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Childhood Attention Deficit Hyperactivity Disorder, Substance Use, and Adult Functioning Among Incarcerated Women

Kathleen A. Hennessey, B.A.¹, Michael D. Stein, M.D.^{2,5}, Cynthia Rosengard, Ph.D., M.P.H.^{1,5}, Jennifer S. Rose, Ph.D.³, and Jennifer G. Clarke, M.D., M.P.H.^{4,5}

¹Rhode Island Hospital

²Butler Hospital

³Wesleyan University

⁴Memorial Hospital

⁵Alpert Medical School of Brown University

Abstract

Objective—To estimate prevalence of childhood Attention Deficit Hyperactivity Disorder (ADHD) among incarcerated females and determine its association with substance use and adult functioning.

Method—192 female participants were recruited from the Department of Corrections in Rhode Island. Childhood ADHD was defined as scoring >46 on the Wender Utah Rating Scale.

Results—46% met criteria for childhood ADHD. Multivariate analysis revealed that women meeting WURS criteria were more likely to be inconsistently employed (OR = 0.23, 95% CI = 0.10 – 0.54), recently homeless (OR = 2.09, 95% CI = 1.02 – 4.30), lifetime incarceration of more than 90 days (OR = 3.00, 95% CI = 1.37 – 6.57), current smokers (OR = 2.99, 95% CI = 1.24 – 7.20) and ever used marijuana regularly (OR = 3.47, 95% CI = 1.61 – 7.45).

Conclusion—Among incarcerated females, childhood ADHD is associated with negative social and health behaviors.

Individuals with attention deficit hyperactivity disorder (ADHD) are at increased risk in childhood for academic failure, behavioral problems, and accidents (Fischer, Barkley, Edelbrock, & Smallish, 1990; DiScala, Lescossier, Barthel, & Li, 1998). In adulthood, ADHD places them at risk for divorce, substance abuse, mental health disorders and employment problems when compared to people without ADHD (Murphy & Barkley, 1996). Many individuals are unaware that they met criteria for childhood or adult ADHD and receiving this diagnosis often assists in understanding the difficulties associated with the disorder (Toner, O'Donoghue, & Houghton, 2006). ADHD often results in increased use of medical or mental health care (Hinnenthal, Perwien, & Sterling, 2005), decreased productive

employment (Kessler, Adler, Ames, Barkley, Birnbaum, Greenberg, et al., 2005) and increased involvement with the justice system (Mannuzza, Klein, Konig & Giampino, 1989).

Background

ADHD is characterized by a chronic level of inattention, impulsivity/hyperactivity, or both, that impairs functioning in two or more areas of life (school, work, family, or social). For children, ADHD symptoms specified by the DSM-IV must have been present prior to age seven and persisted for at least 6 months. The DSM-IV criteria include predominantly inattentive, predominantly hyperactive/impulsive and combined types. The prevalence of ADHD in the general population is estimated at 3%–7% of school aged children, with a male to female ratio of 2:1 to 9:1, depending on type and setting (American Psychiatric Association, 2000).

Inattention, distractibility, and disorganization can impair learning and lead to academic underachievement (Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1993). Hyperactivity, impulsivity and aggressive behaviors may lead to peer rejection (Bagwell, Molina, Pelham, & Hoza, 2001; Berry, Shaywitz, & Shaywitz, 1985; Hoza et al., 2005), involvement with the criminal justice system (Mannuzza, Klein, Konig & Giampino, 1989), and injuries (DiScala, Lescohier, Barthel, & Li, 1998; Leibson, Katusic, Barbaresi, Ransom & O'Brien, 2001). Children with ADHD grow up to have high rates of psychiatric comorbidity (Hinnenthal, Perwien, & Sterling, 2005; Jensen, et al., 2001), substance use disorders (Murphy & Barkley, 1996; Molina & Pelham, 2003), and disrupted familial relationships (Dupaul, McGoey, Eckert, & Vanbrakle, 2001; Harrison & Sofronoff, 2002).

