

UNDERSTANDING ADHD IN GIRLS: IDENTIFICATION AND SOCIAL CHARACTERISTICS

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The purpose of this study was to identify the hyperactive, impulsive, social, and emotional characteristics of girls with symptoms of attention deficit hyperactivity disorder (ADHD). These characteristics could be used to increase the referral rates of these girls and provide implications for intervention. Parent and self-ratings of a school-based sample of 262 girls with and without ADHD were analyzed. Girls with ADHD were characterized as more verbally impulsive and hyperactive, faster in conversations and school-work, more easily bored, more often stirring up trouble, having difficulty waiting, and demonstrating greater moodiness, anger, and stubbornness than their peers. The girls with symptoms of ADHD also discriminated between their own appropriate versus inappropriate activity and demonstrated normal prosocial activities, the level of which was related to higher self-esteem. Implications are that ADHD characteristic behavior in girls can be identified earlier so that treatments can be studied and improved.

The purpose of this study was to address the problem of reduced identification of girls with symptoms of attention deficit hyperactivity disorder (ADHD). That is, teachers typically refer students for school-based assessment because of externalizing and disruptive behavior in the classroom. However, girls with ADHD are less likely to exhibit disruptive, externalizing, or out of seat behavior in the classroom than are boys with ADHD (Abikoff et al., 2002). Furthermore, as girls with ADHD age, they manifest hyperactivity in ways that are less likely to suggest ADHD to their teachers (Ohan & Johnston, 2005). During their preschool years, girls with ADHD exhibit overt hyperactive behavior, but by six through ten years of age, they no longer demonstrate this type of behavior in the classroom (deHaas & Young, 1984; deHaas, 1986; Battle & Lacey, 1972; Huessy & Howell, 1988). These findings could suggest developmental changes that make identification of girls less likely than for boys.

These changes over developmental levels may also be observed in the classroom over time. That is teachers' prior experience with girls with ADHD may lead them to expect an eventual modulation of activity/inattention/impulsivity. These expectations could explain what appear to be biased ratings by teachers of girls versus boys in the following study. Greenblatt (1994) asked 57 elementary and middle school teachers and counselors to evaluate case studies of children described with the characteristics of ADHD (hyperactive, fidgety, uncooperative, inattentive, and having difficulty following through). Teachers assessed only 27% of the girl cases to have ADHD but when reviewing the identical cases labeled as boys, teachers identified ADHD in 72% of the cases. In summary, even when there is an equivalent amount of excessive behavior in girls with ADHD, teachers see this as less disruptive or as more modifiable in the classroom. This conclusion is supported by findings that girls, but not boys, with ADHD inhibited impulsive behavior when punishment was a consequence (Milich, Hartung, Martin, & Haigler, 1994). Perhaps older girls learn to inhibit obvious movement in specific contexts to avoid social disapproval and therefore also avoid identification of ADHD.

From this research we might conclude that the manifestation of ADHD in girls may be specific to setting. Contexts where teacher disapproval would be more likely are academic settings; social settings may provide a context that could more accurately represent ADHD in females. Social settings involve more complex rules and requirements, which may involve delayed and indirect consequences. These delayed consequences for girls are peer rejection. For example, girls with ADHD had more difficulty

making friends than did girls without ADHD, and the friendships they did establish were less stable over a five-week summer session (Blachman & Hinshaw, 2002). Peer rejection or neglect rates were 62% for elementary school girls with ADHD compared to only 9% for comparison girls (Gaub & Carlson, 1997), with an increase in social impairment documented over time (Battle & Lacey, 1972; Prinz & Loney, 1974; Gaub & Carlson). Mikami and Hinshaw (2006) also reported that girls who were rejected by peers in childhood were also rejected in adolescence. In addition to being disliked by peers, girls with ADHD were more often disliked by adults *doubly disliked*, (Mikami, Chi, & Hinshaw, 2004).

Girls with ADHD appear to be aware of this social failure and rejection, as indicated by lowered ratings on their perceived relationships with their teachers, as well as, lowered ratings of self-esteem and increased scores on depression, anxiety, and stress/distress than female comparisons (Rucklidge & Tannock, 2001). Furthermore, girls showed greater impairment in internalizing symptomology and lower self-perceptions than did boys with the disorder (Zalecki & Hinshaw, 2004). In a large clinical sample of girls with ADHD, 45% were co-morbid with disorders of mood and anxiety (Biederman et al., 1999).

Girls with ADHD are at risk for negative adolescent long-term outcomes. For example, in a follow-up study of 140 girls diagnosed with ADHD when they were six to twelve years old, only 16% showed positive adjustment in adolescence across the domains of ADHD symptoms, behavior problems, internalizing problems, social skills, peer relationships, and academic functioning (Owens, Hinshaw, Lee, & Lahey, 2009). Mikami and Hinshaw (2006) reported that girls with ADHD, who were six to twelve years old in an original assessment, had significantly higher rates of internalizing and externalizing symptoms, lower levels of academic achievement, higher rates of substance use, and higher rates of eating disorders four and a half years later. In other words, negative emotionality characterizes adolescent girls with ADHD (Greene et al., 2001).

In adulthood, a third of women with ADHD reported that they were currently depressed and 70.6% reported a history of depression, with higher rates of mental health treatments for major depression, anxiety disorder, agoraphobia, social phobia, and alcohol/drug abuse, and dependence than comparison women (Biederman et al., 1994; Rucklidge & Kaplan, 1997). Adult women with ADHD were also less educated and achieved a lower standard of living than comparison females (Huessy & Howell, 1988). In summary, the social/emotional and educational/vocational outcomes of ADHD in girls are nontrivial, which underscores the importance of early identification.

