

The Comorbidity of ADHD in the General Population of Saudi Arabian School-Age Children

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Objective: To investigate comorbidity of oppositional-defiant disorder (ODD), conduct disorder (CD), anxiety, and depression and to investigate the impaired social and academic developments among children with ADHD in primary school settings in Saudi Arabia. **Method:** Data for the purpose of this study are obtained from parent and teachers of 652 primary school children attending Grades 1 to 3 (children aged between 7 and 9 years). Vanderbilt ADHD diagnostic rating scale, which has relevance and found to be reliable by previous studies, is used in the study. **Results:** ODD and CD are reported to be present in close to two thirds (73%) of children with ADHD, as assessed with *DSM-IV-TR* criteria. Anxiety and depression disorder are estimated to be present in 36% of children with ADHD. Children with ADHD show high levels of impairment in academic achievements (63%) and social performance (90%), compared with non-ADHD children. **Conclusion:** These findings suggest that a significant minority of disruptive children may have their difficulties compounded by the presence of ADHD, which raises the question whether their problems are known and whether they have received appropriate help. It is important to develop a specific set of psychological clinical intervention for helping children with ADHD, ODD, CD, and other related problems. Educating teachers and parents about ADHD and its comorbidity is considered essential in this regard. (*J. of Att. Dis.* 2010; 14(1) 25-30)

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The *diagnostic and statistical manual of mental disorders, textbook revision (DSM-IV-TR)* estimates the prevalence of ADHD to be between 3% and 5%, but there have been several studies that reported the estimate to be as high as 17% (Cohen, Cohen, & Kasen, 1993). Worldwide, researchers indicated that as many as 30% to 50% of referrals to child mental health services are specifically for ADHD (Barkley, 1996; Popper, 1988).

Many other psychiatric problems were found to be associated with ADHD. For example, ADHD contributes to the risk of having additional problems such as ODD (American Psychiatric Association, 2000; Kadesjö, Hägglöf, Kadesjö, & Gillberg, 2003), CD (Dulcan & Benson, 1997; Faraone, Biederman, Weber, & Russell, 1998; Maughan, Rowe, Messer, Goodman, & Meltzer, 2004), anxiety and depression in childhood (Biederman et al., 1996; Pliszka, 2000), and impaired social and academic developments (Barkley, Fischer, Edelbrock, & Smallish, 1990; Barry, Lyman, & Klinger, 2002; Faraone et al., 1993).

Children with ADHD are classified as having three core behavioral symptoms: intention, hyperactivity, and

impulsivity. Intention involves symptoms such as difficulty in organizing or avoiding sustained mental effort andmaking careless mistakes. Hyperactivity-impulsiveness includes symptoms like fidgeting, excessive talking, and difficulty waiting (American Psychiatric Association, 2000). The essential features of ODD include the manifestation of frequent pattern of negativistic, disobedient, defiant, and hostile behavior toward authority figures, which leads to clinically significant impairment in social or academic functioning (Loeber, Burke, Lahey, Winters, & Zera, 2000).

According to *DSM-IV-TR* (American Psychiatric Association, 2000), CD involves a persistent pattern of behavior in which the basic right of others or major age-appropriate societal norms or rules are consistently violated. Children with impaired social developments demonstrate inappropriate behavior, such as kicking,

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fidgeting, shouting, find it difficult to fit in to the social structures of society, and being exceedingly disruptive in school (Neophytou & Webber, 2005). Consequently, children with ADHD have few friends and are constantly being reprimanded (Neuville, 2005). In terms of the academic functioning, children with ADHD are considered to be academic underachievers. They do not achieve academically at the level predicted by their age or IQ (Frick & Lahey, 1991).

Although much attention has been paid to the comorbidity between ADHD and other disruptive behavior disorder, less attention has been paid to this issue in Saudi Arabia. There is not yet any information about the comorbidity patterns of ADHD and related problems among school-age children. This is the first study on this subject in Saudi Arabia.

