Child Maltreatment, Other Trauma Exposure, and Posttraumatic Symptomatology Among Children With Oppositional Defiant and Attention Deficit Hyperactivity Disorders

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Consecutive child psychiatric outpatient admissions with disruptive behavior or adjustment disorders were assessed by validated instruments for trauma exposure and posttraumatic stress disorder (PTSD) symptoms and other psychopathology. Four reliably diagnosed groups were defined in a retrospective case-control design: Attention Deficit Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (ODD), comorbid ADHD-ODD, and adjustment disorder controls. ODD and (although to a lesser extent) ADHD were associated with a history of physical or sexual maltreatment. PTSD symptoms were most severe if (a) ADHD and maltreatment co-occurred or (b) ODD and accident/illness trauma co-occurred. The association between ODD and PTSD Criterion D (hyperarousal/hypervigilance) symptoms remained after controlling for overlapping symptoms, but the association of ADHD with PTSD symptoms was largely due to an overlapping symptom. These findings suggest that screening for maltreatment, other trauma, and PTSD symptoms may enhance prevention, treatment, and research concerning childhood disruptive behavior disorders.

Attention Deficit Hyperactivity Disorder (ADHD) and Oppositional-Defiant Disorder (ODD) are prevalent among school-age children and are often associated with severe emotional disturbance. Epidemiologic and clinical studies indicate that disruptive behavior disorders affect up to 10% of all children and as many as one in three referred for psychiatric treatment (Costello, Angold, Burns, Erklani, et al., 1996; Feehan, McGee, & Williams, 1993; Lahey, Appelgate, Barkley, et al., 1994; Lahey, Appelgate, McBurnett, et al., 1994; Verlhurst, van der Ende, Ferdinand, & Kasisus, 1997). Moreover, ADHD and ODD often involve substantial psychosocial impairment (Costello, Angold, Burns, Stangl, et al., 1996). Almost 75% of

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children with ADHD and 90% with ODD are severely emotionally disturbed in several areas of living (e.g., family or peer relationships, school, legal), rates comparable to or higher than those for other childhood psychiatric disorders (e.g., major depression; Costello, Angold, Burns, Stangl, et al., 1996).

One possibility, that children with disruptive behavior disorders are at risk for exposure to psychological trauma, recently was addressed in two studies. Wozniak et al. (1999) reported that ADHD was not a risk for trauma exposure and for Posttraumatic Stress Disorder (PTSD) in a cohort of child psychiatry outpatients (although mania was linked to trauma and PTSD). Similarly, Ford et al. (1999) concluded that child psychiatry outpatients diagnosed with ADHD were not at risk for trauma exposure, after controlling for a variety of alternative demographic, psychopathological, and relational explanations. However, children with an ODD diagnosis were at risk for trauma exposure, regardless of whether they were diagnosed with comorbid ADHD or not (Ford et al., 1999). Ford et al. also used a psychometrically developed trauma history measure to distinguish between traumatic victimization versus accident/illness-related trauma and found that ODD specifically was a risk for traumatic victimization but not for accident/illness trauma.

In this article, we present several new analyses of the data from the Ford et al. (1999) study to address several questions not dealt with in that study or the Wozniak et al. (1999) report. First, neither study examined whether the risk of child maltreatment per se (i.e., physical or sexual abuse) is associated with a disruptive behavior disorder. Wozniak et al. (1999) included maltreatment as a type of trauma but reported only whether the participants had suffered any form of trauma—and not maltreatment specifically. Ford et al. (1999) differentiated between victimization and accident/illness trauma but aggregated maltreatment within the victimization category (along with witnessing family violence and witnessing or being exposed to assault, kidnapping, or community violence). The psychometrically developed trauma history measure used by Ford et al. (1999) reliably and validly assesses both physical abuse and sexual abuse as distinct trauma types from the perspective of both the child and parent and thus affords an opportunity to examine these two types of maltreatment specifically in relation to disruptive behavior disorders.

Second, neither report examined relationships between the severity of PTSD symptoms and disruptive behavior disorder diagnoses. Ford et al. (1999) evaluated only trauma exposure, not PTSD symptoms. Although Wozniak et al. (1999) assessed PTSD, they used a dichotomous diagnostic criterion that may obscure relationships between PTSD symptoms and the disruptive behavior disorders that could be detected with a continuous measure of PTSD symptom severity (Weathers, Keane, King, & King, 1997).

Third, neither report examined the specificity (or lack thereof) between exposure to maltreatment and PTSD symptoms among children diagnosed with disruptive behavior disorders. PTSD and the disruptive behavior disorders have several potentially overlapping symptoms (see below), so it is important to know that what is attributed to posttraumatic etiology is indeed associated with trauma exposure. Wozniak et al. (1999) concluded that trauma exposure in general placed children diagnosed with ADHD at risk for a PTSD diagnosis, but they did not distinguish the effects of maltreatment from those of other types of childhood trauma, and they did not examine this relationship for children diagnosed with disruptive behavior disorders other than ADHD (e.g., ODD). Ford et al. (1999) did not examine PTSD symptoms, but the data set from that study affords an opportunity to test the relationship between maltreatment and PTSD symptoms in children diagnosed with either ADHD, ODD, or comorbid ADHD/ODD.

