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ORIGINAL ARTICLE

A prospective look at substance use and criminal behavior in urban ADHD youth: what is the role of maltreatment history on outcome?

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Abstract Children with attention-deficit/hyperactivity disorder (ADHD) are at heightened risk of antisocial behavior during adolescence/early adulthood. Here, we characterize the antisocial outcomes of a sample of urban, lower-socioeconomic-status, ethnically diverse ADHD youth and investigate the impact of maltreatment history on criminal and substance use disorder (SUD) outcomes. Ninety-eight participants diagnosed with ADHD in childhood were re-assessed 10 years later and compared with controls. Regression analyses investigated the effect of maltreatment on antisocial outcomes among four groups based on ADHD and maltreatment status. ADHD subjects and controls did not differ in rates of arrest, conviction, incarceration, or recidivism. ADHD youth were younger at their first arrest with higher rates of SUDs when compared to controls. Controls and ADHD subjects with maltreatment had significantly higher rates of SUDs compared to the no-ADHD/no-maltreatment group. Only ADHD youth with maltreatment had significantly higher rates of arrest than the reference group. In contrast to prior studies, ADHD youth did not differ from controls on most measures of antisocial behavior. Maltreatment increased the rate of arrest only among ADHD youth, though increased the rate of SUD for ADHD youth and controls. This suggests that ADHD youth, in the absence of maltreatment, are at no greater risk of SUDs or arrest than controls without maltreatment.

Keywords ADHD · Childhood maltreatment · Substance abuse · Criminality

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Introduction

Attention-deficit/hyperactivity disorder (ADHD) is among the most frequently diagnosed psychiatric disorders and is estimated to affect 5–10 % of school-age children (Scahill and Schwab-Stone 2000). Longitudinal studies have repeatedly shown that children with ADHD are at heightened risk of poor outcomes as they enter adolescence and early adulthood, and epidemiologic studies have identified elevated rates of substance use, personality disorders, and criminal behavior among young adults with symptoms of ADHD (Gudjonsson et al. 2012). Among poor outcomes, criminality (Barkley et al. 1990; Hechtman and Weiss 1986; Mannuzza et al. 1989, 1993) and substance use disorders (SUDs) (Mannuzza et al. 1998; Wilens et al. 1998; King et al. 2004) have the potential to cause significant hardship for the individual, their family, and society at large.

Several groups have shown elevated rates of SUDs and criminal behavior in ADHD youth when compared to non-ADHD peers. For example, Satterfield and colleagues (1997) showed significantly higher rates of arrests and incarcerations in adolescence and early adulthood for boys with ADHD when compared to controls (Satterfield and Schell 1997; Satterfield et al. 1982). Similarly, Hechtman et al. (1984) documented that young adults diagnosed as

hyperactive in childhood reported greater police involvement when compared to matched controls (Hechtman et al. 1984). Biederman et al. (2006) reported elevated rates of antisocial disorders in adolescents/young adults diagnosed with ADHD in childhood when compared to non-ADHD controls (Biederman et al. 2006, 2008). Using official arrest records, Mannuzza et al. (2008) showed that adolescents and adults diagnosed with ADHD in childhood were arrested, convicted, and incarcerated significantly more often than controls (Mannuzza et al. 2008). Further, they reported evidence that criminal outcomes were at least in part mediated by the development of SUDs. Lastly, using official state arrest records, Barkley et al. (2004) found that clinic-referred children with ADHD had significantly more arrests and committed more felonies in early adulthood when compared to controls (Barkley et al. 2004). Interestingly, when separating criminal activities into predatory-overt and drug-related antisocial conduct, the ADHD group differed significantly from the control group only on drug-related activities, with the ADHD group having higher rates.