Participants

Participants in this study were teachers and parents of 642 school-aged children in Assir region, in the southern part of Saudi Arabia. Participants selected for this study were those in Grades 1 to 3 (mean age: 8.01 ± 0.88 years). According to the educational system in Saudi Arabia, there are separate schools for boys and girls. In all, 39 schools (21 boys schools, 18 girls schools) were randomly assigned to the study. Teacher completed one questionnaire and the parent's completed another one for each child participating in the study. All teachers who participated in the current study are Saudis nationals and they have known the children for at least one academic year. All parents participated are fathers or mothers, none of them was a guardian, and all were Saudis.

Instrument

Vanderbilt ADHD diagnostic rating scale (Wolraich et al., 2003; Wolraich, Hannah, Baumgaertel, & Feurer, 1998) was used to measure ADHD, ODD and CD, and anxiety and depression. This scale has two versions, teacher's version (35 items) and parents' version (47 items). To indicate their perception about the children's levels of ADHD, ODD and CD, anxiety and depression, teachers and parents rated on a scale of 0 (*never*) to 3 (*very often*). A rating of 2 or 3 is considered to be a positive endorsement for each item. The cutoff was at least 6 positive items in at least one cluster of intention or hyperactivity-impulsiveness. For the subscales ODD, CD, anxiety and depression, the cutoff were 4 positive items, 3 positive items, and 3 positive items, respectively. Questions about academic (3 items) and social impairments (5 items)

were also based on Vanderbilt ADHD rating scale. Each question was rated on a 5-point rating scale. A rating of 1 or 2 is considered to be positive endorsement for each question.

Statistical Techniques

To screen the reliability in the current study, correlational analyses using Cronbach's alpha coefficients were preformed to measure the internal consistency, for assessing how far the different items in a scale are homogeneous (the alphas for items on the teachers' scales used to measure ADHD, ODD and CD, anxiety and depression were .83, .91, .87, and .71, respectively). Similarly, overall Cronbach's alphas for parents' rating scales were found be reliable, measured at .87, .82, .73, and .79, respectively. A second form of reliability was obtained by considering how far two raters (parents and teachers) who completed the Vanderbilt ADHD rating scale for the same participants agree in their ratings. Pearson's correlations between Vanderbilt ADHD rating scales for parents and teachers ratings ranged from .88 to .93. Vanderbilt ADHD rating scale was selected for its brevity because it directly follows the *DSM-IV-TR* criteria and because it has been shown to discriminate between children with and without ADHD in some studies, with considerable evidence supporting the validity of this scale (Wolraich et al., 1998, 2003).

Data have been checked for distributional properties and missing items. The assumption of normal distribution has been met, justifying the use of the appropriate statistical methodology employed in this study. Histogram of raw scores with normal curve was used to test whether the distribution of the given data is normal (see Figure 1). In general, data were considered to be statistically normative. ANOVA and χ^2 test were employed to test differences between demographic characteristics of the sample, and a *t* test was preformed to compare between teachers' and parents' reporting of ADHD and between non-ADHD and ADHD groups.

Results

Table 1 describes the characteristics of the sample. There were no significant differences between those with and those without ADHD in the following demographics: performance level in school, social class, and parent education. There was a significant difference between girls and boys in terms of presence of ADHD symptoms; boys were more likely to score high on ADHD symptoms than were girls (Table 1).

Figure 1
Histogram of the Raw Scores With Normal Curve to Test the Distribution of the Data

