study.

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3–10% of the school-aged population in the United States (American Psychiatric Association, 2000) and is associated with significant deficits in behavioral, emotional, academic, and social functioning (Barkley, 2006; DuPaul & Stoner, 2003). More than 50% of children with ADHD also display clinically significant symptoms of oppositional defiant disorder (ODD) and conduct disorder (CD) (Barkley, 2006). In community samples, boys are 2–3 times as likely as girls to have ADHD (American Psychiatric Association, 2000; Arnold, 1996).

Most of what is known about ADHD is based on studies using samples of boys. In the past decade, studies have indicated that girls with ADHD exhibit similar deficits and outcomes as do boys with this disorder. For example, Hinshaw and colleagues have conducted several studies comparing a large sample of girls with ADHD to an ethnicity-matched control group of girls without ADHD (Hinshaw, 2002; Hinshaw, Carte, Sami, Treuting, & Zupan, 2002; Thurber, Heller, & Hinshaw, 2002). In general, these studies have indicated significant deficits in behavioral, emotional, and social functioning of girls with ADHD relative to girls without this disorder. Several of the variables included in these studies reflect areas of functioning that are relevant for school performance. For example, girls with ADHD obtained significantly lower IQ and achievement test scores than their peers without ADHD, with effect sizes in the moderate to large range (Hinshaw, 2002; Hinshaw et al., 2002).

Potential gender differences in the manifestation of ADHD and associated difficulties also have been examined. Biederman and colleagues (1999, 2002) found that although girls with ADHD exhibited similar symptomatology and associated deficits to those displayed by boys, girls were more likely to have the inattentive subtype of ADHD and to be less likely to display symptoms of depression, ODD, and CD. Further, girls were less likely to display school problems or have a learning disability (Biederman et al., 2002). Similar results were obtained by Hartung et al. (2002) wherein boys with ADHD were found to dis-

play more ADHD symptoms than girls with this disorder, particularly in the school setting.

Abikoff et al. (2002) examined gender differences in classroom behavior in a large sample of children with ADHD. As has been found in other studies, children with ADHD were found to exhibit higher rates of gross motor activity and fidgeting, negative verbalizations, and various other off-task behaviors relative to students without ADHD. Further, boys with ADHD displayed higher rates of interference, gross motor activity, and aggression than their female counterparts. Alternatively, girls with ADHD solicited attention and assistance from the teacher more often than did boys with this disorder. Thus, there may be important differences in classroom behavior between boys and girls with ADHD.

Two meta-analyses of investigations examining gender differences in this population (Gaub & Carlson, 1997; Gershon, 2002) indicate that girls with ADHD display less severe ADHD symptoms, while manifesting more severe internalizing problems (e.g., anxiety and depression symptoms) and intellectual impairments. Conversely, these meta-analyses found no significant gender differences for academic achievement or social functioning.

Although the results of available studies examining gender differences among children with ADHD are relatively consistent, conclusions based on this literature are limited for several reasons. First, most studies have been conducted in clinic rather than school settings, and have thereby included minimal information about school functioning. Those studies that have included measures of school functioning have relied almost exclusively on teacher behavior ratings and standardized cognitive tests. Second, clinic-referred rather than community samples have been used. Because girls with ADHD symptoms may be less likely to be referred for clinical services (Barkley, 2006), the exclusive use of clinic-referred children may only delineate the functioning of girls with the most severe symptoms. Because of the chronic school-related difficulties experienced by children with ADHD, it would be important to comprehensively evaluate school functioning in girls with this disorder by col-

lecting school-based data regarding academic, social, behavioral, and emotional functioning. Further, the use of a school-based sample may help elucidate difficulties experienced by girls with a wider range of ADHD symptom severity. Finally, earlier studies of gender differences have not examined whether findings are consistent for both raw and standard scores on behavior rating scales. Because the latter are already adjusted for age and gender, it is possible that findings may be different across score type. This is a critical issue because practitioners typically use standard scores to make screening and diagnostic decisions.

The purpose of this study was to identify possible gender differences in school functioning in a large sample of children of elementary school age meeting research diagnostic criteria for ADHD and reported by their teachers to be underachieving academically. This study targeted first- through fourth-grade children because this is the age range when ADHD symptoms and academic difficulties typically are first noted. Based on the results of earlier studies, it was hypothesized that boys with ADHD would be reported to exhibit more externalizing difficulties than girls with ADHD, and these differences would be manifested in both teacher behavior ratings and direct observations of classroom behavior. Conversely, based on meta-analytic findings, it was hypothesized that girls with ADHD would manifest more internalizing symptoms (based on teacher report) than would boys with this disorder. Finally, boys and girls were not expected to differ in academic functioning (as measured by report card grades, teacher ratings, and an achievement test) as differences in this domain have not been found in earlier studies.