To the purpose of identifying girls earlier, we examined the possibility that parents may be better raters than teachers, and that the home may provide a better rating context than the school. Parents may have broader knowledge of their daughters' behavior in social settings at home and in the community. Additionally, the girls themselves, especially older girls with symptoms of ADHD, may be better able to provide ratings that reflect alternative perceptions of their own behavior. It was also possible that traditional rating scales were insufficiently sensitive to differences in the ways that older girls express ADHD, especially in an assessment of their social characteristics. Therefore, supplementary items were needed. Arnold (1996) suggested adding items within the instruments that have been used for boys--items sensitive to ADHD in females. When developing these additional items, we also considered the possibility that there were specific positive types of behavior that protected girls from identification and that would have implications for intervention. The development of these supplementary items served as an initial purpose for this study, which was followed by field-testing of these items.

Method

An initial list of descriptors of the hyperactive and impulsive behaviors of girls with ADHD was generated from the current literature, the teaching, clinical, and personal experiences of experts in the area of ADHD, as well as the childhood experiences of adult women with ADHD. This list of 45 items was formatted into an assessment instrument with five choices, *Almost Never*; *Sometimes*; *Often*; *Most of the Time*; and *Almost Always*.

Women who had been diagnosed in adulthood with ADHD were then invited and agreed to participate in a focus group. Their ages ranged from 27 to 57 ($M = 36$ years), four were Caucasian, and one was Korean-American (two undergraduate university students, two graduate students, and one adult nonstudent). The purpose of the focus group was to evaluate the identified items against their childhood experiences and identify areas that may have been overlooked in past rating scales. The two and a half hour focus group was facilitated by a series of questions to guide the discussion through the domains of

the assessment. Each participant in the focus group completed a self-assessment of the 45 items. Tapes of the focus group were transcribed and coded for the 45 items and any additional strands that emerged from the discussions (Kitzinger, 2008). The transcript was used to revise the list of descriptors on the assessment form.

The final supplementary instrument, referred to throughout this study as the *supplementary descriptive assessment*, consisted of 44 descriptors across six categories that were entitled: Activity Style (ten items), Talking Style (five items), Attentional Style (eight items), Social Style (13 items), and Emotional Style (eight items). Items are listed in Tables 1 and 2. The Social Style category contained both positive social skills and oppositional behavior.

Table 1
Factors of the Supplementary Descriptive Assessment Item Scores: Parents' Ratings

		I	II	III	IV	V
15.	Changes topics of conversation or loses a thought	.76	.04	.01	-.06	-.02
8.	Poor handwriting or changes handwriting style	.67	-.08	-.02	.10	.05
13.	Says things before thinking them through	.66	.17	-.13	-.15	-.02
5.	Trips, bumps into things	.58	-.07	.21	.01	-.01
14.	Jumps into conversations or interrupts	.56	.31	-.11	-.31	-.03
28.	Likes friends that parents don't like	.55	-.05	-.01	.14	.16
9.	Antsy when waiting	.52	.22	-.05	-.01	-.02
10.	Eats or drinks faster than others	.52	-.05	.25	-.19	.01
22.	Easily bored	.50	.19	-.17	.02	.11
19.	Rushes through work or other activities	.48	.11	.08	-.07	.08
32.	Breaks rules when unsupervised	.47	.22	.02	.09	.08
7.	Typically moving some part of the body (foot shaking, tapping, touching)	.42	.24	.36	.03	-.02
17.	Sometimes does the minimum work and other times goes all out	.41	-.08	.13	.08	.24
30.	Stirs up trouble	.40	.31	-.05	.05	.03
39.	Nervous habits (chews fingernails or inside of cheek, pinches, pokes or scratches own body, pulls own hair)	.39	.09	.02	.34	.03
29.	Swears, cusses, uses gestures	.39	.06	-.09	.07	.17
34.	Stubborn, strong willed	.03	.71	.00	.05	.08
36.	Talks back or fights back with parent(s)	.15	.69	-.11	.06	-.23
35.	Gets angry with unfair adults	.13	.64	-.09	.07	.12
43.	Reacts with strong feelings	.01	.62	.08	.19	.13
33.	Worries about fairness	-.04	.61	.08	.15	-.13
40.	Moody -- frequent ups and downs	.16	.53	-.11	.20	.01
11.	Loud with friends or family	.31	.43	.03	-.33	-.01
2.	Busy and <i>on the go</i> - outdoors	.24	-.12	.76	.11	-.15
1.	Busy and <i>on the go</i> - indoors	.17	-.15	.68	.15	-.07
		I	II	III	IV	V
4.	Faster - walking, biking, or working	.21	-.15	.67	.10	-.01
27.	Shows enthusiasm	-.22	.07	.56	-.17	.06
25.	Initiates or starts activities -- a leader with friends	-.33	.19	.46	-.17	.30
31.	Joins activities (clubs, YWCA, Scouts, band/orchestra, sports)	-.39	.13	.44	.04	.15
12.	Likes to talk -- always has a comment or question	.25	.24	.37	-.33	.05
16.	Has many interests (hobbies, games, music, projects, sports, fads, or crafts)	-.14	-.02	.44	-.08	.38
24.	Reads or does homework with others	-.06	.32	.39	-.05	-.17
38.	Nervous in new situations	.01	.23	.12	.82	-.01
37.	Shy around strangers and adults	-.13	.18	.04	.73	.01
21.	Busy with crossword puzzles, writing letters, diaries, art, etc.	.02	-.05	.13	-.02	.63
20.	Dreamer, fantasizer, or reader	.11	-.03	.07	-.01	.54
44.	Always <i>in love</i>	.26	-.08	-.15	.12	.52
3.	Tomboy or spends time with boys	.20	-.01	.23	.04	.43
42.	Idealizes or worships others (teachers, movie/TV stars, musicians, or heroes)	.14	.04	-.13	.29	.39
Items With Highest Loading Below .38						
6.	Hands kept busy (doodling, twirling hair, playing with objects)	.33	.29	.33	.00	-.02
18.	Dresses and gets ready quickly	.04	-.16	.20	-.01	.15
23.	Reads or does homework with the radio or TV on	.10	.12	-.17	-.09	.34
26.	Has difficulty with sudden changes in plans	.11	.35	-.10	.27	.07
41.	Feels guilty	.20	.27	.10	.26	-.01

