Attention Deficit Hyperactivity Disorder in Men and Women Newly Committed to Prison

Clinical Characteristics, Psychiatric Comorbidity, and Quality of Life

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Attention deficit hyperactivity disorder (ADHD) is associated with comorbid psychiatric diagnoses and antisocial behaviors that contribute to criminality, yet studies of ADHD in offenders are few. The authors evaluate a random sample of 319 offenders using a version of the Mini International Neuropsychiatric Interview and Medical Outcome Survey Health Survey. ADHD was present in 68 subjects (21.3%). Offenders with ADHD were more likely to report problems with emotional and social functioning and to have higher suicide risk scores ($p < .001$). They also had higher rates of mood, anxiety, psychotic, and somatoform disorders. Antisocial and borderline personality disorders were also more common among offenders with ADHD. The authors conclude that ADHD is common in offenders and is associated with comorbid disorders, worse quality of life, and higher risk for suicidal behaviors. Its presence should alert prison staff that the offender is likely to require more intensive mental health services.

Keywords: attention deficit hyperactivity disorder; ADHD; prison; offenders; corrections

Attention deficit hyperactivity disorder (ADHD) has been increasingly recognized as a disorder of adults, not just children (Biederman, 1998; Biederman et al., 1994; Biederman et al., 1993). Longitudinal studies of children with ADHD indicate that only 10% achieve full remission, and from 30% to 70% of children with ADHD have significant symptoms in adulthood (Bellak & Black, 1992; Biederman,

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2004; Faraone et al., 2000). The estimated prevalence of ADHD in adults is 4.4% (Kessler et al., 2006). It has been reported that the rates of hyperactivity and impulsivity decline with age and that inattention is the most common adult persistent symptom (Pierce, 2003).

The impact of ADHD on individuals is substantial. Comorbidity has been reported with other mental illnesses including depression, anxiety, and substance abuse (Biederman et al., 1992; Biederman, Faraone, Keenan, Steingard, & Tsuang, 1991; Biederman, Faraone, Keenan, & Tsuang, 1991; Shaffer et al., 1996; Houston, Hawton, & Shepperd, 2001; Pierce, 2003), and risk for suicide is increased (James, Lai, & Dahl, 2004; Kelly, Cornelius, & Clark, 2004; Plattner et al., 2007). A recent study (Gunter, Arndt, Riggins-Caspers, Wenman, & Cadoret, 2006) indicated that childhood ADHD was, in fact, a stronger predictor of adult disruptive behavior, arrests, jail stays, and felony convictions than conduct disorder, regardless of the presence of substance use disorders. The persistence of ADHD into early adulthood is frequently associated with behaviors such as truancy, aggression, and delinquency (Baker, Knight, & Simpson, 1995) and the development of antisocial and other personality disorders (Biederman et al., 1993; Fischer, Barkley, Smallish, & Fletcher, 2002; Manuzza, Klein, Bessler, Malloy, & LaPadula, 1993, 1998; Morrison, 1980; Murphy & Barkley, 1996; Weiss, Hechtman, Milroy, & Perlman, 1985). Criminality in adults with ADHD is predicted by multiple juvenile arrests, arrests for felony crimes in adolescence, and incarceration (Satterfield et al., 2007). In the adult prison population, studies suggest that 30% to 40% of inmates met the criteria for adult ADHD, and an additional 16% have subthreshold symptoms (K. Rasmussen, Almvik, & Levander, 2001).

In this study, we estimated the rate of ADHD and examined the demographic and clinical characteristics of men and women offenders with and without ADHD. The results are presented herein.

Method

We randomly selected participants from the list of incoming offenders newly admitted to the Iowa Medical and Classification Center (IMCC), located at Oakdale, Iowa. IMCC serves as a reception facility for the Iowa Department of Corrections (IDOC). New offenders are admitted for intake activities, including a health screen,

institutional assignment, and initiation of the central offender record. Offenders are then assigned to correctional facilities throughout Iowa to serve their sentences. Owing to logistical issues, the sample did not include offenders on any kind of special supervision (i.e., violent offenders, acutely unstable offenders, probation violators, maximum security designees, or those in protective custody).

