Anxiety in Young People With ADHD: Clinical and Self-Report Outcomes

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Abstract

Objective: (a) To determine the prevalence of comorbid anxiety disorder in ADHD, defined by diagnostic criteria and (b) to compare anxiety as reported by parents and participants with clinician assessment. Method: Children with ADHD were assessed for comorbid anxiety disorder using the Anxiety Disorder Interview Schedule for Children. Parent report (Conners’ Parent Rating Scale–Revised: Long version) and self-report (State-Trait Anxiety Inventory and Brain Resource Inventory for Screening Cases–Child version) scales were used to assess anxiety. The ADHD–Rating Scale IV was used to measure ADHD symptoms. Results: Of 134 participants (11.0 ± 2.6 years), 31.3% had comorbid anxiety disorder. Comorbid anxiety disorder was associated with greater severity of ADHD. Anxiety symptoms from parent reports (p < .05) but not from child/self-report (p > .05) correlated with clinician assessment. Conclusion: Assessment for comorbid anxiety disorder and inclusion of parent rating in this assessment are important components of ADHD treatment in children and adolescents. (J. of Att. Dis. 2015; 19(1) 18-26)

Keywords
ADHD, comorbidity, adolescents

Introduction

ADHD is the most common developmental disorder in young people, with an estimated worldwide prevalence of approximately 5% (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). It can be a lifelong disorder, with up to 80% of patients continuing to experience symptoms into adulthood (Rappley, 2005). ADHD is characterized by difficulties in sustaining attention and focus, impulsivity and/or hyperactivity, with functional impairment (Jensen, 2009; National Institute of Mental Health [NIMH], 2008).

Most (up to 93%) individuals with ADHD also experience comorbid disorders (Jensen, Martin, & Cantwell, 1997). Epidemiological studies indicate that one of the most prevalent comorbid conditions is anxiety disorder, present in about 25% of children and adolescents with ADHD (Jensen, 2009; Larson, Russ, Kahn, & Halfon, 2011; Schatz & Rostain, 2006). The objective of this study was to further elucidate the role of anxiety in ADHD in a cohort of ADHD adolescents and children referred for treatment. We addressed four areas in which there is currently no consensus for ADHD: (a) the frequency of anxiety disorder in ADHD, defined according to diagnostic criteria; (b) whether comorbid anxiety disorder is associated with a specific diagnostic subtype of ADHD; (c) the severity of anxiety symptoms rated dimensionally according to parent and self-report ratings; and (d) the associations between severity of anxiety symptoms and severity of ADHD symptoms, also rated dimensionally.

Understanding anxiety in ADHD, defined by diagnostic criteria and dimensional severity, may help advance more personalized diagnoses, and thereby ultimately assist in tailoring treatment decisions. It has been suggested that ADHD with comorbid anxiety disorder may be a distinct entity (Jensen et al., 2001). Several lines of evidence suggest...
that better elucidating anxiety in ADHD would advance the study of treatment choices. There are indications that stimulant medications may be less effective and produce greater side effects when ADHD is comorbid with anxiety disorder, even though these medications are the most common pharmaceutical treatment for ADHD (March et al., 2000). However, nonstimulant medications, such as atomoxetine, can be recommended when anxiety is comorbid with ADHD (Geller et al., 2007; Pliszka et al., 2006).

To address the four areas of focus in this study, our four aims and associated hypotheses were as follows:

1. To ascertain the prevalence of anxiety disorder in ADHD children and adolescence, we will use a diagnostic interview (Anxiety Disorder Interview Schedule for Children [ADISC]) to identify separation anxiety, generalized anxiety, and obsessive-compulsive disorder (Silverman & Albano, 1996). Based on epidemiological data to date, we predict that one or more of these anxiety disorders will be present in at least 25% of participants with ADHD.

