Violence and Risk of PTSD, Major Depression, Substance Abuse/Dependence, and Comorbidity: Results From the National Survey of Adolescents

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With a national household probability sample of 4,023 telephone-interviewed adolescents ages 12–17, this study provides prevalence, comorbidity, and risk-factor data for posttraumatic stress disorder (PTSD), major depressive episode (MDE), and substance abuse/dependence (SA/D). Roughly 16% of boys and 19% of girls met criteria for at least 1 diagnosis. Six-month PTSD prevalence was 3.7% for boys and 6.3% for girls, 6-month MDE prevalence was 7.4% for boys and 13.9% for girls, and 12-month SA/D prevalence was 8.2% for boys and 6.2% for girls. PTSD was more likely to be comorbid than were MDE and SA/D. Results generally support the hypothesis that exposure to interpersonal violence (i.e., physical assault, sexual assault, or witnessed violence) increases the risk of these disorders and of diagnostic comorbidity.

Limited information exists about the prevalence and comorbidity of posttraumatic stress disorder (PTSD), major depressive episode (MDE), and substance abuse/dependence (SA/D) among probability samples of adolescents. The extent to which interpersonal violence increases risk of these disorders also remains understudied. We examined these issues using data from the National Survey of Adolescents (NSA). In addition to presenting national prevalence and comorbidity data for these three disorders, we tested the hypothesis that exposure to interpersonal violence increases risk of each disorder and of comorbidity.

To date, the best estimates of these mental health problems and their comorbidity among younger age groups at the national level come from the National Comorbidity Survey (NCS; Kessler et al., 1994; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Kessler & Walters, 1998). In their youngest cohort of 15–24 year olds, Kessler (2002) found past-year prevalences of 12.8% for MDE (16.6% women, 9.1% men) and 16.5% for SA/D (9.2% women, 23.4% men). Lifetime PTSD prevalences of 10.4% for women and 5.0% for men were reported in a separate article (Kessler et al., 1995). For all three disorders, risk/protective factor analyses suggested that this age group had increased risk relative to their older counterparts (ages 25–54 years). However, because adolescent participants composed only one third (33.9%) of the age 15–24 years cohort in the NCS, these findings may not generalize well to the population of adolescents as a whole.

Other studies have used nonnational samples to provide prevalence and risk-factor data exclusively with child and adolescent participants (e.g., Romano, Tremblay, Vitaro, Zoccolillo, & Pagani, 2001; Shaffer et al., 1996). Romano et al. used a structured diagnostic interview to assess the 6-month prevalence of several *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edition, revised (*DSM–III–R*; American Psychiatric Association, 1987) diagnoses among 1,201 adolescents (60% participation rate) ages 14–17 years residing in the province of Quebec, Canada. Prevalences based on self-report data were 8.9% (13.5% girls, 4.3% boys) for anxiety disorders (i.e., simple phobia, social phobia, agoraphobia, separation anxiety disorder, overanxious disorder, or generalized anxiety disorder) and 5.6% (9.4% girls, 1.7% boys) for depressive disorders (i.e., dysthymia or major depression). Using a similar methodology, Shaffer et al. assessed several *DSM–III–R* diagnoses among 1,285 youth (84% participation rate) ages 9–17 years who were recruited from four geographic areas in the United States; three areas were in the eastern continental United States, and the fourth area was in San Juan, Puerto Rico. Six-month prevalences (based on self-report data and diagnosis-specific impairment) were 12.3% for anxiety disorders and 4.3% for depressive disorders.

Although these studies represent important developments in the literature on child and adolescent psychopathology, the extent to which findings are generalizable to the U.S. national population of adolescents as a whole is unclear. Prevalence and comorbidity data generated with nonnational samples may be influenced by a variety of factors (e.g., racial composition of sample, likelihood of exposure to interpersonal violence) associated with different recruitment settings (e.g., region of the country, inner-city vs. rural settings). For example, using data from two national probability

samples of nearly 11,000 women, Kilpatrick (2002) found that lifetime prevalence of completed rape described by adult women differs significantly across the nine regions of the country, ranging from 11.0% (Middle Atlantic) to 21.1% (Mountain). This underscores the need for national probability estimates to strengthen confidence in, and advance data from, nonnational samples concerning the prevalence, comorbidity, and risk/protective factors associated with traumatic life events and related mental health outcomes.

Violence and Mental Health

Research with adult participants demonstrates clear relations between exposure to interpersonal violence and PTSD. For instance, Resnick, Kilpatrick, Dansky, Saunders, and Best (1993) and Kessler et al. (1995) reported that interpersonal violence (e.g., rape, physical assault) increased risk of PTSD relative to other potentially traumatic events (e.g., disasters, accidents). Researchers have also identified other outcomes associated with interpersonal violence, such as MDE and SA/D (e.g., Kessler, Davis, & Kendler, 1997; Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997; Saunders, Kilpatrick, Hanson, Resnick, & Walker, 1999), but these relations are less well established.