Trained raters interviewed participants at IMCC. All participants gave written, informed consent according to procedures approved by the Institutional Review Board of the University of Iowa and the IDOC. Study data were protected by a Federal Certificate of Confidentiality. All participants received compensation. Researchers were not employed by the IDOC and did not participate in any offender's care while at IMCC. Urgent or emergent issues were referred to IMCC psychology staff for further evaluation as deemed necessary.

We obtained demographic data including age, gender, race or ethnicity, education, income, marital status, and legal or criminal variables. We administered to offenders the Mini International Neuropsychiatric Interview–Plus (MINI-PLUS; D. V. Sheehan et al., 1998), a fully structured instrument to assess the presence of *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-IV; American Psychiatric Association, 1994) mood disorders, anxiety disorders, somatoform disorders, substance use disorders, psychotic disorders, eating disorders, conduct disorder, and adjustment disorder. The MINI-Plus employs different time frames for various disorders: current, past, or lifetime. The MINI has been directly compared with both the Structured Clinical Interview for DSM-III-R (SCID) and the Composite International Diagnostic Interview. It was found to have acceptably high validation and reliability scores for most disorders (Lecrubier, Sheehan, Hergueta, & Weiller, 1997; D. Sheehan et al., 1997). In the study reported by D. V. Sheehan et al. (1998), MINI diagnoses were characterized by good or very good kappa values with only a single value (current drug dependence) under 0.50. Sensitivity was 0.70 for all disorders except dysthymia, obsessive-compulsive disorder, and current drug dependence. Positive predictive values were above 0.75 for major depression, lifetime mania, current and/or lifetime panic disorder, lifetime agoraphobia, lifetime psychotic disorder, anorexia, and posttraumatic stress disorder. Otsubo et al. (2005) compared Japanese versions of both the MINI and SCID; they reported that kappa values showed good or excellent agreement between MINI and SCID diagnoses. None of the validation studies addressed the reliability or validity of the ADHD diagnosis. The instrument also assesses suicide risk by combining several relevant items (current or past suicide thoughts, plans, and attempts) that yield a score that ranges from 0 to 33. Low risk is indicated by a score from 1 to 5, moderate risk 6 to 9, and high risk ≥10.

The Medical Outcome Study Short Form–36 Health Survey (SF-36; Stewart et al., 1989; Ware, 1993) was used to assess physical and mental dimensions of functioning. Participants were administered the Level of Service Inventory–Revised (LSI-R; Andrews & Bonta, 1995) to provide a measure of the primary risk factors

that contribute to the development of lifetime adjustment problems. This instrument is widely used in correctional settings. We calculated adjusted odds ratios (with confidence intervals and *p* values) by fitting a logistic regression model for each LSI-R item (treated as a dichotomous outcome) with ADHD status, gender, antisocial personality disorder (ASPD), age, and race or ethnicity as covariates. A *p* value of <.05 was considered statistically significant.

Results

We recruited 322 participants and 319 completed the assessment protocol. A total of 68 offenders (21.3%) met criteria for ADHD. Of those with adult persistent ADHD, 60 of 68 were male and most were Caucasian. When looking at the entire sample, the percentage of women with adult persistent ADHD (14.3%) was less than that for men (23.1%) but the difference was not significant ($\chi^2 = 2.00$, $df = 1$, $p = .157$). Associated demographic characteristics of the sample are shown in Table 1. Offenders with ADHD had a mean age of 29.2 ($SD = 7.9$) years. Although slightly younger than the non-ADHD group with a mean age of 31.6 (9.9) years, the difference was not statistically significant ($t = 1.84$, $df = 317$, $p = .07$). ADHD status was strongly related to suicide risk measured by the MINI-Plus, with a more than two-fold increase in this group ($t = 1.84$, $df = 317$, $p = .07$). There were no significant differences between offenders with and without ADHD with respect to age, gender, education, marital status, or type of current offense.

Figure 1 shows a distribution of ADHD symptoms in persons with and without ADHD. Symptoms are found in both groups; among those with ADHD, the most frequent are impulsivity regarding money, other impulsivity, distractibility, and being in a fog. Among others, commonly reported symptoms include being impulsive with money, other impulsivity, and not achieving. Among offenders with ADHD, 91.2% had four or more of 23 symptoms (Figure 2).