Table 2
Factors of Supplementary Descriptive Assessment Item Scores: Students' Self-ratings

		I	II	III	IV	V
14.	Jumps into conversations or interrupts	.76	.02	-.13	.01	-.12
13.	Says things before thinking them through	.73	-.02	-.07	.11	.00
11.	Loud with friends or family	.69	-.01	-.01	.07	-.16
6.	Hands kept busy (doodling, twirling hair, playing with objects)	.66	.05	.13	-.18	.16
7.	Typically moving some part of the body (foot shaking, tapping, touching)	.61	.15	.10	-.24	.15
15.	Changes topics of conversation or loses a thought	.53	.10	-.13	.10	.11
9.	Antsy when waiting	.53	.02	.01	-.04	.16
12.	Likes to talk -- always has a comment or question	.49	-.10	.22	.26	-.22
5.	Trips, bumps into things	.46	.21	.03	-.02	-.08
22.	Easily bored	.37	.07	-.12	.15	.15
29.	Swears, cusses, uses gestures	.04	.71	-.04	.14	-.10
32.	Breaks rules when unsupervised	.10	.63	-.05	.19	-.04
30.	Stirs up trouble	.07	.62	-.07	.10	.0
28.	Likes friends that parents don't like	.06	.54	.03	-.01	.14
3.	Tomboy or spends time with boys	.01	.44	.26	.10	-.04
8.	Poor handwriting or changes handwriting style	.17	.40	.13	-.14	.01
16.	Has many interests (hobbies, games, music, projects, sports, fads, or crafts)	-.03	-.09	.65	-.07	-.02
25.	Initiates or starts activities -- a leader with friends	-.10	.15	.56	.26	-.07
1.	Busy and <i>on the go</i> -- indoors	.08	-.02	.54	.02	.06
4.	Faster - walking, biking, or working	-.15	.26	.54	.07	-.01
31.	Joins activities (clubs, YWCA, Scouts, band/orchestra, sports)	.03	-.30	.48	.02	.24
2.	Busy and <i>on the go</i> -- outdoors	.19	.06	.42	.03	-.04
34.	Stubborn, strong willed	-.03	.11	.0	.68	.03
		I	II	III	IV	V
33.	Worries about fairness	-.11	.05	-.03	.51	.16
43.	Reacts with strong feelings	.05	.08	.22	.51	.21
35.	Gets angry with unfair adults	.06	.34	-.08	.46	.01
27.	Shows enthusiasm	.22	-.36	.30	.40	-.09
38.	Nervous in new situations	-.01	-.10	-.01	.14	.71
37.	Shy around strangers and adults	-.13	-.13	-.09	.09	.61
41.	Feels guilty	-.01	-.06	.01	.35	.46
42.	Idealizes or worships others (teachers, movie/TV stars, musicians, or heroes)	-.05	.33	.15	-.10	.40
40.	Moody -- frequent ups and downs	.13	.24	-.02	.35	.40
26.	Has difficulty with sudden changes in plans	.14	.11	.10	.12	.39
Items with Highest Loading Below .37						
10.	Eats or drinks faster than others	.24	.25	.13	-.05	-.23
17.	Sometimes does the minimum work and other times goes all out	.14	.08	.27	-.03	.15
18.	Dresses and gets ready quickly	-.21	.27	.33	-.04	-.15
19.	Rushes through work or other activities	.30	.27	.04	.18	-.13
20.	Dreamer, fantasizer, or reader	.02	.04	.17	.33	.14
21.	Busy with crossword puzzles, writing letters, diaries, art, etc.	-.04	.04	.21	.17	.27
23.	Reads or does homework with the radio or TV on	.12	.20	.08	.06	.01
24.	Reads or does homework with others	.09	.07	.34	-.01	.23
36.	Talks back or fights back with parent(s)	.24	.25	-.36	.15	.06
39.	Nervous habits (chews fingernails or inside of cheek, pinches, pokes or scratches own body, pulls own hair)	.31	.21	.03	-.21	.29
44.	Always <i>in love</i>	.24	.27	.09	.01	.08

Participants and Recruitment Procedures

To encourage the participation of a diverse sample of girls and to broaden the generality of findings, participants were recruited from five school districts: two within a mile radius of a large Midwestern university, one in a largely Hispanic, urban school district, one in a predominantly white, rural, Midwestern community, and one in a racially diverse small town in a Southern community. All teachers in four of the schools were invited to participate if they taught a last hour class or study hall with fifth through eighth grade female students. The urban school and rural school had 100% teacher participation. The other two schools had teacher participation rates of about 50% and 75%. To include a larger sample of girls with a clinical diagnosis of ADHD, the school nurse mailed invitations to participate to the families of girls with a clinical diagnosis of ADHD in the school near the university.

Together, these procedures produced a total sample of 262 participants (41 from the urban school, 113 rural, Midwestern schools, 71 from the Southern school, and 37 from schools near the university). For this sample, intelligence, reading, and math standard achievement scores were taken from existing group-administered, nationally norm-referenced standardized test scores in students' accumulative files. Additional demographic information was provided in writing by parents on girls' age, grade, number of siblings, parents' marital status, occupation, income, and race/ethnicity.

Procedures

Each teacher, parent, and girl participant was asked to complete the ADD-H Comprehensive Teacher's Rating Scale (ACTeRS) (Ullmann, Sleator, & Sprague, 1991). This is a 24-item scale that assesses Attention, Hyperactivity, Social Skills, and Oppositionality and includes separate norms for girls. Its subscales have a high degree of factorial independence and adequate reliability (internal consistency $r = .92 - .97$; test-retest $r = .78 - .82$; inter judge $r = .51 - .73$). The items on the ACTeRS subscales of Attention and Hyperactivity closely reflect the concepts and wording in the *DSM-IVTR* (American Psychiatric Association, APA, 2000). There is recent evidence that teacher ratings that are not specific to any one day or situation are moderately to strongly related to student behaviors recorded by an independent observer over 3 to 4 days; this supports the validity of rating scales (Lauth et al., 2006). ADHD rating scales have been shown to have to specificity greater than 94% in studies differentiating children with ADHD from normal, age-matched, community controls (AAP, 2001).