## Method

### Participants

A sample of 175 children (133 boys, 42 girls) attending first through fourth grade ( $M$  age = 8.5 years;  $SD = 1.2$ ) in public elementary schools in eastern Pennsylvania who met diagnostic criteria for ADHD participated in this study. This sample was comprised of all

participants in a larger study investigating models of academic intervention for children with ADHD (cf. DuPaul et al., 2004). The sample primarily comprised Caucasian children ( $n = 100$ ; 57% of the sample), but also included children from Latino ( $n = 53$ ; 30% of the sample) and African American ( $n = 20$ ; 11% of the sample) backgrounds. Participants were recruited from schools in urban, rural, and suburban settings. Children were from families with diverse socioeconomic backgrounds, primarily middle class ( $M$  Hollingshead index = 48.0;  $SD = 24.8$ ).

Children were referred to this study by their teachers because of concerns regarding inattentive and/or hyperactive-impulsive behavior as well as difficulties with reading and/or math achievement. Further, to be identified as having ADHD for the purposes of this study, children must have (a) received parent and teacher ratings on the Attention Deficit Hyperactivity Disorder Rating Scale—IV (ADHD Rating Scale-IV; DuPaul, Power, Anastopoulos, & Reid, 1998) at or above the 90th percentile on either the Inattention or Hyperactivity-Impulsivity subscales using appropriate age and gender norms and (b) met *Diagnostic and Statistical Manual* (4th edition, text revision; DSM-IV-TR; American Psychiatric Association, 2000) criteria for one of the three subtypes of ADHD based on a parent interview using the National Institute of Mental Health Diagnostic Interview Schedule for Children—IV (Shaffer, Fisher, & Lucas, 1998). Children with clinically significant symptoms of autism or developmental disabilities, who had experienced brain damage, who had visual or hearing impairments, or who were identified as cognitively impaired by their school were excluded from participation.

Of the 175 children in the sample, 114 met study criteria for the combined type of ADHD, 44 for the predominantly inattentive type, and 17 for the predominantly hyperactive-impulsive type. In addition, 67 children met study criteria for comorbid ODD and another 27 exhibited clinically significant CD symptoms. A total of 51 students (29.1%) were receiving part-time special education services, while 50 children (28.5%) were receiv-

**Table 1**  
**Demographic and Diagnostic Characteristics by Gender**

Measure	Group		t(185) or $\chi^2$ (1)	p
	Girls	Boys		
Age (years)	8.6 <sup>a</sup> (1.1) <sup>b</sup>	8.4 (1.2)	0.79	.43
Grade	2.7 (0.9)	2.5 (1.1)	1.1	.28
Caucasian (%)	71.8	56.6	3.09	.21
Father's occupation	29.1 (22.7)	37.1 (27.5)	1.51	.13
Mother's occupation	39.4 (25.4)	37.2 (25.9)	-0.41	.69
ADHD combined (%)	64.3	65.4	0.02	.89
ADHD inattentive (%)	33.3	22.6	1.97	.22
ADHD hyperactive-impulsive (%)	2.4	12.0	3.39	.05
ODD (%)	47.6	35.3	2.04	.15
CD (%)	11.9	16.5	0.53	.47
Percentage receiving special education	26.2	33.8	0.70	.40
Percentage receiving psychotropic medication	21.4	30.1	1.38	.24

Note. ADHD = attention deficit hyperactivity disorder; ODD = oppositional defiant disorder; CD = conduct disorder.

<sup>a</sup>Mean.

<sup>b</sup>Standard deviation.

ing psychotropic medication including psychostimulants ( $n = 38$ ), antidepressants ( $n = 8$ ), and other medications ( $n = 26$ ).<sup>1</sup>

Table 1 presents demographic data separately for boys and girls. Boys were significantly more likely to be diagnosed with ADHD predominantly hyperactive-impulsive type [ $\chi^2(1) = 3.39, p = .05$ ]. No statistically significant gender differences were found for age, grade, or parental occupation (using two-sample  $t$  tests) as well as ethnicity, diagnostic status (other than the subtype difference noted above), special education status, or medication status (using  $\chi^2$  tests; see Table 1). There were also no significant differences between genders with respect to severity of ADHD symptomatology as defined by the ADHD Rating Scale-IV (School Version) percentile scores for inattention [ $t(174) = -0.4, p = .65$ ] and hyperactivity-impulsivity [ $t(174) = 0.02, p = .98$ ] as well as number of parent-reported symptoms of inattention [ $t(169) = -0.9, p = .30$ ] and hyperactivity-impulsivity [ $t(169) = 1.3, p = .20$ ] on the Diagnostic Interview Schedule for Children—IV. Children with the combined type ADHD (regardless of gender)

were significantly more likely to receive psychotropic medication (64.9%) than were children meeting criteria for the inattentive type of ADHD [13.6%;  $\chi^2(1) = 6.8, p < .01$ ]. Medication usage did not differ with respect to the hyperactive-impulsive ADHD type or comorbid diagnosis (i.e., ODD and CD).