Table 2 compares lifetime psychiatric diagnoses between the groups. There was a significant difference in the prevalence of mood, anxiety, psychotic, and somatoform disorders. Offenders with ADHD were more likely (Fisher's Exact, $p < .029$) to have any of several additional diagnoses on the MINI-Plus. Participants with ADHD were significantly more likely to have comorbid mood and anxiety disorders. Psychotic disorders, particularly schizophrenia, were also more common in patients with ADHD ($\chi^2 = 8.76$, $df = 1$, $p < .003$), as was body dysmorphic disorder (Fisher's Exact, $p < .001$) and any somatoform disorder (Fisher's Exact, $p < .001$). Childhood conduct disorder was significantly more common in adults with ADHD, with 31.6% of offenders with ADHD (compared to 14% of offenders without ADHD) having a history of childhood conduct disorder ($\chi^2 = 11.8$, $df = 1$, $p < .001$). There was also considerable overlap between ADHD and both antisocial and borderline personality disorders; 54.4% of offenders with ADHD (vs. 29.9% of offenders without ADHD)

Table 1
Demographic Characteristics in 319 Offenders With and Without
Attention Deficit Hyperactivity Disorder (ADHD)

Variable	ADHD Status		
	Present ($n = 68$)	Absent ($n = 251$)	p
Age, mean (SD)	29.2 (7.9)	31.6 (9.9)	.066[a]
Gender (%)			
Female	11.8	19.1	.157
Male	88.4	80.9	
Race or ethnicity (%)			
African American	10.3	19.1	.039
Caucasian	83.8	68.1	
Other	5.9	12.8	
Education (%)			
Less than high school	26.5	19.9	.487
High school or General Equivalency Diploma	55.9	59.4	
More than high school	17.7	20.7	
Marital Status (%)			
Divorced	17.7	19.8	.061
Married	29.4	19.4	
Single	44.1	57.3	
Other	8.8	3.6	
Current suicide risk (%)	51.5	23.5	<.001
Type of current offense (%)			
Drug manufacturing or delivery	32.4	32.3	.701[b]
Assault or abuse	27.9	22.7	
DUI or driving while barred	8.8	13.6	
Burglary	10.3	11.6	
Parole violation	13.2	10.4	
Fraud or forgery	5.9	6.8	
Possession of firearm	0.0	2.4	
Unknown	1.5	0.4	

Note: p value is from Pearson's chi-square test. DUI = driving under the influence (of alcohol or other substances).
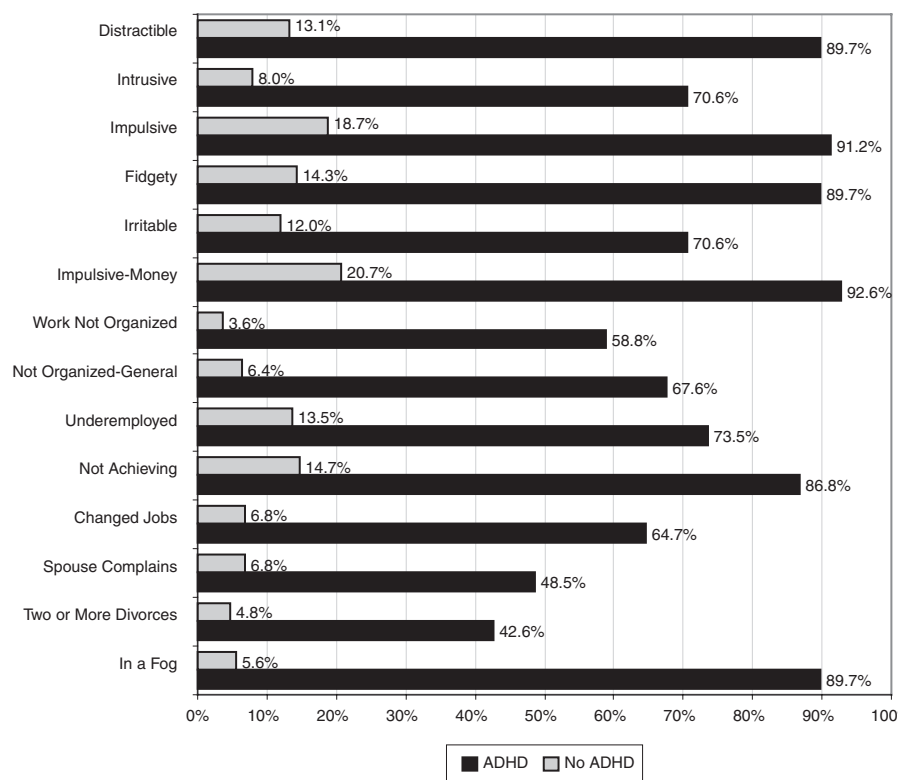a. Student's t test was used.
b. Fisher's Exact test was used.

met criteria for ASPD, whereas nearly 52% of offenders with ADHD met criteria for borderline personality disorders (vs. 22.6% of offenders without ADHD). There were no significant differences between the groups with respect to substance use disorders and eating disorders.