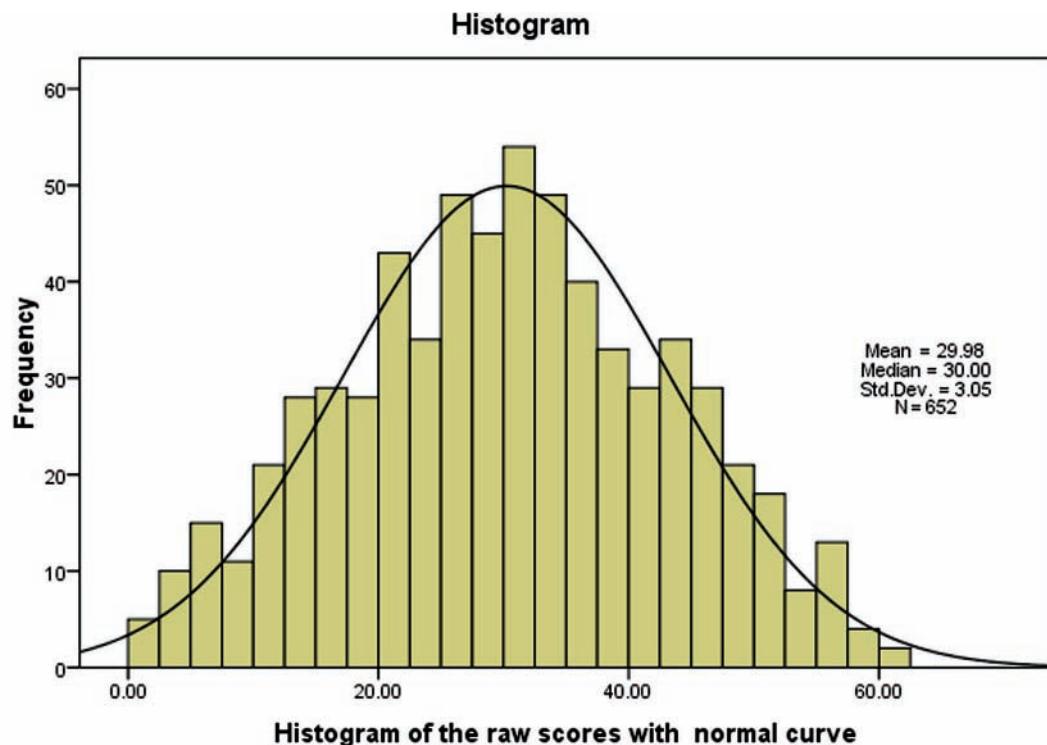


Table 1
ANOVA and χ^2 Test Were Test Differences of Demographic and Characteristics of the Sample

Sample Characteristics ^a	Numbers	%	ADHD		Significance Tests
			-	+	
Sex					
Boys	261	40.65	240	21	χ^2
Girls	381	59.35	369	12	7.62**
Level in school					
Year one	198	30.85	193	5	F
Year two	242	37.69	227	15	3.12
Year three	202	31.46	189	13	
Social class					
Level 1 (-)	137	21.34	127	10	F
Level 2 (middle income)	429	66.82	412	17	1.08
Level 3 (+)	76	11.84	70	6	
Parent education					
High school and below	265	41.28	247	18	χ^2
University degree and above	377	58.72	362	15	1.15

Note: ADHD columns refer to those who were identified as ADHD group (+) or non-ADHD (-).

a. n = 642.

**p < .01.

None of the children was reported by their teacher or parent to have a history of ADHD or to have learning disability. A total 26% (167 children) of all participants met the teachers' criteria for ADHD, and 14% (92 children)

met the parents' criteria for ADHD. Of all the participants, only 5% (33 children) met the full *DSM-IV-TR* criteria for ADHD, suggesting that this was reported by both teachers and parents (two different settings). With

Table 2
**Frequencies and Percentages of Psychological Problems
(ODD and CD; Anxiety and Depression) Associated With ADHD**

Psychological Disorders	ADHD (Teacher Rating) ^a			ADHD (Parents Rating) ^b			DSM-IV-TR Criteria of ADHD	<i>T</i> . test
	Attention (n = 87)	Hyperac. (n = 121)	Both	Attention (n = 27)	Hyperac. (n = 81)	Both		
ODD and CD	44 (50.57%)	65 (53.72%)	167 (26.00)	14 (52.05%)	48 (59.26%)	92 (14.30)	24 (72.73%)	5.744*** (df 641)
Anxiety and depression	34 (39.08%)	19 (15.70%)	(<i>M</i> : 0.78; <i>SD</i> : 1.32)	12 (44.44%)	29 (35.80%)	(<i>M</i> : 0.42; <i>SD</i> : 1.05)	12 (36.36%)	

Note: *T*. test (*T*) compare between teachers and parents rating.

a. *N* = 208.

b. *N* = 108.