Sequelae of Traumatic Maltreatment: PTSD and Comorbid Disorders

Trauma is defined in the American Psychiatric Association's (1994) *Diagnostic and Statistical Manual for Mental Disorders* (DSM-IV) as exposure to "actual or threatened death or serious injury, or a threat to the physical integrity of self or others" (Criterion A1) with a response of "intense fear, helplessness, or horror . . . [or] disorganized or agitated behavior" (Criterion A2). Recent prevalence studies suggest that as many as one in two children in the community (Boney-McCoy & Finkelhor, 1995; Cuffe et al., 1998) and two in three children or adolescents in psychiatric clinical samples (Steiner, Garcia, & Matthews, 1997; Weine, Becker, Levy, Edell, & McGlashan, 1997) are exposed directly or as witnesses to trauma. Childhood traumas include physical maltreatment (Boney-McCoy & Finkelhor, 1995), sexual assault or molestation (Boney-McCoy & Finkelhor, 1995; Neumann, Houskamp, Pollock, & Briere, 1996), life-threatening accidents (Winje & Ulvik, 1998), the unexpected death of close friends or family members (Appelbaum & Burns, 1991), life-threatening illness (Stuber, Nader, Houskamp, & Pynoos, 1996), disaster (Green et al., 1994; LaGreca, Silverman, Vernberg, & Prinstein,

1996), domestic violence (Famularo, Fenton, Kinscherff, Ayoub, & Barnum 1994), and community violence (Cooley, Turner, & Beidel, 1995; Nader, Pynoos, Fairbanks, & Frederick, 1990).

By their own report, and as observed by adults such as their parents or teachers, children exposed to psychological trauma commonly experience posttraumatic stress symptoms (PTSD symptoms) such as intrusive memories or nightmares, avoidance of trauma-reminders, emotional blunting, behavioral regression or acting-out, anxious or ambivalent attachment, extreme fearfulness and hypervigilance, and somatic complaints related to autonomic hyperreactivity (Boney-McCoy & Finkelhor, 1995; Cuffe et al., 1998; Famularo et al., 1994; Steiner et al., 1997; Weine et al., 1997; Winje & Ulvik, 1998). Although fewer than half of all children exposed to single-incident traumas suffer posttraumatic symptomatology (PTSD symptoms) sufficient to warrant a clinical diagnosis of PTSD (Green et al., 1994; LaGreca et al., 1996; Nader et al., 1990), children subjected to maltreatment (Cuffe et al., 1998; Famularo et al., 1994; Neumann et al., 1996; Steiner et al., 1997), devastating emotional loss (Appelbaum & Burns, 1991; Green et al., 1994; Nader et al., 1990; Winje & Ulvik, 1998), or to the cumulative effect of multiple traumas (Cuffe et al., 1998; Neumann, et al., 1996; Steiner et al., 1997) are at high risk for PTSD. Although children's PTSD symptoms usually decline in severity and prevalence during the 2nd and subsequent years following exposure to trauma (Green et al., 1994; LaGreca et al., 1996; McFarlane, 1987; Winje & Ulvik, 1998), severe emotional and behavioral sequelae (e.g., social isolation, school problems, substance abuse) may persist or develop for some child trauma survivors more than a decade later in adolescence or young adulthood (Green et al., 1994; Lipschitz, Winegar, Hartnick, Foote, & Southwick, 1999)—particularly for adult survivors of traumatic sexual or physical abuse (Briere, 1992; Cole & Putnam, 1992, Neumann et al., 1996; Winje & Ulvik, 1998; Zuravin & Fontanella, 1999). In addition to PTSD, maltreated children often are found to suffer internalizing disorders (Cuffe et al., 1998; Famularo et al., 1994; Green et al., 1994; Hubbard, Realmuto, Northwood, & Masten, 1995), for example, specific or social phobias (Burnam et al., 1988; David, Giron & Mellman, 1995; Mancini, Van Ameringen, & MacMillan, 1995) or depression (Burnam et al., 1988; Giaconia et al., 1995; Pribor & Dinwiddie, 1992). Although there is evidence that maltreated children are at risk for alcohol and substance use disorders (Burnam et al., 1988; Clark, Lesnick, & Hegedus, 1997; Giaconia et al., 1995) and conduct disorder (Steiner et al., 1997) in late childhood and adolescence, the link between trauma, PTSD, and externalizing disorders earlier in childhood has been less well documented and remains more controversial.

Bases for Hypothesizing a Link Between Maltreatment, PTSD, and the Disruptive Behavior Disorders

Several possible bidirectional or interactive relationships could link maltreatment or other forms of trauma and PTSD with the disruptive behavior disorders. First, children with preexisting ADHD or ODD may be at risk for trauma exposure and PTSD symptoms. ADHD and ODD involve interpersonal and self-regulatory problems that could place a child in harm's way, especially for maltreatment (Angold & Costello, 1996; Cuffe, McCullough, & Pumariega, 1994). For example, ADHD's distractability and hyperactivity and ODD's aggressive, defiant, and provocative behavior may precipitate abuse by causing severe conflict (Patterson & Forgatch, 1995) or attachment problems (Alexander, 1992). ADHD's incautious, impulsive, and hyperactive behavior style (Barkley, Grodzinsky, & DuPaul, 1992) also may increase a child's risk of accidental trauma.

