HHS Public Access

Author manuscript

Am J Orthopsychiatry. Author manuscript; available in PMC 2015 November 06.

Published in final edited form as:

Am J Orthopsychiatry. 2015 September ; 85(5): 504–513. doi:10.1037/ort0000081.

The Association Between Youth Violence Exposure and Attention-Deficit/Hyperactivity Disorder (ADHD) Symptoms in a Sample of Fifth-Graders

Terri Lewis,
Kempe Center for the Prevention and Treatment of Child Abuse and Neglect, Department of Pediatrics, University of Colorado, Anschutz Medical Campus, School of Medicine

Marc N. Elliott,
RAND Health, Santa Monica, California

Sara L. Toomey,
Division of General Pediatrics, Boston Children's Hospital, Boston, Massachusetts and Harvard Medical School

Paula Cuccaro,
School of Public Health, University of Texas Health Science Center at Houston

Susan Tortolero Emery,
School of Public Health, University of Texas Health Science Center at Houston

David C. Schwebel,
Department of Psychology, University of Alabama at Birmingham

Susanna N. Visser,
National Center on Birth Defects and Disabilities, Centers for Disease Control and Prevention, Atlanta, Georgia

Katie A. McLaughlin,
Division of General Pediatrics, Boston Children's Hospital and Harvard Medical School and University of Washington

Stephen W. Banspach, and
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia

Mark A. Schuster
Division of General Pediatrics, Boston Children's Hospital and Harvard Medical School.

Abstract

The purpose of the current study was to examine the association between violence exposures (no exposure, witness or victim only, and both witness and victim) and attention-deficit/hyperactivity disorder (ADHD) symptoms, as well as the potential moderating role of gender. Data from 4,745

Correspondence concerning this article should be addressed to Terri Lewis, University of Colorado Denver, Department of Pediatrics, 13123 E. 16th Avenue, B390, Aurora, CO 80045. Terri.Lewis@Childrenscolorado.org.

5th graders and their primary caregivers were drawn from the Healthy Passages study of adolescent health. Parent respondents completed the DISC Predictive Scales for ADHD, and youth provided information about exposure to violence. Results indicated that youth who reported both witnessing and victimization had more parent-reported ADHD symptoms and were more likely to meet predictive criteria for ADHD. Among those with both exposures, girls exhibited a steeper increase in ADHD symptoms and higher probability of meeting predictive criteria than did boys. Findings indicate that being both victim-of and witness-to violence is significantly associated with ADHD symptoms particularly among girls.

Keywords

violence exposure; ADHD; gender; victimization; witnessing violence; school-age children

Violence exposure among children and adolescents is a major public health concern (Krug, Mercy, Dahlberg, & Zwi, 2002), with significant short- and long-term consequences (Buka, Stichick, Birdthistle, & Earls, 2001; Lynch & Cicchetti, 1998) in all domains of functioning including academic, social, physical, and psychological (Briggs-Gowan et al., 2010; Herrenkohl, Sousa, Tajima, Herrenkohl, & Moylan, 2008; Moffitt & the Klaus-Grawe 2012 Think Tank, 2013; Perkins & Graham-Bermann, 2012). Data from the 2008 National Survey of Children's Exposure to Violence indicated that 60.6% of children and adolescents either experienced direct victimization and/or witnessed violence in the previous year (Finkelhor, Turner, Ormrod, & Hamby, 2009). Considerable attention has been given to the developmental effects of victimization and exposure in early childhood. Exposure to violence, particularly during sensitive developmental periods such as infancy and very early childhood, has been linked to changes in brain structures such as the amygdala, basal ganglia, hippocampus, and prefrontal cortex (De Bellis, et al., 2002; Carrion, Weems, & Reiss, 2007; Leeb, Lewis, & Zolotor, 2011; Moffitt & the Klaus-Grawe 2012 Think Tank, 2013; Perry, Pollard, Blakley, Baker, & Vigilante, 1995). These structures collectively regulate motor activity, impulse control, and concentration. Impairments in these areas are linked to deficits in executive functioning, self-regulation (Perkins & Graham-Bermann, 2012), and externalizing behaviors, symptoms characteristic of attention-deficit/hyperactivity disorder (ADHD). Despite evidence of brain malleability into adolescence (Zelazo & Carlson, 2012), there is limited assessment of neurobiological effects of violence exposure in older youth, and very limited assessment of the association of violence exposure and ADHD symptoms in general among school-aged youth.

ADHD is a disorder with a host of negative consequences including social and academic difficulties, school failure, parent–child conflict, substance use, externalizing problems, and high rates of comorbid behavioral disorders (Brassett-Harknett & Butler, 2007). National prevalence estimates of ADHD in children range from 9% to 19% (Brassett-Harknett & Butler, 2007), with boys disproportionately diagnosed relative to girls. The prevalence of health care provider-diagnosed ADHD among children has steadily increased since 1998 (Akinbami, Liu, Pastor, & Reuben, 2011; Visser et al., 2014). Although genetic heritability is linked to the etiology and causal mechanisms of the disorder (Brassett-Harknett & Butler, 2007), a number of environmental/psychosocial factors are also linked to ADHD, including

number of adverse childhood events (Biederman, 2005), early traumatic events (Briggs-Gowan et al., 2010), family adversity and violence (Becker & McCloskey, 2002; Counts, Nigg, Stawicki, Rappley, & Von Eye, 2005), child abuse (Briscoe-Smith & Hinshaw, 2006; Ford et al., 2000), institutional rearing (McLaughlin et al., 2014), and community violence (Fishbein et al., 2009). The association between adverse, stressful, experiences and ADHD are consistent with scholarly assertions that childhood stress may affect vulnerable brain structures that have in turn been implicated in the development of ADHD (Teicher, Andersen, Polcari, Anderson, & Navalta, 2002). Given the high rate of violence exposures among children and youth, assessment of the association between violence exposure and ADHD symptomology is warranted.

Violence exposure is a broad term applied to complex experiences. Violence exposure, as discussed in the literature, may be limited to witnessing violence, victimization, or both experiences. The bulk of extant literature indicates that most violence-exposed children are polyvictims, meaning that they experience multiple types of victimization. This may include multiple types of direct victimization (i.e., maltreatment) or a combination of witnessing violence and direct victimization (Finkelhor, Turner, Hamby, & Ormrod, 2011) with considerable overlap between experiencing maltreatment and witnessed violence (Herrenkohl et al., 2008) and direct victimization and community violence (Turner, Finkelhor, & Ormrod, 2010). Studies suggest that the combination of witnessing violence and direct victimization may result in poorer outcomes compared to those with only one type of violence exposure (Herrenkohl et al., 2008). However a meta-analytic review of child witnessed domestic violence and physical abuse did not find significantly different outcomes for those who were both witnesses and victims relative to those with one mode of exposure (Kitzmann, Gaylord, Holt, & Kenny, 2003). Cuevas, Finkelhor, Ormrod, and Turner (2009) found a higher rate of psychiatric disorders, including ADHD, in those who had a higher number of victimization experiences across five categories (conventional crime, child maltreatment, peer and sibling violence, sexual assault, and witnessing and indirect victimization). The higher rate of psychiatric diagnosis and poorer outcomes among polyvictims may be the result of more frequent experiences or that the experience of direct victimization in addition to witnessed violence is more profound than that of witnessed violence alone. At least one study found the experience of polyvictimization was associated with poorer outcomes than chronic (more frequent) victimization of one type (Finkelhor, Ormrod, & Turner, 2007).