2. To assess if comorbid anxiety disorder is associated with a particular diagnostic subtype of ADHD, we will use the ADHD–Rating Scale IV (ADHD-RS IV) to define inattentive, hyperactive-impulsive, and combined diagnostic subtypes of ADHD (DuPaul, Power, Anastopoulos, & Reid, 1998). We expect that comorbid anxiety disorders will be most common in participants with the “combined” subtype.

3. To ascertain which features of anxiety are more severe in ADHD when comorbid with anxiety disorder, we will use several dimensional parent and self-reported rating scales, encompassing measures of state anxiety (State-Trait Anxiety Inventory for Children [STAIC-State]), trait anxiety (STAIC-Trait), anxious-shyness (Conners’ Parent Rating Scale–Revised, Long version [CPRS-L]), and physiological effects of anxiety and stress (Brain Resource Inventory for Screening Cases–Child version [BRISC-C]; Brain Resource, 2008; Conners, Sitarenios, Parker, & Epstein, 1998; Conners, 1973; Spielberger, Goursuch, & Lushene, 1970). We expect ADHD with comorbid anxiety disorder to be distinguished by higher severity on state aspects of anxiety in particular. We also expect specific anxiety disorder diagnoses to be distinguished by severity on different aspects of parent/self-reported anxiety.

4. To assess whether comorbid anxiety disorder in ADHD also contributes to more severe symptoms of ADHD, we will use dimensional ratings on the parent-reported CPRS-L. We expect higher severity of CPRS-L ADHD symptoms in ADHD with comorbid anxiety. We also expect higher ADHD symptom severity to correlate with higher anxiety symptom severity.

Method
Participant Recruitment

The data for this study were obtained from the ADHD Controlled Trial Investigation of a Nonstimulant (ACTION) study (Tsang et al., 2011). Participants in this study were enrolled (February 2008 to April 2010) into the ACTION study, which is a double-blind, randomized, cross-over trial that is investigating the predictors of response to treatment with atomoxetine compared with placebo in young people who have a primary diagnosis of ADHD. Participants referred to the ACTION study were originally referred to pediatric care for treatment, none of whom warranted referral to psychiatrists. Participants were aged 6 to 17 years, with a primary diagnosis of ADHD and fluent in English, with normal body mass for their age and gender. Exclusion criteria included concurrent stimulant use; medical condition(s) or disease that might interfere with the assessments or put the participant at increased risk when exposed to atomoxetine; alcohol, drug, or heavy caffeine use; and inability to comprehend and follow study instructions (Tsang et al., 2011). Participants were recruited into the ACTION study via referrals from pediatricians in Sydney, Melbourne, and Adelaide (Australia). This article will focus on ADHD and comorbid anxiety disorder and symptoms, as assessed at preenrollment (clinician screening) and baseline (0 week).

Institutional Review Board approval was obtained prior to patient enrollment at any clinical site. Prior to undertaking any study-related procedures, investigators obtained written informed consent from each study participant after a verbal and written explanation of study aims, methods, and potential hazards and benefits.

Table 1 lists the instruments used in the diagnosis of ADHD and its subtypes, the diagnosis of comorbid anxiety disorder, and the measures for ADHD and anxiety symptom severity.

Diagnosis of ADHD and ADHD Subtype

Diagnoses of ADHD were established by the referring clinicians, drawing on Diagnostic and Statistical Manual of Mental Disorders (4th ed., DSM-IV; American Psychiatric Association, 1994) criteria. The ADHD-RS IV was administered to the parent/guardian of each participant. The ADHD-RS IV is divided into two sections: Inattention and Hyperactive-Impulsive. If six or more symptoms were scored as 2 or 3 in either section, the participant would be classified as having that subtype of ADHD (i.e., inattentive...
or hyperactive-impulsive). A participant would be classified as having the combined subtype if six or more symptoms were scored as $\geq 2$ in both sections.