### Screening Measures

The ADHD Rating Scale-IV (DuPaul et al., 1998) is a behavior rating scale that includes items directly related to the 18 symptoms of ADHD based on the DSM-IV-TR (American Psychiatric Association, 2000). Home and school versions are available for completion by parents and teachers, respectively. Items are scored on a 0 (*never or rarely*) to 3 (*very often*) basis. Normative data based on age and gender are available and the psychometric properties of this instrument are well established (DuPaul et al., 1998).

The Computerized NIMH Diagnostic Interview Schedule for Children (Parent Version; CDISC 4.0; Shaffer et al., 1998) is a structured diagnostic interview administered

using computer software. Current (present state) symptoms and symptoms over the past year are reported by parents on this interview. The Disruptive Behavior Disorders module was administered by a trained interviewer (i.e., doctoral student in school psychology) either in person or by phone. The entire CDISC was not administered because of time constraints (i.e., the Disruptive Behavior Disorder module took approximately 1 h to complete) and because the focus of the treatment outcome study was on externalizing difficulties (as well as academic achievement). Interviewers were trained by the research project coordinator, who was a master's level psychologist. Diagnostic decisions based on this interview have been found to be highly reliable (Shaffer et al., 1998). The ADHD category of the CDISC has been shown to demonstrate good test-retest reliability ( $\kappa = .60$ ; Schwab-Stone et al., 1996) as well as scale reliability (intra-class correlation coefficient = 0.84; Shaffer et al., 1996). All CDISC 4.0 interviews were audiotaped and a random subsample (21%) was reviewed by a second trained interviewer (i.e., doctoral student in school psychology) to assess interdiagnostician agreement. Agreement was 100% across all interviews with respect to overall diagnosis and subtype designation.

### Dependent Measures

Standard scores on all reading and math subtests of the Woodcock-Johnson III Tests of Achievement (WJ-III; Woodcock, McGrew, & Mather, 2001) served as indices of academic achievement. Reading subtests include Letter-Word Identification, Reading Fluency, and Passage Comprehension, while math subtests are Calculation, Math Fluency, and Applied Problems. The WJ-III is a widely used individually administered, norm-referenced achievement test that has exemplary psychometric properties (Mather & Woodcock, 2001).

Report card grades in reading and math also served as measures of academic achievement. Grades provided by classroom teachers

in these subject areas were converted to numerical scores ranging from 1 (*F*) to 5 (*A*).

Teacher ratings on all subscales for the Behavior Assessment System for Children (BASC; Reynolds & Kamphaus, 1992) were obtained to assess behavioral and emotional functioning. The BASC is used frequently in research studies with this population and has adequate psychometric properties (Reynolds & Kamphaus, 1998). Composite scores examined in the present study include externalizing problems, internalizing problems, school problems, behavioral symptoms index, and adaptive skills. Items are scored on a 4-point Likert scale ranging from *never* to *almost always*. BASC composite *T* scores (i.e., standard scores) were used in all analyses.

Teacher ratings also were obtained on the Conners Teacher Rating Scale (CTRS; Conners, 1997). Specifically, two subscales (DSM-IV Inattention and DSM-IV Hyperactivity/Impulsivity) of the CTRS were examined. Items were scored on a 4-point Likert scale ranging from *never* to *very often*. Extensive data have been gathered to support the reliability and validity of this scale (Conners, 1997). Separate analyses were conducted on raw and standard scores for this measure to determine whether gender differences in ADHD symptoms varied as a function of score type.

Raw scores on the subscales of the Academic Competency Evaluation Scale (ACES; DiPerna & Elliott, 2000) provided teacher perceptions of children's academic skills and achievement-related behaviors. The Academic Skills scale includes three subscales (Reading/Language Arts, Mathematics, and Critical Thinking Skills) whereas the Academic Enablers scale includes four subscales (Interpersonal Skills, Engagement, Motivation, and Study Skills). For each of these subscales, item frequencies were scored on a 1 (*never*) to 5 (*almost always*) Likert scale. The ACES has more than adequate levels of reliability and validity (DiPerna & Elliott, 2000).

Teacher perceptions of children's social skills were represented by standard scores on the Social Skills subscale of the Social Skills Rating System (Gresham & Elliott, 1990).

This subscale is comprised of 30 items rated on a 0 (*never*) to 2 (*very often*) basis. The reliability and validity of the Social Skills Rating System are well established (Gresham & Elliott, 1990).