Measures of physical, mental, and social function were also assessed. Table 3 presents the SF-36 scales as semicontinuous measures. We report the adjusted

Figure 1
Percentage of Offenders With Attention Deficit
Hyperactivity Disorder (ADHD) Symptoms

Symptom	No ADHD	ADHD
Distractible	13.1%	89.7%
Intrusive	8.0%	70.6%
Impulsive	18.7%	91.2%
Fidgety	14.3%	89.7%
Irritable	12.0%	70.6%
Impulsive-Money	20.7%	92.6%
Work Not Organized	3.6%	58.8%
Not Organized-General	6.4%	67.6%
Underemployed	13.5%	73.5%
Not Achieving	14.7%	86.8%
Changed Jobs	6.8%	64.7%
Spouse Complains	6.8%	48.5%
Two or More Divorces	4.8%	42.6%
In a Fog	5.6%	89.7%

■ ADHD   □ No ADHD

difference (*D*) in the means of both groups for each measure. The adjusted differences were derived by fitting multiple linear regression models with each measure as the outcome and gender, ASPD, age, and race or ethnicity as covariates. The SF-36 scale scores were significantly lower for the ADHD group in the areas of mental summary, emotional role limitations, mental health, and social functioning. These findings indicate significantly worse functioning in the ADHD group. Other SF-36 scores of individuals with ADHD were not significantly worse than those without ADHD in relation to physical functioning, vitality, bodily pain, and general health. The LSI-R scores were not significantly different between offenders with and those without ADHD.

**Figure 2
Symptom Frequency Categories in Offenders With
Attention Deficit Hyperactivity Disorder**
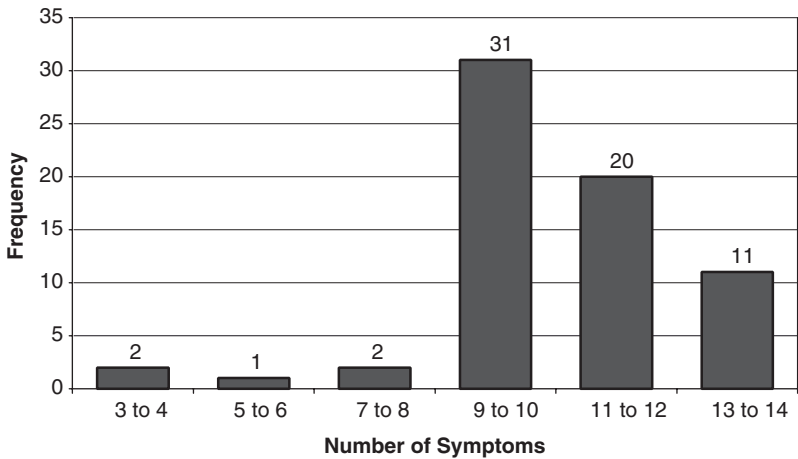
Discussion

Just more than 21% of men and women offenders assessed met criteria for ADHD. Among offenders with adult persistent ADHD, 91.2% had 4 or more of 23 symptoms; being impulsive with money was the most frequent, followed by being impulsive in general, not achieving, and fidgeting. Fewer than 10% of offenders with ADHD reported having 3 or fewer ADHD symptoms. The rate of ADHD is higher than in our pilot study (10%; Black, Arndt, Hale, & Rogerson, 2004), despite using the same diagnostic instrument at the same facility, but the finding could be because of the larger sample and more consistent administration of the MINI-Plus. The rate is substantially higher than that found in the general population and can be directly compared with figures reported in the National Comorbidity study replication (Kessler et al., 2006), in which the general population rate of ADHD was estimated at 4.4%. The rate of ADHD was high in women (14.3%), and the difference with the rate in men (23.1%) was not significantly different. The fact that so many women met criteria for ADHD is a reminder that, at least in prison settings, the disorder should be included in the clinician's differential diagnosis, particularly when symptoms include inattention, impulsivity, and hyperactivity.