Second, maltreatment and subsequent PTSD symptoms may contribute to or exacerbate ADHD or ODD. Maltreatment or accidental trauma places children (Flisher et al., 1997; Green et al., 1994) and adults (Neumann et al., 1996) at risk for symptomatic problems paralleling those in ADHD, for example inhibitory deficits (Comings, 1997), and ODD, for example anger and relational self-regulation deficits (Jennings, van der Molen, Pelham, Debski, & Hoza, 1997). The etiologies of ADHD and ODD involve multiple biogenetic and psychosocial factors (Barkley et al., 1992; Comings, 1997; Jennings et al., 1997) to which trauma and PTSD symptoms may contribute. Even if not etiologically implicated, trauma and PTSD could exacerbate ADHD's attention, impulse regulation, and physiological hyperreactivity symptoms or ODD's problems with aggression and oppositionality. Posttraumatic intrusive reexperiencing and hyperarousal symptoms may worsen ADHD's deficits in impulse control, attentional focusing, or stress management, or ODD's oppositionality and defiance. Hyperarousal and hypervigilance could exacerbate ADHD's hyperactivity or ODD's problems with temper and externalizing of blame. The posttraumatic cluster of symptoms related to avoidance, emotional numbing, and detachment from social rela-

tionships may contribute to ADHD's motivational or social problem-solving deficits or to ODD's isolativeness, defiance, and spitefulness.

Additionally, PTSD may co-occur with ADHD or ODD. Studies have shown high rates of ADHD (Famularo, Fenton, Kinscherff, & Augustyn, 1996; Merry & Andrews, 1994) and ODD (Flisher et al., 1997; Merry & Andrews, 1994) among abused children. PTSD has been found to be comorbid with ADHD in children (Cuffe, McCullough, & Pumariega, 1994; Famularo et al., 1996), and elevated PTSD symptoms are associated with adolescent conduct disorder (Steiner et al., 1997). PTSD and ODD or ADHD also may co-occur due to shared risk factors for etiology or syndromal maintenance. PTSD's etiology involves a genetic predisposition toward psychophysiologic reactivity (True et al., 1993) that may parallel ADHD's temperament component (Comings, 1997). Several ODD etiologic factors, for example, poverty, family conflict, and parental psychopathology (Biederman, Newcorn, & Sprich, 1991; Frick, Lahey, Loeber, Stouthamer-Loeber, 1992; Webster-Stratton, 1996), also are risk factors for PTSD (Flisher et al., 1997; Green et al., 1994; Steiner et al., 1997).

PTSD involves symptoms and psychopathological processes that may not simply be comorbid with ADHD or ODD but actually may be inappropriately attributed to PTSD when actually due to a disruptive behavior disorder independent of any maltreatment or other trauma exposure. Symptoms designated as the result of PTSD's intrusive reexperiencing or hyperarousal/hypervigilance could be the result of ADHD's hyperactivity or disinhibition/impulsivity or ODD's angry defiance (Glod & Teicher, 1996). What appear to be PTSD symptoms of avoidance and emotional numbing could be the product of ADHD's inattention, distractability, and avoidance of activities requiring planful organization and sustained organization or of ODD's negativity and noncompliance. These overlapping symptoms reflect parallel psychobiological and social learning (i.e., operant and respondent conditioning-based) impairments in PTSD and the disruptive behavior disorders of (a) information processing (Barkley et al., 1992; DeBellis et al., 1999), (b) emotion regulation (DeBellis, Lefter, Trickett, & Putnam, 1994; Jennings et al., 1997), and (c) behavioral self-regulation (Fletcher, Fischer, Barkley, & Smallish, 1996; Ornitz & Pynoos, 1989; Patterson & Forgatch, 1995; Winje & Ulvik, 1998).

In the present study, we employed a retrospective case-control design to investigate the likelihood of a history of maltreatment or accidental/illness trauma and the severity and type of PTSD symptoms in child psychiatry outpatients diagnosed with ODD, ADHD, both, or adjustment disorder. The analyses test three hypotheses derived from the above literature review concerning the association of ADHD and/or ODD with trauma history and PTSD symptoms, none of which previously has been examined.

1. Given the possible bidirectional association between maltreatment and the disruptive behavior disorders, we hypothesized that children diagnosed with ADHD or ODD would have a higher likelihood of lifetime exposure to physical and sexual maltreatment than psychiatric controls.
2. Given the parallel psychopathological and symptomatic features of PTSD and the disruptive behavior disorders, we hypothesized that a diagnosis of ADHD or ODD would be associated with elevated levels of PTSD symptoms, compared with a control diagnosis of adjustment disorder.
3. To test the specificity of PTSD symptoms to traumatic maltreatment within the groups of children diagnosed with ODD or ADHD, we hypothesized that after controlling for sociodemographic factors and the severity of overall child psychopathology, a history of child maltreatment would be associated with elevated levels of PTSD symptoms.

To reduce the likelihood that any effects on maltreatment or PTSD symptoms attributed to ODD or ADHD are actually due to other variables, we controlled for several sociodemographic factors (i.e., age, gender, and parent education as a proxy for socioeconomic status). Socioeconomic deprivation's role is well established as a risk factor for ODD and PTSD (cited above), and children's age and gender are associated with ADHD (DeKlyen, 1996; Fletcher et al., 1996), ODD (Biederman et al., 1991; Frick et al., 1992; Webster-Stratton, 1996), child abuse and violence trauma (Boney-McCoy & Finkelhor, 1995), and children's risk of PTSD (Green et al., 1994).