Teachers completed the ACTeRS rating scale on each participating girl; parents and girls completed the Supplementary Descriptive Assessment. (Teachers were not asked to complete this scale because many of the items were not classroom based.) Girls' self-assessments on the ACTeRS, Supplementary Descriptive Assessment, and Piers-Harris were conducted in four schools in a 30 min assembly. Each item on the ACTeRS scale was read aloud to the students. At the largely Hispanic, urban school, instructions were given in both English and Spanish and instruments were available in both languages. All students then independently completed the Supplementary Descriptive Assessment and Piers-Harris Children's Self-Concept Scale (an 80 item *yes, no* self-rating scale with cluster scores in Behavior, Intellectual and School Status, Physical Appearance and Attributes, Anxiety, Popularity, and Happiness and Satisfaction, Piers & Harris, 1984). There is evidence that children with ADHD can accurately self-report their feelings and behavior (Klimkeit et al., 2006). The researcher was available throughout each session to answer questions. As students finished, each was thanked, given a certificate and a pencil, and released to class.

Parents were asked to complete the ACTeRS and Supplementary Descriptive Assessment at home. Due to restrictions placed on the study by the school administration, parent ratings were not available for the largely Hispanic, urban school district. For the one local school with only six participants, the school year was ending. Therefore, appointments were made with each family for the researcher to visit their homes. Parents were given the parent scales and were asked to complete them independently in another part of the home. The student ratings were administered to the students individually using the same procedures that had been employed in the schools.

Participant Grouping Criteria

A girl was included in the ADHD group ($n = 20$) if she had a prior diagnosis of any subtype of ADHD indicated in school records or reported by the family or by the school nurse, which was typically associated with a prescription for stimulant medication. Reliability of this group membership status was determined with an ACTeRS hyperactivity subscale score at or below the 10th percentile on the parent rating and at or below the 25th percentile on the teacher rating, or vice versa (i.e., demonstrating ADHD in more than one context). Scores were compared to the ACTeRS norms for girls. According to the ACTeRS manual, if the Attention subscale score is at or below the 10th percentile, regardless of other scores, one can have confidence in the diagnosis of ADHD (Ullmann et al., 1991, p. 9), and that a score at or below the 25th percentile on any subscale should be considered indicative of a major deficit. Because we did not assess age of onset of the symptoms of ADHD nor conduct a diagnostic interview, we labeled our participants as a school-based sample of girls with ADHD.

The Comparison group included girls with ratings equal to or greater than the 40th percentile on both the parent and teacher ratings of the ACTeRS hyperactivity subscale. According to the ACTeRS manual, a percentile score between 40 and 50 may indicate a mild problem but scores above the 50th percentile show no indication of a problem (Ullmann et al., 1991). Girls whose hyperactivity scores

were between the 25th and 40th percentiles ($n = 160$), indicating higher levels of hyperactivity, were excluded from the Comparison group.

An additional sample of girls with learning disabilities (LD) were either reported by their families as having a prior diagnosis of LD or had evidence of a school-based identification of LD in school records. Because we were attempting to identify the characteristics of girls with ADHD separate from those who have learning problems, girls who were both LD and ADHD ($n = 7$) were included in the LD group. The demographics of these groups are presented in Table 3.

Table 3
Demographics of the Total Sample and Group Equivalence Means, (SD), and Follow-up Comparisons

	Total <i>n</i> =262	NC <i>n</i> =63	ADHD <i>n</i> =20	LD <i>n</i> =19	<i>F</i> -ratio
Age	152.7 (12.94)	152.5 (10.7)	152.2 (12.8)	155.5 (12.4)	0.56
Grade	6.65 (0.98)	6.73 (0.82)	6.95 (0.99)	6.42 (0.90)	1.80
IQ (Range)	106.96 (15.21) (66-141)	113.1 (12.66) = (86-141)	105.6 (9.97) > (93-125)	95.0 (16.27) (66-122)	12.52****
Reading	60.89 (27.84)	71.0 (23.24) >	56.2 (23.84) >	34.1 (30.88)	15.27****
Math	63.19 (28.66)	74.3 (21.97) >	58.1 (22.15) >	37.4 (29.11)	17.48****

Note: * $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$

Groups: NC = Normal Comparisons; ADHD = ADHD; LD = Learning Disabled. Arrowheads indicate greater than direction. Age is in months. IQ is in standard scores. Reading and math are in percentile scores.

Results

Demographic data

Differences among groups of girls (with and without symptoms of ADHD) and with LD were *not* found in age, grade, number of siblings, parents' marital status, occupation, or income. See Table 3. The Comparison girls scored higher on measures of both math and reading than the girls in the ADHD group, who in turn scored higher than the girls in the LD group. Even though their achievement scores were lower, intelligence scores for the ADHD group were equivalent to that of Comparison girls and higher than those of the girls in the LD group, who had average but lower IQ scores.

There also were group differences on race/ethnicity, $\chi^2(6, n = 99) = 27.47, p < .001$. That is, 90% of the Comparison group reported being white (but not Hispanic), 5% African American, and 5% Hispanic; 58% of the ADHD group reported being white (but not Hispanic), 37% African American, and 5% other; and 64% of the LD group reported being white (but not Hispanic), 13% African American, and 23% Hispanic. However, race did not contribute to total scale scores for parents' ratings or for girls' self-ratings. We did find that Hispanic parents rated their daughters as engaging in less pro-social activity than the other parent groups, $F(3) = 2.99, p = .032$; similarly, the Hispanic girls rated themselves as engaging in less pro-social behavior than the African American girls, $F(3) = 7.72, p = .0001$.