The reported rate of ADHD in prison settings has varied depending on the sample, assessment method, and how stringently the diagnostic criteria are applied

Table 2
Psychiatric Comorbidity in 319 Offenders With and Without ADHD

Disorder	ADHD Status		Adj. *OR* (95% CI)	*p*
	Present (*n* = 68)	Absent (*n* = 251)		
Mood disorders				
Major depression	50.0%	15.9%	4.8 (2.6, 8.9)	<.001
Dysthymia	7.4%	2.0%	4.6 (1.1, 18.6)	.040[a]
Bipolar	72.1%	37.9%	3.6 (1.9, 6.7)	<.001
Other mood disorder	19.9%	5.6%	4.5 (1.8, 11.3)	.001
Any mood disorder	86.8%	45.4%	7.2 (3.3, 15.9)	<.001
Anxiety disorders				
Panic	19.1%	4.8%	4.1 (1.7, 9.8)	.002
Agoraphobia	38.2%	18.7%	2.5 (1.3, 4.7)	.004
Generalized anxiety disorder	32.4%	15.5%	2.3 (1.2, 4.5)	.013
Social anxiety disorder	20.6%	7.6%	2.5 (1.1, 5.5)	.029
Specific phobia	11.8%	2.8%	6.5 (1.9, 22.3)	.005[a]
Obsessive-compulsive disorder	19.1%	6.8%	2.2 (1.0, 5.1)	.066
Posttraumatic stress disorder	20.6%	10.4%	2.2 (1.0, 5.0)	.056
Any anxiety disorder	67.7%	35.9%	3.7 (2.0, 6.9)	<.001
Substance use disorders				
Alcohol disorder	86.8%	70.1%	2.1 (1.0, 4.6)	.065
Drug disorder	88.2%	73.3%	1.7 (0.8, 4.0)	.201
Any substance use disorder	98.5%	87.3%	4.8 (0.6, 37.5)	.137
Psychotic disorders				
Schizophrenia or NOS	19.1%	5.2%	3.6 (1.5, 8.5)	.004
Substance or GMC related	36.8%	23.9%	1.5 (0.8, 2.7)	.219
Any psychotic disorder	55.9%	29.1%	2.4 (1.4, 4.4)	.003
Eating disorders				
Anorexia	0.0%	0.0%	NA	NA
Bulimia	5.8%	2.0%	2.7 (0.6, 11.2)	.101[a]
Any eating disorder	5.8%	2.0%	2.7 (0.6, 11.2)	.101[a]
Somatoform disorders				
Somatization disorder	1.5%	0.0%	NA	.213[a]
Hypochondriasis	1.5%	1.2%	1.0 (0.1, 10.6)	1.00[a]
Body dysmorphic disorder	11.8%	1.2%	18.7 (3.6, 97.1)	<.001[a]
Pain disorder	4.4%	1.2%	3.0 (0.5, 16.8)	.114[a]
Any somatoform disorder	14.7%	3.2%	5.4 (1.9, 16.0)	.001[a]
Childhood conduct disorder[b]	31.6%	14.0%	2.7 (1.5, 4.8)	<.001
ASPD[b]	54.4%	29.9%	2.6 (1.4, 4.5)	.001
Borderline personality disorder[c]	51.9%	22.6%	3.5 (1.7, 7.1)	<.001
Adjustment disorder	7.4%	3.6%	2.3 (0.7, 7.8)	.187[a]
Any MINI disorder	100.0%	93.2%	NA	.029[a]

Note: Adj. *OR* = odds ratio adjusted for age, gender, race or ethnicity, and ASPD. ADHD = attention deficit hyperactivity disorder; NOS = not otherwise specified; GMC = general medical condition; ASPD = antisocial personality disorder; MINI = Mini International Neuropsychiatric Interview; NA = logistic regression model not fit because of lack of response variability. Results for ADHD are based on simple (unadjusted) logistic regression model. *p* value is from multiple logistic regression model.
a. *p* value from Fisher's Exact test.
b. Adj. *OR* adjusted for age, gender, and race or ethnicity.
c. Based on *n* = 220.