An adapted version of the Behavior Observation System for Students (BOSS; Shapiro, 2004) was used to collect data on student behavior during math and reading class periods. Using 15-s observation intervals, a momentary time sampling procedure was used to categorize children's engagement as either active (e.g., answering teacher questions or writing) or passive (e.g., listening to teacher directions or reading silently). Children's off-task behavior was categorized on a partial interval basis as off-task-motor (e.g., fidgeting), off-task-verbal (e.g., talking out without permission), or off-task-passive (e.g., looking away from assigned task or activity). Also, children's noncompliant behavior (e.g., refusing to follow a teacher directive before the initiation of the next observation interval) was coded on a partial interval basis. Adequate interobserver agreement reliability data (i.e., agreement >80%) have been obtained consistently in studies using the BOSS (Shapiro, 2004) and four of the five behavioral categories discriminate reliably between students with and without ADHD (Vile Junod, DuPaul, Jitendra, Volpe, & Cleary, 2006).

## Procedures

Local school districts were informed of a study examining the effects of academic interventions for students with ADHD and were asked to refer children with ADHD-related behaviors who were also experiencing difficulties in reading and/or math. Children from 10 school districts (representing a cross section of urban, suburban, and rural communities) were referred based on school principal and teacher interest as well as child difficulties, as noted above. Parents and teachers of referred children completed the ADHD Rating Scale-IV independently. Parents of those children who met criteria on behavior ratings were then interviewed by phone or in person using the CDISC 4.0. Parents of children who met

inclusion criteria on the CDISC 4.0 then provided informed consent for participation in the study. A total of 327 students were referred, of whom 182 were deemed eligible as participants with ADHD. Consent was provided for 175 children. Parents of the 7 remaining children provided verbal approval for participation but failed to sign the written informed consent form.

Once consent was obtained, dependent measures were collected over approximately a 1-month period during the middle of the school year (December to February). All measures were collected before to academic interventions were implemented in classrooms (i.e., during the baseline period of the larger study). Trained graduate students in school psychology, special education, and counseling psychology administered the WJ-III and conducted classroom observations using the BOSS. Research assistants were blind to the purposes of the study and to group membership of participating children. Behavior ratings were distributed directly to teachers by data collectors and were returned to the investigators by mail. A stipend of \$50 was provided to teachers upon completion of the rating scale packet. Schools or parents provided photocopies of the most recent report card to provide grades in reading and math.

Behavioral observations were conducted for approximately 15 min each during one math and reading class for each participant. For most students, these two observations were conducted during the same school day. A second (reliability) observer was present for 32% of these observations. Mean percentages of occurrence, nonoccurrence, and total agreement across the behavioral categories and two subject areas ranged from 85.18 to 99.98% ( $M = 95.59$ ;  $SD = 4.00$ ). Mean  $\kappa$  coefficients ranged from 0.88 to 0.98 ( $M = 0.93$ ;  $SD = 0.03$ ).

## Results

A series of multivariate analyses of variance (MANOVAs) were conducted to examine possible gender differences in the academic, social, and behavioral functioning of

children with ADHD. Measures were grouped according to content area. Multivariate analyses were used (a) to account for possible correlations among dependent measures within content areas and (b) protect against Type I experimentwise error given the relatively large number of univariate group comparisons. If the Wilks's lambdas (and associated approximate  $F$  values) were statistically significant ( $p < .05$ ), then two follow-up analyses were conducted. Individual  $t$  tests were conducted for each dependent variable at the  $\alpha = 0.05$  level to examine between-gender differences at the univariate level. Also, discriminant function analyses were used to delineate those variables in each content area that contributed most to between-gender differences. Alternatively, if the MANOVA for a specific set of measures was not statistically significant, then univariate tests and discriminant function analyses were not conducted. Effect size (ES) was calculated for each variable using Cohen's  $d$  with a pooled standard deviation in the denominator. Means, standard deviations, and effect sizes for all variables, as well as relevant significance levels, are presented in Table 2.

### Academic Functioning

The MANOVA conducted on the raw scores of the ACES revealed significant overall gender differences [Wilks's lambda = 0.87;  $F(7, 114) = 2.45$ ;  $p < .05$ ]. Individual  $t$  tests revealed significant differences only on subtests of the Academic Enablers portion of the scale. Girls were rated higher than boys on both the Motivation [ $t(120) = 2.45$ ,  $p < .05$ ; ES = 0.51] and Study Skills [ $t(120) = 2.87$ ,  $p < .01$ ; ES = 0.60] subscales. Significant differences between genders were not found on any other subscale.

Standardized discriminant function coefficients and structure coefficients also were examined to further evaluate gender differences in ACES academic enablers' ratings (see Table 3). Relative absolute values for these indices were greatest for the Study Skills and Motivation subscales, thus indicating that ratings on these subscales made the largest

contributions to discriminating between genders.

Results of the MANOVAs conducted on standardized tests of achievement (WJ-III math, WJ-III reading) and report card grades revealed no significant gender differences in academic functioning of children with ADHD. Effect sizes for gender differences on these variables were small (see Table 2).

### Social Functioning

As only the Social Skills subscale of the Social Skills Rating System was used to assess social functioning, a univariate  $t$  test was performed. Results did not yield significant findings between the groups in standard scores on this measure, and the effect size for this difference was small (see Table 2).