Studies exploring relations between interpersonal violence and mental health outcomes among adolescents are much rarer and have yielded inconsistent results (Kessler, Avenevoli, & Merikangas, 2001). One particularly noteworthy study was conducted by Boney-McCoy and Finkelhor (1996), who used a longitudinal, prospective design to examine youth victimization in relation to symptoms of PTSD and depression with a national random sample of children ages 10–16 years. Assessment at Time 2 occurred roughly 15 months following Time 1 assessment, and several Time 2 questions were designed to assess participants' victimization experiences (e.g., sexual abuse, parental physical assault, nonfamilial physical assault) in the interim. Findings indicated that victimization in the interim (particularly sexual abuse, parental physical assault, and kidnapping) was associated with significantly increased risk for MDE and symptoms of PTSD after controlling for Time 1 symptom data and parent–child relationship quality. Other outcomes, such as substance use problems and comorbid diagnoses, were not assessed.

Research indicates that PTSD is commonly comorbid with MDE and, to a lesser extent, with SA/D (e.g., Breslau, Davis, Andreski, & Peterson, 1991; Helzer, Robins, & McEvoy, 1987; Kessler et al., 1995). Yet, the literature offers little information concerning risk and protective factors for diagnostic comorbidity among youth. Furthermore, in light of accumulating support for relations between interpersonal violence and PTSD, and between PTSD and other disorders, it follows that some forms of violence may heighten risk for diagnostic comorbidity. A greater understanding of risk associated with different forms of interpersonal victimization in youth may advance our understanding of the etiology, course, and treatment of adolescent psychopathology (cf. Angold, Costello, & Erkanli, 1999).

Kilpatrick et al. (2000) recently published an investigation of alcohol abuse/dependence, marijuana abuse/dependence, and hard-drug abuse/dependence among a national probability sample of adolescents. Demographic and familial correlates of SA/D included age, gender, race, and familial substance-use problems.

Furthermore, Kilpatrick et al. (2000) found that exposure to interpersonal violence increased risk for each substance-use disorder after controlling for these demographic and familial variables.

We build upon these Kilpatrick et al. (2000) findings by focusing on a broader range of outcomes, including MDE and PTSD, as well as patterns of comorbidity. Using the sample described by Kilpatrick et al. (2000), we examined prevalence, comorbidity, and risk and protective factors associated with adolescent PTSD, MDE, and SA/D. We tested the hypothesis that exposure to interpersonal violence (i.e., sexual assault, physical assault, witnessed violence) would increase risk of PTSD, MDE, SA/D, and of comorbidity after controlling for demographic characteristics and familial substance abuse.

Method

Participants

Because a detailed description of the NSA sample and methodology was provided by Kilpatrick et al. (2000), this description will focus primarily on measures and procedures that were not described in the previous article. The NSA included a sample of 4,023 youth between the ages of 12 and 17 years. Sample selection and interviewing were conducted by Schulman, Ronca, and Bucuvalas, Inc. (a New York-based survey research firm) using a multistage, stratified, area probability random digit dialing procedure to produce a representative sample of adolescents based on U.S. Bureau of the Census (1988) estimates of the 1995 adolescent population. Of the 4,023 participants, 3,161 composed a national probability sample, and the remaining 862 composed a probability oversample selected from households in areas designated as central cities by the U.S. Bureau of the Census. Parental permission was obtained to interview a randomly selected adolescent, and the adolescent gave permission and completed the interview in 75% of eligible households.

To correct for demographic discrepancies between the NSA and U.S. population proportions as a result of the central city oversample, data were weighted on the basis of geographic stratum, age, race, and gender. Data from participants in each of these categories then were multiplied by a weighting coefficient calculated to bring this sample in line with U.S. Census estimates. Data for the present sample were limited to the NSA subsample of 2,002 male and 1,904 female respondents who provided complete age, race, and psychopathology information.

Measures

A highly structured telephone interview was designed to collect information across several domains, including demographic and familial variables, trauma history (e.g., sexual assault, physical assault), and the three disorders (i.e., PTSD, MDE, SA/D).

Risk- and protective-factor variables. *Race* and *ethnicity* were assessed using standard questions employed by the U.S. Bureau of the Census (1988). For risk-factor analyses, four dummy-coded variables refer to each of the following participant groups: African American, non-Hispanic (*n* = 590, 15.1%); Native American, non-Hispanic (*n* = 139, 3.6%); Asian American, non-Hispanic (*n* = 46, 1.2%); and Hispanic (*n* = 311, 8.0%). Caucasian, non-Hispanic participants (*n* = 2820, 72.2%) served as the reference group.