Table 3
Mean (*SD*) LSI-R and SF-36 Scores in Offenders With and
Without Attention Deficit Hyperactivity Disorder (ADHD)

Scale	ADHD Status		Adjusted *D* (*SE*)	*p*
	Present (*n* = 68)	Absent (*n* = 251)		
LSI-R total score	34.3 (7.0)	32.6 (7.4)	1.0 (1.1)	.373
SF-36 Scales				
Physical summary	79.2 (20.4)	80.5 (18.8)	−2.4 (2.7)	.374
Mental summary	56.0 (21.8)	67.7 (22.1)	−10.4 (3.2)	.001
Physical functioning	88.8 (20.6)	85.8 (23.1)	0.1 (3.2)	.965
Role limitations (physical)	79.4 (32.0)	81.9 (32.3)	−3.0 (4.6)	.512
Role limitations (emotional)	60.8 (42.3)	74.9 (38.3)	−12.0 (5.5)	.031
Vitality	52.2 (21.6)	58.5 (21.2)	−5.2 (3.1)	.094
Mental health	48.1 (21.1)	64.2 (21.2)	−15.0 (3.1)	<.001
Social functioning	62.5 (25.1)	73.5 (26.9)	−10.2 (3.8)	.008
Bodily pain	78.5 (24.5)	81.8 (23.7)	−3.9 (3.3)	.229
General health	70.7 (21.8)	72.5 (20.8)	−1.9 (2.9)	.519

Note: Adj. *D* = difference in group means adjusted for age, gender, race or ethnicity, and antisocial personality disorder. *p* values are from a multiple linear regression model.

(Rösler et al., 2004), and our rate is toward the lower end of the range. Eyestone and Howell (1994) reported that 25.5% of 102 male prisoners met criteria for ADHD. A study of young German inmates employing the ICD-10 criteria (Retz et al., 2004) found that 22% of 129 had ADHD. A later study of the same population, however, indicated that 45% had ADHD when DSM-IV criteria were applied (Rösler et al., 2004). In a study of 82 male prisoners in Norway, some of whom had been convicted of violent crimes, K. Rasmussen et al. (2001) reported that 30% had ADHD and an additional 16% had probable ADHD. Other studies have also found that a higher percentage of inmates have symptoms of ADHD even when they do not meet full syndromal criteria.

The finding that offenders with ADHD were more likely to be Caucasian is consistent with studies of the U.S. nonincarcerated population, in which lower rates of ADHD diagnoses have been reported in children from minority backgrounds (Froehlich et al., 2007; Lesesne, Visser, & White, 2003; Pastor & Reuben, 2005). Other studies (Angold et al., 2002; Costello et al., 1996), however, found no difference in ADHD rates in children from disparate ethnic backgrounds (non-Hispanic White and African American children). It is possible that differences in ADHD prevalence rates reported for offspring from different ethnic groups could reflect a pattern of varying recognition and treatment of ADHD among children from different backgrounds. Olfson, Gameroff, Marcus, and Jensen (2003) noted that although

ADHD is diagnosed increasingly more frequently among American children (in particular among minority groups), treatment rates for ADHD among different racial and ethnic minority groups continue to lag behind those of Caucasian children.

Offenders with ADHD had high rates of psychiatric comorbidity, particularly for mood, anxiety, and somatoform disorders. The pattern mirrors that seen in clinical and community samples, except perhaps that substance use disorders were not increased whereas body dysmorphic disorder was increased more than 18-fold. According to Biederman (2004), many of the comorbid conditions in patients with ADHD begin in childhood. In children with ADHD, comorbidity with internalizing disorders such as anxiety and depression is highly variable, ranging to 75% (Milberger, Biederman, Faraone, Murphy, & Tsuang, 1995). An association between adult ADHD and other Axis 1 disorders has also varied in published studies. Of 56 adults with ADHD, Shekim, Asarnow, Hess, Zaucha, and Wheeler (1990) noted that 14% of patients with ADHD carried that diagnosis alone and that as many as one third of their study participants had four other diagnoses in addition to ADHD. Secnik, Swensen, and Lage (2005) found higher rates of depression, anxiety, bipolar disorder, and oppositional defiant disorder in a group of ADHD patients; these patients were reported to have higher medical costs and more work absences. Biederman and colleagues (1992; Biederman, Faraone, Keenan, Steingard, et al., 1991) suggest an association between comorbid mood disorders and ADHD in the general population; another retrospective study found that major depressive disorder occurs in 50% of adult patients with ADHD compared to 11% of control participants (Biederman, 2004). Other studies (Cantwell, 1972; Lahey et al., 1988; Manuzza et al., 1993, 1998; Weiss et al., 1985) do not support this association. There appears to be similar controversy related to the prevalence of bipolar disorder in patients with ADHD, with some studies finding comorbid bipolar disorder in patients with ADHD as children (Biederman, 2004) and others failing to find this association (Manuzza et al., 1993, 1998; Murphy & Barkley, 1996). Similarly, some studies suggest an association between ADHD and anxiety disorders (Biederman, Faraone, Keenan, & Tsuang, 1991; Biederman et al., 1992), although others failed to find this association (Manuzza et al., 1998; Reeves, Werry, Elkind, & Zametkin, 1987).