**Diagnosis of Comorbid Anxiety Disorder**

The diagnosis of comorbid anxiety disorder was derived from the ADISC, which was administered to participants and their parents/guardians. To be classified as having comorbid anxiety disorder, a score of at least 4 was required in the separation anxiety disorder (SAD), generalized anxiety disorder (GAD), or obsessive-compulsive disorder (OCD) domains (Silverman, Saavedra, & Pina, 2001).

**Assessment of State and Trait Anxiety**

Severity of anxious features was measured from the CPRS-L Anxious-Shy subscale. Participants with ADHD rated features of trait and state anxiety using the STAIC. They also rated specific features of fear-related anxiety, generalized arousal, and associated depressed mood using the BRISC-C (Brain Resource, 2008). The BRISC-C has been validated against the Depression, Anxiety, and Stress Scale (Brain Resource, 2008; Lovibond & Lovibond, 1995). If necessary, research personnel supported children in understanding the questions for self-report scales.

**Assessment of ADHD Symptoms**

The ADHD-RS IV scores (total, inattentive, and hyperactive-impulsive) and the $T$-scores for the CPRS-L subscales Conners’ Global Index (CGI) Total and DSM-IV Total were used as indicators of general ADHD severity (Conners, 1997). These scales were parent/guardian reported.

At each study site, the ADISC (Silverman & Albano, 1996) and the ADHD-RS IV were administered by the referring clinician, whereas the remaining scales (Table 1) were administered by study staff.

**Statistical Analysis**

ADHD subtype and the presence of comorbid anxiety were treated as categorical variables. Symptom severity measures for ADHD and anxiety were treated as continuous variables,
checked for normality of distribution. For all subsequent analyses, a p value of < .05 was considered statistically significant. All analyses were performed using PASW Statistics 18 software.

The following analyses were used to test each study aim and hypothesis:

**Aim 1:** To address the first aim, participants were categorized into one of two groups, as either having comorbid anxiety disorder (ADHD + anxiety) or not having comorbid anxiety disorder (ADHD alone). Within the comorbid anxiety disorder group, they were subcategorized according to each individual anxiety disorder diagnosis. Frequency tables were used to count the numbers of participants in each category and subcategory.

**Aim 2:** Cross-tabulation analysis was used to compare the frequency of participants with and without comorbid anxiety disorder across the three ADHD subtypes: hyperactive-impulsive, inattentive, and combined.

**Aim 3:** One-way analysis of variance (ANOVA) was used to investigate which features of anxiety are more severe in participants with ADHD and comorbid anxiety disorder, using the dimensional parent and self-report scales (STAIC-State, STAIC-Trait, CPRS-L, BRISC-C). Where data were skewed, results were confirmed using nonparametric testing (Mann–Whitney U test).

**Aim 4:** One-way ANOVA was used to assess whether comorbid anxiety disorder in ADHD also contributes to more severe symptoms of ADHD, as assessed by the parent-reported CPRS-L. Where data were not normally distributed, results were confirmed using nonparametric testing (Mann–Whitney U test). Correlation analysis was used to assess the relationship between ADHD symptom severity and feature of anxiety on each anxiety scale.

**Results**

**Frequency of ADHD With Comorbid Anxiety Disorder**

In total, 134 children and adolescents with ADHD were enrolled (Figure 1) into the study (M age = 11.0 ± 2.6 years; 81.3% male). Forty-two (31.3%) of the participants had at least one comorbid anxiety disorder, determined using diagnostic criteria from the ADISC (Table 2). Of this group, most had a diagnosis of GAD (72.1%), nearly half had a diagnosis of SAD (44.2%), and over a quarter had a diagnosis of OCD (27.9%). These proportions sum up to well over 100%, as many of the participants had multiple anxiety disorder diagnoses (Table 3). When looking only at our participants who had comorbid anxiety, approximately one third (34.9%) had GAD only, 14.0% had SAD only, and 11.6% had OCD only. Up to 28.6% had two anxiety diagnoses combined, and 7.1% were diagnosed with all three types of anxiety (Table 3).