The aforementioned longitudinal studies have been extremely influential in shaping our current thinking with regard to ADHD and antisocial outcomes; however, several of these samples were initially recruited prior to 1980, before operationally defined criteria for the diagnosis of ADHD had been firmly established (Fischer et al. 1990; Hechtman et al. 1979; Mannuzza et al. 1998; Satterfield et al. 1982). Further, the majority of subjects in these studies were homogeneous in terms of ethnicity (mostly Caucasian) and socioeconomic profiles (mostly middle class) (Mannuzza et al. 1991; Satterfield et al. 1982; Barkley et al. 1990; Biederman et al. 2006), which limits generalizability. Considering the fact that poorer minorities represent the bulk of prison populations (Washburn et al. 2008), it follows that more diverse samples should be the target of research regarding antisocial behavior. Another key factor that has been overlooked in this line of research is the contribution of childhood maltreatment to poor outcome in ADHD youth, despite a wealth of literature outlining its risk in general population studies of antisocial outcomes. This is particularly striking given the facts that a) children with ADHD are at elevated risk of maltreatment (Briscoe-Smith and Hinshaw 2006; Cicchetti and Manly 2001; Ford et al. 2000) and b) population-based prospective studies carried out in the USA consistently report a robust link between a history of childhood maltreatment and later antisocial behavior (Widom 1989; Cicchetti and Manly 2001; Manly et al. 2001; Lansford et al. 2002; Smith and Thornberry 1995; Smith et al. 2005; Ireland et al. 2002).

The present study is unique in that it consists of a referred sample of children with ADHD who were recruited and assessed in childhood between the ages of 7 and 11 years. As the sample was recruited in the 1990s, standardized rating instruments, structured interviews, and DSM criteria were utilized. The children were re-assessed after approximately 10 years and compared with a well-matched, never-ADHD comparison group. Substance use and childhood maltreatment history were assessed for both probands and controls during the adolescent follow-up. Criminal data for the entire sample were obtained from the New York State Division of Criminal Justice Services approximately 3 years after the commencement of the adolescent follow-up. Finally, this sample, both probands and controls, is urban and ethnically and socioeconomically diverse, a group that has been underrepresented in the ADHD literature.

Here, we first characterize the antisocial outcomes among probands and controls. Regression analyses were then used to investigate the relative effect of childhood maltreatment on antisocial outcomes among four groups based on the presence or absence of ADHD and maltreatment. We hypothesized that (1) individuals diagnosed with ADHD in childhood would have elevated rates of criminality and substance use when compared to typically developing controls and (2) maltreatment history would differentially influence criminal and substance use outcome across the four groups.

Method

Participants

Ninety-eight adolescents/young adults who were evaluated in a research protocol during childhood (Halperin et al. 1997) participated in a follow-up evaluation approximately 10 years later. They were drawn from a group of 169 youth who were recruited between 1990 and 1997. Of these, 18 refused participation, one was deceased, five were incarcerated, and 47 were lost to follow-up. Those who were and were not followed did not differ significantly in age at initial evaluation, race/ethnicity, sex, childhood comorbidity, socioeconomic status (SES), or ADHD behavior ratings at baseline. All participants were 7–11 years old; mean (SD) age at initial evaluation was 8.9 (1.3) years. The original sample was comprised of 21.2 % Caucasian, 26.5 % African-American, 40.4 % Hispanic, and 11.9 % mixed ancestry. The group was primarily of lower to lower-middle SES [mean (SD) = 31.6 (14.51), range = 11–66] (Nakao and Treas 1994), with a large portion at the poverty level. All participants were English-speaking. Individuals were referred for behavioral difficulties by schools and mental health providers. The childhood sample was rated as having significant behavior

problems by both parents and teachers, and all participants were diagnosed with ADHD according to Diagnostic and Statistical Manual for Mental Disorders 3rd edition, revised (i.e., DSM-III-R) or 4th edition (i.e., DSM-IV) criteria (depending on the date recruited, as the diagnostic system changed in the middle of the study). Parent and teacher reports using the Child Behavior Checklist (Achenbach 1991) and IOWA Conners Rating Scale (Loney and Milich 1982), respectively, were also obtained. Childhood assessments determined using DSM-III-R were re-coded to be consistent with DSM-IV; it is likely that most, if not all, participants met criteria for ADHD combined type (ADHD-C). Children were assessed cognitively using the WISC-III (Wechsler 1974, 1991). Table 1 shows childhood characteristics of the ADHD sample. Diagnoses of schizophrenia, pervasive developmental disorder, or Tourette's disorder, or a full scale IQ below 70 were excluded. Eighty-two (48.5 %) subjects met criteria for ODD, 53 (31.4 %) met criteria for CD, 55 (32.5 %) met criteria for at least one anxiety disorder, and 22 (13.0 %) had a mood disorder.

In addition, 85 never-ADHD controls were recruited during the adolescence/young adulthood follow-up via advertisements in neighborhoods that matched the ADHD sample by zip code. Control participants were screened for lifetime presence of ADHD symptoms, treatment for ADHD symptoms, and previous difficulties related to ADHD symptoms. Those with evidence of prior or current ADHD symptoms were excluded from the study. Like the original ADHD sample, prospective controls were excluded if they had any chronic medical/neurological condition or psychosis or were non-English-speaking. Controls were not excluded for the presence of psychiatric disorders other than those that were also excluded for the ADHD children and therefore did not represent a group of 'super-normals.'