The limited assessment of ADHD among violence or trauma-exposed youth tends to group the two experiences (witnessed and direct victimization) together without examining whether symptomology is greater in those who are both witnesses and victims compared to those with one type of exposure. No study has assessed whether witnessed violence coupled with victimization may be associated with a greater ADHD symptomology or whether those with dual exposures are more likely to meet criteria predictive of ADHD diagnosis than those with only one type of exposure or no exposure history. The current study examines ADHD symptoms as a function of dual exposure (witnesses and direct victimization), single-type exposure, and no exposure.

Finally, there is evidence to suggest that boys and girls may react to violence exposure differently (Becker & McCloskey, 2002; Tolin & Foa, 2006). Studies assessing the potential moderating role of gender have produced inconsistent findings with some showing effects for violence exposed girls (see Becker & McCloskey, 2002) and some showing greater sensitivity among males (see De Bellis et al., 2002). These contradictory findings may be partly because of methodological and sample differences. Girls are typically underrepresented in empirical studies assessing predictors of ADHD given the lower prevalence among girls compared to boys. However, girls often present with the less disruptive symptoms and may be underdiagnosed relative to boys (Nussbaum, 2012). Larger studies including both boys and girls that do not rely on prior clinical diagnosis of ADHD may help further our understanding of whether there are differential outcomes of violence exposure as a function of gender.

In summary, a significant percentage of children are exposed to violence. Finkelhor and colleagues (2009) report a substantial increase in violence exposure after age 10 suggesting a need to examine violence exposures and ADHD symptoms in older children. Differential links between a single type of exposure (witnessed or victimization) and having both witnessed and been directly victimized are poorly understood with regard to ADHD symptoms in childhood, as is the role of gender as a possible moderator of these associations. Data from a large multisite, multilevel study were used to examine the links among violence exposure, gender, and ADHD symptoms. The purpose of the current study was threefold: (a) to assess whether differential violence exposure (no exposure, single-type exposure, and witnessed plus direct victimization) was associated with symptoms of ADHD; (b) to assess whether violence exposure was associated with predictive criteria for ADHD; and (c) to examine the role of gender as a potential moderator of these links. We hypothesized that more symptoms would be reported for those who were both witnesses and victims and that this group would be more likely to meet predictive criteria for ADHD compared to those with a single-type exposure or those without violence exposure. Given inconsistent findings with regard to the role of gender, no hypotheses were made with respect to gender moderation. The context in which victimization experiences occurred is also described.

Method

Study Sample

The present study uses data from Healthy Passages, a multilevel, multimethod longitudinal study of adolescent health (Windle et al., 2004; Schuster et al., 2012). The study population included all fifth-grade students, in three geographic areas, who were enrolled in public schools with an enrollment of at least 25 fifth graders (representing over 99% of all students enrolled in public schools in each of the three areas). These geographic areas were in the catchment areas of (a) 25 contiguous public school districts in Los Angeles County, CA; (b) 10 contiguous public school districts in and around Birmingham, AL; and (c) the largest public school district in Houston, TX. The overall baseline sample for Healthy Passages is 5,147 participants, with a racial/ethnic distribution of 34% African American, 35%

Hispanic, 24% White, and 8% Other. Gender is equally distributed. Child age at the fifth-grade assessment averages 10.26 years (*SD* = 0.64).

Study Procedures

Within each of the three sites, a two-stage probability sampling procedure was employed. In the first stage, schools were randomly selected with probabilities proportionate to a measure that was the ratio of targets to actual proportions by race/ethnicity within schools. This continuous weighted measure accounted for over-sampling of some schools within sites to maximize the power of the study to compare racial/ethnic groups. In the second stage, all fifth-grade students in sampled schools were invited to participate. The response rate was approximately 77.3%. The few students who were not identified as African American, Hispanic, or White were categorized as "Other" for sampling purposes only. Design weights were constructed to reflect different school selection probabilities by racial/ethnic composition. Nonresponse weights were constructed to model nonresponse as a function of school, student gender, and student race/ethnicity. These two sets of weights were combined into a final weight that represents the population of fifth graders in the public schools in the catchment areas defining each site. All analyses fully take into account the complex sample design and the final probability weights.

Data were collected from children and primary caregivers during separate interviews using a combination of computer-assisted personal interviews (CAPI) and audio computer-assisted self-administered interviews (A-CASI). All sensitive information, including information about violence exposure, was collected via A-CASI. Of the initial sample, 4,745 participants had complete data on measures of interest and constituted the analysis sample for the current study.

Measures

ADHD symptoms—ADHD symptoms were assessed using the Diagnostic Interview Schedule for Children (DISC) Predictive Scales–Parent version (DPS-ADHD; Lucas et al., 2001). The DPS-ADHD is based on *DSM–IV* criteria (APA, 2000), and recommended as a screening tool by the American Academy of Pediatrics (2010). Caregivers indicated whether their child has exhibited each of the 10 problem symptoms in the last 12 months (e.g., "Has your child often had trouble finishing his/her homework or other things s/he is supposed to do?"). Positive endorsements are summed for a count of problem symptoms. Endorsement of three or more symptoms is considered indicative of ADHD (sensitivity = .98, specificity = .90; see Lucas et al., 2001). For this study, two items focusing on impairment were excluded from the scale. Because we did not assess impairment or severity, a more stringent cutoff value of four or more symptoms was used (see Coker et al., 2009) as a dichotomous cutpoint for predictive criteria. For the current study, both the number of symptoms and the dichotomous indicator were assessed and analyzed as two separate outcomes.