### Behavioral Functioning

**BASC.** Results of the MANOVA on the 5 standard composite scores of the BASC revealed significant overall gender differences [Wilks's lambda = 0.85;  $F(5, 155) = 5.32$ ;  $p < .001$ ]. Individual  $t$  tests revealed significant findings for all the composite scales. Girls were rated significantly higher on the Externalizing Problems [ $t(159) = 2.51$ ,  $p < .05$ ; ES = 0.47], Internalizing Problems [ $t(159) = 3.52$ ,  $p < .001$ ; ES = 0.65], and School Problems [ $t(159) = 2.46$ ,  $p < .05$ ; ES = 0.46] composite scales. In addition, girls received a higher rating on the Behavior Symptoms Index [ $t(159) = 3.09$ ,  $p < .01$ ; ES = 0.57]. Conversely, boys were rated as having more adaptive skills [ $t(159) = 4.28$ ,  $p < .001$ ; ES = 0.79]. Effect sizes for all composites were in the moderate to large range (0.46–0.79).

Standardized discriminant function coefficients and structure coefficients also were examined to further evaluate gender differences in BASC ratings (see Table 3). Relative absolute values for these indices were greatest for the Adaptive Skills, Internalizing Problems, and Behavioral Symptoms scales, thus indicating that ratings on these factors made the largest contributions to discriminating between genders.

**CTRS—Revised.** The MANOVA performed on the standard scores of the DSM-IV subtests of inattentive and hyperactive-impulsive symptoms also revealed significant gender differences [Wilks's lambda = 0.83;  $F(2, 160) = 16.96$ ;  $p < .001$ ]. Girls were rated significantly higher on the Inattentive subscale [ $t(161) = 5.83$ ,  $p < .001$ ] with a large ES of 1.07. There was no significant difference on the Hyperactivity/Impulsivity subscale. The standardized discriminant and structure coefficients for this analysis confirmed the greater relative contribution of the Inattentive subscale to discrimination between genders (see Table 3).

Analysis of the raw scores of the CTRS—Revised revealed a reversal of the previous significant finding [Wilks's lambda = 0.88;  $F(2, 160) = 11.33$ ;  $p < .001$ ]. Individual  $t$  tests on the raw scores revealed that boys score significantly higher on both the Inattentive subscale [ $t(161) = 2.63$ ,  $p < .01$ ] and the Hyperactive/Impulsive subscale [ $t(161) = 4.35$ ,  $p < .001$ ] with effect sizes of 0.48 and 0.80, respectively. The Hyperactive/Impulsive subscale appeared to make the greater contribution to gender differences based on examination of the standardized discriminant function and structure coefficients (see Table 3).

**BOSS.** The MANOVAs of the direct observations of math and reading (performed separately by content area) using the BOSS revealed no statistically significant differences between genders. Effect sizes for these differences were in the small range, except for off-task-verbal in reading (ES = 0.41).

## Discussion

In general, boys and girls with ADHD participating in the current study showed the same degree of impairment in school functioning. Specifically, both genders were found to function below their peers (based on normative data) in academic, behavioral, and social domains. Further, more than 50% of boys and girls with ADHD also met diagnostic criteria for another disruptive behavior disorder (i.e., ODD or CD), a finding consistent with prior

research with this population (Barkley, 2006). Some relatively minor differences between boys and girls were found, particularly with respect to teacher perceptions of academic enablers and teacher report of emotional and behavioral difficulties.

## Gender Differences in Academic Functioning

Both boys and girls with ADHD were found to be functioning in the low average range in math and reading based on WJ-III scores and report card grades. This finding was expected given that students with ADHD are, by definition, at high risk for academic impairment and because children were referred to this research project owing, in part, to academic difficulties. Although there were small effects favoring boys in math and girls in reading, these gender differences were not statistically significant. These results are similar to those obtained in earlier studies examining gender differences in achievement among children with ADHD (Gershon, 2002; Hartung et al., 2002) and emotional and behavioral disorders (Nelson, Benner, Lane, & Smith, 2004).

Consistent with achievement test scores and report card grades, teacher ratings of academic skills and enablers indicated that both boys and girls were impaired in these domains relative to the ACES normative group. Some gender differences in academic enablers were found, with girls rated as higher in academic motivation and study skills than were boys. Specifically, the "average" girl with ADHD was rated approximately 0.5 *SD* units (using the current data) higher than the "average" boy with this disorder. Small effects favoring girls in reading and language arts and critical thinking were found; however, gender differences on these variables were not statistically significant. This is the first study to specifically examine gender differences in academic motivation and enablers among children with ADHD, with results indicating that girls may be less impaired than were boys in this domain.