ADHD has been correlated with increased risk of criminal activity. The estimated prevalence of childhood ADHD persisting into adulthood in male prison populations ranges from 25–46% (Eyestone & Howell, 1994; Rasmussen, Almvik, & Levander, 2001; Rösler, et al., 2004). It was once believed that ADHD was exclusively a male disorder. A 1985 study found a ratio of 9:1 in males to females (Weiss, Hechtman, Milroy & Perlman, 1985); later work estimated the prevalence of ADHD in boys to be 9.0% compared to 3.3% in girls (Szatmari, Offord & Boyle, 1989). With the subtyping of ADHD, gender differences are less salient. The male to female ratio per subtype has recently been reported as: inattentive, 2.4:1; hyperactive/impulsive, 1.8:1; combined, 2.9:1 (Levy, Hay, Bennett & McStephen, 2005). To date, there are no published studies examining childhood ADHD in incarcerated females.

By the time children with ADHD reach adulthood they have not only acquired coping strategies (positive and negative), but also may have other diagnoses that could mask the detection of adult ADHD. Adults with ADHD are more likely to have had oppositional-defiant, conduct, antisocial, and substance use and abuse disorders, and to present with more education, employment, legal and marital problems relative to adults without ADHD (Biederman, Faraone, et al., 2006; Biederman, Monuteaux, et al., 2006; Downey, Stelson, Pomerleau, & Giordani, 1997; Mannuzza, et al., 1989; Murphy & Barkley, 1996). Assessing ADHD in adults is similar to assessing ADHD in children; current and past symptoms are documented, functional impairment is established in at least two life areas (home, work/

school and relationships), developmental, psychiatric and family histories are obtained and a physical examination is performed to rule out other disorders (Weiss & Murray, 2003).

The Current Study

The present study explored the prevalence of a childhood ADHD history in incarcerated women and its association with substance use and adult functioning (homelessness, inconsistent employment and lack of education). We hypothesized that those who reported a history of significant childhood ADHD symptoms would be more likely to engage in negative health behaviors (e.g., substance use) and to report significantly more social problems such as homelessness, unemployment and lack of education compared to those who did not report such symptoms.

Methods

Procedures

Face-to-face interviews were conducted with female detainees within 4 days of arrival to the Rhode Island Department of Corrections (RI DOC). Research assistants introduced themselves as members of a research team from Rhode Island Hospital, and invited women to participate in a brief questionnaire. It was emphasized that study participation was completely voluntary and that no identifying information would be recorded. A one-page verbal consent was administered, and to ensure participant anonymity, no identifying information was retained as part of the interview. Study approval was obtained from the Miriam Hospital Institutional Review Board and the Medical Research Advisory Group at the RI DOC prior to initiation. Approval was obtained from the warden of the women's facility to help guarantee participant confidentiality and grant permission for all interactions with the women to occur one-on-one with research assistants in unmonitored rooms.

Between the months of June 2005 to November 2005, women entering the RI DOC who were awaiting trial were approached to participate. Research assistants reviewed "traffic sheets" (daily printouts of all female inmates committed to the facility) on a daily basis, Monday (which includes weekend traffic) through Friday, and attempted to contact all women. Research staff collected demographic data (age, race, and number of days incarcerated in lifetime) on women who declined participation, were released prior to contact, or did not meet inclusion criteria. Study eligibility criteria included: English speaking, housed in general facility population, age 18 or older, not yet sentenced, and able to competently provide verbal consent. If a woman was unable to be screened secondary to being in segregation, ill, or in acute withdrawal from drugs and/or alcohol, her status was followed until she was released or could be approached for participation. Of 363 women approached for screening, 163 (44.9%) refused and 192 (52.9%) provided complete data on the ADHD measure and 8 (2.2%) provided incomplete data and were not included in the analysis. Women who declined to be screened did not differ significantly from the 192 women in the data analytic sample in terms of age or race. However, women who refused the screener were significantly less likely to have been incarcerated more than 90 days during their lifetime (9.5% of refusers vs. 34.4% of the data analytic sample; OR=0.20; 95% CI=0.11, 0.37). The eight women who did not provide complete data on the ADHD measure

did not differ from the data analytic sample in age, education, race, or likelihood of being incarcerated in the past 90 days.