Violence exposure—Violence exposure was assessed by asking youth to indicate how often and where they had witnessed and/or been the victims of violence in the last 12 months. Items were borrowed from the Youth Risk Behavior Surveillance Survey (Eaton et al., 2006). Four items assessed witnessing violence (e.g., "How often in the past 12 months

did you see someone get hit, kicked, punched, or beaten up"), and five items assessed victimization (e.g., "How often in the past 12 months has someone threatened or injured you with a gun?"). Response options included 0 (*never*), 1 (*one time*), 2 (*a few times*), or 3 (*lots of times*). Responses were summed as a measure of the frequency of exposure. Responses were also dichotomized, such that *one or more times* was coded as 1 and *never* coded as 0. Based on dichotomized responses, a mutually exclusive three-level variable was created to indicate (a) No Exposure, (b) Single Exposure (either witnessed only or victimization only), and (c) Victimization and Witnessed Violence (referred to hereafter as Dual Exposure). Respondents who acknowledged having experienced a particular event (witnessed or victimization), were asked to indicate in what context(s) the event occurred. Nonmutually exclusive options included school, neighborhood, home, or someplace else.

Control variables—Control variables included child gender, race/ethnicity (African American, Hispanic, White, and Other), caregiver income, and study site. Gender and race/ethnic distribution were consistent with the overall baseline sample. Site representation was approximately equal (Birmingham 32%, Houston 35%, Los Angeles 32%). The median household income was $30,000–$34,999.

Analyses

Following preliminary descriptive analyses, a weighted univariate ANOVA was conducted to determine whether ADHD symptoms were greater for the violence exposure groups. To examine the association of violence exposure group, gender effects, and the interaction of gender and violence exposure, we used Proc SurveyReg (for number of symptoms) and Proc SurveyLogistic (for the predictive diagnostic indicator) using SAS V9.2. These procedures account for study design and nonresponse weights, clustering of children within schools, and site stratification using a sandwich estimator and a Taylor series linearization (Korn & Graubard, 1999). To assess whether gender moderated the relationship between violence exposure and ADHD, two interaction terms (gender × Single Exposure; gender × Dual Exposure) were tested separately in each of the regression analyses.

Results

Overall, 72% of youth reported some form of violence exposure. Thirty-nine percent of respondents reported a single form of violence exposure (38% percent reported having witnessed violence but no victimization and 1% of participants reported victimization but not witnessed violence). Thirty-four percent reported having witnessed and been victims of violence, and 28% did not report any violence exposure.

There were significant gender by violence exposure group differences, $\chi^2(2) = 83.36$, $p < .001$. Specifically, more boys than girls reported experiencing dual exposures (39% and 28% respectively), and fewer boys indicated no violence exposure relative to girls (24% and 33% respectively). There were no gender differences for the Single Exposure group. Of those who reported violence exposure, 82% indicated exposure at school, 27% reported exposure in the neighborhood, 14% in the home, and 38% someplace other than the home, school, or neighborhood. In the Dual Exposure group (i.e., witnessed and victimization), 90% reported exposures at school, 49% someplace else, 35% in the neighborhood, and 23% at home.

Those in the Single Exposure group reported the majority of exposure in the school (73%) followed by someplace else (30%), neighborhood (20%), and in the home (6%). On average, those in the Single Exposure group reported fewer locations of exposures than did those who were both witnesses and victims (Single Exposure: $M = 1.29$, $SD = .60$; Dual Exposure: $M = 1.98$, $SD = .92$; $t(2674.9) = -25.34$, $p < .0001$).

The frequency of exposure was summed for the witnessing and victimization items. The sample average for the witnessing items was 2.14 ($SD = 2.27$; possible range = 0–12). The average summed frequency for victimization items was 0.81 ($SD = 1.45$; possible range = 0–15). Consistent with gender differences observed in the discrete exposure groupings, boys reported more frequent exposure to witnessing violence ($M = 2.44$, $SD = 2.39$) than did girls, $M = 1.89$, $SD = 2.07$; $t(4681.6) = -8.50$, $p < .001$, as well as more frequent exposure to victimization than did girls, $M_{boys} = 1.01$, $SD = 1.64$; $M_{girls} = 0.62$, $SD = 1.22$; $t(4440.7) = -9.34$, $p < .001$.

Parents reported an average of 2.24 ADHD symptoms ($SD = 2.15$). Parents of boys reported significantly more symptoms compared to parents of girls, $M = 2.52$, $SD = 2.25$; $M = 1.91$, $SD = 1.98$, respectively; $t(4905.8) = -10.31$, $p < .001$. A weighted univariate ANOVA indicated a significant increase in symptoms as a function of violence exposure, $F(2, 4742) = 49.94$, $p < .001$, such that the group with no exposure reported the fewest number of ADHD symptoms ($M = 1.91$, $SD = 1.96$), followed by the Single Exposure group ($M = 2.10$, $SD = 2.08$), and the Dual Exposure group ($M = 2.65$, $SD = 2.24$). Twenty-seven percent of the sample met predictive criteria (≥4 symptoms) for ADHD. Boys were significantly more likely to meet criteria on the DPS compared to girls, 32% and 22% respectively; $\chi^2 = 59.19$, $p < .001$. See Table 1 for sample demographics by ADHD symptoms and predictive criteria.

The correlation between frequency of exposure/victimization and ADHD symptoms was examined. Results indicated a significant, positive correlation between frequency of witnessing violence and number of ADHD symptoms, $r(5024) = .16$, $p < .001$, as well as frequency of victimization and ADHD symptoms, $r(5024) = .18$, $p < .001$. The correlation between ADHD symptoms and the frequency of *all* exposure items (witnessing and victimization) was also significant, $r(5024) = .19$, $p < .001$.

A regression model using Proc SurveyReg was conducted to examine the association of violence exposure with number of ADHD symptoms. The moderating effect of gender was examined by including interaction terms (one at a time) for gender × Single Exposure and gender × Dual Exposure. Control variables included study site, race/ethnicity, and income. Results indicated a significant main effect for gender and the Dual Exposure group. The gender × Dual Exposure group interaction was statistically significant, however the gender × Single Exposure group term was not significant and subsequently dropped from further exploration. To explore the gender × Dual Exposure effect, analyses were conducted separately by gender. The models for both genders indicated a significant main effect for the Dual Exposure group, however there was a steeper slope for females ($b = 0.63$, $SE = 0.12$) compared to males ($b = 0.41$, $SE = 0.10$). This finding suggests a larger effect for females as evidenced by a .63 increase in symptoms for females reporting both exposures compared to a .41 increase in symptoms for males reporting both. See Tables 2 (total sample) and 3 (by

gender) for the results. A follow-up regression model was conducted using the frequency of exposure to all items (instead of discrete groupings based on type of exposure). Controlling for the same demographic variables and site, results indicated a significant association between cumulative exposure and ADHD symptoms, $b = 0.09$, $SE = 0.01$, $t(115) = 6.76$, $p < .001$. The interaction between gender and cumulative exposure was not significant.