**Table 2**  
**Means, Standard Deviations, and Effect Sizes Across Gender and Dependent Variables**

Dependent Variables	Means ( <i>SD</i> )		Effect Size	<i>p</i> Value
	Males	Females		
Standard Scores				
Woodcock-Johnson III: Mathematics	94.27 (14.68)	92.40 (9.99)	0.00	NS
	88.80 (13.86)	89.36 (13.41)	-0.04	NS
	98.22 (13.07)	96.60 (10.90)	0.13	NS
Woodcock-Johnson III: Reading	93.61 (14.11)	95.00 (10.37)	-0.11	NS
	83.31 (21.31)	88.43 (19.27)	-0.25	NS
	89.05 (12.65)	91.90 (7.60)	-0.25	NS
	3.32 (1.11)	3.21 (0.91)	0.10	NS
	3.10 (1.05)	3.32 (0.87)	-0.22	NS
	83.20 (8.81)	80.56 (7.38)	0.31	NS
	59.32 (10.20)	64.71 (15.22)	-0.47	<.05
	52.51 (9.49)	58.92 (10.81)	-0.65	.001
	66.28 (7.85)	69.84 (7.75)	-0.46	<.05
	60.87 (8.90)	66.42 (11.85)	-0.57	<.01
	40.64 (4.99)	36.55 (5.66)	0.79	<.001
	67.94 (6.55)	75.49 (8.51)	-1.07	<.001
	66.62 (10.51)	69.74 (16.39)	-0.26	NS
Raw Scores				
ACES: Academic Skills	22.20 (6.82)	24.97 (6.77)	-0.41	NS
	17.25 (5.03)	16.87 (5.41)	0.07	NS
	24.48 (7.89)	26.83 (8.00)	-0.30	NS
	30.74 (6.31)	32.63 (6.52)	-0.30	NS
	22.61 (5.65)	24.27 (5.78)	-0.29	NS
	20.03 (6.00)	23.13 (6.12)	-0.51	<.05
	25.80 (6.24)	29.50 (5.75)	-0.60	.005

Table 2. (Continued)

Dependent Variables	Means ( <i>SD</i> )		Effect Size	<i>p</i> Value	
	Males	Females			
Raw Scores ( <i>Continued</i> )					
CTRS-Revised					
	DSM-IV: Inattention	21.07 (5.03)	18.67 (4.87)	0.48	<.01
	DSM-IV: Hyperactivity/Impulsivity	16.38 (6.96)	10.74 (7.35)	0.80	<.001
	AET	28.33 (16.29)	27.82 (15.51)	0.03	NS
	PET	38.08 (18.23)	39.82 (20.22)	-0.09	NS
	OFT-M	24.14 (19.32)	21.29 (20.24)	0.15	NS
	OFT-V	10.24 (11.47)	7.26 (8.61)	0.27	NS
	OFT-P	8.13 (8.68)	7.14 (7.23)	0.12	NS
	Noncompliance	0.29 (1.10)	0.58 (1.60)	-0.24	<.05
	AET	25.32 (16.92)	25.38 (18.33)	-0.00	NS
	PET	45.23 (20.15)	47.98 (22.98)	-0.13	NS
	OFT-M	19.01 (17.81)	16.22 (15.94)	0.16	NS
	OFT-V	8.32 (10.50)	4.47 (4.51)	0.41	<.05
	OFT-P	8.45 (9.10)	7.27 (7.16)	0.14	NS
	Noncompliance	0.54 (1.62)	0.25 (1.16)	0.19	NS
BOSS: Percentage of Intervals: Reading					

Note. SSRS = Social Skills Rating System; BASC = Behavior Assessment System for Children; CTRS-Revised = Conners Teacher Rating Scale—Revised; DSM-IV = *Diagnostic and Statistical Manual* (4th ed.); ACES = Academic Competency Evaluation Scale; BOSS = Behavior Observation System for Students.

**Table 3**  
**Standardized Discriminant Function and Structure Coefficients for Gender Differences in Teacher Ratings**

Scale	Subscale	Standardized Discriminant Function Coefficient	Structure Coefficient
Academic Competence Evaluation Scale	Interpersonal Skills	-0.098	-0.334
	Engagement	-0.227	-0.327
	Motivation	-0.195	-0.576
	Study Skills	-0.427	-0.676
	Externalizing Problems	0.366	0.481
Behavior Assessment System for Children	Internalizing Problems	0.688	0.637
	School Problems	0.183	0.470
	Behavioral Symptoms	-0.421	0.592
	Adaptive Skills	-0.640	-0.818
Conners Teacher Rating Scale (standard scores)	Inattentive	0.985	0.997
	Hyperactive/Impulsive	0.073	0.239
Conners Teacher Rating Scale (raw scores)	Inattentive	0.417	0.550
	Hyperactive/Impulsive	0.846	0.911

### Gender Differences in Inattention and Hyperactivity-Impulsivity

As was expected, both genders were rated by their teachers to be in the clinically significant range for ADHD symptoms on the CTRS, with boys receiving significantly higher *raw score* ratings than girls for both inattention and hyperactivity-impulsivity. In fact, effect sizes for these differences were in the moderate to large range. These gender differences in teacher ratings of ADHD symptoms are commensurate with prior findings (e.g., Biederman et al., 2002; Gershon, 2002). These raw score findings reflect gender differences with no correction for age and gender. Interestingly, when *standard scores* on the CTRS were considered, girls received significantly higher ratings for inattention than did boys, with an effect size greater than 1.0 *SD* units. This finding is based on scores that reflect a comparison to the normative sample (i.e., corrected for age and gender).