Factor Analysis

To determine the constructs underlying the new Supplementary Descriptive Assessment, an exploratory, principal components analysis, and Promax (oblique) rotation of all 44 items was performed separately for the parent and student ratings of all participants, using squared multiple correlations as prior communality estimates. Initial analyses produced five factors with eigenvalues of at least one and extracted factors that were conceptually interpretable according to the criteria set forth by Hatcher (1994). Based on interpretation of the rotated factor pattern, an item was included in a factor if the factor loading was .37 or greater for that factor and less than .37 for all other factors. Tables 1 and 2 document the five factors and show consistent findings across both raters.

For parent ratings, Factor I clustered items in the area of Impulsivity/hyperactivity and contained 17 items. Factor II, Unregulated Emotions, had seven items reflecting stubbornness, anger, and strong emotions. Factor III contained nine items in Pro-Social Activity and included items such as, *Busy and on the go* and *Shows enthusiasm*. The fourth factor was made up of two items that assessed Anxiety, and Factor V clustered five items related to Cognitive Stimulation.

For student self-ratings on Factor I, ten clustered items in the area of Impulsivity/hyperactivity. Factor II contained six items in the area of Inappropriate Behavior. Factor III contained six items in Pro-Social Activity, and the fourth factor clustered five items related to Unregulated Emotions. Factor V was

made up of six items that assessed Anxiety and Emotionality. Most items on factors I and III loaded similarly for parent and student self-ratings.

Supplementary Descriptive Assessment Validity

Discriminant function analyses were conducted to determine whether the descriptive assessment could correctly assign girls to groups (ADHD, Comparison). Using the parents' ratings, the five factors correctly assigned 79% of the girls to the ADHD group and 94% to the Comparison group. The coefficient was largest for Factor I, Impulsivity/Hyperactivity and Factor III, Pro-Social Activity--reflecting their contribution to the discrimination between the two groups. For the girls' data, self-ratings correctly assigned only 44% of the girls to the ADHD group and 36% to the Comparison group.

We also examined concurrent validity. After reverse coding the Attention and Social Skills subscales of the ACTeRS, total scale scores were computed for both scales. Total scale correlation for the parents' descriptor ratings and the ACTeRS was .51 ($p < .0001$), and the students' descriptors and ACTeRS correlated at .54 ($p < .0001$), suggesting that the two scales were tapping overlapping constructs.

To examine the validity of the individual constructs, subscale scores from the ACTeRS were correlated with Factor Scores from the parent and student ratings on the Supplementary Descriptive Assessment. See Table 4. The highest correlation from the parents' ratings was obtained for parent's Factor I (Impulsivity/hyperactivity) and the Hyperactivity subscale of the ACTeRS ($r = .75$). Also high was the students' self-ratings ($r = .66$) of hyperactivity and impulsivity on both scales. The items on the ACTeRS scale focused on the physical domain (e.g., *Out of seat*, *Squirms in seat*), whereas the items on Factor I of the Supplementary Descriptive assessment were primarily verbal (e.g., *Jumps into conversations*; *Says things before thinking them through*; *Changes topic of conversations*).

Table 4
Correlations of Subscale Scores from the ACTeRS and Factor Scores from the Supplementary Descriptive Assessment

Parents' Ratings Supplementary Descriptive Assessment Factors	ACTeRS Attention	ACTeRS Hyperactivity	ACTeRS Social Skills	ACTeRS Oppositionality
I. Impulsivity/Hyperactivity	.46****	.75****	.44****	.47****
II. Unregulated Emotions	.30****	.53****	.26***	.30****
III. Pro-Social Activity	-.24***	.12	-.27****	-.11
IV. Anxiety	.01	.12	.12	.10
V. Cognitive Stimulation	.06	.33****	.10	.19**

Note: * $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$

Students' Ratings Supplementary Descriptive Assessment Factors	ACTeRS Attention	ACTeRS Hyperactivity	ACTeRS Social Skills	ACTeRS Oppositionality
S I. Impulsivity/Hyperactivity	.16*	.66****	.12	.40****
S II. Inappropriate Behavior	.31****	.46****	.26***	.68****
S III. Pro-Social Activity	-.16*	.17*	-.30****	.01
S IV. Unregulated Emotion	.04	.33****	-.01	.27****
S V. Anxiety	.19**	.29****	.20**	.33****

Note: * $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$

Impulsivity/hyperactivity. As documented in Table 1 for parents and Table 2 for students, the largest and most clearly defined factor from both parents' and students' ratings described impulsive and hyperactive behavior. The parents' Factor I included items from Factors I and II of the students' self-ratings. Although the parents' Factor I combined characteristics, the girls' analysis separated Impulsivity/hyperactivity from volitional Inappropriate Behavior (e.g., *Stirs up trouble*; *Swears, cusses, uses gestures*).

Social behavior. Social skill deficits were identified on the ACTeRS. Teachers identified 23% of girls and parents identified 35% of the total sample at the 25th percentile and 2% and 3%, respectively at the 10th percentile. The girls' self-ratings showed a similar pattern, with 34% self-identifying problems with social skills at the 25th percentile and 3% at the 10th percentile. These percentages suggest that it is common for fifth through eighth grade girls to have some problems with social behavior, but it is uncommon for them to have severe problems. An analysis of group differences on the ACTeRS ratings

showed that girls with ADHD and LD were rated by all three rating sources (teachers, parents, and girls) as having significantly more problems with social skills than Comparison girls. See Table 5.