A logistic regression analysis using Proc SurveyLogistic was conducted to examine the association of violence exposure with predictive criteria for ADHD (i.e., 4 or more symptoms). The moderating effect of gender was examined by including interaction terms (one at a time) for gender × Single Exposure and gender × Dual Exposure. Control variables included study site, race/ethnicity, and income. As shown in Table 3, results indicated significant main effects for gender ($\chi^2 = 36.98$, $p < .001$) and Dual Exposure ($\chi^2 = 30.11$, $p < .001$). There was also a gender × Dual Exposure interaction ($\chi^2 = 4.17$, $p = .041$). The gender × Single Exposure term was not significant and was eliminated from the final model. To explore the gender × Dual Exposure group interaction, analyses were conducted separately by gender. Results indicated that both boys and girls reporting dual exposures were more likely to meet predictive ADHD criteria (boys: $\chi^2 = 16.65$, $p < .001$; girls: $\chi^2 = 20.38$, $p < .001$), however, girls with dual exposures were 2 times more likely to meet predictive criteria for ADHD and boys with dual exposures were 1.6 times more likely to meet predictive criteria (see Tables 4 and 5). A follow-up logistic model was conducted to examine frequency of cumulative exposure. The results were consistent with the models using discrete groupings. The frequency of exposures was significantly associated with predictive criteria ($b = 0.10$, $SE = 0.02$, $\chi^2 = 28.31$, $p < .001$). The gender × frequency of exposure interaction was not significant.

Discussion

The purpose of the current study was to examine the association between violence exposures and ADHD symptoms in a large community sample of fifth-graders and examine the potential moderating role of gender. Seventy-two percent of children reported violence exposure in the last year, and the most frequently endorsed location of violence exposure was the school setting. Using the discrete groupings, children who did not report any witnessed violence had the fewest parent-reported ADHD symptoms, followed by those with a single form of exposure. Those who were both victims and witnesses had the greatest parent-reported number of symptoms and were at highest risk for meeting predictive criteria. It was also in this highest risk group that gender differences emerged.

Several studies have shown that the compounding negative effects of being both victimized and witnesses to violence exceeds that of single exposure only (see Herrenkohl et al., 2008). Sometimes termed the “double whammy” effect (Hughes, Parkinson, & Vargo, 1989), investigators have reported increased negative consequences as the number of exposures and adversities increases. Dual exposure has been linked to increased internalizing and externalizing problems, as well as child and adult health risk indicators (Graham-Bermann & Seng, 2005; Felitti et al., 1998). However these studies primarily examine the effect of childhood abuse and exposure to domestic violence. Extensions of the compounding effect of victimization and exposure outside the home is less well-documented but tend to mirror

those findings for abused and intimate partner/family violence-exposed children (Herrenkohl et al., 2008). To our knowledge, this study is the first to examine whether dual exposure is associated with greater ADHD symptomology, without limiting the assessment of violence exposure to the home. We did not assess severity of exposure in this study, or context specific effects. Examining these factors may be an important extension to more fully understand the findings from the current study. In addition, there may be other factors, not examined in this study, that distinguish the dual victimization group from other groups, such as family functioning factors and/or a history of child maltreatment. Further investigation of possible mediating or moderating effects is warranted.

The finding that girls who report witnessing and victimization experiences appear to be at elevated risk for ADHD symptoms relative to similarly exposed boys is consistent with studies assessing gender differences in other stress-related symptoms (e.g., posttraumatic stress symptoms) in response to violence exposure. For example, Foster and colleagues found a stronger association between violence exposure and anxiety symptoms for girls compared to boys (Foster, Kuperminc, & Price, 2004). A meta-analysis of studies assessing sex differences in response to trauma conducted by Tolin and Foa (2006) found greater trauma exposure among males, but greater posttraumatic stress symptomology among trauma-exposed females. Although both boys and girls in the current study showed similar increases in ADHD symptoms and predictive criteria for diagnosis, girls in the dual victimization group appear to experience a steeper increase in symptoms relative to boys. However, gender did not moderate the association between cumulative frequency of exposure and number of ADHD symptoms or ADHD predictive criteria as measured by the DPS. This may be an artifact of the dichotomization of exposure into discrete groupings of exposure without considering frequency of exposure. Alternatively, the discrepant findings may support the unique role of polyvictimization regardless of the frequency of exposure (Hickman et al., 2013). Further examination of gender-specific effects, such as differences in type of symptomology or contexts in which exposures occur may further clarify the role of gender in understanding violence exposure and ADHD symptomology.

Overall, these findings add to the burgeoning literature suggesting that violence exposures may be associated with symptoms of inattention and hyperactivity in later childhood as well as early childhood. No study has specifically examined this association in early adolescence, but the results are consistent with studies assessing violence/trauma exposure and externalizing problems (Buka et al., 2001) as well as deficits in executive functioning tasks (DePrince, Weinzierl, & Combs, 2009), and school problems (Perkins & Graham-Bermann, 2012) in school-age children and adults. Contemporary research increasingly supports the hypothesis that traumatic experiences including violence exposure lead to neurobiological changes in response to the activation of physiological stress response systems (Shonkoff et al., 2012). This in turns affects structures responsible for regulating behaviors that are deficient or maladaptive in children with ADHD.

However, the lack of conclusive causal studies and our cross-sectional findings leaves interpretation open to alternative hypotheses. For example, children with ADHD are at heightened risk for maltreatment experiences (Briscoe-Smith & Hinshaw, 2006; Ouyang, Fang, Mercy, Perou, & Grosse, 2008) and peer victimization (Chou, Liu, Yang, Yen, & Hu,

2014; Humphrey, Storch, & Geffken, 2007; Taylor, Saylor, Twyman, & Macias, 2010), perhaps because of the expression of challenging behaviors. Further, youth with comorbid ADHD and other behavioral disorders are more likely to engage in aggressive and delinquent behaviors (Harty, Miller, Newcorn, & Halperin, 2009), potentially resulting in a bidirectional cycle of violence. Alternatively, children and adults with ADHD may be more vulnerable to the effects of stress than nondisordered individuals (Margolin, 2005; Lackschewitz, Hüther, & Kröner-Herwig, 2008; Pesonen et al., 2011). Discerning etiological pathways versus consequences are complex and scholars have increasingly called for “ecobiodevelopmental” (Shonkoff et al., 2012) and “developmental psychopathology” (Cicchetti, 1991) perspectives that integrate biology and environmental influences to explain pathways to disordered and maladaptive behaviors. Given the significant impact of ADHD and violence exposure on individuals and to society, more discourse and research, particularly longitudinal studies, are needed to assess directional causes and consequences to better address prevention, intervention, and treatment needs of this at-risk population.

Limitations of extant literature include small samples, clinic-based samples, underrepresentation of females, and a narrow focus on violence exposure in the home. This study overcomes such limitations with the use of a large, community-based sample of fifth graders providing ample power, equal representation of gender, and inclusion of participants that were not exclusively diagnosed and/or referred for other behavioral problems. In addition, the inclusion of data from parents (symptoms of ADHD) and children (exposure to violence) reduces potential informant biases.