Measures

ADHD Outcome Variable—Our outcome was a dichotomous variable indicating presence of childhood ADHD symptomatology based on a threshold score of 46 on the Wender Utah Rating Scale (WURS; Ward, Wender & Reimherr, 1993). The WURS consists of 61 items that retrospectively assess ADHD-relevant childhood behavioral, medical and learning problem behaviors and symptoms. Participants rated the extent to which they had each of the behaviors or symptoms on a 5-point Likert-type scale ranging from 0=“not at all or slightly” to 4=“very much.” Scoring proceeds by summing 25 items found in previous research to discriminate best among those with and without an ADHD diagnosis. A score of 46 or higher has a sensitivity of 86% and specificity of 99% for the diagnosis of childhood ADHD (Ward, Wender & Reimherr, 1993).

Demographics—Demographic measures included age, race, education, and employment history for past two years, homelessness for past two years, and amount of time incarcerated during lifetime.

Cigarette smoking and substance use—Participants were asked if they ever smoked cigarettes with response options of “never,” “social smoker, irregular,” “quit more than 6 months ago,” “quit less than 6 months ago” and “current smoker.” A dichotomous variable was created comparing those who were current smokers to all other responses. Participants were asked how many years they had used marijuana, heroin, cocaine, and anxiolytics (sedatives and/or hypnotics and/or tranquilizers) regularly (three or more times per week) in their lifetime. Four dichotomous variables were created to indicate lifetime use of marijuana, heroin, cocaine, and anxiolytics, respectively.

ADHD history—Participants were asked, “Did anyone ever tell you that you had Attention Deficit Hyperactivity Disorder?”, “If yes, was it a Healthcare professional?”, “Were you treated with medication for this disorder?”

Data Analysis

Chi-square statistics and unadjusted odds ratios (with 95% confidence intervals) were calculated to assess bivariate relations between the dichotomous Wender ADHD score outcome variable and the demographic, substance use, and ADHD diagnosis correlates. A multivariate logistic regression analysis was then conducted, to examine the demographic and substance use correlates of a positive childhood ADHD history. Effect sizes and significance for the individual correlates were determined by adjusted odds ratios and 95% confidence intervals. Regression diagnostics were conducted to identify outliers or other model fitting problems related to collinearity.

Results

Description of the Sample

Participants ranged in age from 18–55 years with a mean age of 33 years ($SD = 10.1$ years). The majority of study participants were White (70%), and fewer than half (45%) had completed high school. Forty six percent met Wender criteria for childhood ADHD history, and 47% of those women reported having ever been diagnosed with ADHD. Of those who met the Wender criteria, more than a third (40%) reported being homeless in the year prior to the current incarceration, 31% reported having worked full or part time for more than one year out of the past two years, and 34% reported having been incarcerated for more than 90 days in their lifetime. Most women reported being current smokers (77%), 34% drank to intoxication in the past 90 days, and prevalence of lifetime regular use of marijuana, heroin and cocaine were 47%, 21%, and 55%, respectively (Table 1).

Wender ADHD Score Correlates—Compared with women who did not meet WURS criteria for childhood ADHD, women who met ADHD criteria (45.8%) were significantly less likely to have completed high school ($OR\ 0.44$) or to have worked for more than a year in the past two years ($OR\ 0.27$). In addition, they were more likely to report having been homeless in the past year and were more likely to have been incarcerated for more than 90 days in their lifetime (Table 1). Cigarette smoking, marijuana use, and cocaine use were significantly more prevalent among women with a positive ADHD history. Women with a positive ADHD history were also more likely to have been diagnosed with, and treated for, ADHD as a child.

The multivariate logistic regression analysis indicated that, after controlling for other variables in the analysis, being homeless, not working for more than a year in the past two years, being incarcerated for more than 90 days in one's lifetime, cigarette smoking, and marijuana use remained significantly correlated with childhood ADHD (Table 2).