We also controlled in two ways for global childhood psychopathology (i.e., behavior problems and social impairment) to ensure that our findings were specific to ADHD or ODD. Child (Flisher et al., 1997; Green et al., 1994) and adult (Green et al., 1994; Neumann et al., 1996) survivors of childhood trauma are at risk for generalized psychopathology. Therefore, we first excluded child patients from the ADHD, ODD, and ADHD/ODD groups if they had other comorbid diagnoses. Secondly, we controlled for global severity of child behavior problems and social impairment by using, respectively, the Child Behavior Checklist Behavior Problems and Social Competence scores.

METHOD

Participants and Procedure

Consecutive admissions to the Dartmouth Hitchcock Medical Center outpatient child psychiatry clinic between September 1995 and July 1997 (aged 6 to 17 years) were screened for enrollment in the study if they had a clinical diagnosis of ADHD, ODD, or adjustment disorder. The following exclusion criteria were established to ensure that all participants and their parents could provide accurate data concerning trauma and PTSD symptoms: current psychotic disorder, bipolar disorder, severe obsessive-compulsive disorder, pervasive developmental disorder, mental retardation, or problems by parent or child with the English language. A small number (fewer than 10) of patients initially referred to child psychiatry but found to have a primary neurological or chronic medical condition were not included because they were referred out before a complete psychiatric work-up was done. Participants (N = 165; M age = 12, SD = 3.4; 57% female, 43% male) were primarily Caucasian (8% African American, Hispanic, or Asian-Pacific Island ethnicity) from primarily rural and secondarily urban New England communities, with mixed parent education levels (31% less than high school graduate, 28% high school graduates, 21% some college, 20% college graduates). Based on a protocol approved by the Dartmouth College Committee on Protection of Human Subjects, results of all questionnaires and structured interviews routinely completed by child psychiatry outpatients, their parents, and clinicians for purposes of clinical evaluation were copied and placed in a research file and in a statistical package for the social sciences (SPSS) database with all identifying information expunged.

Demographic Variables

A parent or primary caregiver completed a background questionnaire describing the child's age, gender, and ethnicity, and the highest grade level attained by the parent/caregiver. Age was dichotomized into two distinct developmental periods (Staub, 1979), 6.0 to 8.9 and 9.0 to 17.0 years old, to accommodate the possibility of a nonlinear effect for this variable. Race may be a significant factor in vulnerability to and chronicity of childhood PTSD (Famularo & Fenton, 1996) and may influence the etiology or presentation of childhood disruptive behavior disorders (Reid et al., 1998); however, due to the very small representation of non-Caucasian ethnicities in this sample (i.e., $N < 5$ for each of the African American, Hispanic, and Asian-Pacific Islands subgroups), we did not include race as a covariate. We also conducted all analyses including only Caucasian participants and found no change in the pattern or significance of the results.

Diagnostic Classification

Diagnoses were obtained and confirmed using a protocol adapted from the multiple-gating procedures of Multimodal Treatment Study of Children with ADHD (MTA) (Hinshaw et al., 1997). While conducting a clinical diagnostic evaluation, clinicians completed a diagnostic checklist (Hudziak, personal communication, 1996) reviewing all *DSM-IV* criteria for ADHD (inattentive, hyperactive-impulsive, or combined types), ODD, and PTSD. We also added *DSM-IV* adjustment disorder criteria. Diagnoses for a random sample of 33 study cases (20%) were reliably rated by independent clinicians (interrater kappa = .80, .60, .81, .77, for ADHD, ODD, PTSD, and adjustment disorder, respectively) (Daviss et al., 2000). To ensure inclusive and accurate ADHD and ODD diagnoses, parent-reported symptoms on the SNAP-IV were included in diagnostic determinations (Hinshaw et al., 1997, Footnote 4).

Child Behavior Problem Severity and Psychosocial Impairment

Participating parents completed the Child Behavior Checklist (CBCL), yielding scores for total behavior problems and for social competence (Achenbach, 1996). The CBCL addresses a range of behaviors of clinical concern, yielding reliable and validated scores for (a) overall severity of externalizing and internalizing behavior problems and (b) child social competence.

Posttraumatic Stress Symptomatology

PTSD symptoms were assessed by parent report on the PTSD Checklist for Children-Parent Report (PCL/C-PR) (Ford & Rogers, 1997). Parents rated the extent to which, in the past month, their child has shown each of the 17 *DSM-IV* PTSD symptoms on a numerical scale ranging from 1 (*not at all*) to 5 (*extremely*). The PCL/C-PR was internally consistent for a total score (alpha = .89) and for each of three subscales assessing intrusive reexperiencing (alpha = .84), avoidance and emotional numbing (alpha = .77), and hyperarousal and hypervigilance (alpha = .80). The PCL/C-PR showed good retest reliability over a 2 to 4 month period in a sample of children exposed to traumatic injury (r = .82, $p < .01$) and 1-week retest reliability (r = 0.92, $p < 0.0001$) in a sample of 21 psychiatric patients at intake evaluations

(Daviss et al., 2000). Criterion validity was suggested by the PCL / C-PR's correlation with a structured interview for child PTSD (the Clinical Administered PTSD Scale for Children and Adolescents [CAPS-CA]) for total score (r = 0.47, p < .001), Reexperiencing (r = 0.53, p < .001), and Hyperarousal (r = 0.51, p < 0.001) and marginally for Avoidance / Numbing (r = 0.20, p = 0.17) (Daviss et al., 2000). Evidence for convergent and discriminant validity of the PCL / C-PR total and subscale scores was found through positive correlations with conceptually related subscales of the Revised Children's Manifest Anxiety Scale and zero-order correlations with unrelated subscales (Ford & Rogers, 1999).