Table 5

Group Differences on Teachers,' Parents,' and Students' Ratings on the Subscales of the ACTeRS

ACTeRS Teachers' Ratings	F-Value	SNK*	Mean	SD
Attention	41.01****	A - LD	2.67	0.96
		A - AD/HD	2.47	0.92
		B - NC	1.30	0.43
Hyperactivity	54.11****	A - AD/HD	3.07	1.27
		B - LD	1.90	1.11
		C - NC	1.08	0.17
Social Skills	36.30****	A - LD	2.51	0.62
		A - AD/HD	2.33	0.58
		B - NC	1.47	0.47
Oppositional	23.24****	A - AD/HD	2.07	1.05
		B - LD	1.40	0.63
		C - NC	1.07	0.22
ACTeRS Parents' Ratings				
Attention	36.95****	A - LD	3.09	1.09
		A - AD/HD	2.97	1.13
		B - NC	1.46	0.65
Hyperactivity	93.88****	A - AD/HD	3.43	1.01
		B - LD	2.38	0.95
		C - NC	1.22	0.20
Social Skills	28.03****	A - LD	2.80	0.86
		A - AD/HD	2.50	0.71
		B - NC	1.64	0.53
Oppositional	8.55***	A - AD/HD	1.84	0.85
		A - LD	1.56	0.72
		B - NC	1.18	0.48
ACTeRS Students' Ratings				
Attention	36.95****	A - LD	3.09	1.09
		A - AD/HD	2.97	1.13
		B - NC	1.46	0.65
Hyperactivity	6.09**	A - AD/HD	3.04	1.16
		AB - LD	2.74	0.94
		B - NC	2.24	0.90
Social Skills	9.15***	A - LD	2.52	0.69
		A - AD/HD	2.29	0.47
		B - NC	1.97	0.48
Oppositional	3.36*	A - ADHD	2.08	1.04
		A - LD	1.78	0.90
		A - NC	1.52	0.80

*Student Newman Keuls

Note: Letters that differ indicate significant differences between groups

*p < .05, **p < .01, ***p < .001, ****p < .0001

In addition to the differences in problematic social behavior documented on the ACTeRS, the new Supplementary Descriptive Assessment added an important dimension of social behavior -- positive social involvement. This Pro-social factor was not a measure of social skill but rather social involvement. Girls with ADHD were rated equivalent to girls without disabilities on this factor (Table 6 next page) and on eight of the nine Pro-social items (Table 2). They were rated significantly higher than girls without disabilities on the remaining Pro-social item, *Likes to talk -- always has a comment or question*. In contrast, girls with LD were rated significantly lower than one or both of the other groups on five of the nine items (i.e., they were less likely to like to talk, to be busy and on the go, initiate or start activities -- be a leader with friends, show enthusiasm, or join activities). For self-ratings, girls with ADHD scored similar to girls without disabilities on all Pro-social items but one (Table 2). On *Faster - walking, biking, or working*, they self-rated significantly higher than girls without disabilities. Girls with LD self-rated significantly *lower* than girls with ADHD on this faster moving item and on *Has many interests (hobbies, games, music, projects, sports, fads, or crafts)*.

Emotionality. The Supplementary Descriptive Assessment included two factors--Unregulated Emotions and Anxiety. See Table 1 for parent ratings and Table 2 for student self-ratings. Girls with ADHD were rated higher than Comparison girls for all seven items of the Unregulated Emotions parents' factor. Parents' mean rating of girls with ADHD on the Unregulated Emotions factor was 3.51 (between

Table 6
Group Differences on the Factor Scores of Parents' Ratings of the Supplementary Descriptive Assessment items

Variable	F-Value	SNK*	Mean	SD
I Impulsivity/Hyperactivity	45.86****	A - ADHD	2.88	0.80
		B - LD	2.29	0.64
		C - NC	1.63	0.34
II Unregulated Emotions	18.29****	A - ADHD	3.51	1.07
		B - LD	2.78	0.93
		C - NC	2.23	0.68
III Pro-Social	4.78*	A - ADHD	3.23	.64
		A - NC	3.10	.65
		B - LD	2.59	.77
IV Anxiety	2.03 ^{ns}	A - LD	2.65	2.13
		A - NC	2.0	1.04
		A - ADHD		.98
V Cognitive Stimulation	1.25 ^{ns}	A - ADHD	2.42	.87
		A - LD	2.26	.81
		A - NC	2.13	.62

Comparison group $n = 63$, ADHD group $n = 20$, LD group $n = 19$

*Student Newman Keuls

Note: Letters that differ indicate significant differences between groups

* $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$

Often and Most of the Time), the highest mean score of any factor on the parents' scale. Girls with ADHD were more stubborn, moody, overly reactive, and angry. They were also more likely to worry, feel guilty, and be loud with their family and friends. Their self-ratings on this factor yielded a mean score of 3.53, second only to their self-ratings of pro-social activity. Although girls rated themselves as high as parents rated them on this factor, only one item of their self-ratings differentiated them from the other groups. The one item indicated that they were aware that they were more likely than other girls to react with strong feelings. The second emotional factor, Anxiety, did not seem to characterize this sample as different from Comparison or LD groups.

Self-concept. In the present study, girls with ADHD were found to have lower total self-concept on the Piers-Harris than Comparison girls, and girls with LD had the lowest self-concept (see Table 7).

Table 7
Group Differences on the Piers Harris Self-Concept Scale

Variable	F-Value	SNK*	Mean	SD
Total Self-concept	6.04**	A - NC	57.27	9.46
		B - ADHD	51.70	11.14
		C - LD	49.26	9.34
Behavioral Self-concept	3.35*	A - NC	55.84	9.67
		A - LD	51.84	10.27
		A - ADHD	49.50	11.96
Intellectual Self-concept	4.49*	A - NC	54.48	9.29
		AB - ADHD	49.65	15.46
		B - LD	46.58	9.85
Anxiety Self-concept	4.38*	A - NC	53.11	9.89
		AB - ADHD	49.70	10.86
		B - LD	45.21	11.64
Popularity Self-concept	3.67*	A - NC	50.24	9.75
		AB - ADHD	46.60	10.06
		B - LD	43.74	9.12
Physical Appearance Self-concept	4.15*	A - NC	56.52	9.32
		AB - ADHD	53.80	12.66
		B - LD	48.79	10.90
Happy Self-concept	2.68	A - NC	55.09	9.23
		A - ADHD	52.45	8.66
		A - LD	49.63	10.30

*Student Newman Keuls

Note: Letters that differ indicate significant differences between groups

* $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$

As presented in Table 8, for girls with symptoms of ADHD, lower self-concept was associated with higher levels of (a) impulsivity and hyperactivity on parent (but not student) ratings on the descriptor

assessment and (b) self-ratings of inappropriate behavior. Lower self-concept in girls with symptoms of ADHD was also associated with self-rating of inattention on the ACTeRS, parent ratings of unregulated emotions, and self-ratings of social skill problems on the ACTeRS. Girls reporting high levels of pro-social activity reported the highest self-concept.