Among the 183 probands and controls who participated in the follow-up study, 161 (88.0 %) were male and all but three were between the ages of 16 and 21 years of age[1] [mean (SD): 18.4(1.7)]. The adolescent sample, like the childhood sample, was ethnically diverse—with 26.8 % African-American, 35.5 % Latino, 25.1 % Caucasian, and 12.6 % mixed ethnicity. Participants were generally of lower to lower-middle SES (mean = 36.5, SD = 17.8, range 11–85) (Nakao and Treas 1994) and almost exclusively urban. There were no significant differences between the ADHD and control groups in age (18.4 vs. 18.5 years), sex (88.8 vs. 87.1 % male), SES (43.6 vs. 40.9), or FSIQ (93.0 vs. 96.8) (all p values >.05).

This study was approved by the Institutional Review Boards of the Mount Sinai School of Medicine and Queens College, City University of New York. Participants over the age of 18 signed their own statement of informed consent for participation in the study. When participants were under the age of 18, parents signed written statements of informed consent for their own and their child's participation, and assent was obtained from all participants younger than 18. Participants were compensated for their time and travel expenses.

Table 1 Baseline Characteristics of the Childhood ADHD Sample

Variable	$n = 98$	
	Mean	SD
Age at initial assessment (in years)	9.1	1.3
FSIQ	94.0	14.3
SES	29.6	13.3
Parent ratings—CBCL T-scores		
Externalizing	69.7	11.2
Internalizing	65.1	12.0
Teacher ratings—IOWA Conners scores		
Inattention/overactivity	11.2	3.2
Oppositional/defiant	8.0	4.7
	%	#
ODD	48.0	47
CD	32.7	32
Anxiety disorder	31.6	31
Mood disorder	10.2	10

n's may differ due to missing variables

Measures

Assessment of childhood maltreatment

Childhood maltreatment was assessed during the follow-up evaluation using the short form of the Childhood Trauma Questionnaire (CTQ-SF (Bernstein et al. 1994, 2003), a 28-item self-report measure that screens adults and adolescents for histories of childhood abuse and neglect. The CTQ-SF is a brief, reliable, and valid means of retrospectively assessing childhood maltreatment, with test–retest reliability coefficients ranging from .79 to .86 and internal consistency coefficients ranging from .66 to .92 across samples (Bernstein et al. 1997, 2003). Subjects rated statements about childhood trauma on a 5-point Likert scale as 'never true,' 'rarely true,' 'sometimes true,' 'often true,' and 'very often true.' Minimization and denial of abuse and neglect are rated on a three-item scale that is incorporated into the questionnaire to detect false-negative trauma reports. The CTQ-SF assesses five types of

[1] Three subjects fell outside this range: 15 years 9 months, 25 years 5 months, and 22 years 1 month.

maltreatment: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. The CTQ-SF provides cutoff scores from none to low, low to moderate, moderate to severe, and severe to extreme exposure for each of the five types of maltreatment. For the purposes of this study, a dichotomous variable of maltreated/not-maltreated was created where individuals were categorized as maltreated if they met criteria for one or more subtypes of maltreatment using the cutoff scores provided in the CTQ manual.

Assessment of socioeconomic status

Socioeconomic status was assessed using a measure of socioeconomic prestige developed at the National Opinion Research Center (Nakao and Treas 1994). This measure approaches the issue of measuring SES by ranking the relative prestige of an individual's occupation on a scale from 1 to 100. Information used to determine the socioeconomic prestige score was obtained from the parents during both the baseline and follow-up assessments as most participants were still living with their parents.