**Frequency of Comorbid Anxiety Disorder in ADHD Subtypes**

Table 2 shows the breakdown of participants with ADHD and comorbid anxiety versus those with ADHD alone across the three ADHD subtypes. In the analyses, we excluded the hyperactive-impulsive subtype given the low base rate (Table 2). For the other two subtypes, the distribution of ADHD with comorbid anxiety disorder was relatively more prevalent in the combined (69.8%) than inattentive (27.9%) subtype, whereas ADHD alone was fairly evenly distributed across these subtypes: combined (50.5%) and inattentive (45.1%). Chi-square analysis showed a significant relationship between presence of comorbid anxiety and ADHD subtype ($\chi^2 = 4.029, p = .045$).

**Severity of Anxiety Features in ADHD With and Without Comorbid Anxiety Disorder**

One-way ANOVA was used to investigate which features of anxiety are more severe in participants with ADHD and comorbid anxiety disorder, using the dimensional parent and self-report scales (STAIC-State, STAIC-Trait, CPRS-L, BRISC-C). Where data were skewed, results were confirmed using nonparametric testing (Mann–Whitney U test).

Regarding parent-reported ratings, a greater severity of anxious-shyness features was observed in the ADHD with comorbid anxiety group compared with the ADHD alone group (CPRS-L: Anxious-Shy T-score, $p < .0001$). In
contrast, self-reported anxiety ratings on the BRISC-C and STAIC were not significantly different between these groups ($p > .05$; Table 4).

A more specific picture was revealed when we assessed anxiety severity within each anxiety disorder diagnosis. CPRS-L: Anxious-Shy T-score was significantly more severe in those with SAD ($p < .0001$) and GAD ($p = .005$) compared with those with ADHD alone, whereas in those with OCD, the trend toward a poorer CPRS-L: Anxious-Shy score tended toward significance ($p = .053$).

Similarly, there were more specific patterns when ADHD subtype was considered. Anxiety symptoms on the CPRS Anxious-Shy scale were more severe in the ADHD combined subtype (compared with the other subtypes, $p = .048$), consistent with the higher prevalence of comorbid anxiety in this subtype. Anxious-shy symptoms (CPRS-L: Anxious-Shy) were least severe in the inattentive subtype and were actually significantly better compared with the other ADHD subtypes ($p = .032$).

### Relationship Between ADHD Symptom Severity and Anxiety Severity

The ADHD + anxiety group showed more severe symptoms of ADHD than did the ADHD alone group for each of the measures of ADHD symptom severity: ADHD-RS IV: Total ($p = .004$), ADHD-RS IV: Inattentive ($p = .046$), ADHD-RS IV: Hyperactive-impulsive ($p = .023$), CPRS-L: CGI Total T-score ($p = .002$), and CPRS-L: DSM-IV Total T-score ($p = .012$; Table 4).

When we considered individual anxiety disorders, severity of ADHD symptoms was highest in those with comorbid SAD (compared with ADHD alone) where ADHD symptoms in all of our ADHD measures were significantly poorer in those with SAD—ADHD-RS IV: Inattentive ($p = .016$); ADHD-RS IV: Hyperactive-Impulsive ($p = .016$); ADHD-RS IV: Total ($p = .004$).