Considered together, these results indicate that teachers perceive boys to exhibit more severe ADHD symptoms than girls; however, girls with this disorder are perceived to display more severe symptoms relative to girls without ADHD than do boys relative to their same-gender counterparts. Stated differently, girls with ADHD are perceived to be more deviant with respect to inattention relative to other girls than boys with ADHD are relative to other boys. This finding could be partly because of differences in teacher expectations for child behavior as a function of gender. Teachers' views of ADHD-related behaviors may be affected by sex role stereotypes wherein girls are not expected to display problems with inattention, impulsivity, and/or overactivity.

Although CTRS ratings of ADHD symptoms were different across genders, boys and girls did not differ significantly with respect to proportion of combined type ADHD diagnoses on the DISC (see Table 1). In keeping with the CTRS standard score analyses above, girls were slightly more likely (33.3%) than boys (22.6%) to meet diagnostic criteria for the inattentive type of ADHD; however,

this difference was not statistically significant. Alternatively, a significantly greater proportion of boys (12.0%) than girls (2.4%) met diagnostic criteria for the hyperactive-impulsive type of ADHD, which is consistent with CTRS raw score gender differences.

### Gender Differences in Social and Emotional and Behavioral Functioning

Significant differences between boys and girls were found for standard scores on teacher ratings of emotional and behavioral functioning. Specifically, girls obtained significantly higher (i.e., more deviant) scores for externalizing problems, internalizing problems, and school problems. Conversely, boys with ADHD received higher (i.e., more adaptive) scores with respect to adaptive skills on the BASC than did girls. Although earlier studies have found girls with ADHD to have greater internalizing problems than do boys with this disorder (Gershon, 2002), externalizing behavior problems usually are more pronounced in boys. The discrepancy between the present findings and results of earlier investigations may be because of the primary reliance on symptom counts and/or raw scores in many prior studies (e.g., Biederman et al., 2002; Hartung et al., 2002) whereas we examined standard scores.

No significant gender differences in observations of classroom behavior and teacher ratings of social skills were found. Any differences between boys and girls in these domains were associated with relatively small effect sizes. Although the lack of differences in social skills ratings is consistent with earlier findings (Gershon, 2002), the similarity of boys and girls with respect to classroom behavior is discrepant from the results obtained by Abikoff et al. (2002), who found gender differences in both student and teacher behavior. The inconsistency in results could be partly because of the use of different observational systems that employed variant behavior code definitions and types of observational procedures (e.g., partial interval vs. momentary time sampling). The smaller size of the present sample may also have limited power to

detect small to moderate effect size differences (e.g., with respect to OFT-V in math and reading; see Table 2).

Overall, the results of the present study are commensurate with other studies that show the following: (a) boys and girls with ADHD are at relatively similar risk for deficits in academic, emotional and behavioral, and social functioning; (b) boys exhibit greater ADHD symptom severity than girls; and (c) girls show a higher risk for internalizing behavior problems than do boys. In contrast to earlier findings, girls in this study were reported to have greater externalizing and school problems, lower adaptive skills, and more severe inattention symptoms when compared to same-gender norms than did boys. The latter findings highlight the importance of score type (raw vs. standard) when examining possible gender differences in symptom severity and impairment.

### **Limitations**

Conclusions based on the present findings must be tempered by several factors. First, the sample of girls was relatively small ( $n = 42$ ) and this may have limited power to detect statistically significant differences. It should be noted, however, that most of the gender differences associated with moderate or larger effect sizes were found to be statistically significant, and therefore power was only an issue for analysis of small effects. Second, children were referred based on teacher concerns related to ADHD symptoms and academic achievement problems. Thus, it is possible that these findings are specific to children with both ADHD and achievement problems. Further, this may have led to a floor effect that could have negated possible gender differences because boys and girls were, by definition, achieving below teacher expectations. Of course, according to DSM-IV criteria (American Psychiatric Association, 2000), the diagnosis of ADHD is based, in part, on symptoms being associated with social or academic impairment, thereby implying that most children with this disorder must also experience academic difficulties. Third, data were col-

lected for students of elementary school age—results are thus limited to this age group. Fourth, interactions of gender with other important demographic variables (e.g., ethnicity and socioeconomic status) were not examined because of limited power (i.e., owing to small sample size in some data cells). Fifth, a comparison control group was not included; it was thus not possible to evaluate the specificity of gender differences within the ADHD sample relative to possible differences within a comparison group of children who either had other behavioral disorders or who did not have any disorder. Sixth, behavioral observations were conducted on a single occasion and therefore may have limited cross-temporal validity. Finally, parent and teacher ratings may not be as sensitive as self-report to internalizing disorder symptoms (Klein, Dougherty, & Olin, 2005)—thus, possible gender differences in this area may have been attenuated in this analysis.