Discussion

Women in this study with a childhood history of ADHD by the Wender Utah Rating Scale experienced serious social and health behavior consequences including homelessness, inconsistent employment, and greater cigarette and marijuana use than the women without a history of ADHD. It has been shown that ADHD in the male incarcerated population occurs at a much higher frequency than in the general population. Eyestone and Howell (1994) found that 25% of the male prisoners sampled were diagnosable as having substantial symptoms of ADHD in both childhood and adulthood using the Utah Criteria for ADHD in adults, developed by Wender and colleagues. Other researchers found a prevalence of ADHD of approximately 45% in incarcerated male populations, using the Wender Utah Rating Scale (Rasmussen et al., 2001; Rösler et al., 2004). These rates are 5–10 times higher than the general population. Our finding of a 46% prevalence of childhood ADHD in incarcerated women, similar to rates among the incarcerated males in other studies, is surprising given the gender differences in ADHD described in community samples.

The fact that women with a history of ADHD in this study were three times more likely to be current smokers when all other variables were controlled confirms previous research indicating that childhood ADHD predicts cigarette smoking. Milberger, Biederman, Faraone, Chen and Jones (1997) found that childhood ADHD predicted cigarette smoking in mid-adolescence with a younger age of onset than non-ADHD children. They also found that ADHD treatment adherence declined in smokers more than non-smokers, which could indicate a self-medicating effect of cigarettes. Knowing that nicotine improves attention, vigilance and short-term memory (Pomerleau, Downey, Stelson & Pomerleau, 1995), and that adolescents with ADHD are twice as likely to smoke cigarettes as adolescents without ADHD, Potter and Newhouse (2004) chose to study the effects of nicotine administration on behavioral inhibitions in adolescents with ADHD. They found that nicotine produced a significant reduction in stop signal reaction time (SSRT) confirming their hypothesis that nicotine would improve cognitive/behavioral inhibition in adolescents with ADHD. Nicotine may provide temporary relief of typical ADHD symptoms such as inattention, distractibility and hyperactivity (Pomerleau, Downey, Stelson & Pomerleau, 1995).

The women with ADHD in this study were also more likely to have ever used marijuana than the non-ADHD women. A study of inpatient adolescents (13 to 17 years old) found that ADHD symptoms were significantly correlated with frequency of marijuana use in the three months prior to hospitalization, as well as being associated with marijuana and nicotine dependence symptoms (Abrantes, Strong, Ramsey, Lewinsohn & Brown, 2005). Interestingly, ADHD inattention symptoms, but not hyperactivity/impulsivity symptoms, were associated with marijuana and nicotine dependence, suggesting that adolescents may be self-medicating, given their finding that the greater ADHD symptoms the more likely to meet criteria for an internalizing disorder. Hammersley and Leon (2006) examined the positive and negative experiences of marijuana use among university students. They found that the most common negative effects of marijuana use were being forgetful, not getting things done, difficulty in concentrating, neglecting work or duties and difficulty in doing things, which may exacerbate ADHD symptoms. Despite the possible negative effects of use, the adolescents may be using marijuana for the positive effects of use such as feeling more relaxed, interactive, happier, and forgetting cares and worries (Hammersley and Leon, 2006). Hammersley and Leon (2006) also found that the most common method of marijuana use, among university students, is concurrent use with tobacco. More research is needed in order to understand the relationship between ADHD symptomatology and marijuana

In this study, homelessness in the past year was reported by twice as many women with a history of ADHD as women without such a history. Other researchers have noted that ADHD may increase the risk of school failure and subsequent poverty, which may lead to homelessness (Van Wormer, 2003). It has also been suggested that the impulsivity and inattention of ADHD youth may lead to conflicts with family and friends, which may result in running away or being pushed out of the home (Unger, Kipke, Simon, Montgomery, & Johnson, 1997).