Assessment of adolescent substance use

Adolescent substance use was assessed using several measures. The Rutgers Alcohol and Drug Use Questionnaire (Labouvie et al. 1997) was used to systematically evaluate the subject's overall drug and alcohol use. The RADQ assesses current and past use of cigarettes, alcohol, marijuana, cocaine, and other prescription and non-prescription drugs. Respondents report the frequency and amount of drug and alcohol use in the past 3 years. Secondly, the substance abuse supplemental module of the Kiddie-SADS-Present Lifetime version (K-SADS-PL; (Kaufman et al. 1996) was used to ascertain current and lifetime psychiatric disorders based on DSM-IV criteria, including SUDs. Interviews were conducted by trained graduate students and postdoctoral fellows, separately with adolescents and their parents as informants. Responses were combined across informants; if either informant indicated that the item caused significant distress or impairment, the symptom was judged to be present. Finally, a urine toxicology screen was collected from each subject on the day of evaluation, analyzed for the presence of marijuana, cocaine, amphetamines, and opiates, and used to corroborate subject report, although this could not be used to determine the proband's diagnostic status. In addition, to facilitate honest responding and to maintain strict measures of confidentiality, we obtained a certificate of confidentiality from the National Institute of Health. Information gathered from all sources was used to inform the clinician determination of the individual subject's drug and alcohol habits and guided the clinician in probing for the specific criteria needed to make a diagnosis of drug or alcohol abuse and/or dependence in accordance with the criteria set forth in the DSM-IV. Measures of abuse and dependence were collapsed to create a dichotomous variable of substance abuse/dependence versus no substance abuse/dependence.

Criminality

Detailed juvenile and adult criminal records for the entire sample were obtained from the New York State Division of Criminal Justice Services, Albany, which houses the official data for all offenses committed in New York State. A detailed description of our prospective follow-up study (including methods, sample characteristics, goals, and significance) was submitted to the Division of Criminal Justice Services for review. On approval, a non-disclosure agreement was signed by the principal investigator (J.M.H), stipulating that arrest history data would not be disclosed in a manner that could identify any individual, would be used only for research purposes, and would be treated as strictly confidential. This large criminal records data set includes numerous variables such as age of first arrest, number of arrests, type of offense (drug related or not), conviction records, as well as details of recidivism.

Statistical procedures

Chi-square analyses were used to determine group (ADHD/control) differences in rates of childhood maltreatment, SUDs, arrest, conviction, incarceration, and drug-related crime (dichotomous measures). Student's *t* tests were used to determine group differences in age at criminal database (CDB) collection, childhood maltreatment severity, age of first arrest, and rates of recidivism (continuous variables). To further characterize the sample, subjects were assigned to four groups based on the presence or absence of ADHD and maltreatment: (1) without ADHD, without maltreatment ($n = 31$); (2) without ADHD, with maltreatment ($n = 51$); (3) ADHD without maltreatment ($n = 23$); and (4) ADHD with maltreatment ($n = 61$). Arrest and SUD outcomes were compared between these four groups using logistic regression analyses with the no-ADHD/no-maltreatment group serving as a reference group. Age and SES were entered into the first step of the analysis as control variables.

Additionally, we used logistic regression analyses to explore whether SUD status was associated with arrest or, more specifically, drug-related arrest. Age and SES were entered as control variables on the first step, SUD diagnosis and group status were entered as predictor variables on the second step, and an SUD-by-group interaction term was entered on the third step.

Results

At the time of the criminal database collection, 41 probands (41.8 %) and 30 controls (35.3 %) had been arrested. Rates of arrest, conviction, incarceration, and recidivism did not differ significantly between probands and controls (all p values >.05), although probands were significantly younger than controls at the time of their first arrest [16.9 (1.7) vs. 18.2 (2.3); t (63) = − 2.6, p = .011]. Group differences for select variables are listed in Table 2. When divided into four groups based on group status and maltreatment history, probands with maltreatment were significantly more likely to have been arrested when compared to controls without maltreatment (OR, 3.12; 95 % CI 1.02–9.57; p = .05). Controls with a history of maltreatment did not have significantly higher rates of arrest when compared to the reference group.

In terms of SUD outcome, probands had significantly higher rates of SUD diagnoses at the adolescent follow-up (47.4 vs. 29.4 %; χ^2 = 6.2, p = .01). Probands and controls with maltreatment were more likely to be diagnosed with an SUD when compared to controls without maltreatment (OR 10.27; 95 % CI 3.05–34.61; p < .001, OR 4.07; 95 % CI 1.18–14.07; p = .03). Individuals with an ADHD diagnosis and a history of maltreatment were two and a half times more likely to have an SUD diagnosis when compared to controls with a history of maltreatment (see Fig. 1). Surprisingly, although the two groups differed significantly in rates of SUDs, with probands almost twice as likely to obtain an SUD diagnosis when compared to controls, rates of drug-related arrests did not differ between the two groups. Lastly, SUD diagnosis, group status, and group-by-SUD-diagnosis did not significantly predict arrests or drug-related arrests.