### **Implications for Practice**

The results of this study have implications for the school-based assessment of children with ADHD. First, it is evident that girls with ADHD suffer from a similar degree of impairment as experienced by boys with ADHD. Clearly, this disorder is not milder or less impairing in girls. Epidemiologic studies indicate that there are more girls with significant ADHD symptoms in the community than are referred for clinical services (Barkley, 2006; Szatmari, 1992). Differences in referral rates may be owing to boys with ADHD exhibiting a higher degree of disruptive behavior and aggression than were girls with ADHD (Barkley, 2006). This underreferral bias suggests that practitioners should not wait for teachers to refer girls who might have this disorder, but rather should actively screen for students who may require services for ADHD. Screening and early detection may be critical for preventing or reducing impairment resulting from symptoms of this disorder. Second, assessment instruments (e.g., behavior rating scales) that have separate norms for each gender should be used as part of the evaluation

battery. Although girls may appear less impaired than were boys in an absolute sense, impairment may actually be more severe for girls relative to same-gender peers. Thus, the use of gender-specific norms is particularly critical when measuring the degree of impairment that students experience as a result of ADHD. Stated differently, it is imperative that practitioners use standard scores for screening and diagnostic purposes so that scores are “corrected” for gender and age. It is particularly critical to use standard scores within gender in order to minimize the influence of sex role stereotypes and gender expectations regarding ADHD-related behaviors on teacher ratings.

### Directions for Future Research

Several directions for future investigations of possible gender differences in school functioning among children with ADHD are suggested by the present findings. First, a more specific examination of gender differences in academic subskill areas should be undertaken. Given that girls in the nondisabled population tend to obtain higher reading skill scores than do boys (U.S. Department of Education, 2001), it may be fruitful to examine specific reading subskills (e.g., decoding, comprehension) in greater detail. Similarly, boys in the nondisabled population obtain higher math scores than girls (U.S. Department of Education, 2003)—thus investigation of gender differences in computational skills, fluency, and word problem-solving may yield important findings.

A second possible direction for future research is to investigate possible gender differences in impairment and functioning among young children at risk for ADHD. Collecting comprehensive data regarding the preacademic, behavioral, social, and emotional functioning of preschool-aged children could provide promising leads on the origins of gender differences as well as whether there may be differential risk indicators for problematic outcomes that vary across boys and girls. Further, it is important to ascertain differences in parenting and family functioning that may be

related to gender differences in this population.

Another potential direction for study of gender differences would be to evaluate the interaction of diagnosis and gender with respect to school functioning. Specifically, boys and girls within three diagnostic groups—(a) children with ADHD, (b) children with a psychiatric disorder other than ADHD, and (c) children with no disorder—could be compared to determine the degree to which gender differences in academic, behavioral, social, and emotional functioning are specific to ADHD or generically associated with behavioral disturbance in general. In similar fashion, the degree to which ADHD severity interacts with gender in accounting for school performance difficulties should be examined.

Most research examining school functioning in individuals with ADHD has been conducted with children of elementary school age. Little is known about how school performance changes over time as students progress through middle and high school. Given that boys and girls typically diverge in adolescence with respect to academic (Campbell, 1997) and social (Stevenson, 1994) functioning, it is possible that important gender differences in the ADHD population would be evident over time. Examination of trajectories for different school functioning into and through the college years may be particularly critical for understanding how the disorder may differ across genders and for delineating possible gender-specific treatment approaches.

### Conclusion

Both boys and girls with ADHD experience significant difficulties in school settings and impairment across the important domains of academic, social, and emotional and behavioral functioning. As has been the case in earlier studies, relatively few gender differences in school impairment were found. This study extends the results of previous investigations by indicating that the nature of gender differences in this population depends not only on the area of functioning but also on the type of score and comparison group being used.

Specifically, although girls are less likely to have ADHD than are boys, when they do exhibit this disorder, their impairments are as severe, or possibly more severe, than for boys relative to non-ADHD peers of the same gender. School-based assessment and intervention planning must be proactive and comprehensive in addressing the myriad problems experienced by girls with ADHD.

### Supplementary Material

For a further discussion of implications for practice, go to [www.nasponline.org/publications/sprsupplemental.html](http://www.nasponline.org/publications/sprsupplemental.html).

### Footnotes

<sup>1</sup>Some children received more than one psychotropic medication; the total number of medications is thus greater than the number of children receiving medication.

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Date Received: July 25, 2005

Date Accepted: February 4, 2006

Action Editor: Susan Swearer ■

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