The effects of ADHD on the workforce have been noted in the literature. In a study of ADHD and work performance it was found that ADHD is a significant predictor of overall lost work performance, in both absenteeism (missed days of work) and presenteeism (low

performance while at work), resulting in 35 lost days per ADHD worker per year (Kessler et al., 2005). In a study by Biederman and colleagues, adults with self-reported ADHD in the community were less likely to be employed, less likely to be employed full-time, and more likely to be looking for work than the control group. Of the ADHD adults who were currently employed, they endorsed having had more jobs in the past 10 years than did the controls (Biederman, Faraone, et al., 2006). Finally Barkley, Fischer, Smallish and Fletcher (2006) found that employer-rated ADHD in the workplace significantly predicted the risk of being fired, and that both employer-rated ADHD and parent-rated severity of childhood hyperactivity predicted lower work performance ratings from employers.

Studies of adult ADHD vary in the methods used to establish a diagnosis, and comorbid conditions often makes comparison between studies difficult. It is commonly cited that 30–50% of children with ADHD will be impaired by symptoms of ADHD as adults (Cantwell, 1985; Hill & Schoener, 1996; Mannuzza, Klein, Bonagura, Malloy, Giampino, et al., 1991; Weiss, Hechtman, Milroy & Perlman, 1985). Epidemiological data suggests that 1.5%–5.25% of adults have ADHD (Faraone & Biederman, 2005). Barkley, et al., (2002) found that between 71%–83% of adults with a childhood diagnosis of hyperactivity continued to have impairing symptoms 15 years after an initial hyperactivity diagnosis (Weiss, et al., 1985).

Limitations

One limitation of this study is that the Wender Utah Rating Scale measures symptoms and behaviors that are associated with ADHD but does not offer clinical diagnosis of ADHD. However with a score of 46 or higher, sensitivity is 86% and specificity is 99% for ADHD (Ward, Wender & Reimherr, 1993). Many of the symptoms and behaviors measured by the WURS overlap with other conditions such as obsessive-compulsive disorder, disruptive behavior disorders, conduct disorder, oppositional defiant disorder, and mood, anxiety, and substance use disorders (Kempton, et al., 1999; Masi, et al., 2006; Safren, Lanka, Otto, & Pollack, 2001; Souza, Pinheiro, Denardin, Mattos, & Rohde, 2004), but our study did not include diagnostic evaluation of these disorders. Childhood ADHD is often diagnosed using parent and teacher reports, neither of which was available here; we relied on retrospective self-report of such WURS symptoms. Finally, the WURS does not distinguish ADHD types (inattentive, hyperactive/impulsive, and combined).

Our study was also limited by recruitment from a single site. Of those women approached for participation, 55% agreed to participate; selection bias may exist, with those women having ADHD symptoms more likely to participate.

Implications for Future Research

This research provided important information regarding the estimated prevalence of childhood ADHD in a female incarcerated population. Childhood ADHD's relation to health behaviors and adult functioning may help to identify those at risk for judicial involvement and/or incarceration. Future studies should include structured clinical interviews based on the DSM-IV criteria to diagnose ADHD and should compare rates of childhood ADHD to adult ADHD in incarcerated populations. Finally, future investigations should determine if

treatment for ADHD among incarcerated women might reduce substance use, homelessness, joblessness and recidivism.

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Biographies

Kathleen Hennessey received her B.A. in Psychology from the University of Rhode Island in 2003. She joined the Research Unit of the Division of General Internal Medicine at Rhode Island Hospital in January, 2004. She serves as a research assistant on four projects within her unit, focusing on depression, alcohol use and HIV risk behaviors. She is currently pursuing Master's degree in Social Work at Rhode Island College.

Dr. Michael Stein is Professor of Medicine & Community Health at Alpert School of Medicine, Brown University. The Principal Investigator on ten NIH grants over the past decade, Dr. Stein's research has focused on the intersection of primary care, substance abuse and mental health. He is the recipient of a NIDA mid-career research (K24) award.