### Table 2. Characteristics of Sample.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total cohort ((n = 134))</th>
<th>ADHD alone ((n = 92))</th>
<th>ADHD + anxiety ((n = 42))</th>
</tr>
</thead>
<tbody>
<tr>
<td>$M$ age in years (range)</td>
<td>11.0 ± 2.6 (6-17)</td>
<td>11.2 ± 2.5 (6-16)</td>
<td>10.8 ± 2.8 (6-17)</td>
</tr>
<tr>
<td>$n$ (%)</td>
<td>109 (81.3)</td>
<td>74 (80.4)</td>
<td>35 (83.3)</td>
</tr>
<tr>
<td>Male</td>
<td>109 (81.3)</td>
<td>74 (80.4)</td>
<td>35 (83.3)</td>
</tr>
<tr>
<td>Race/ethnicity (of 111 reported)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>79 (71.2)</td>
<td>56 (72.7)</td>
<td>23 (67.6)</td>
</tr>
<tr>
<td>Black</td>
<td>1 (0.9)</td>
<td>0 (0.0)</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>Indigenous</td>
<td>4 (3.6)</td>
<td>3 (3.9)</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>Asian</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Pacific Islands</td>
<td>3 (2.7)</td>
<td>2 (2.6)</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>Middle East</td>
<td>4 (3.6)</td>
<td>2 (2.6)</td>
<td>2 (5.9)</td>
</tr>
<tr>
<td>Mixture</td>
<td>20 (18.0)</td>
<td>14 (18.2)</td>
<td>6 (17.6)</td>
</tr>
<tr>
<td>Without high school diploma</td>
<td>134 (100.0)</td>
<td>92 (100.0)</td>
<td>42 (100.0)</td>
</tr>
<tr>
<td>Combined subtype$^a$</td>
<td>76 (56.7)</td>
<td>46 (50.0)</td>
<td>30 (71.4)</td>
</tr>
<tr>
<td>Hyperactive-impulsive subtype$^a$</td>
<td>5 (3.7)</td>
<td>4 (4.3)</td>
<td>1 (2.3)</td>
</tr>
<tr>
<td>Inattentive subtype$^a$</td>
<td>53 (39.6)</td>
<td>41 (44.5)</td>
<td>11 (26.2)</td>
</tr>
<tr>
<td>With comorbid anxiety$^b$</td>
<td>52 (39.6)</td>
<td>41 (44.5)</td>
<td>11 (26.2)</td>
</tr>
</tbody>
</table>

**Note.** Bold values denote statistically significant differences between ADHD alone and ADHD + anxiety \((p < .05)\).

$^a$ADHD subtypes were defined using the Attention Deficit Hyperactivity Disorder Rating Scale IV.

$^b$Anxiety diagnoses were defined using the Anxiety Disorders Interview Schedule for Children—Some participants had more than one anxiety type diagnosed.

### Table 3. Specific Anxiety Diagnoses in Those With ADHD With Comorbid Anxiety.

<table>
<thead>
<tr>
<th>Anxiety type</th>
<th>$n$</th>
<th>% of total cohort ((n = 134))</th>
<th>% of anxious cohort ((n = 43))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 diagnosis: SAD</td>
<td>6</td>
<td>4.5</td>
<td>14.0</td>
</tr>
<tr>
<td>1 diagnosis: GAD</td>
<td>15</td>
<td>11.2</td>
<td>34.9</td>
</tr>
<tr>
<td>1 diagnosis: OCD</td>
<td>5</td>
<td>3.7</td>
<td>11.6</td>
</tr>
<tr>
<td>2 diagnoses: SAD and GAD</td>
<td>12</td>
<td>9.0</td>
<td>28.6</td>
</tr>
<tr>
<td>2 diagnoses: SAD and OCD</td>
<td>4</td>
<td>3.0</td>
<td>9.5</td>
</tr>
<tr>
<td>2 diagnoses: GAD and OCD</td>
<td>6</td>
<td>4.5</td>
<td>14.3</td>
</tr>
<tr>
<td>3 diagnoses: SAD and GAD and OCD</td>
<td>3</td>
<td>2.2</td>
<td>7.1</td>
</tr>
</tbody>
</table>

**Note:** SAD = separation anxiety disorder; GAD = generalized anxiety disorder; OCD = obsessive-compulsive disorder. Anxiety diagnoses were determined using the Anxiety Disorders Interview Schedule for Children.
ADHD-RS IV: Total \( (p = .005) \); CPRS-L: CGI Total \( (p < .0001) \); CPRS-L: DSM-IV Total \( (p = .011) \). In comparison with those with ADHD alone, those with GAD had greater ADHD severity in CPRS-L measures (CGI Total: \( p = .009 \); DSM-IV Total: \( p = .029 \)); whereas those with OCD had greater ADHD severity in ADHD-RS IV measures (Hyperactive-Impulsive: \( p = .035 \); Total: \( p = .034 \)).