****p* < .0001.

Table 3
***T*. test (*T*) Tested Both ODD and CD and Anxiety and Depression, Comparison Between Non-ADHD Group and ADHD Group According to DSM-IV-TR Criteria**

Psychological Impairment	Groups	<i>M</i>	<i>SD</i>	<i>T</i> . test
ODD and CD	Non-ADHD	19.39	2.79	3.01**
	ADHD	28.65	1.45	
Anxiety and depression	Non-ADHD	20.22	2.47	4.21***
	ADHD	31.07	1.20	

p* < .001. *p* < .0001.

significant difference at *p* < .0001, teachers were the first to report ADHD, compared to parents, who were relatively late in reporting ADHD symptoms (Table 2). The rates of ODD and CD prevalence reported by both teachers and parents measured to be more than half of the ADHD groups (50%-59%). About two thirds (73%) of the ADHD group, according to *DSM-IV-TR* criteria, were identified to be presenting symptoms for ODD and CD as well (Table 2). The rates of anxiety and depression disorders were estimated to be 36% of the ADHD group according to the *DSM-IV-TR* criteria.

The two groups of ADHD (with and without ADHD) were compared (Table 3) on ODD and CD and anxiety and depression. ADHD group reported significant differences in both comparisons (both *p* < .001).

As expected, the ADHD group scored below the level of non-ADHD group in all academic areas. This is true whether reported by teachers or parents (Table 4). Results of *t* test indicated that ADHD group obtained lower scores academically, compared to that achieved by the non-ADHD group (*p* < .001). Consistent with *DSM-IV-TR* criteria, participants with ADHD showed high percent of

impairment in academic achievements (63.6%). ADHD group were reported to have high and significant rates (90.9%) of impairment in social behavior (*p* < .0001). Only about 9% of the participants with ADHD had no significant signs of impairment in social behavior.

Discussion

The present study revealed that ADHD and associated comorbid problems are common among school-age children in Saudi Arabia. Nevertheless, none of them was referred to receive psychiatric or psychological help. None of the children was reported to have learning disability. According to the educational systems, students with moderate or severe learning disability have to be in separate schools designed for them. Mild learning disability is rarely looked for during clinical diagnosis of children in Saudi Arabia. Unfortunately, signs and symptoms of mild learning disability often appear later in the higher grades of schools. This suggests that most mild learning disabilities are identified or diagnosed too late for any effective intervention.

Due to the paucity of information about ADHD and associated problems in Saudi Arabia, frequently ADHD students may be rejected from class or may be exposed to punishment by teachers or parents due to unidentified ADHD and related behaviors.

Except for gender, the current findings suggested that the sample characteristic of participants with ADHD does not explain the differences between participants with and without ADHD. This finding is consistent with previous work reported (e.g., Gimpel & Kuhn, 2000; Kadesjö et al., 2003). This study is also consistent with those of school-aged children studies reporting that boys are more likely to exhibit ADHD behavior than girls are (Gimpel & Kuhn, 2002).

Table 4
Social and Academic Impairment, Comparison Between Two Groups.
T. test (T) Compare Between Non-ADHD Group and ADHD Group

