Girls With ADHD And Associated Behavioral Problems: Patterns of Comorbidity

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Attention Deficit Hyperactivity Disorder (ADHD) is a behavioral disorder commonly seen by pediatricians, psychiatrists and community mental health specialists, and is less frequently identified in girls. This review investigated parent-reported behavioral profiles of girls among different ADHD diagnostic comorbid groups. Demographic and *Child Behavior Checklist* (CBCL) data were available for 40 girls and a comparison group of 55 boys. Independent measures *t*-tests compared CBCL *T*-scores among three diagnostic groups: (1) girls with ADHD only; (2) girls with ADHD and co-occurring learning disabilities (LD); and, (3) girls with ADHD and other co-occurring DSM Axis I diagnoses. Girls in the ADHD/Axis I group had the most clinically significant behavioral problems; in contrast, girls in the ADHD/LD group had few behavioral symptoms. This pattern was not found for the boys’ groups, suggesting that the co-occurrence of ADHD and other behavioral problems, especially LD, may have a different behavioral phenotype in girls than in boys.

Attention Deficit Hyperactivity Disorder (ADHD) is a common childhood disorder, with epidemiological studies revealing prevalence rates ranging from 4% to 12% in the general population of 6 to 12 year olds (Brown, 2000; Brown et al., 2001). Despite the overall frequency with which children having ADHD are seen by pediatric mental health and primary care practitioners, it is a behavioral condition that is underidentified in girls (Biederman, 1998; Biederman et al., 1999). Research addressing the behavioral manifestations of ADHD in females has been limited (Arnold, 1996). Further characterization of the disorder...
in girls is critical in order to optimize our diagnostic and treatment strategies.

In at least fifty percent of ADHD diagnoses, children also suffer at least one other psychiatric disorder, and an estimated 20-25% of children with ADHD receive a co-diagnosis of learning disorder (LD; Brown, 2000). Our understanding of these co-occurring disorder processes is limited by poor measurement strategies, clinical disciplinary biases, and the unpredictable sequence of emerging behavioral symptoms (Cantwell & Baker, 1991; Shaywitz, Fletcher, & Shaywitz, 1995).

Further, while it is established that other behavioral, emotional, and learning problems significantly co-occur with ADHD, (Purvis & Tannock, 1997; Shaywitz et al., 1995) the concurrent behavioral manifestations of ADHD and other disorders have been described in predominantly male samples. For example, several studies have demonstrated that boys with ADHD and comorbid LD typically demonstrate externalizing behavior problems, as well as language-related difficulties, (Beitchman & Young, 1997; Brown, 2000; Faraone et al., 1993; Hinshaw, 1992) and peer relation problems (Flick, 1992). In addition, research has shown that boys with ADHD and co-occurring LD often exhibit similar, if not higher, levels of parent-reported externalizing problem behaviors than boys with ADHD alone (Nigg, Carte, Hinshaw, & Treuting, 1998; Piesco, Baker, Silva, & Brooke, 1996). In contrast, much less is known about the behavioral symptoms of girls with comorbid ADHD (Newcorn et al., 2001; Rucklidge & Tannock, 2001; Sharp et al., 1999 as exceptions). One recent study suggests that girls and boys with ADHD are very similar in presentation (e.g., Sharp et al., 1999) while others have found that girls with ADHD are less symptomatic than boys, particularly with regard to activity level and aggression (e.g., Carlson, Tamm, & Gaub, 1997; Newcorn et al., 2001). Given these conflicting findings, a lack of attention to LD as a comorbid condition of ADHD, and the relative dearth of information regarding ADHD in females, additional research that addresses girls with ADHD and co-occurring behavioral and learning problems clearly is needed.

In attempts to more thoroughly understand comorbidity issues in children with ADHD, it has been suggested that the Child Behavior Checklist (CBCL; Achenbach, 1991a) might be useful for behaviorally characterizing and discriminating comorbid and non-comorbid cases of ADHD (Biederman et al., 1993). The use of behavior rating scales such as the CBCL to further characterize the Diagnostic and Statistical Manual of Mental Disorder’s (DSM; Diagnostic and Statistical Manual of Mental Disorders, 1994) ADHD diagnoses is well supported (Biederman et al., 1993; Eiraldi, Power, & Karustis, 2000). The American Academy
of Pediatrics recently presented clinical practice guidelines for ADHD, recommending that, although behavioral symptoms are only one of the six diagnostic criteria for an ADHD diagnosis, tests such as the CBCL may be useful in differentiating children with ADHD from children with other behavioral problems (Committee on Quality Improvement, 2000). Again, however, the majority of studies evaluating relations between the CBCL scales and DSM diagnoses have focused on male pediatric samples and have not attempted to discriminate and identify behavioral characteristics among comorbid ADHD cases in females.