Dr. Rosengard received her Ph.D. in Clinical Psychology from the University of Connecticut in 1994. Subsequently, she completed a two-year post-doctoral fellowship in Psychology and Medicine and Adolescent Medicine at the University of California, San Francisco and served on the faculty of the Pacific Graduate School of Psychology in Palo Alto, CA for five years. She joined the Research Unit of the Division of General Internal Medicine at Rhode Island Hospital in September, 2001. Her work centers around understanding the health-related decision-making and behaviors of adolescents and young adults.

Dr. Jennifer Rose is a Research Associate Professor at Wesleyan University. She is trained in quantitative methodology and health psychology. Her work focuses on the application of

advanced statistical modeling techniques to identify population subgroups of individuals engaged in health risk behaviors and to evaluate changes in health risk behaviors and related risk factors from adolescence through adulthood.

Dr. Jennifer Clarke, Assistant Professor of Medicine & Obstetrics and Gynecology at Brown Medical School, received her medical degree from Cornell University and completed her residency in General Internal Medicine at Rhode Island Hospital. After residency she completed a two-year fellowship in women's health and has been performing her clinical work at the women's division of the Rhode Island Department of Corrections since 1998. Dr. Clarke's research has focused on the reproductive health needs of incarcerated women. Additionally, Dr. Clarke is Co-Principal Investigator on a multicenter trial of substance abuse treatment for people leaving prison (CJ-DATS).

Table 1

Sample Characteristics and Unadjusted Odds Ratios for Correlates of ADHD

	Total (n=192)	ADHD (n=88)	Non-ADHD (n=104)	Unadjusted OR (95% CI)
Demographics				
Mean Age (sd)	33 (10.1)	33 (10.3)	33 (9.9)	1.00 (0.97, 1.03)
% White	69.6	75.0	65.1	1.61 (0.86, 3.03)
% Completed High School	44.8	34.1	53.8	0.44 (0.25, 0.80) **
% Homeless Past Year	39.6	53.4	27.9	2.96 (1.63, 5.40) ***
% Worked >1 Year Past 2 Years	31.3	17.1	43.3	0.27 (0.14, 0.53) ***
% Incarcerated > 90 Days in Lifetime	34.4	47.7	23.8	3.04 (1.64, 5.65) ***
Substance Use				
% Current Smokers	76.6	85.2	69.2	2.56 (1.25, 5.27) **
% Drank to Intoxication Past 30 Days	34.4	39.8	29.8	1.56 (0.85, 2.83)
% Used Marijuana Ever	47.1	60.9	35.6	2.82 (1.57, 5.09) ***
% Used Heroin Ever	20.8	25.0	17.3	1.59 (0.79, 3.21)
% Used Cocaine Ever	54.7	67.1	44.2	2.57 (1.42, 4.62) **
% Used Sedatives/Hypnotics/Tranquilizers Ever	7.3	8.0	6.7	1.20 (0.40, 3.56)
ADHD Diagnosis				
% With ADHD Diagnosis	26.6	46.6	9.6	8.20 (3.78, 17.80) ***
% Treated With ADHD Medication	12.7	24.1	2.9	10.50 (3.01, 36.62) ***
% Have Children Diagnosed With ADHD	20.5	25.0	16.7	1.67 (0.82, 3.39)

*
p<0.05,**
p<0.01,***
p<0.001

Table 2

Multivariate Logistic Regression Adjusted Odds Ratios for Demographic and Substance Use Correlates of ADHD

	Adjusted OR (95% CI)
Demographics	
White	1.86 (0.86, 4.00)
Completed High School	0.52 (0.25, 1.10)
Homeless Past Year	2.09 (1.02, 4.30) *
Worked >1 Year Past 2 Years	0.23 (0.10, 0.54) **
Incarcerated > 90 Days in Lifetime	3.00 (1.37, 6.57) **
Substance Use	
Current Smoker	2.99 (1.24, 7.20) **
Drank to Intoxication Past 30 Days	1.10 (0.53, 2.31)
Used Marijuana Ever	3.47 (1.61, 7.45) **
Used Heroin Ever	1.42 (0.58, 3.45)
Used Cocaine Ever	1.42 (0.66, 3.06)

Note: Analysis excluded one outlier.

*
p<0.05,

**
p<0.01