However, some limitations of the current study are worth noting. First, the assessment of ADHD symptoms and predictive criteria was based on an 8-item ADHD screener measure and not clinical assessment. In the current study, 22% of females and 32% of males met predictive criteria for ADHD using the DISC Predictive Scales for Children-ADHD. This is higher than national prevalence estimates for both genders and higher female to male ratios than previously reported (about 3:7 in current study compared to 1:3 in most previous reports). The DPS screener measure used in the current study does not assess impairment, length of time symptoms were present, or whether symptoms are observed in more than one context (as specified by *DSM–IV* diagnostic criteria). In addition, only one informant (the primary caregiver) provided information on ADHD symptoms. This likely inflates the number of children meeting predictive criteria. Replication of these findings using a different screener measure and cutpoint criteria would enhance the robustness of these findings. Second, the data are cross-sectional, precluding definitive statements about the causal direction of influence and the joint trajectory of symptoms and violence exposure over time. Longitudinal studies are needed to clarify the direction of effect. Third, we did not attempt to disentangle trauma symptoms from ADHD symptoms. Some studies suggest considerable overlap in behaviors/symptoms common to both ADHD and posttraumatic stress (Szymanski, Sapanski, & Conway, 2011); others assert that diagnostic co- occurrence is not due to diagnostic errors (Antshel et al., 2013). This may have important implications for identifying effective assessment and treatment options. Finally, other potential precursors of violence exposure or confounding symptomology were not assessed or controlled in the current study.

In conclusion, ADHD is a complex and heterogeneous neurobiological disorder with varying manifestations and severity of symptomology. Etiological mechanistic pathways from nearly every domain have been proposed including genetic, neurological, environmental, epigenetic, and social/familial. Negative sequelae of violence exposure may impact ADHD symptomology or alternatively ADHD may be associated with greater risk of victimization and witnessed violence. Our findings support existing data in this area demonstrating significant associations between violence exposure and ADHD symptoms particularly for girls who are both witnesses to and victims of violence. Although the cross-sectional nature of the data preclude definitive conclusions about the direction of effect, these results document co-occurring ADHD symptomology and exposure to violence, with particularly high rates of exposure in the school setting. These findings suggest a number of potential policy and assessment implications. First, given the high rate of violence exposure in schools, targeted interventions to reduce school violence particularly among vulnerable populations are essential, as are appropriate services for school related violence (Espelage & Swearer, 2003). Second, results from this study and others (e.g., Ouyang et al., 2008) suggest that clinicians and physicians should assess history of violence exposure in children and youth presenting with ADHD symptoms. Because of the potential overlap of acute symptoms of violence exposure (e.g., trauma symptoms) with ADHD symptomology, careful attention should be given to current *DSM* guidelines for differential assessment of trauma symptoms, externalizing problems, and ADHD (Attention-Deficit/Hyperactivity Subcommittee, 2011). Finally, further work is needed to clarify mechanistic pathways between violence and ADHD including longitudinal and neurobiological studies as well as the expansion of assessment to older youth and violence outside the home to better understand potential developmental and gender differences as a function of child age and context of exposure. Considering the short- and long-term negative effects of violence exposure and ADHD, further study is warranted to better understand the simultaneous rise of ADHD diagnoses and violence exposures in middle childhood.

Acknowledgments

Funded by the Centers for Disease Control and Prevention (Cooperative Agreements CCU409679, CCU609653, CCU915773). The contents of this publication are solely the responsibility of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

References

Akinbami, LJ.; Liu, X.; Pastor, PN.; Reuben, CA. Attention deficit hyperactivity disorder among children aged 5–17 years in the United States, 1998–2009 (NCHS Data Brief, 7). CDC National Center for Health Statistics; Hyattsville, MD: 2011. Retrieved from http://www.cdc.gov/nchs/data/databriefs/db70.htm

American Academy of Pediatrics. Addressing mental health concerns in primary care: A clinician's toolkit. Author; Elk Grove Village, IL: 2010.

American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed., text rev.. Author; Washington, DC: 2000.

Antshel KM, Kaul P, Biederman J, Spencer TJ, Hier BO, Hendricks K, Faraone SV. Posttraumatic stress disorder in adult attention-deficit/hyperactivity disorder: Clinical features and familial transmission. The Journal of Clinical Psychiatry. 2013; 74:e197–e204. http://dx.doi.org/10.4088/JCP.12m07698. [PubMed: 23561240]

Attention-Deficit/Hyperactivity Subcommittee. ADHD: Clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. Pediatrics. 2011; 128:1007–1022. http://dx.doi.org/10.1542/peds.2011-2654. [PubMed: 22003063]

Becker KB, McCloskey LA. Attention and conduct problems in children exposed to family violence. American Journal of Orthopsychiatry. 2002; 72:83–91. http://dx.doi.org/10.1037/0002-9432.72.1.83. [PubMed: 14964597]

Biederman J. Attention-deficit/hyperactivity disorder: A selective overview. Biological Psychiatry. 2005; 57:1215–1220. http://dx.doi.org/10.1016/j.biopsych.2004.10.020. [PubMed: 15949990]

Brassett-Harknett A, Butler N. Attention-deficit/hyperactivity disorder: An overview of the etiology and a review of the literature relating to the correlates and lifecourse outcomes for men and women. Clinical Psychology Review. 2007; 27:188–210. http://dx.doi.org/10.1016/j.cpr.2005.06.001. [PubMed: 16081194]

Briggs-Gowan MJ, Carter AS, Clark R, Augustyn M, McCarthy KJ, Ford JD. Exposure to potentially traumatic events in early childhood: Differential links to emergent psychopathology. Journal of Child Psychology and Psychiatry. 2010; 51:1132–1140. http://dx.doi.org/10.1111/j.1469-7610.2010.02256.x. [PubMed: 20840502]

Briscoe-Smith AM, Hinshaw SP. Linkages between child abuse and attention-deficit/hyperactivity disorder in girls: Behavioral and social correlates. Child Abuse & Neglect. 2006; 30:1239–1255. http://dx.doi.org/10.1016/j.chiabu.2006.04.008. [PubMed: 17097140]

Buka SL, Stichick TL, Birdthistle I, Earls FJ. Youth exposure to violence: Prevalence, risks, and consequences. American Journal of Orthopsychiatry. 2001; 71:298–310. http://dx.doi.org/10.1037/0002-9432.71.3.298. [PubMed: 11495332]

Carrion VG, Weems CF, Reiss AL. Stress predicts brain changes in children: A pilot longitudinal study on youth stress, posttraumatic stress disorder, and the hippocampus. Pediatrics. 2007; 119:509–516. http://dx.doi.org/10.1542/peds.2006-2028. [PubMed: 17332204]

Chou, WJ.; Liu, TL.; Yang, P.; Yen, CF.; Hu, HF. Bullying victimization and perpetration and their correlates in adolescents clinically diagnosed with ADHD.. Journal of Attention Disorders. 2014. Advance online publication. http://dx.doi.org/10.1177/1087054714558874

Cicchetti, D. Development and psychopathology. Cambridge University Press; New York, NY: 1991.