The purpose of the current study is to further investigate the behavioral symptomatology of girls with ADHD, girls with co-occurring ADHD and LD, and co-occurring ADHD and other Axis I disorders. Informed by conclusions from previous research on boys with ADHD, we hypothesized that girls with ADHD and Axis I disorders and girls with ADHD and LD would have higher levels of parent-rated problem behaviors than girls with ADHD alone. To fully explore these hypotheses, a comparison group of boys with similar “pure” and comorbid diagnoses also was examined.

METHOD

Participants

The target sample was comprised of school-aged children and adolescents who were evaluated for attention problems in a non-profit community behavioral health agency located in Northern California. All children who had medical charts and were referred for an evaluation of ADHD between 1988 and 1998 (N = 179) were included. In one case, a diagnosis of ADHD made by a community clinician more than one year prior to the participant’s presentation to our agency precluded participation (because the basis and method of diagnosis were unknown to this agency). As part of the agency’s client intake process, demographic information and CBCLs were requested of all parents of new clients presenting to the agency’s ADHD Clinic for an evaluation of ADHD. All participants receiving the full diagnosis of ADHD (n=133) and who had complete demographic, medical history, and CBCL data reported by parents (n=95) were included and recorded for a female group (n=40) and an age and ethnicity-comparable comparison group of boys (n=55). Age, ethnicity, and referral sources for the final study sample are presented in Table 1.

Our sample consisted of predominantly Caucasian and Hispanic pre-adolescent children referred by a pediatrician or family member. Although many participants chose not to report family income information, the location of residence (by zip code and street address)
indicated that over 90% of participants were from middle- and upper-class communities.

TABLE 1. Demographic Characteristics of the Sample

<table>
<thead>
<tr>
<th></th>
<th>Girls group</th>
<th>Boys comparison group</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>40</td>
<td>55</td>
</tr>
<tr>
<td>Mean age in years (SD)</td>
<td>9.0 (3.2)</td>
<td>8.9 (3.2)</td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>n=20 (50.0%)</td>
<td>n=25 (45.5%)</td>
</tr>
<tr>
<td>Latino/a</td>
<td>n=4 (10.0%)</td>
<td>n=3 (5.5%)</td>
</tr>
<tr>
<td>Other</td>
<td>n=3 (7.5%)</td>
<td>n=1 (1.8%)</td>
</tr>
<tr>
<td>Missing</td>
<td>n=13 (32.5%)</td>
<td>n=26 (47.3%)</td>
</tr>
<tr>
<td>Referral sources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatrician</td>
<td>n=13 (32.5%)</td>
<td>n=16 (29.9%)</td>
</tr>
<tr>
<td>Family member or parent</td>
<td>n=13 (32.4%)</td>
<td>n=14 (25.5%)</td>
</tr>
<tr>
<td>Therapist or counselor</td>
<td>n=7 (16%)</td>
<td>n=10 (18.2%)</td>
</tr>
<tr>
<td>School or educator</td>
<td>n=4 (9%)</td>
<td>n=7 (12.7%)</td>
</tr>
<tr>
<td>Lawyer/courts</td>
<td>n=1 (2.3%)</td>
<td>-</td>
</tr>
<tr>
<td>Not available</td>
<td>n=2 (4.5%)</td>
<td>n=8 (14.5%)</td>
</tr>
</tbody>
</table>

Measures
A trained research assistant collected data from the following measures during the chart review:

Diagnostic and Statistical Manual of Mental Disorders (DSM III-R Diagnostic and Statistical Manual of Mental Disorders, 1987; and IV Diagnostic and Statistical Manual of Mental Disorders, 1994). All diagnoses were made by one of three licensed psychologists staffing the ADHD Clinic, and were based upon a semi-structured clinical interview using the DSM IV (75%) or III-R (25%) criteria. Participants were given the full diagnosis of ADHD and any co-occurring disorders only if all criteria from the DSM were met unequivocally. Likewise, Learning Disorders also were made according to the DSM, and included Reading Disorder, Mathematics Disorder, and Disorder of Written Expression; these disorders were only given if all DSM criteria were met.