Table 2 Group differences on select variables

Variable	Probands n = 98 Mean (SD)/ % (n)	Controls n = 85 Mean (SD)/ % (n)	χ^2/t	p
Arrested[b]**	41.8 % (41)	35.3 % (30)	.82	.37
Convicted[b]**	24.4 % (24)	20 % (17)	.98	.32
Incarcerated[b]**	13.3 % (13)	8.2 % (7)	1.45	.23
Age of first arrest[b]*	**16.9 (1.7)**	**18.2 (2.3)**	**−2.62**	**.01**
Rates of recidivism[b]*	1.7 (3.3)	1.2 (2.5)	1.00	.32
Drug-related arrest[b]**	19.4 % (19)	22.4 % (19)	.55	.46
SUD[a†]**	**47.4 % (46)**	**29.4 % (25)**	**6.18**	**.01**
SES[a]*	43.2 (17.5)	40.7 (16.8)	.97	.33
Childhood maltreatment[a−††]**	72.6 % (61)	62.2 % (51)	2.05	.15

Significant variables are boldfaced

* Mean (SD)

** % (n)

† SUD diagnosis was not obtained for one proband

†† Childhood maltreatment data were not completed for three controls and 14 probands

[a] Assessed at follow-up

[b] Assessed at the time of criminal data collection

Discussion

This prospective study reported on criminal and substance use outcomes in an ethnically diverse, lower-SES sample of urban youth with and without ADHD and investigated the influence of maltreatment on outcome. Consistent with the extant child abuse literature, our results show that children with a history of maltreatment have elevated rates of later criminality (Widom 1989; Ireland et al. 2002; Smith et al. 2005) and SUDs (Liebschutz et al. 2002; Moran et al. 2004; Ondersma 2007; Wall and Kohl 2007). In contrast to most of the major prospective studies of children with ADHD (Mannuzza et al. 1989; Barkley et al. 1990; Fischer et al. 2002; Weiss et al. 1985), we did not identify significant discrepancies between probands and controls in rates of arrest, drug-related arrest, conviction, incarceration, or recidivism. Arrest rates were quite high for controls in this sample (35.3 %) when compared to controls in other studies, most probably a reflection of the sociodemographic composition of the sample. This suggests that a diagnosis of ADHD may have less of an impact when studying criminal outcomes among lower-SES, minority urban youth. The same cannot be said for substance use outcomes. Despite possible 'mitigating'

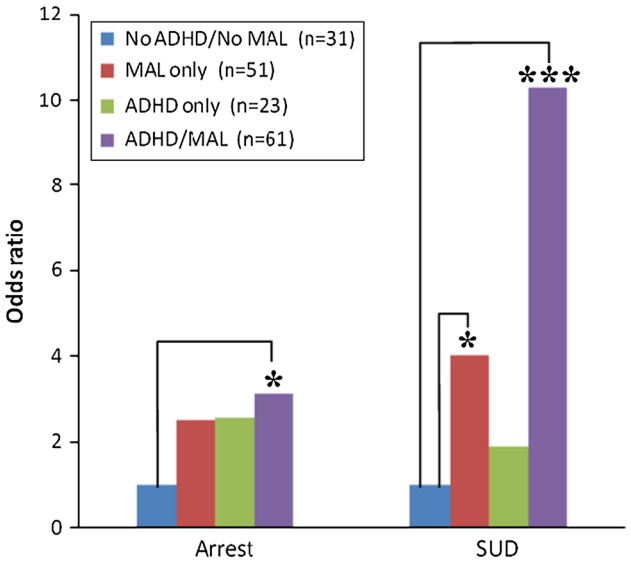

Fig. 1 Risk of arrest and substance use disorder diagnosis by maltreatment history and ADHD status. *p < .05; ***p < .001

sociodemographic variables, we identified significant discrepancies between ADHD and control groups in rates of SUDs, in accordance with extant studies of ADHD youth.

Similar to Mannuzza et al. (1989), we found that subjects with an arrest record did have significantly higher rates of SUDs compared with subjects without an arrest record. (66.2 vs. 21.4 %; $\chi^2 = 36.2$, $p = < .001$). This suggests that criminality may be at least in part mediated by substance use, although our data do not provide sufficient information to discern the temporal sequence of events (e.g., substance use preceded or following arrest). In contrast to the findings of Barkley et al. (2004), SUD diagnosis was not a significant predictor of drug-related crime in our sample.