History of Trauma Exposure

Psychological trauma exposure was assessed by a structured clinical interview with the child, the Traumatic Events Screening Inventory (TESI-C), and as reported by the parent on a parallel questionnaire (TESI-P). Both forms require approximately 20 minutes to complete and ask if the child has experienced each of 15 potentially traumatic events. Questions range from queries for accidental trauma such as "Has your child [or "Have you," for the TESI-C] ever been in a serious accident like a car accident, a fall or a fire?" to queries for sexual trauma such as "Has someone at least 5 years older than your child ever engaged your child in any sort of sexual way? Or made your child see or do something sexual?" (TESI-P) and "Has someone ever touched your body (private parts) in a way you didn't want them to or in a way that made you uncomfortable?" (TESI-C). Item wording was carefully designed and pilot tested to ensure comprehensibility and acceptability for adults (TESI-P) and children (TESI-C).

When an event has occurred, both the TESI-C and TESI-P probe carefully to distinguish trauma (using *DSM-IV* criteria) from other negative life events. Trauma data were converted from 15 separate items to three conceptually distinct composite indices: (a) accident, disaster, or illness trauma; (b) physical maltreatment (i.e., exposure to physical violence such as assault, kidnapping, or family violence), and (c) sexual maltreatment. Interrater reliability kappas for the TESI-C summary scores were calculated and found to range from .73 to 1.00 (Ford & Rogers, 1997). Retest reliability was calculated for a sample of pediatric injury patients, with kappas ranging from .50 to .70 for TESI-P and TESI-C summary scores over a 2- to 4-month period. Parent-Child agreement on trauma exposure items were positively correlated (i.e., kappa = .64 to .79) (Ford & Rogers, 1997) but not identical, as expected for cross-informants (e.g., Verlhurst et al., 1997). Therefore, a positive report by either parent or child was considered evidence of probable occurrence for each composite trauma variable.

Neither physical nor sexual maltreatment was identified based on child protective services records. When clinicians identified instances of potential maltreatment in either child or parent TESI interviews, they followed a clinic protocol for assessing the current likelihood of imminent physical danger or sexual abuse and for making a report to the State Department of Children, Youth, and Families. None of the positive TESI findings for physical or sexual maltreatment required a report of possible current abuse.

Data Analyses

Chi-square analyses compared the proportion of children in four diagnostic groupings (ODD, ADHD, comorbid ADHD / ODD, adjustment disorder) with a history of physical or sexual maltreatment. One-way analyses of variance (ANOVA) were calculated to compare CBCL and PCL / C-PR scores across diagnostic groups. Hierarchical multiple regression analyses were done to determine the unique contribution of a history of trauma exposure to PTSD symptoms in each diagnostic group, controlling for age, gender, parent education, and CBCL Behavior Problems and Social Competence.

RESULTS

Descriptive characteristics of the ADHD (N = 50), ODD (N = 27), comorbid ADHD / ODD (N = 40), and adjustment disorder (N = 48) case groups are presented in Table 1. Children with an ODD diagnosis (with or without ADHD diagnoses) were significantly more symptomatic on the CBCL, according to an ANOVA followed by Newman-Keuls post hoc tests, than those with a sole ADHD diagnosis or an adjustment disorder diagnosis, $F(3,111) = 11.17$, $p < .001$. Children with comorbid ODD and ADHD were significantly more impaired on CBCL Social Competence scores than those with an adjustment disorder diagnosis, $F(3,109) = 3.10$, $p < .05$. Children with ODD or comorbid ODD / ADHD were more likely to have a comorbid PTSD diagnosis than those with ADHD-only or an adjustment disorder diagnosis, $\chi^2(3, N = 165) = 9.8$, $p < .01$.

Chi-square tests showed that the study groups differed significantly on proportions reporting exposure to physical maltreatment, $\chi^2(3, N = 165) = 27.6$, $p < .001$; sexual maltreatment, $\chi^2(3, N = 165) = 15.0$, $p < .001$; and either physical or sexual maltreatment $\chi^2(3) = 36.3$, $p < .001$ (see Table 1). Paired comparison chi-square tests, $\chi^2(1, N\text{s} = 67 \text{ to } 98)$, showed that the

TABLE 1: Demographic Composition, Clinical Data, and History of Trauma Exposure of Study Groups

	Group							
Background Variable	*ADHD Only (n = 50)*		*ODD Only (n = 27)*		*ADHD/ODD Only (n = 40)*		*Adjustment Disorder (n = 48)*	
Age	11.5	(2.3)	11.6	(3.5)	11.5	(3.5)	11.4	(3.4)
Gender (% Female)	52%		50%		63%		56%	
Parent education (less than high school graduate)	32%		33%		30%		29%	
PTSD diagnosis (lifetime)	6%[a]		24%[b]		22%[b]		0%[a]	
CBCL total problems	65.5	(11.1)[a,b]	70.9	(8.4)[c]	71.8	(5.6)[c]	59.0	(10.8)[a]
CBCL social competence	40.2	(10.4)	39.2	(8.3)	35.7	(7.2)[a]	42.6	(8.0)[b]
PCL/C-PR total score	34.0	(15.7)[b]	33.7	(7.2)[b]	36.7	(10.6)[b]	26.5	(10.5)[a]
PCL/C-PR intrusive reexperiencing	9.8	(5.5)[b]	8.3	(4.7)	9.3	(4.2)	6.9	(2.9)[a]
PCL/C-PR avoidance/numbing	12.4	(6.1)	11.5	(4.5)	13.3	(5.4)	10.3	(3.2)
PCL/C-PR hyperarousal	11.1	(4.3)[b]	13.9	(5.5)[c]	14.1	(5.6)[c]	9.6	(4.5)[a]
Physical maltreatment	26%[b]		48%[c]		73%[d]		10%[a]	
Sexual maltreatment	11%[b]		18%[b]		31%[c]		0%[a]	