Child Behavior Checklist. (Achenbach, 1991a). The CBCL is a widely used and well-standardized measure of child behavioral symptomatology. This parent-reported 113-item checklist is used to produce standardized profiles of behavior that may assist in the identification and assessment of a wide range of child behavioral disorders. The checklist is age- and gender-standardized and is designed to describe the behavior of children aged 4-18 years. The CBCL has substantial test-retest reliability, inter-rater agreement, internal consis-
tency and external validity (Achenbach, 1991b). For the purposes of this chart review, we recorded T-scores for three total problems scales (i.e., Total Problems, Internalizing Problems and Externalizing Problems) as well as eight CBCL syndrome scales (i.e., Attention Problems, Somatic Complaints, Withdrawn, Anxiety-Depression, Social Problems, Thought Problems, Delinquent Behavior, and Aggressive Behavior). For the syndrome scales, a T-score greater than or equal to 67 is clinically significant, representing either ‘borderline clinical’ or ‘clinical’ levels of symptoms. Mothers represented 83% of respondents for the girls and 87% of respondents for the boys. Other respondents included fathers, adoptive parents, foster parents and grandparents. Eight percent of CBCLs were filled out by both mothers and fathers; in these cases, the mothers’ reports were used.

Procedure

A clinical chart review was conducted to acquire the CBCL data, diagnoses, and demographic information. Diagnostic and Statistical Manual multi-axial diagnoses were obtained from formal mental health evaluations, and were utilized to create three diagnostic groups: (1) girls diagnosed only with ADHD (“ADHD” group); (2) girls diagnosed with ADHD and learning disabilities (“ADHD/LD” group); and, (3) girls diagnosed with ADHD and other DSM Axis I diagnoses (e.g., adjustment disorder, anxiety disorder, oppositional defiant disorder, and dysthymia; “ADHD/Axis I” group). One girl had diagnoses of ADHD, LD, and another Axis I disorder; she was included in the ADHD/Axis I group due to the strong influence of her other disorder on her behavioral symptomatology. Diagnostic groups similarly were constructed for a comparison group of boys. There were no cases where LD and Axis I disorders were coexisting in the boys’ group. CBCLs are considered stable for an individual over the period of at least 1 year (Achenbach, 1991b), and had been administered in the ADHD Clinic within six months of all of the participants’ ADHD diagnosis/evaluation.

Statistical Analyses

In order to establish normal distributions, CBCL scores were transformed logarithmically. Thereafter, independent samples t-tests were used to compare the transformed CBCL T-scores across the three female groups: ADHD, ADHD/LD, and ADHD/Axis I. Similar analytic strategies were applied to the comparison male group CBCL data. An alpha of .01 (two-tailed) was used as the threshold for statistical significance.
RESULTS

Gender comparisons

Girls and boys were similar in age ($t_{(93)} = .01, p=.99$), with a mean age of 8.9 ($SD$ 3.1) for girls and 8.9 ($SD$ 3.2) for boys. The frequency distributions of the three diagnostic categories were not statistically different for girls and boys ($two-way X^2=1.1, p=.57$). Mean scores for CBCL syndrome scales were similar for girls and boys, with the exception of the Attention Problems syndrome scale (mean Attention Problems $T$-score for girls=72 and for boys=67; $t_{(93)} = 2.5, p=.014$).

Diagnostic Group Distributions

Diagnoses of Attention Deficit Hyperactivity Disorder included 25% DSM IIIR-based and 75% DSM IV-based Axis I ADHD\(^1\). For the study group of 40 girls, there were eight (20%) in the ADHD group, 14 (35%) in the comorbid ADHD/LD group, and 18 (45%) in the comorbid ADHD/Axis I group. For the comparison group of 55 boys, there were 11 (22%) in the ADHD group, 14 (28%) in the comorbid ADHD/LD group, and 30 (60%) in the comorbid ADHD/Axis I group.

Behavioral Symptomatology: CBCL T-score Results by Diagnostic Group

For the three diagnostic groups, mean $T$-scores on the CBCL Attention Problems syndrome scale were in the clinical range for all three diagnostic groups: ADHD (70.0), ADHD/LD (72.8), and ADHD/Axis I (71.9). On the Aggressive Behavior syndrome scale, the mean scores for the ADHD (67.5) and the ADHD/Axis I (71.6) groups were in the clinical range. Lastly, the mean $T$-scores for the Social Problems syndrome scale were in the clinical range for the ADHD diagnostic group (68.0). All other mean syndrome scale scores for the girls’ diagnostic groups were in the non-clinical range, and are available upon request from the first author.

For the boys’ groups, CBCL mean $T$-scores on the Attention Problems syndrome scale reached the clinical range for the ADHD (69.3) and ADHD/LD (71.3) groups only. All other mean CBCL syndrome $T$-scores for the boys’ diagnostic groups were in the non-clinical range.