Correlation analyses within each diagnostic subgroup showed an additional specific relationship. For the GAD diagnoses, greater state anxiety (STAIC-State) was associated with greater ADHD severity (CPRS-L: CGI Total: \( r = .430, p = .025 \)). No significant correlations were observed between anxiety and ADHD severity in those with SAD or OCD \( (p > .05) \).

When ADHD subtype was considered, we found that within the Combined subtype, greater anxious-shy ratings on the CPRS-L were consistently associated with greater ADHD severity (on each ADHD-RS IV and CPRS rating: ADHD-RS IV Total: \( r = .272, p = .018 \); ADHD-RS IV Inattentive: \( r = .230, p = .047 \); ADHD-RS IV Hyperactive-Impulsive: \( r = .270, p = .019 \); CPRS-L: CGI Total: \( r = .458, p < .0001 \); CPRS-L: DSM-IV Total: \( r = .375, p = .001 \)), providing further convergence with the role of comorbid anxiety in this ADHD subtype.

### Discussion

In this study, anxiety disorder was determined by diagnostic criteria in the ADISC structured interview. Nearly one third of ADHD patients had comorbid anxiety disorder. This finding broadly accords with observations from community and other clinical samples (Bedard & Tannock, 2008; Jensen, 2009; Jensen et al., 2001; Larson et al., 2011). Differences in prevalence occur in the context of differences in measures used, age of populations, and sampling strategies used to create study cohorts.

A lower prevalence of comorbid anxiety disorder was found in previous cohorts from Western countries using other diagnostic measures (Bedard & Tannock, 2008; Jensen, 2009; Jensen et al., 2001; Larson et al., 2011), though a higher prevalence was reported from the NIMH Multimodal Treatment Study of Children With Attention-Deficit/Hyperactivity Disorder (MTA) study (38.7%; Jensen et al., 2001). Lower prevalence rates of 24.6% and 18.0% were reported, respectively, by Bedard and Tannock (2008; using the Parent Interview for Child Symptoms [PICS]) and Larson et al., (2011; using parent report). The higher prevalence rates in this study may also have occurred as this was a clinically referred population compared with community sampling used in other studies (Larson et al., 2011). The older population in this study may have further added to the higher prevalence of anxiety disorders (“Managing ADHD in Children, Adolescents, and Adults With Comorbid Anxiety in Primary Care,” 2007). Our sample was, on average, 11 years of age, compared with an average age of 8.6 years in the Bedard and Tannock study and the NIMH MTA study (Jensen et al., 2001). The MTA study selected only ADHD patients with combined subtype. In the clinical population of the ACTION study, all ADHD subtypes were included and the combined subtype was found to have the highest prevalence of comorbid anxiety disorder. Hence, selection of participants in the MTA study may have contributed to the higher prevalence of comorbid anxiety disorders noted in that study.
Within our sample with comorbid anxiety disorder, the most common diagnosis was GAD (72.1%). This was followed by SAD (44.2%) and OCD (27.9%). Elia, Ambrosini, and Berrettini (2008) also found that GAD was the most common anxiety diagnosis in their Caucasian American sample with ADHD + anxiety but reported a much lower prevalence of GAD of 47.3% in their ADHD + anxiety cohort. The difference in prevalence of GAD within our ADHD + anxiety groups could possibly be explained by differences in gender ratio, comorbidities and type of care received, and the person(s) interviewed for the anxiety diagnosis (parent with the ADISC versus parent and child with Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children; K-SADS).