NOTE: ADHD = Attention Deficit Hyperactivity Disorder, ODD = Oppositional Defiant Disorder, PTSD = Posttraumatic Stress Disorder, CBCL = Child Behavior Checklist, and PCL/C-PR = PTSD Checklist for Parent Report. Data reported as mean (standard deviation) or as a percentage.
a., b., c. Indicate groups with significantly different levels on a measure, $p < .05$.

likelihood of exposure to physical or sexual maltreatment was greatest for the comorbid ADHD and ODD group, followed in descending order by ODD alone, ADHD alone, and adjustment disorder.

A one-way ANOVA resulted in a significant effect (see Table 1) for diagnostic group for total PTSD symptoms on the PCL/C-PR, $F(3, 120) = 4.45$, $p < .005$, as well as for the PTSD diagnostic (American Psychiatric Association, 1994) Criterion B intrusive reexperiencing symptoms, $F(3, 120) = 2.42$, $p < .05$, and Criterion D hyperarousal symptoms, $F(3, 120) = 5.52$, $p < .001$, but not for Criterion C avoidance/numbing/social isolation symptoms, $F(3, 120) = 1.76$, $p > .15$. Post hoc Newman-Keuls tests ($p < .05$) showed that the ADHD, ODD, and comorbid ADHD/ODD groups each had significantly greater total PCL/C-PR scores than the adjustment disorder group. The ADHD group had significantly higher intrusive reexperiencing scores than the adjustment disorder group, with the ADHD/ODD and ODD groups intermediate. On hyperarousal scores, the comorbid ADHD/ODD and ODD groups scored significantly higher than ADHD or adjustment disorder groups, and the ADHD group scored higher than the adjustment disorder group. To determine if the hyperarousal symptoms were due primarily to items overlapping with ADHD or ODD symptom criteria, an exploratory analysis compared diagnostic groups on hyperarousal symptoms after taking out the two symptoms most clearly overlapping with ADHD (PTSD Criterion D1: concentration problems) and ODD (PTSD Criterion D2: anger). The result was that the PTSD-specific hyperarousal symptoms (Criterion D1: sleep disturbance, D4: generalized arousal, and D5: startle response) were significantly elevated for comorbid ADHD/ODD ($M = 10.5$, $SD = 4.5$) and ODD-only ($M = 10.2$, $SD = 3.6$), and the ADHD-only group's levels ($M = 6.6$, $SD = 3.5$) were not different than the adjustment disorder group's ($M = 7.0$, $SD = 3.5$), $F(3, 112) = 9.84$, $p < .001$.

Hierarchical linear regression analyses demonstrated that history of maltreatment and other trauma contributed differently to PTSD symptoms in the three diagnostic groups (Table 2). When entered in a first block, age and parent education were not significant predictors of PCL/C-PR scores but (female) gender was for both the ADHD and adjustment disorder groups. CBCL total score, representing overall severity of psychopathology, was a significant predictor of PCL/C-PR scores for all diagnostic groups when entered in a second block—CBCL Social Competence, also entered in the second block, was not a significant predictor of PCL/C-PR scores. Moreover, maltreatment trauma accounted for additional significant variance in the prediction of PTSD symptoms within the ADHD group as did accident/illness trauma within the ODD group. By contrast, within the adjustment disorder group, neither type of trauma contributed to the prediction of PCL/C-PR scores.

DISCUSSION

Our findings indicate that not only victimization trauma in general (Ford et al., 1999) but more specifically traumatic physical and sexual maltreatment are prevalent among children diagnosed with ODD and

TABLE 2: Prediction of Posttraumatic Symptom Severity by Hierarchic Linear Regression

Predictor Variable	*Final β Weight*	R^2	ΔR^2	ΔF	p
Analyses for ADHD diagnosis participants					
First step: gender	.28	.12	.12	6.89	.001
Second step: CBCL behavior problems	.31	.26	.14	11.3	.000
Third step: maltreatment trauma	.20	.30	.04	7.72	.000
Analyses for ODD diagnosis participants					
First step: no predictors					
Second step: CBCL behavior problems	.35	.15	.14	3.98	.014
Third step: accident/injury/illness trauma	.28	.24	.09	4.13	.003
Analyses for adjustment disorder participants					
First step: gender	–.40	.14	.14	3.87	.035
Second step: CBCL behavior problems	.30	.22	.08	4.38	.009
Third step: no predictors					