Table 8
Correlations of Total Self-concept and Behavioral Ratings

ACTeRS Subscales	Total Sample	AD/HD (<i>n</i> = 20)	LD (<i>n</i> = 19)
Teachers' Ratings			
Attention	-.29****	.15	-.53*
Hyperactivity	-.01	.57*	.13
Social Skills	-.26***	.22	-.78***
Oppositional	-.03	-.27	-.18
Parents' Ratings			
Attention	-.31****	-.42 (<i>p</i> < .08)	-.21
Hyperactivity	-.25***	-.35	.02
Social Skills	-.32****	-.40	-.32
Oppositional	-.23**	-.27	-.38
Students' Ratings			
Attention	-.46****	-.48*	-.25
Hyperactivity	-.31****	.07	-.42
Social Skills	-.58****	-.76***	-.40
Oppositional	-.43****	-.31	-.43 (<i>p</i> < .09)
Factors on the Supplementary Assessment			
Parents' Ratings			
I. Impulsivity/Hyperactivity	-.33****	-.49*	-.03
II. Unregulated Emotions	-.24***	-.59**	.16
III. Pro-Social Activity	.31****	.20	.44 (<i>p</i> < .08)
IV. Anxiety	-.20**	-.05	-.18
V. Cognitive Stimulation	-.10	.14	-.04
Students' Ratings			
I. Impulsivity/Hyperactivity	-.31****	-.15	-.37
II. Inappropriate Behavior	-.43****	-.52*	-.27
III. Pro-Social Activity	.26****	.49*	.08
IV. Unregulated Emotions	-.17*	.11	-.08
V. Anxiety	-.41****	-.11	-.11

Note: **p* < .05, ***p* < .01, ****p* < .001, *****p* < .0001

Subscales of Social Skills and Attention on the ACTeRS were reverse-coded so that high scores reflect greater problems on all subscales.

Discussion

The purposes of this study were comprehensively to identify: (1) sensitive raters or rating contexts, (2) types of behavior that could increase the sensitivity of assessment of girls with ADHD and could supplement traditional rating scales, and (3) possible protective factors for girls with ADHD. Limitations that qualify the findings are that our school-based participants would be considered as exhibiting symptoms of ADHD. That is, even though they had been identified by their doctors and we administered both parent and teacher rating scales using both home and school criteria, we did not determine the age of onset of these rated characteristics or interview parents. These limitations are inherent in the difficulties of recruiting large school-based samples, rather than convenient samples of clinic-referred participants. Other sample limitations were that we did not differentiate children into the inattentive, hyperactive, and combined subtypes within community samples or identify a sufficient number of children with co-occurring learning disabilities with and without ADHD.

Our initial analysis compared ratings of girls with ADHD on traditional ADHD rating scales versus our assessment. Traditional scale items describe large motor activities like running, climbing or getting out of seats in the classroom. In this study we documented findings concordant with traditional rating scales, but with additional important specificity. That is, both parents' and girls' ratings on Impulsivity/hyperactivity (Factor I) significantly discriminated between girls with and without ADHD. Impulsivity may have contributed to their seeking a fast pace in both conversations and in their work, to their greater clumsiness (tripping and bumping into things), and to poor handwriting. Our supplementary assessment also documented that girls were busy with small motor activities like foot shaking, doodling, twirling their hair, or chewing their fingernails on both parent and student ratings. Similarly the Supplementary Descriptive Assessment items in this study provided more specific

assessment of social behavior (e.g., *Swears, cusses, uses gesture; Breaks rules when unsupervised; Stirs up trouble*) than the general ACTeRS Social Skill items (e.g., *Behaves positively with peers/classmates*).

Related to the importance of context, we predicted group differences in the social domain. We found that the most defining feature of ADHD behavior in girls was not large motor movement, but verbal impulsivity, as defined by both parents and students. They interrupted others, talked too loudly, changed topics inappropriately, often lost track of their own thoughts in conversations, and said things before thinking. Both parents and girls rated girls with ADHD as becoming easily bored and having difficulty waiting, items also related to impulsivity. These results support those presented by Ohan and Johnston (2005) who assessed eight *female-sensitive* characteristics of ADHD (i.e., talks excessively and without thinking first, instead of doing homework or class work writes/passes notes, whispers and talks to friends, doodles, changes friends impulsively, forgetful in social situations), all of which involved social interaction. They found that their female-sensitive ADHD items accounted for variance in impairment over and above that accounted for by the DSM-IV symptoms. Similarly our social items overlapped three of those by Ohan and Johnston (likes to talk, says things without thinking, and changes topics of conversation) and provided unique information about girls' social functioning.

Also related to our expectations about the importance of girls as raters, we found that girls with ADHD saw themselves as engaging in more inappropriate behavior than Comparison girls (i.e., not just the amount of activity/impulsivity, see Students' Factor II, Table 9).