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\(^1\) In the DSM IV, the diagnosis of ADHD includes subtypes of Inattentive Type, Hyperactive-Impulsive Type, and Combined Type.
Between - Diagnostic Group CBCL Paired Comparisons for Girls and Boys

For the girls, independent samples \( t \)-tests indicated that the ADHD and the ADHD/LD groups differed significantly on the Somatic Complaints and approached a significant difference on the Delinquent Behavior syndrome scales (\( t_{(20)} = 2.71, p=.013, \) effect size 21\%; and \( t_{(20)} = 2.32, p=.031, \) effect size 10\%, respectively), indicating more problems in these domains for girls with ADHD only than for girls with a comorbid diagnosis of ADHD/LD. No other ADHD and ADHD/LD group differences were observed.

Comparisons of the ADHD/LD and ADHD/Axis I diagnostic groups indicated that girls with ADHD and Axis I diagnoses were rated significantly higher on the Somatic Complaints and approached a statistical difference on the Aggressive Behavior scales only (\( t_{(30)} = 2.96, p=.006, \) effect size 21\%; and \( t_{(30)} = 2.21, p=.035, \) effect size 13\%, respectively). No other group differences were found between the ADHD/LD and ADHD/Axis I groups.

No significant group differences were found between the ADHD and ADHD/Axis I diagnostic groups on the eight CBCL syndrome scales. The \( t \)-test results are presented in Table 2.

The same statistical procedures were used to compare CBCL scores across the three comparison boys’ diagnostic groups. The \( t \)-test statistics revealed no group differences on the eight CBCL syndrome scales, indicating that the comparison boys have similar parent-reported behavioral profiles, regardless of their status as having ADHD only, ADHD with comorbid LD, or ADHD with other Axis I disorders.

### TABLE 2 Paired Comparisons of Girls’ CBCL \( t \)-scores Between Diagnostic Groups

<table>
<thead>
<tr>
<th>CBCL syndrome scale</th>
<th>ADHD vs. ADHD/LD ( t )-test statistic</th>
<th>ADHD/LD vs. ADHD/Axis I ( t )-test statistic</th>
<th>ADHD/Axis I vs. ADHD ( t )-test statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatic complaints</td>
<td>2.712*</td>
<td>-2.958*</td>
<td>-.016</td>
</tr>
<tr>
<td>Aggression</td>
<td>1.275</td>
<td>-2.208</td>
<td>-0.726</td>
</tr>
<tr>
<td>Delinquency</td>
<td>2.322</td>
<td>-1.463</td>
<td>.626</td>
</tr>
<tr>
<td>Depression</td>
<td>.631</td>
<td>-1.426</td>
<td>-0.511</td>
</tr>
<tr>
<td>Withdrawn</td>
<td>-1.883</td>
<td>.512</td>
<td>-1.756</td>
</tr>
<tr>
<td>Social problems</td>
<td>1.171</td>
<td>-0.287</td>
<td>1.150</td>
</tr>
<tr>
<td>Thought problems</td>
<td>.443</td>
<td>.269</td>
<td>-0.243</td>
</tr>
<tr>
<td>Attention problems</td>
<td>.061</td>
<td>.259</td>
<td>-0.479</td>
</tr>
</tbody>
</table>

* two-tailed significance, \( p<.01 \)
DISCUSSION

This study contributes to the growing pediatric and psychological literature on girls with ADHD and other co-occurring behavioral disorders. Using a medical chart review, we demonstrated that girls with a diagnosis of “pure” ADHD or ADHD with co-occurring Axis I disorders have several different behavioral characteristics than girls with co-occurring ADHD and LD. Across all diagnostic groups, parents rate their daughters as demonstrating clinically significant levels of attention problems. Beyond this, girls with ADHD only and ADHD/Axis I disorders were rated as having clinically elevated aggression symptoms. In addition, girls with ADHD/LD were perceived as relatively free of behavioral symptoms (with the exception of inattention).

Girls in the “pure” ADHD group were rated as having significantly higher scores on the Delinquent Behavior and Somatic Complaints syndrome scales than girls in the ADHD/LD group. Further, girls with ADHD/Axis I disorders were rated by their parents as having higher levels of aggressive behavior and somatic complaints than girls with ADHD/LD. The elevated externalizing symptoms reported by parents of girls in the ADHD and ADHD/Axis I groups are reminiscent of the ADHD children with comorbid Oppositional Defiant Disorder/Conduct Disorder reported by Newcorn et al. (2001) in their analysis of data from 498 children studied in the National Institute of Mental Health Collaborative Multisite Multimodal Treatment project. As noted by Newcorn and others (e.g., Abikoff, Courtney, Pelham, & Koplewicx, 1993), this may reflect a diagnostic bias with an increased identification of ADHD symptoms in children who are oppositional and disruptive.