Although these findings appear contradictory, some reports have suggested that the prevalence of comorbid conditions in adults with ADHD varies according to whether the study was designed as retrospective or prospective (Marks, Newcorn, & Halperin, 2001). Other authors have suggested that symptoms misdiagnosed as comorbid affective disorders or even psychotic disorders may be symptoms arising from ADHD, especially in cases where the ADHD symptoms are so extreme as to profoundly interfere with reality testing, self-image, and judgment (Bellak & Black, 1992; Bellak, Kay, & Opler, 1987). In a meta-analysis of epidemiological studies of comorbidity, it was also reported that the link between ADHD and Axis 1 disorders such as depression is mediated by the link between these disorders (e.g., mood

disorders) and oppositional defiant or conduct disorder and that, absent this link, ADHD may not predispose to depression (Angold, Costello, & Erkanli, 1999). That childhood conduct disorder was significantly more common in adults with ADHD has been noted (Dowson, 2008). Several additional studies have noted that patients with a history of conduct problems in addition to ADHD are at increased risk for adult criminality compared to those with hyperactivity alone (Satterfield et al., 2007; Christiansen et al., 2008). Another study concluded that hyperactive children are at significant risk of at least one nondrug disorder in young adulthood but that this risk is by and large mediated by the presence of conduct disorder in adolescence (Fischer et al., 2002).

Comorbidity between ADHD and substance use disorders has been noted in studies of ADHD in the general population (Shaffer et al., 1996; Houston et al., 2001). We did not find a significantly higher rate of substance use in offenders with ADHD compared to those without ADHD, although alcohol use tended to be higher in the ADHD group and approached statistical significance. Several prior studies (Biederman et al., 1994; Biederman et al., 1993; Marks et al., 2001; Morrison, 1980; Shekim et al., 1990) found a significantly higher rate of alcohol abuse and/or dependence amongst ADHD probands, although other studies did not (Hechtman & Weiss, 1986; Manuzza et al., 1993, 1998). Several studies of the general population, both retrospective (Biederman et al., 1993) and prospective (Manuzza et al., 1993, 1998), found as much as a three- to four-fold increase in rates of drug abuse between ADHD patients and controls. That our study did not find a significantly greater prevalence of substance use disorders in offenders with or without ADHD likely speaks to the fact that a very high percentage of offenders in general have substance use disorders (Gunter et al., 2008).

Comorbid borderline and antisocial personality disorders were significantly more common in offenders with ADHD (52% and 55%, respectively). Prior studies have observed an increased risk for antisocial disorders in adults in the general population with ADHD (Manuzza et al., 1993, 1998; Weiss et al., 1985). In a study by Manuzza et al. (1993), ADHD probands were nearly 10 times as likely as controls were to have antisocial personality disorder at follow-up. Retrospective studies concur with these findings (Biederman et al., 1993; Fischer et al., 2002; Morrison, 1980; Murphy & Barkley, 1996). Borderline personality disorder has also been found to be more common among young adults with ADHD (Fischer et al., 2002). According to Fischer et al. (2002), the conceptual basis as to why ADHD may be associated with an increased risk for personality disorders is that the core feature of personality disorders (defined as deviant patterns of behavior in two of the following: cognition, affectivity, interpersonal function, and impulse control) closely approximates the deviances from the norm that are needed for the diagnosis of ADHD. It is not clear whether this diagnostic commonality represents shared risk for either disorders or merely symptom overlap.

The lower SF-36 scale scores for our ADHD group indicate significantly worse self-reported functioning in the areas of mental and emotional health as well as social functioning. Other studies in the general population (Murphy & Barkley, 2002) have also noted increased psychological distress in adults with ADHD as well as problems with social and job related demands (Pierce, 2003).