Impairment	Non-ADHD		ADHD			T. test (M; SD)
	Teacher rating (n = 475)	Parents rating (n = 550)	Teacher rating (n = 167)	Parents rating (n = 92)	DSM-IV-TR ^a (n = 33)	
Achievements						
Reading	62 (13.1%)	70 (12.7%)	52 (31.1%)	26 (28.3%)	21 (63.6%)	<i>T</i> = 3.36** (Not-ADHD group: 1.75; 1.58)
Writing	60 (12.6%)	77 (14.0%)	55 (32.9%)	38 (41.3%)		
Mathematics	55 (11.6%)	88 (16.0%)	49 (29.3%)	36 (39.1%)		
Social behavior						
Relationships with peers	64 (13.5%)	78 (14.2%)	59 (35.3%)	37 (40.2%)	30 (90.9%)	<i>T</i> = 7.56*** (Not-ADHD group: 4.15; 2.24)
Following rules	37 (7.80%)	65 (11.8%)	71 (42.5%)	30 (32.6%)		
Disrupting others	36 (7.6%)	67 (12.2%)	57 (34.1%)	36 (39.1%)		
Doing things perfectly	33 (6.9%)	63 (11.5%)	45 (26.9%)	24 (26.1%)		

a. Both teachers and parents agreed.

p* <.001. *p* <.0001.

The high rates of ODD and CD among ADHD group may reflect the comorbidity between both (Lahey, McBurnett & Loeber, 2000; Rowe, Maughan, Pickles, Costello, & Angold, 2002; Spitzer, Davies, & Barkley, 1990). A study that applied a meta-analysis of epidemiological finding on comorbidity (Angold, Costello, & Erkanli, 1999), drawing on studies that used psychiatric interviews to generate diagnostic data on the basis of *DSM-III*, *DSM-III-R*, *DSM-IV*, and *DSM-IV-TR* criteria, reported overlaps between ODD and CD and ADHD. They found significant levels of comorbidity in 11 out of 14 studies. However, the current results confirm previous results (Kadesjö & Gillberg, 2001), that ADHD as a distinct disorder is rare. It is clear not only from this study but also from other studies referred to in the article that teachers are more likely to report ADHD than parents are. This could be in addition to the problem of the validity of ADHD criteria that requires screening patients for ADHD using a minimum of two settings or more. ADHD may become apparent in some situations and may not in some (Place, Wilson, Martin, & Hulsmeier, 1999). However, current findings emphasize the need to collect data from both teachers and parents when assessing ADHD.

The high rates of anxiety and depression among ADHD group in the current study may also reflect the comorbidity between both. Studies indicated that about 26% of ADHD children also have anxiety and 18% of them also have depressive disorder (Stein & Perrin, 2003). There were significant main effects due to ADHD, on all academic and social measures: poorer achievement and

poorer social performance compared to children without ADHD. Low achievements are frequently reported to be associated with ADHD (Barry et al., 2002).

Part of difficulties in schools may arise due to ADHD, ODD, and CD. Complaints such as psychological problems, low academic achievement, or antisocial behavior are expected to be associated with ADHD, which also causes learning difficulties and absenteeism at school. Thus, it is important to develop a specific set of psychological-clinical interventions for helping children with ADHD. Focused interventions, such as social skills training within the school setting, are a fundamental element of any intervention meant for ADHD children (Place et al., 1999). This study is only one step in the direction of exploring the association between ADHD and psychological, academic, and social impairments. The inclusion of a large number of non-ADHD children and the lower rates of problems reported for this group may underestimate the importance of the real problem of ADHD. Research with a larger and more representative sample of children with ADHD is called for.

The present study has another methodological shortcoming as well. The current finding reported the lack of participants who suffered from ADHD only. Without such a specific group, which has ADHD only, it is impossible to determine whether the academic and psychosocial problems that are identified in this study is a function of ADHD itself or the result of a combination of two problems (i.e., ODD and CD + ADHD). As this study did not distinguish between ADHD and ODD and

CD, researchers in Saudi Arabia and other Arab countries are encouraged to conduct studies to evaluate the characteristics of ADHD exclusively and perform separate studies that evaluate ODD and CD only and not ADHD. It is possible to apply statistical methods to control the overlap between ODD and CD symptoms and ADHD symptoms. Conducting further studies in different settings, for example, a primary care center, is needed in Saudi Arabia. The prevalence of ADHD in a clinical setting has been reported to be very high (Faraone et al., 1998).

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