NOTE: ADHD = Attention Deficit Hyperactivity Disorder, ODD = Oppositional Defiant Disorder, and CBCL = Child Behavior Checklist. Predictors entered in first block (step): age (dichotomized as 6.0 to 8.9 vs. 9.0 to 17.0), gender, parent education level (dichotomized as less than high school graduate vs. high school graduate or higher). Predictor entered in second block (step): CBCL Total Behavior Problem score. Predictors entered in third block (step): history of accident/illness trauma and history of maltreatment. Predictors reported above for each step are those that made statistically significant ($p < .05$) contributions to the final model.

secondarily among children diagnosed with ADHD. We found also that trauma exposure was linked to elevated PTSD symptoms for children diagnosed with ODD, ADHD, or both disorders. Overall, psychiatric severity and gender accounted for a substantial proportion of the relationship between trauma exposure and PTSD symptoms, but trauma exposure also accounted for significant additional variance in PTSD symptoms in the ADHD and ODD groups—suggesting that although PTSD symptoms appear to be partially the sequela of trauma, they also may be due to the disruptive behavior disorders.

The findings that intrusive reexperiencing symptoms were most strongly associated with ADHD (and less so with ODD) and that potentially overlapping hyperarousal symptoms accounted for the elevated levels associated with the ADHD-only group (but not for the ODD or comorbid ADHD-ODD groups), suggest that the positive PTSD symptoms (as distinct from negative avoidance/numbing symptoms) may be an artifact of ADHD symptoms. On the other hand, paralleling Milberger, Biederman, Faraone, Murphy, and Tsuang's (1995) finding of the integrity of ADHD and childhood depression diagnoses, PTSD appears to have the distinct effect within the ODD diagnostic groups of heightening hyperarousal symptoms that are the least associated with the disruptive behavior diagnoses. In addition, we found that children diagnosed with ODD were especially at risk for traumatic maltreatment: 48% to 73% had been exposed to physical maltreatment, and 18% to 31% had been exposed to sexual maltreatment. Thus, compared to adjustment disorder controls, children with ODD had more historical exposure to maltreatment, more severe current hyperarousal symptoms, worse overall psychopathology, and poorer social competence (although the latter was true only for comorbid ODD and ADHD). Thus, although an artifactual effect cannot be ruled out, our findings provide some support for the hypothesis that maltreatment and subsequent PTSD may exacerbate ODD.

The findings are consistent with prior studies showing ODD to be associated with particularly severe disruptive behavior problems and psychosocial impairment (Biederman et al., 1996; Costello, Angold, Burns, Erklani, et al., 1996). The nonsignificant relationship between ODD alone with social competence is inconsistent with prior studies (Nottelmann & Jensen, 1995) but may be an artifact of low power due to the ODD-only group's smaller sample size. Prospective longitudinal studies following children with and without ODD and ADHD are needed to replicate and extend our cross-sectional findings. Additional diagnostic studies, paralleling those done with ADHD, anxiety, and depression (e.g., Milberger et al., 1995), are necessary to distinguish the unique, overlapping, and interactive features of PTSD, ODD, and ADHD.

Children with a diagnosis of ADHD were nevertheless at risk for past exposure to maltreatment trauma but less so than children diagnosed with ODD: 25% had been exposed to physical maltreatment, and one in nine had been exposed to sexual maltreatment. ADHD is heterogeneous with regard to psychiatric morbidity, with most severe impairment associated with antisocial families (Faraone, Biederman, & Milberger, 1995). Further study is warranted to determine if maltreatment contributes to the adverse outcome in ADHD associated with antisocial families

(Gabel & Shindledecker, 1993). ADHD children often reported accident/illness trauma and had levels of PTSD symptoms comparable with those for ODD children (and significantly higher than those for the adjustment disorder group), so the injury proneness observed with ADHD (Farmer & Peterson, 1995) may place these children at risk for accidental psychological trauma.

The finding that ADHD was associated with lesser likelihood of having experienced maltreatment than ODD and the absence of an increased risk of accident/illness trauma in ADHD (compared to adjustment disorder), is consistent with studies indicating that biological and nontraumatic parent/family factors are critical in the etiology and treatment of ADHD (Faraone, Biederman, Jetton, & Tsuang, 1997; Jensen, Martin, & Cantwell, 1997). We found that children with ADHD were less at risk for maltreatment than those with ODD but nevertheless still at greater risk than those with adjustment disorders. Children with ADHD also had elevated PTSD symptoms, particularly if exposed to maltreatment. Screening for maltreatment and PTSD symptoms thus appears warranted with children in treatment for ADHD, with an emphasis on detecting those with subthreshold PTSD symptoms rather than the relatively few with full PTSD. Given ADHD's association with intrusive reexperiencing symptoms, careful clinical distinction of these symptoms from related ADHD symptoms is important for the accurate classification of and treatment planning for children with ADHD. Even if trauma is not an etiologic factor for ADHD, it may be a source of heterogeneity in ADHD (Faraone et al., 1995) that may affect both functioning and treatment.

The comorbid ADHD/ODD group was distinct from both the ADHD and ODD groups in terms of high rates of physical and sexual maltreatment. Beyond the finding reported by Ford et al. (1999) that 91% of children with comorbid ADHD/ODD had a trauma history and 78% had experienced victimization trauma, the present results show that for most of these youths, victimization took the specific form of physical maltreatment (i.e., 73% or 90% of the victimized subgroup), and for many it also included sexual maltreatment (i.e. 31% or 40% of the victimized subgroup). These maltreatment prevalence levels are substantially higher than those for the general child population (e.g., Boney-McCoy & Finkelhor, 1995) and than those reported by Wozniak et al. (1999) for both child psychiatric and nonpsychiatric samples. However, the maltreatment prevalences are similar to those for adult psychiatric samples (Dansky et al., 1996; Lombardo & Pohl, 1997), suggesting that the use of a structured trauma assessment protocol is preferable to general clinical interviewing for the accurate and complete detection of children who have been traumatized either by maltreatment or in other forms.