When compared to a no-ADHD/no-maltreatment reference group, both ADHD youth and controls with maltreatment had significantly higher rates of SUD. When compared to the control group with a history of maltreatment, ADHD youth with maltreatment were two and a half times more likely to carry an SUD diagnosis. This result highlights the need to consider childhood maltreatment when assessing and treating ADHD youth, particularly with regard to substance use risk.

There are several limitations to be considered when interpreting these findings. First, there is a relatively high attrition rate from the original sample. The difficulty to find many individuals from this highly mobile, largely lower-SES group is not surprising—especially given the passage of nearly 10 years. While available data suggest that the follow-up subsample is largely representative of the original group, it is possible that those lost to follow-up had different and perhaps worse outcomes. Secondly, identification of childhood maltreatment was based solely on retrospective reports from each participant. Although considerable data support the reliability and validity of the CTQ (Bernstein et al. 1997, 2003; Fink et al. 1995; Scher et al. 2001), self-report measures are susceptible to a variety of biases including social desirability, mood at the time of report, and memory limitations. Nevertheless, had maltreatment been assessed during childhood, there would be increased likelihood for false negatives due to parental underreporting as well as the possibility of the childhood maltreatment occurring subsequent to our childhood evaluation. Furthermore, as is true of other longitudinal research in the area of ADHD, this sample is largely male, and it is therefore difficult to generalize the findings to females. While the use of official state criminal records captures more data on criminal activity, this method overlooks those individual cases that were redirected outside the state and courts or when charges were dropped due to errors. Finally, the present study did not control for possible contributory effects of comorbid childhood psychopathologies (e.g., CD) or familial factors (e.g., parental psychopathology). The contributions of childhood psychiatric comorbidities, mainly CD, have been established as a potent risk factor for both criminal and SUD outcomes in several studies of ADHD youth (Armstrong and Costello 2002; Brook et al. 1995; Disney et al. 1999; Barkley et al. 2004) and should be included in future investigations into the salience of maltreatment as an independent risk factor for poor outcome in ADHD youth.

In conclusion, we found that a well-replicated finding—namely an increase in criminal outcome for ADHD youth—is not necessarily applicable to samples of lower-SES, ethnically diverse urban youth. Results of existing longitudinal studies in Caucasian children with ADHD may have limited the ability to fully understand the key issues regarding antisocial outcomes in non-Caucasian, urban children of lower SES. Considering the fact that minorities are much more likely to be arrested and convicted and subsequently represent the bulk of prison populations (Washburn et al. 2008), more diverse samples should be the target of future ADHD research in order to develop a clearer understanding of the mechanisms that underlie antisocial behavior in this group. Additionally, maltreatment history emerged as a potent predictor of SUD and criminal activity among both ADHD youth and non-ADHD peers, highlighting the need for maltreatment screening to identify at-risk youth. These results suggest that ADHD, in the absence of maltreatment, may not confer added risk, at least in an ethnically diverse, lower-SES sample.

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References

Achenbach TM (1991) Manual for the child behavior checklist/4–18 and 1991 profiles. University of Vermont, Department of Psychiatry, Burlington

Armstrong TD, Costello EJ (2002) Community studies on adolescent substance use, abuse, or dependence and psychiatric comorbidity. J Consult Clin Psychol 70(6):1224–1239

Barkley RA, Fischer M, Edelbrock CS, Smallish L (1990) The adolescent outcome of hyperactive-children diagnosed by research criteria.1. An 8-year prospective follow-up-study. J Am Acad Child Adolesc Psychiatry 29:546–557

Barkley RA, Fischer M, Smallish L, Fletcher K (2004) Young adult follow-up of hyperactive children: antisocial activities and drug use. J Child Psychol Psychiatry 45:195–211

Bernstein DP, Fink L, Handelsman L, Foote J, Lovejoy M, Wenzel K et al (1994) Initial reliability and validity of a new retrospective measure of child-abuse and neglect. Am J Psychiatry 151:1132–1136

Bernstein DP, Ahluvalia T, Pogge D, Handelsman L (1997) Validity of the CHILDHOOD Trauma Questionnaire in an adolescent psychiatric population. J Am Acad Child Adolesc Psychiatry 36:340–348

Bernstein DP, Stein JA, Newcomb MD, Walker E, Pogge D, Ahluvalia T et al (2003) Development and validation of a brief

screening version of the Childhood Trauma Questionnaire. Child Abuse Negl 27:169–190