Mean scores on the Somatic Complaints scale were among the lowest of the syndrome scales; nonetheless, this CBCL dimension was an interestingly apt scale for differentiating the groups with ADHD only, ADHD/LD or ADHD/Axis I disorders. One recent report has suggested that the presence of somatic complaints in girls is strongly associated with emotional disorders such as anxiety (Egger, Costello, Erkanli, & Angold, 1999). Though somatization is recognized in the DSM-IV as a criterion for a variety of anxiety disorders, there have been relatively few studies examining its utility as an important behavioral symptom in diagnosing or characterizing other mental disorders. Our findings suggest that girls with pure ADHD or ADHD/Axis I may report higher levels of somatizing symptoms, (e.g., nausea, stomach and headaches, dizziness, being tired) than girls with ADHD and LD. These findings merit further investigation and consideration, particularly in the context of primary pediatric healthcare, where somatizing symptoms may be elicited and recognized most easily.
Contrary to our hypothesis, we found that the girls in the comorbid ADHD/LD group were relatively asymptomatic. The only parent-reported behavioral symptoms of clinical significance were those on the Attention Problems scale. In this group it may be that inattention is more reasonably considered an indicator of learning problems than a manifestation of an attention deficit hyperactivity syndrome. Pursuing this formulation, a primary care pediatrician might prioritize further psychological and educational assessments.

Our findings from the boys’ comparison groups correspond with most existing literature describing the behavioral symptomatology of boys with ADHD and co-occurring LD. As an exception, one previous report, based mainly on boys and using discriminant-function analyses, concluded that CBCL Aggressive Behavior and Externalizing scores could differentiate among and between pure ADHD, pure LD and comorbid ADHD/LD groups (Robins, 1992). In our study, similar results differentiating the ADHD from the ADHD/LD groups were found, but for the girls’ diagnostic groups only.

Given the findings of our study, we believe that behavior ratings may be helpful in enriching our understanding of girls presenting with ADHD symptoms to community mental health care practitioners. Diagnostic group behavior patterns may have important clinical implications for ADHD identification and evaluation, may inform our understanding of ADHD etiology, and can shape decision-making about appropriate treatment strategies.

We recognize that the retrospective design of this study increases its limitations. As we could not predetermine the source of our study sample recruitment, our sample contained a combination of pediatric, mental health specialist, and self-referred participants. Our sample was not large enough to evaluate symptomatology by diagnosis and referral source, limiting our ability to draw broader conclusions. Gaub and Carlson (Gaub & Carlson, 1997) have demonstrated that clinic referred girls and boys with ADHD exhibited similar levels of inattention, internalizing behavior, and peer aggression, while non-clinic referred girls and boys with ADHD appeared notably different in their behavioral symptomatology. Concerning the validity of our parent-respondent data, recent research supports the use of parent ratings of the CBCL, in particular the Attention Problems and Aggressive Behavior scales, in identifying behavioral trends in children with ADHD, with no evidence of rater biases and rater differences by child gender (Hudziak et al., 2000). In addition, CBCL parent ratings of behavior have been shown to correspond very well with structured diagnostic interview-based diagnoses. (Ostrander et al., 1998; Steingard et al., 1992). Lastly, though our sample size was only moderate,
we did have similar numbers of girls and boys represented in our analyses, and we employed a limited number of statistical tests when investigating group differences.

Future research is needed to more fully address the relationship between comorbid and non-comorbid ADHD and the corresponding behavioral symptoms in girls. This information may reveal important behavioral patterns that could be utilized in future diagnostic and screening strategies. Longitudinal studies addressing the patterns of emerging behavioral symptoms also are needed, particularly in younger girls before ADHD and LD symptoms become impairing. Our findings with the Somatic Complaints syndrome scale serve as a reminder that even sub-clinical behaviors should be considered in understanding and identifying children with varying comorbid behavioral problems. Future research addressing the somatizing aspects of behavior and ADHD in girls is needed. In addition, future studies should utilize multiple respondent study designs, incorporating parent, teacher and child self-report measures in the process of assessing behavioral phenotypes of ADHD and co-occurring learning or other mental problems. Lastly, future research in this arena utilizing larger sample sizes will help us identify more subtle behavioral differences among girls and boys with comorbid and ADHD only, and will aid us to measure and predict future clinical and academic outcomes for children presenting with ADHD symptoms.

REFERENCES


correlates of ADHD in females: findings from a large group of girls ascertained from pediatric and psychiatric referral sources. *Journal of the American Academy of Child & Adolescent Psychiatry, 38*(8), 966-975.


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