These high prevalence levels of maltreatment for comorbid ADHD/ODD and the elevated PTSD symptom levels across all three disruptive behavior disorder subgroups raise the possibility that the severity of childhood psychopathology and not ODD or comorbid ADHD/ODD per se is the true risk factor for maltreatment and PTSD symptoms. Particularly severe internalizing disorders such as major depression (Cuffe et al., 1998) or bipolar disorder (Wozniak et al., 1999) also have been linked to childhood trauma and PTSD, so the relationship may be due to generalized psychopathology and not any specific disorder. However, Ford et al. (1999) reported that controlling for the severity of internalizing symptoms did not account for the relationship between ODD and victimization trauma, and our current results indicate that controlling for overall severity of childhood psychopathology did not account for relationships between either maltreatment or accidental/illness trauma and PTSD symptom severity. Prospective investigations of the risk and etiologic relationships between maltreatment and other forms of childhood trauma with a full array of internalizing and externalizing disorders will be necessary to clarify the role of disorder-specific and general psychopathological effects and outcomes.

There also is the possibility that these multiimpaired traumatized children are conduct disordered (Steiner et al., 1997). Moreover, further studies are needed to clarify whether trauma plays a role in the progression from ADHD to ODD to conduct disorder observed by Biederman et al. (1996). Genetic (Jensen et al., 1997) and family psychopathology (Faraone et al., 1995) factors appear to be the prime risks for escalating behavior problem morbidity, but trauma's role remains to be discovered.

Limitations of the present study include its reliance on one child psychiatry clinic's enrollment, with a dearth of participants representing non-Caucasian or suburban populations, and the absence of nonpsychiatric and nontreatment-seeking controls. Replication is indicated with a broader mixed clinical and community sample (Hinshaw et al., 1997) that includes a wider range of ethnocultural, residential, and psychiatric characteristics. Another limitation is the study's cross-sectional design, which does not permit the detection and clarification of crucial causal and temporal relationships linking trauma, PTSD symptoms, and the disruptive behavior disorders. Longitudinal studies, with children known to have

been exposed to trauma and/or to have been diagnosed with varying combinations of ADHD, ODD, and PTSD, are a vital next step toward a fuller definition of the role of trauma and posttraumatic symptomatology in the etiology, course, and treatment of childhood disruptive behavior disorders.

Furthermore, the approach to diagnostic classification, although reliable and systematic, would be improved by the use of standardized structured interview protocols such as the K-SADS, DICA, or DISC (Hinshaw et al., 1997). On the other hand, the study's findings were strengthened by the use of the TESI-C and TESI-P, which provide a much needed (Solomon, Keane, Newman, & Kaloupek, in press) omnibus child trauma exposure assessment methodology, as well as by use of the validated PCL/C-PR for posttraumatic symptomatology and the CBCL for overall severity of child psychopathology and child social competence. Peer-reviewed measures of child trauma and PTSD symptomatology will contribute to the development of both clinical and research protocols for disruptive behavior disorders (Hinshaw et al., 1997).

Our findings suggest that many of the tens of thousands of children with disruptive behavior disorders may have been exposed to traumatic maltreatment and may experience undetected PTSD symptoms. Prospective studies with sample sizes sufficient to permit complex statistical analyses (e.g., confirmatory factor analyses, structural equation modeling) are necessary to clarify the conceptual, clinical, and etiological interrelationships among the many variables involved in maltreatment, PTSD symptoms, and the disruptive behavior disorders.

A primary clinical implication is that children in treatment for disruptive behavior disorders may benefit from screening for maltreatment, accidental trauma, and PTSD symptoms. As many as three in four children in treatment for ODD and a substantial minority of children treated for ADHD had experienced maltreatment and suffered from PTSD symptoms. Children screening positive for history of maltreatment may benefit from adaptation of the therapeutic and social services received for disruptive behavior to address PTSD symptoms (e.g., Cohen & Mannarino, 1996; Deblinger, Lippmann, & Steer, 1996). In addition to maltreatment, screening ODD-diagnosed children for accidental/illness trauma may be warranted given this trauma type's association with PTSD symptoms in this group.

Furthermore, multimodal clinical assessment of PTSD symptoms appears important for accurate and complete differential diagnosis of children with disruptive behavior symptomatology. Parents generally are able to detect specific ODD (and ADHD) symptoms accurately but have more difficulty with internalizing symptoms such as those characterizing PTSD (Cantwell, Lewinsohn, Rohde, & Seeley, 1997; Faraone et al., 1997). Our findings suggest that parents may have difficulty distinguishing PTSD symptoms from trauma-unrelated symptoms of ADHD (e.g., intrusive distress, concentration problems). Education for both clinicians and parents concerning the commonalities and distinctions among the symptoms of ADHD and ODD with those due to maltreatment and PTSD may enhance our collective ability to identify, understand, and provide the most appropriate care for maltreated children whose emotional and behavioral syndromes have diverse and often complex trajectories of etiology and recovery.

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