Coker TR, Elliott MN, Kataoka S, Schwebel DC, Mrug S, Grunbaum JA, Schuster MA. Racial/ethnic disparities in the mental health care utilization of fifth grade children. Academic Pediatrics. 2009; 9:89–96. http://dx.doi.org/10.1016/j.acap.2008.11.007. [PubMed: 19329099]

Counts CA, Nigg JT, Stawicki JA, Rappley MD, von Eye A. Family adversity in *DSM–IV* ADHD combined and inattentive subtypes and associated disruptive behavior problems. Journal of the American Academy of Child & Adolescent Psychiatry. 2005; 44:690–698. http://dx.doi.org/10.1097/01.chi.0000162582.87710.66. [PubMed: 15968238]

Cuevas CA, Finkelhor D, Ormrod R, Turner H. Psychiatric diagnosis as a risk marker for victimization in a national sample of children. Journal of Interpersonal Violence. 2009; 24:636–652. http://dx.doi.org/10.1177/0886260508317197. [PubMed: 18445831]

De Bellis MD, Keshavan MS, Shifflett H, Iyengar S, Beers SR, Hall J, Moritz G. Brain structures in pediatric maltreatment-related posttraumatic stress disorder: A sociodemographically matched study. Biological Psychiatry. 2002; 52:1066–1078. http://dx.doi.org/10.1016/S0006-3223(02)01459-2. [PubMed: 12460690]

DePrince AP, Weinzierl KM, Combs MD. Executive function performance and trauma exposure in a community sample of children. Child Abuse & Neglect. 2009; 33:353–361. http://dx.doi.org/10.1016/j.chiabu.2008.08.002. [PubMed: 19477515]

Eaton DK, Kann L, Kinchen S, Ross J, Hawkins J, Harris WA, Wechsler H. Youth risk behavior surveillance-United States, 2005. Morbidity and Mortality Weekly Report, Surveillance Summaries. 2006; 55(SS05):1–108. Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5505a1.htm. [PubMed: 16760893]

Espelage DL, Swearer SM. Research on school bullying and victimization: What have we learned and where do we go from here? School Psychology Review. 2003; 32:365–383.

Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, Marks JS. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The

Adverse Childhood Experiences (ACE) Study. American Journal of Preventive Medicine. 1998; 14:245–258. http://dx.doi.org/10.1016/S0749-3797(98)00017-8. [PubMed: 9635069]

Finkelhor D, Ormrod RK, Turner HA. Poly-victimization: A neglected component in child victimization. Child Abuse & Neglect. 2007; 31:7–26. http://dx.doi.org/10.1016/j.chiabu.2006.06.008. [PubMed: 17224181]

Finkelhor, D.; Turner, H.; Hamby, SL.; Ormrod, R. Polyvictimization: Children's exposure to multiple types of violence, crime, and abuse. U. S. Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention; Washington, DC: 2011. Retrieved from https://www.ncjrs.gov/pdffiles1/ojjdp/235504.pdf

Finkelhor D, Turner H, Ormrod R, Hamby SL. Violence, abuse, and crime exposure in a national sample of children and youth. Pediatrics. 2009; 124:1411–1423. http://dx.doi.org/10.1542/peds2009-0467. [PubMed: 19805459]

Fishbein D, Warner T, Krebs C, Trevarthen N, Flannery B, Hammond J. Differential relationships between personal and community stressors and children's neurocognitive functioning. Child Maltreatment. 2009; 14:299–315. http://dx.doi.org/10.1177/1077559508326355. [PubMed: 18971345]

Ford JD, Racusin R, Ellis CG, Daviss WB, Reiser J, Fleischer A, Thomas J. Child maltreatment, other trauma exposure, and posttraumatic symptomatology among children with oppositional defiant and attention deficit hyperactivity disorders. Child Maltreatment. 2000; 5:205–217. http://dx.doi.org/10.1177/1077559500005003001. [PubMed: 11232267]

Foster JD, Kuperminc GP, Price AW. Gender differences in posttraumatic stress and related symptoms among inner-city minority youth exposed to community violence. Journal of Youth and Adolescence. 2004; 33:59–69. http://dx.doi.org/10.1023/A:1027386430859.

Graham-Bermann SA, Seng J. Violence exposure and traumatic stress symptoms as additional predictors of health problems in high-risk children. The Journal of Pediatrics. 2005; 146:349–354. http://dx.doi.org/10.1016/j.jpeds.2004.10.065. [PubMed: 15756218]

Harty SC, Miller CJ, Newcorn JH, Halperin JM. Adolescents with childhood ADHD and comorbid disruptive behavior disorders: Aggression, anger, and hostility. Child Psychiatry and Human Development. 2009; 40:85–97. http://dx.doi.org/10.1007/s10578-008-0110-0. [PubMed: 18597170]

Herrenkohl TI, Sousa C, Tajima EA, Herrenkohl RC, Moylan CA. Intersection of child abuse and children's exposure to domestic violence. Trauma, Violence, & Abuse. 2008; 9:84–99. http://dx.doi.org/10.1177/1524838008314797.

Hickman LJ, Jaycox LH, Setodji CM, Kofner A, Schultz D, Barnes-Proby D, Harris R. How much does “how much” matter? Assessing the relationship between children's lifetime exposure to violence and trauma symptoms, behavior problems, and parenting stress. Journal of Interpersonal Violence. 2013; 28:1338–1362. http://dx.doi.org/10.1177/0886260512468239. [PubMed: 23266994]

Hughes HM, Parkinson D, Vargo M. Witnessing spouse abuse and experiencing physical abuse: A “double whammy”? Journal of Family Violence. 1989; 4:197–209. http://dx.doi.org/10.1007/BF01006629.

Humphrey JL, Storch EA, Geffken GR. Peer victimization in children with attention-deficit hyperactivity disorder. Journal of Child Health Care. 2007; 11:248–260. http://dx.doi.org/10.1177/1367493507079571. [PubMed: 17709359]

Kitzmann KM, Gaylord NK, Holt AR, Kenny ED. Child witnesses to domestic violence: A meta-analytic review. Journal of Consulting and Clinical Psychology. 2003; 71:339–352. http://dx.doi.org/10.1037/0022-006X.71.2.339. [PubMed: 12699028]

Korn, EL.; Graubard, BI. Analysis of health surveys. Wiley; New York, NY: 1999.