Table 9
Group Differences on the Factor Scores of Students' Self-ratings on the Supplementary Descriptive Assessment Items

Variable	F-Value	SNK*	Mean	SD
I Impulsivity/Hyperactivity	4.60*	A -ADHD	3.43	1.02
		AB - LD	2.93	0.69
		B - NC	2.76	0.86
II Inappropriate Behavior	3.93*	A - ADHD	2.96	0.93
		B - LD	2.28	1.02
		B - NC	2.26	1.01
III Pro-Social	4.73*	A - ADHD	3.99	0.67
		B - NC	3.61	0.61
		B - LD	3.35	0.79
IV Unregulated Emotions	2.49 ^{ns}	A - ADHD	3.53	0.99
		A - NC	3.10	0.85
		A - LD	2.96	0.73
V Anxiety	9.44***	A - ADHD	3.16	0.72
		B - LD	2.47	0.78
		B - NC	2.36	0.70

Comparison group $n = 63$, ADHD group $n = 20$, LD group $n = 19$

*Student Newman Keuls

Note: Letters that differ indicate significant differences between groups

* $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$

That is, girls were able to assess the quality of their own impulsive/hyperactive behavior. In contrast, parents rated impulsive/hyperactive and inappropriate behavior as one construct. Girls may better assess the specific nature and function of their own active behavior than do their parents. In line with these conclusions, low self-concepts in girls with ADHD was not associated with high levels of impulsivity and hyperactivity on their self-ratings. In contrast, boys with ADHD self-reported more impulsivity and hyperactivity associated with lower self-concept (Slomkowski, Klein, & Mannuzza, 1995). From these findings we concluded that because girls could differentiate between their appropriate and inappropriate hyperactivity and impulsivity (using the supplemental assessment), their negative self-judgments were *only* associated with their inappropriate activities (i.e., when they swore, broke rules, and stirred up trouble) and not with global assessments of hyperactivity/impulsivity as has been observed with boys.

Our conclusions about the emotional characteristics of girls with ADHD in this school-based sample did not support prior work with clinical samples, which has indicated that girls with ADHD are at risk for anxiety and mood disorders (Gaub & Carlson, 1997; Rucklidge & Tannock, 2001). For example, the second emotional factor, Anxiety, did not characterize this sample as different from comparisons,

which is consistent with other research using school-based samples and a comparison group (Hinshaw, 2002).

There were supplementary items that were included to identify possible protective behavior for girls with ADHD that could preclude their identification. Prior work (Mikami & Hinshaw, 2006) had documented that those girls with ADHD, who were more confident about their academic abilities, showed reductions in internalizing and externalizing symptoms over time, lower levels of substance use in adolescence, and further gains in academic achievement. To extend this line of research, we found a pro-social factor on both parent and student ratings (active involvement with friends, organizations, and activities in educational settings) that was equivalently exhibited by girls with and without ADHD [Only Hispanic parents rated their daughters as engaging in less pro-social activity than the other parent groups]. This pro-social factor was related to higher self-esteem for girls with ADHD. Overall, we presented evidence to suggest that girls with ADHD may be more tractable than boys; that is, girls with ADHD (a) were already aware at this age that they were more likely to react with strong feelings than other groups of girls, and (b) could make a distinction between inappropriate behavior (e.g., swearing) and self-regulatory activity, such as doodling.

Educational/Clinical Implications

Overall, the identification implications of this study are related to the importance of recognizing ADHD characteristic behavior and performance in girls, so that earlier treatment of these girls can be studied and improved. The current study focused on school-based samples of girls who could be identified prior to clinical labeling and adverse functional outcomes. We documented high levels of hyperactivity/impulsivity similar to traditional rating scales but with greater specificity (i.e., faster talking and moving, leading perhaps to lower quality performance of gross motor clumsiness and fine motor handwriting). The importance of the social context was clearly in evidence. That is, verbal impulsivity within the social context was the single most defining characteristic of girls with ADHD, in contrast to the motor activity of boys. Parents and girls agreed on this defining characteristic. Rater differences were documented on the appropriateness of motor behavior, which only the girls self-assessed with greater specificity (e.g., self-regulatory *busy* activity versus inappropriate stirring-up-trouble activity). Thus, both parents and girls assessed impulsive behavior in relation to the social context.

Related to the early identification of these girls by teachers, it was expected that girls in this age group would inhibit behavior in school and go relatively unnoticed by their teachers. We found, however, that teachers identified six percent of the total sample as having severe problems at the 10th percentile in hyperactivity on the ACTeRs scale. Of those girls identified as hyperactive by their teachers, less than a third had been diagnosed as having ADHD. We also documented that girls with ADHD (without LD) scored significantly lower than Comparison girls in both math and reading achievement, even though their IQ scores were equivalent (i.e., academic impairment). Since girls with ADHD are twice as likely as boys with ADHD to have low achievement (Caseau, Luckasson, & Kroth, 1994), early recognition of poor achievement relative to IQ scores may be another important marker within school-based samples and another important intervention target (Mikami & Hinshaw, 2006).

In summary, teachers can identify girls with ADHD but fail to refer them, perhaps not recognizing the importance of early referral or due to the tractability of girls in school settings. This study highlights the importance of future research examining why girls in school-based samples of children are not referred for services, in spite of clear documentation of poor long-term outcomes for girls with ADHD (e.g., Mikami & Hinshaw, 2006). Some of the implications for intervention derived from the present study are related to their pro-social behavior, which was equivalent to that of their peers. Because this behavior was within the normal range, reinforcing their active involvement in school activities and sports may be relatively easy to accomplish and could be associated with gains in self-esteem (as was documented in this study). Overall, we concluded that engaging young girls with ADHD in social activities and sports may reduce their likelihood of formal identification and help them develop peer relationships that could protect them from developing additional dysfunction. Recent research by Booth, Farrell, and Varano (2008) also reported that for girls, the risk of engaging in delinquent behavior was significantly reduced if they took part in sports, and Owens et al. (2009) reported that although most girls with ADHD failed to meet criteria for positive adjustment across five of six domains, nearly all (94%) demonstrated positive adjustment in at least one domain. Focusing on positive behavior may be an important balance to implementing interventions on the social inappropriateness of some of their behavior and their over-emotionality. That is, girls were aware of

their intense social and emotional style, and for this reason, they may respond to services to help them understand and regulate their faster pace and inappropriate activity.

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