Biederman J, Monuteaux MC, Mick E, Spencer T, Wilens TE, Silva JM et al (2006) Young adult outcome of attention deficit hyperactivity disorder: a controlled 10-year follow-up study. Psychol Med 36:167–179

Biederman J, Petty CR, Dolan C, Hughes S, Mick E, Monuteaux MC et al (2008) The long-term longitudinal course of oppositional defiant disorder and conduct disorder in ADHD boys: findings from a controlled 10-year prospective longitudinal follow-up study. Psychol Med 38:1027–1036

Briscoe-Smith AM, Hinshaw SP (2006) Linkages between child abuse and attention-deficit/hyperactivity disorder in girls: behavioral and social correlates. Child Abuse Negl 30:1239–1255

Brook JS, Whiteman M, Cohen P, Shapiro J, Balka E (1995) Longitudinally predicting late adolescent and young-adult drug-use—childhood and adolescent precursors. J Am Acad Child Adolesc Psychiatry 34(9):1230–1238

Cicchetti D, Manly JT (2001) Operationalizing child maltreatment: developmental processes and outcomes. Dev Psychopathol 13:755–757

Disney ER, Elkins IJ, Mcgue M, Iacono WJ (1999) Effects of ADHD, conduct disorder, and gender on substance use and abuse in adolescence. Am J Psychiatry 156(10):1515–1521

Fink LA, Bernstein D, Handelsman L, Foote J, Lovejoy M (1995) Initial reliability and validity of the childhood trauma interview—a new multidimensional measure of childhood interpersonal trauma. Am J Psychiatry 152:1329–1335

Fischer M, Barkley RA, Edelbrock CS, Smallish L (1990) The adolescent outcome of hyperactive-children diagnosed by research criteria. 2. Academic, attentional, and neuropsychological status. J Consult Clin Psychol 58:580–588

Fischer M, Barkley RA, Smallish L, Fletcher K (2002) Young adult follow-up of hyperactive children: self-reported psychiatric disorders, comorbidity, and the role of childhood conduct problems and teen CD. J Abnorm Child Psychol 30:463–475

Ford JD, Racusin R, Ellis CG, Daviss WB, Reiser J, Fleischer A et al (2000) Child maltreatment, other trauma exposure, and post-traumatic symptomatology among children with oppositional defiant and attention deficit hyperactivity disorders. Child Maltreat 5:205–217

Gudjonsson GH, Sigurdsson JF, Sigfusdottir ID, Young S (2012) An epidemiological study of ADHD symptoms among young persons and the relationship with cigarette smoking, alcohol consumption and illicit drug use. J Child Psychol Psychiatry 53(3):304–312

Halperin JM, Newcorn JH, Schwartz ST, Sharma V, Siever LJ, Koda VH et al (1997) Age-related changes in the association between serotonergic function and aggression in boys with ADHD. Biol Psychiatry 41:682–689

Hechtman L, Weiss G (1986) Controlled prospective 15-year follow-up of hyperactives as adults—Nonmedical drug and alcohol-use and antisocial-behavior. Can J Psychiatry 31:557–567

Hechtman L, Weiss G, Perlman T, Hopkins J, Wener A (1979) Hyperactive-children in young adulthood—Controlled, prospective, 10-year follow-up. Int J Ment Health 8:52–66

Hechtman L, Weiss G, Perlman T (1984) Hyperactives as young-adults—past and current substance abuse and antisocial-behavior. Am J Orthopsychiatry 54(3):415–425

Ireland TO, Smith CA, Thornberry TP (2002) Developmental issues in the impact of child maltreatment on later delinquency and drug use. Criminology 40:359–399

Kaufman J, Ryan N, Rao U, Brent D, Brimaher B (1996) Kiddie-SADS—Present and lifetime version. University of Pittsburgh School of Medicine, Pittsburgh

King SM, Iacono WG, Mcgue M (2004) Childhood externalizing and internalizing psychopathology in the prediction of early substance use. Addiction 99:1548–1559

Labouvie E, Bates ME, Pandina RJ (1997) Age of first use: its reliability and predictive utility. J Stud Alcohol 58:638–643

Lansford JE, Dodge KA, Pettit GS, Bates JE, Crozier J, Kaplow J (2002) A 12-year prospective study of the long-term effects of early child physical maltreatment on psychological, behavioral, and academic problems in adolescence. Arch Pediatr Adolesc Med 156:824–830