Krug EG, Mercy JA, Dahlberg LL, Zwi AB. The world report on violence and health. The Lancet. 2002; 360:1083–1088. http://dx.doi.org/10.1016/S0140-6736(02)11133-0.

Lackschewitz H, Hüther G, Kröner-Herwig B. Physiological and psychological stress responses in adults with attention-deficit/hyperactivity disorder (ADHD). Psychoneuroendocrinology. 2008; 33:612–624. http://dx.doi.org/10.1016/j.psyneuen.2008.01.016. [PubMed: 18329819]

Leeb RT, Lewis T, Zolotor AJ. A review of physical and mental health consequences of child abuse and neglect and implications for practice. American Journal of Lifestyle Medicine. 2011; 5:454–468. http://dx.doi.org/10.1177/1559827611410266.

Lucas CP, Zhang H, Fisher PW, Shaffer D, Regier DA, Narrow WE, Friman P. The DISC Predictive Scales (DPS): Efficiently screening for diagnoses. Journal of the American Academy of Child & Adolescent Psychiatry. 2001; 40:443–449. http://dx.doi.org/10.1097/00004583-200104000-00013. [PubMed: 11314570]

Lynch M, Cicchetti D. An ecological-transactional analysis of children and contexts: The longitudinal interplay among child maltreatment, community violence, and children's symptomatology. Development and Psychopathology. 1998; 10:235–257. http://dx.doi.org/10.1017/S095457949800159X. [PubMed: 9635223]

Margolin G. Children's exposure to violence: Exploring developmental pathways to diverse outcomes. Journal of Interpersonal Violence. 2005; 20:72–81. http://dx.doi.org/10.1177/0886260504268371. [PubMed: 15618563]

McLaughlin KA, Sheridan MA, Winter W, Fox NA, Zeanah CH, Nelson CA. Widespread reductions in cortical thickness following severe early-life deprivation: A neurodevelopmental pathway to attention-deficit/hyperactivity disorder. Biological Psychiatry. 2014; 76:629–638. http://dx.doi.org/10.1016/j.biopsych.2013.08.016. [PubMed: 24090797]

Moffitt TE, the Klaus-Grawe 2012 Think Tank. Childhood exposure to violence and lifelong health: Clinical intervention science and stress-biology research join forces. Development and Psychopathology. 2013; 25:1619–1634. http://dx.doi.org/10.1017/S0954579413000801. [PubMed: 24342859]

Nussbaum NL. ADHD and female specific concerns: A review of the literature and clinical implications. Journal of Attention Disorders. 2012; 16:87–100. http://dx.doi.org/10.1177/1087054711416909. [PubMed: 21976033]

Ouyang L, Fang X, Mercy J, Perou R, Grosse SD. Attention-deficit/hyperactivity disorder symptoms and child maltreatment: A population-based study. The Journal of Pediatrics. 2008; 153:851–856. http://dx.doi.org/10.1016/j.jpeds.2008.06.002. [PubMed: 18619612]

Perkins S, Graham-Bermann S. Violence exposure and the development of school-related functioning: Mental health, neurocognition, and learning. Aggression and Violent Behavior. 2012; 17:89–98. http://dx.doi.org/10.1016/j.avb.2011.10.001. [PubMed: 22837647]

Perry BD, Pollard RA, Blakley TL, Baker WL, Vigilante D. Childhood trauma, the neurobiology of adaptation, and “use-dependent” development of the brain: How “states” become “traits”. Infant Mental Health Journal. 1995; 16:271–291. http://dx.doi.org/10.1002/1097-0355(199524)16:4<271::AID-IMHJ2280160404>3.0.CO;2-B.

Pesonen AK, Kajantie E, Jones A, Pyhälä R, Lahti J, Heinonen K, Räikkönen K. Symptoms of attention deficit hyperactivity disorder in children are associated with cortisol responses to psychosocial stress but not with daily cortisol levels. Journal of Psychiatric Research. 2011; 45:1471–1476. http://dx.doi.org/10.1016/j.jpsychires.2011.07.002. [PubMed: 21802096]

Schuster MA, Elliott MN, Kanouse DE, Wallander JL, Tortolero SR, Ratner JA, Banspach SW. Racial and ethnic health disparities among fifth-graders in three cities. The New England Journal of Medicine. 2012; 367:735–745. http://dx.doi.org/10.1056/NEJMsa1114353. [PubMed: 22913683]

Shonkoff JP, Garner AS, Committee on Psychosocial Aspects of Child and Family Health, Committee on Early Childhood, Adoption, and Dependent Care, Section on Developmental and Behavioral Pediatrics. Siegel BS, Wegner LM. The lifelong effects of early childhood adversity and toxic stress. Pediatrics. 2012; 129:e232–e246. http://dx.doi.org/10.1542/peds.2011-2663. [PubMed: 22201156]

Szymanski K, Sapanski L, Conway F. Trauma and ADHD—Association or diagnostic confusion? A clinical perspective. Journal of Infant, Child, and Adolescent Psychotherapy. 2011; 10:51–59. http://dx.doi.org/10.1080/15289168.2011.575704.

Taylor LA, Saylor C, Twyman K, Macias M. Adding insult to injury: Bullying experiences of youth with attention deficit hyperactivity disorder. Children's Health Care. 2010; 39:59–72. http://dx.doi.org/10.1080/02739610903455152.

Teicher MH, Andersen SL, Polcari A, Anderson CM, Navalta CP. Developmental neurobiology of childhood stress and trauma. Psychiatric Clinics of North America. 2002; 25:397–426. http://dx.doi.org/10.1016/S0193-953X(01)00003-X. [PubMed: 12136507]

Tolin DF, Foa EB. Sex differences in trauma and posttraumatic stress disorder: A quantitative review of 25 years of research. Psychological Bulletin. 2006; 132:959–992. http://dx.doi.org/10.1037/0033-2909.132.6.959. [PubMed: 17073529]

Turner HA, Finkelhor D, Ormrod R. Poly-victimization in a national sample of children and youth. American Journal of Preventive Medicine. 2010; 38:323–330. http://dx.doi.org/10.1016/j.amepre.2009.11.012. [PubMed: 20171535]

Visser SN, Danielson ML, Bitsko RH, Holbrook JR, Kogan MD, Ghandour RM, Blumberg SJ. Trends in the parent-report of health care provider-diagnosed and medicated attention-deficit/hyperactivity disorder: United States, 2003–2011. Journal of the American Academy of Child & Adolescent Psychiatry. 2014; 53:34–46. e2. http://dx.doi.org/10.1016/j.jaac.2013.09.001. [PubMed: 24342384]

Windle M, Grunbaum JA, Elliott M, Tortolero SR, Berry S, Gilliland J, Schuster M. Healthy passages: A multilevel, multimethod longitudinal study of adolescent health. American Journal of Preventive Medicine. 2004; 27:164–172. http://dx.doi.org/10.1016/j.amepre.2004.04.007. [PubMed: 15261905]

Zelazo PD, Carlson SM. Hot and cool executive function in childhood and adolescence: Development and plasticity. Child Development Perspectives. 2012; 6:354–360.