The finding that the ADHD group was considered at risk for suicide (based on a scale embedded in the MINI-Plus) has been recognized in earlier studies of ADHD in the general population (James et al., 2004; Kelly et al., 2004) as well as in correctional samples (Plattner et al., 2007), particularly among offenders with comorbid ADHD and antisocial personality disorder (Semiz et al., 2008). The impulsivity inherent to ADHD as well as the greater risk that these individuals have for developing other psychiatric disorders (Willcutt, Pennington, Chhabildas, Friedman, & Alexander, 1999) predispose to suicidal behavior. James et al. (2004) conducted a meta-analysis of ADHD and suicide in the general population and found an association between ADHD and completed suicide, noting that the rate of completed suicide was nearly three times higher for men with than without ADHD. The authors suggest that ADHD appears to increase the risk for suicide by increasing both the incidence and severity of comorbid psychiatric disorders (especially mood and conduct disorders). In addition, comorbid psychiatric disorders are also associated with the persistence of ADHD through adolescence (Cuffe et al., 2001), thus strengthening the link between ADHD and suicide. Not all studies, however, agree that it is the comorbidity between ADHD and other psychiatric disorders that increases the suicide risk; for example, Kelly et al. (2004) noted that risk for suicide attempts amongst adolescents with substance use disorders was increased by comorbid ADHD but that this effect could be independent of that associated with incipient mood disorders.

There are several limitations to this study. The sample consisted of offenders newly committed to the general population of a reception unit at a state prison; the results may not generalize to incarcerated offenders as a whole or to probationers or parolees. There were relatively few women, so caution should be used in attempting to generalize the findings to this population. Because this study was exploratory we chose not to correct for the number of comparisons made. Whereas the MINI-Plus itself is widely used and has acceptable reliability and validity with most diagnostic categories, there is some evidence that the instrument may overdiagnose some disorders such as the psychoses. In using the MINI-Plus for ADHD, it is important to note that the interviewer only queries the 14 adult ADHD symptoms if the participant endorses 6 of 10 possible childhood symptoms of ADHD with some of the symptoms occurring prior to age 7. There then need to be 9 or 14 symptoms endorsed as positive prior and evidence of impairment before a diagnosis of adult ADHD is made. Consequently, only severe chronic cases are likely to be recorded as having adult persisting ADHD. That said, the instrument has been used by other

investigators to diagnose ADHD (Nierenberg et al., 2005). Another limitation is the use of the suicide risk scale of the MINI-Plus. Although its validity has not been adequately determined, a recent report from Brazil showed its utility in a general hospital setting in which 23% of 253 patients were judged to be at risk for suicide (Ferriera et al., 2007). Further work is necessary to show whether the scale has suitable sensitivity and specificity to justify its use with offenders. Finally, the ADHD diagnosis was based on a single instrument, and there was no effort to interview family members or other informants who could have provided additional information.

Conclusions

ADHD is common in offenders and should not be overlooked in either male or female offenders. Offenders with ADHD are more likely to report poorer mental health and social functioning, to have substantial psychiatric comorbidity, and to report higher suicide risk. Offenders with ADHD are likely to require more intensive mental health services. These findings should lead to discussions regarding the appropriate treatment of ADHD in correctional settings. Because it is often difficult to monitor symptoms of ADHD during confinement and many of the medications used to treat ADHD have significant street value and abuse potential, there may be a reluctance to treat this disorder pharmacologically. There are now a number of brief rating scales and checklists to assist in the assessment of the disorder, and effective nonstimulant treatments (such as buproprion, atomoxetine, or tricyclic antidepressants) are available. When stimulants are required, administration in liquid form may mitigate concerns regarding redistribution and abuse in this population. A variety of nonpharmacologic treatments may also be useful in treating this disorder. A recent review on ADHD treatment highlighted the importance of helping patients understand the disorder and address specific problems inherent to ADHD, such as time management issues, temper outbursts, poor self esteem, and relationship issues (Kolar et al., 2008). Cognitive behavioral therapy may also be helpful in assisting patient to challenge their cognitive distortions and modify dysfunctional behaviors (Rapport, Chung, Shore, & Isaacs 2001), particularly in the setting of psychiatric comorbidity (Rostain & Ramsay, 2006).

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