Liebschutz J, Savetsky JB, Saitz R, Horton NJ, Lloyd-Travaglini C, Samet JH (2002) The relationship between sexual and physical abuse and substance abuse consequences. J Subst Abuse Treat 22:121–128

Loney J, Milich R (1982) Hyperactivity, inattention, and aggression in clinical practice. Adv Dev Behav Pediatr 3:113–147

Manly JT, Kim JE, Rogosch FA, Cicchetti D (2001) Dimensions of child maltreatment and children's adjustment: contributions of developmental timing and subtype. Dev Psychopathol 13:759–782

Mannuzza S, Klein RG, Konig PH, Giampino TL (1989) Hyperactive boys almost grown up: 4. Criminality and its relationship to psychiatric status. Arch Gen Psychiatry 46:1073–1079

Mannuzza S, Klein RG, Bonagura N, Malloy P, Giampino TL, Addalli KA (1991) Hyperactive boys almost grown up: 5. Replication of psychiatric status. Arch Gen Psychiatry 48:77–83

Mannuzza S, Klein RG, Bessler A, Malloy P, LaPadula M (1993) Adult outcome of hyperactive boys—Educational-achievement, occupational rank, and psychiatric status. Arch Gen Psychiatry 50:565–576

Mannuzza S, Klein RG, Bessler A, Malloy P, LaPadula M (1998) Adult psychiatric status of hyperactive boys grown up. Am J Psychiatry 155:493–498

Mannuzza S, Klein RG, Moulton JL III (2008) Lifetime criminality among boys with attention deficit hyperactivity disorder: a prospective follow-up study into adulthood using official arrest records. Psychiatry Res 160:237–246

Moran PB, Vuchinich S, Hall NK (2004) Associations between types of maltreatment and substance use during adolescence. Child Abuse Negl 28:565–574

Nakao K, Treas J (1994) Updating occupational prestige and Socioeconomic Scores—How the new measures measure up. Sociol Methodol 24(24):1–72

Ondersma SJ (2007) Introduction to the first of two special sections on substance abuse and child maltreatment. Child Maltreat 12:3–6

Satterfield JH, Schell A (1997) A prospective study of hyperactive boys with conduct problems and normal boys: adolescent and adult criminality. J Am Acad Child Adolesc Psychiatry 36:1726–1735

Satterfield JH, Hoppe CM, Schell AM (1982) A prospective study of delinquency in 110 adolescent boys with attention deficit disorder and 88 normal adolescent boys. Am J Psychiatry 139:795–798

Scahill L, Schwab-Stone M (2000) Epidemiology of ADHD in school-age children. Child Adolesc Psychiatr Clin N Am 9:541–555

Scher CD, Stein MB, Asmundson GJG, McCreary DR, Forde DR (2001) The childhood trauma questionnaire in a community sample: psychometric properties and normative data. J Trauma Stress 14:843–857

Smith C, Thornberry TP (1995) The relationship between childhood maltreatment and adolescent involvement in delinquency. Criminology 33:451–481

Smith CA, Ireland TO, Thornberry TP (2005) Adolescent maltreatment and its impact on young adult antisocial behavior. Child Abuse Negl 29:1099–1119

Wall AE, Kohl PL (2007) Substance use in maltreated youth: findings from the National Survey of Child and adolescent well-being. Child Maltreat 12:20–30

Washburn JJ, Teplin LA, Voss LS, Simon CD, Abram KM, McClelland GM (2008) Psychiatric disorders among detained youths: a comparison of youths processed in juvenile court and adult criminal court. Psychiatr Serv 59:965–973

Wechsler D (1974) Wechsler intelligence scale for children-revised (WISC-R). Psychological Corporation, New York

Wechsler D (1991) Wechsler intelligence scale for children (WISC-III). Psychological Corporation, San Antonio

Weiss G, Hechtman L, Milroy T, Perlman T (1985) Psychiatric status of hyperactives as adults—A controlled prospective 15-year follow-up of 63 hyperactive-children. J Am Acad Child Adolesc Psychiatry 24:211–220

Widom CS (1989) Child abuse, neglect, and adult behavior: research design and findings on criminality, violence, and child abuse. Am J Orthopsychiatry 59:355–367

Wilens TE, Biederman J, Mick E (1998) Does ADHD affect the course of substance abuse? Findings from a sample of adults with and without ADHD. Am J Addict 7:156–163