Our results demonstrated that the presence of an anxiety disorder diagnosis comorbid with ADHD was related to especially high severity on the CPRS-L: Anxious-Shy subscale rated by parents. To our knowledge, the CPRS-L: Anxious-Shy subscale has not been previously used to characterize the dimensional severity of anxiety in ADHD patients with versus without comorbid anxiety. By contrast, other anxiety or related depression features were not found to be significantly more severe in ADHD participants with at least one or more diagnoses of SAD, GAD, or OCD. A strength of the current design was the inclusion of multiple anxiety scales to identify what specific aspects are most severe in ADHD combined with anxiety disorder. The findings from analyses across each scale indicate that ADHD with anxiety disorder is characterized by very specific features of anxiety distinct from depression and distinct from trait aspects of anxiety. Alternatively, it is also possible that parents provide a more precise rating of observed anxiety than the children/adolescents self-report. The need for self-report anxiety measures to take into account the age, experience, and developmental stage of the informants has been emphasized (Campbell & Rapee, 1996). Future studies may benefit from including objective, physiological indicators of anxiety, such as heart rate, skin conductance, and blood pressure, which do not rely on either parent or self-report (Campbell & Rapee, 1996).

When ADHD subtype was considered, the highest rate of anxiety disorder diagnosis was found in those who had the combined subtype of ADHD. Our observation accords with our hypothesis based on evidence from a nonreferred community sample of Australian children with ADHD (Levy, Hay, Bennett, & McStephen, 2005), although we note other studies have reported no statistical difference in comorbid anxiety across ADHD subtypes (Lubke, Hudziak, Derks, van Bijsterveldt, & Boomsma, 2009).

Our results show that participants with comorbid anxiety disorder diagnoses had a greater severity of ADHD symptoms than participants who did not have comorbid anxiety disorder in all of our ADHD symptom measures (ADHD-RS IV and CPRS-L). This was particularly true in those with SAD and those with GAD. These findings are likely to have significant clinical and real-world implications for the management of ADHD. In adults, having ADHD of the combined subtype and a history of anxiety has been correlated with poor occupational outcome (e.g., unemployment, sick leave, disability pension, rehabilitation, social welfare, prison, and others). In children, more severe ADHD symptoms have also been associated with lower educational achievement (Halmøy, Fasmer, Gillberg, & Haavik, 2009). Thus, we might extrapolate that the combination of more severe ADHD and more severe anxiety in children/adolescents with ADHD will produce the greater burden of illness for the child and community. An important next step will be to elucidate the role of ADHD with comorbid anxiety in treatment decisions and outcomes. This is one way in which the present results will be extended in the controlled trial component of the ACTION study to identify clinical and objective predictors of nonstimulant treatment for ADHD with and without anxiety disorder.

**Limitations**

Limitations of this study include the study’s relatively small sample size ($N = 134$) compared with population-level studies. Also, the focus on pediatrician-referred participants limits the generalizability of our findings. However, this study was a controlled study that accepted referrals for a treatment trial, so the findings may be generalizable to patients who are seeking treatment, rather than to the community population. Another limitation akin to that in previous studies is the absence of objective brain-based measures of anxiety that do not rely on self or parent-report. These measures are included in subsequent phases of the ACTION trial.

**Conclusion**

In the current clinician-referred sample, approximately one third of ADHD children and adolescents had a comorbid anxiety disorder, which broadly accords with observations from community and other clinical samples. The most common anxiety diagnosis was GAD. Participants with ADHD and comorbid anxiety disorder were characterized by higher severity on specific aspects of anxiety, especially anxious-shy features rated by parents. They were not distinguished by self-reported trait aspects of anxiety, or by severity of depression. ADHD with comorbid anxiety disorder was also characterized by a more severe profile of ADHD symptoms, and the most severe symptoms were in those with the combined subtype comorbid with anxiety disorder. The clinical significance of these findings is that children with ADHD (especially the combined subtype) and comorbid anxiety disorder are likely to have more severe symptoms of ADHD as well as anxiety, which in turn is likely to generate a poorer prognosis. There is a need
to extend these results by including objective measures of anxiety and by investigating the implications for treatment.

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Authors’ Note
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