Table 1

Sample Demographics as a Function of ADHD Symptoms and Diagnostic Indicator (N = 4745)

Study variables	Number of ADHD symptoms		Diagnostic indicator for ADHD	
	Mean[a]	*SD*	%	*n*
Violence exposure				
No exposure	1.91	1.96	21	278
Single exposure	2.10	2.08	25	454
Dual exposure	2.65	2.24	35	551
Gender				
Boys	2.52	2.25	32	755
Girls	1.91	1.98	22	528
Study site				
Birmingham	2.56	2.31	34	517
Houston	2.13	2.03	24	406
Los Angeles	2.00	1.98	23	360
Race/ethnicity				
African American	2.64	2.11	34	560
Caucasian	2.19	2.12	25	305
Latino	1.98	2.14	22	347
Other	1.99	1.79	24	71
Median income	—	—	$30,000-$34,999	1283

Note. Percentages represent the percentage of the row category.

[a]Indicates weighted means.

Table 2

Summary of Regression Analyses Predicting Number of ADHD Symptoms for the Total Sample

			Total sample		
Study variables	***b***	***SE* B**	***t***	**95% CI**	
Income	–0.06	0.01	–6.79***	–0.07	–0.04
Race/ethnicity (ref = White)					
African American	0.07	0.10	0.74	–0.12	0.27
Latino	–0.36	0.10	–3.47***	–0.57	–0.16
Other	–0.19	0.15	–1.25	–0.49	0.11
Study site (ref = Birmingham)					
Houston	–0.30	0.09	–3.40***	–0.47	–0.13
Los Angeles	–0.34	0.09	–3.64***	–0.52	–0.15
Gender (ref = girls)	0.68	0.08	8.55***	0.52	0.83
Violence exposure (ref = No exposure)					
Single exposure	0.05	0.08	0.67	–0.10	0.20
Dual exposure	0.67	0.11	5.87***	0.44	0.89
Gender × dual exposure	–0.29	0.13	–2.28*	–0.54	–0.04

Note. $F(10, 115) = 24.11$, $p < .0001$; $R^2 = .07$, $N = 4,745$.

** $p < .01$.

* $p < .05$.

*** $p < .001$.

Table 3

Summary of Regression Analyses Predicting Number of ADHD Symptoms by Gender

	Girls[a]					Boys[b]				
Study variables	***b***	***SE* B**	***t***	**95% CI**		***b***	***SE* B**	***t***	**95% CI**	
Income	–0.05	0.01	–5.40***	–0.07	–0.03	–0.06	0.01	–4.29***	–0.08	–0.03
Race/ethnicity (ref = White)										
African American	0.13	0.12	1.14	–0.09	0.36	0.02	0.16	0.11	–0.30	0.34
Latino	–.39	0.14	–2.73*	–0.67	–0.11	–0.32	0.17	–1.87	–0.67	0.02
Other	–0.23	0.18	–1.33	–0.58	11	–0.13	0.24	–0.54	–0.61	0.35
Study site (ref = Birmingham)										
Houston	–0.11	0.12	–0.90	–0.34	0.13	–0.49	0.13	–3.65***	–0.75	–0.22
Los Angeles	–0.19	0.12	–1.60	–0.42	0.04	–0.49	0.16	–2.99**	–0.81	–0.16
Gender	—	—		—	—	—	—		—	—
Violence exposure (ref = No exposure)										
Single exposure	–.00	.10	–0.01	–0.21	0.22	0.11	0.12	0.95	–0.12	0.34
Dual exposure	0.63	0.12	5.22***	0.39	0.87	0.41	0.10	3.96***	0.21	0.62
Gender × dual exposure	—	—		—	—	—	—		—	—

[a] $F(8, 115) = 24.11$, $p < .0001$; $R^2 = .06$, $N = 2.388$.

[b] $F(8, 114) = 13.92$, $p < .0001$; $R^2 = .04$, $N = 2.357$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 4

Summary of Logistic Regression Analyses Predicting Predictive Criteria for the Total Sample

	Total sample					
Study variables	***b***	***SE* B**	**Adj OR**	**95% CI**		***p***
Income	–0.04	0.01	0.96	0.94	0.98	<.001
Race/ethnicity[a]						
African American	0.02	0.10	1.02	0.85	1.24	.804
Latino	–0.38	0.12	0.68	0.56	0.82	.002
Other	–0.04	0.18	0.96	0.67	1.38	.838
Study site						
Texas	–0.28	0.09	0.75	0.63	0.90	.002
Los Angeles	–0.39	0.10	0.68	0.56	0.82	<.001
Gender (Ref = Girls)	0.63	0.10	1.88	1.53	2.30	<.001
Violence exposure[b]						
Single exposure	0.12	0.10	1.13	0.93	1.37	.212
Dual exposure	0.72	0.13	2.05	1.59	2.65	<.001
Gender × dual exp	–0.30	0.15	0.74	0.55	0.99	.041

[a] Reference = White.

[b] Reference = No exposure.

Table 5

Summary of Logistic Regression Analyses Predicting Predictive Criteria by Gender

	Girls						Boys					
Study variables	***b***	***SE* B**	**Adj OR**	**95% CI**		***p***	***b***	***SE* B**	**Adj OR**	**95% CI**		***p***
Income	–.05	.01	0.95	0.93	0.98	<.001	–.04	.01	0.97	0.94	0.99	.009
Race/ethnicity[a]												
African American	.09	.16	1.10	0.81	1.49	.559	–.03	.15	0.97	0.72	1.30	.829
Latino	–.52	.22	0.60	0.39	0.92	.019	–.28	.17	0.76	0.54	1.05	.097
Other	–.24	.26	0.79	0.47	1.32	.019	.10	.25	1.11	0.68	1.81	0.676
Study site												
Texas	–.14	.16	0.87	0.64	1.18	.367	–.40	.12	0.67	0.53	0.85	.001
Los Angeles	–.23	.15	0.79	0.59	1.07	.128	–.52	.15	0.60	0.45	0.80	.001
Violence exposure[b]												
Single exposure	.06	.16	1.07	0.77	1.47	0.69	.17	.11	1.18	0.94	1.48	.144
Dual exposure	.66	.15	1.94	1.46	2.59	<.001	.45	.11	1.57	1.26	1.94	<.001

[a] Reference = White.

[b] Reference = No exposure.