Sexual assault was defined as forced (a) vaginal or anal penetration by an object, finger, or penis; (b) oral sex; (c) touching of the respondent's breasts or genitalia; or (d) respondents' touching of another person's genitalia. *Physical assault* was defined as having been (a) attacked or threatened with a gun, knife, or some other weapon; (b) attacked by another person with perceived intent to kill or seriously injure; (c) beaten and injured (i.e., "hurt pretty badly") by another person; (d) spanked so force-

fully that the respondent sustained welts or bruises, or required medical care; or (e) cut, burned, or tied up by a caregiver as a punitive consequence. *Witnessed violence* included having observed in person someone (a) shoot someone with a gun; (b) cut or stab someone with a knife; (c) threaten someone with a gun, a knife, or other weapon; (d) mug or rob someone; or (e) rape or sexually assault someone.

Additional measures were taken to encourage accurate reporting when assessing the occurrence of sexual assault, physical assault, and witnessed violence. First, prefatory statements were used to orient participants toward the range and nature of events being assessed. For example, prior to administering the set of sexual assault questions (similarly structured introductory statements were used to facilitate assessment of physical assault and witnessed violence), participants were told the following:

> Sometimes a person may do sexual things to a young person that the young person doesn't want. These unwanted sexual things can happen to boys as well as girls and to young men as well as young women. People who try to do unwanted sexual things to young people are not always strangers but can be someone you know well like a neighbor, teacher, coach, counselor, boss, baby-sitter, minister, or priest. They can even be a family member. People who try to make young people do unwanted sexual things aren't always men or boys—they can also be women or girls. I am talking about *any* experiences you've had where someone tried to make you do something sexual you didn't want to do, no matter who did it, how long ago it happened, or whether it was reported to police.

Second, questions were structured in a behaviorally specific manner to ensure precise communication of the types of events and circumstances being assessed, thereby increasing the likelihood that interpersonal victimization would accurately be detected through self-report (see Koss, 1993). Returning to the example of sexual assault, questions were structured as such (follow-up questions were asked when any of the questions below were endorsed):

1. Has a man or boy ever put a sexual part of his body inside your private sexual parts, inside your rear end, or inside your mouth when you didn't want them to?

2. (Not counting any incidents you already told me about), has anyone, male or female, ever put fingers or objects inside your private sexual parts or inside your rear end when you didn't want them to?

3. (Not counting any incidents you already told me about), has anyone, male or female, ever put their mouth on your private sexual parts when you didn't want them to?

4. (Not counting any incidents you already told me about), has anyone, male or female, ever touched your private sexual parts when you didn't want them to?

5. (Not counting any incidents you already told me about), has anyone ever made you touch their private sexual parts when you didn't want them to?

6. *For boys only*: (Not counting any incidents you already told me about), has a women or girl ever put *your* sexual private part in her mouth or inside her body when you didn't want her to?

Familial alcohol problems was operationalized as an affirmative answer to the following question: "Has anyone—either in your family or who lived with you, not counting you—drank alcohol (beer, wine) so much that it became a problem?" *Familial drug use* was defined as an affirmative answer to the following question: "Did anyone in your family or who lived with you, not counting you, use hard drugs, such as heroin, cocaine, speed,

or uppers or downers, or have a drug problem?" Questions for familial alcohol problems and drug use both were accompanied by clarifying statements (see Kilpatrick et al., 2000).

Criterion variables. PTSD was assessed with a modified version of the National Women's Study (NWS) PTSD Module (Kilpatrick, Resnick, Saunders, & Best, 1989), which assessed each *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (*DSM–IV*; American Psychiatric Association, 1994) criterion with a yes/no response and yielded *DSM–IV* diagnoses of PTSD for the previous 6 months (see Kilpatrick et al., 2000). Cronbach's alpha for this sample was .87, indicative of good internal consistency. *MDE* was assessed using the NWS Depression Module, a structured interview that targets MDE criteria using a yes/no response format for each *DSM–IV* symptom for the prior 6 months. This module has been used in previous studies examining mental health correlates of interpersonal violence and terrorism (e.g., Duncan, Saunders, Kilpatrick, Hanson, & Resnick, 1996; Galea et al., 2002; Saunders et al., 1999). Cronbach's alpha coefficient for this sample was .85. Past-year *SA/D* was assessed for a range of substances (e.g., alcohol, marijuana, cocaine) using questions that followed *DSM–IV* criteria. The presence of substance abuse or substance dependence was sufficient to be categorized as having current SA/D in this study. Whereas PTSD and MDE symptoms were assessed using a 6-month criterion to differentiate "current" and "lifetime" diagnoses, a 12-month criterion was used for SA/D items for the purpose of ensuring consistency with *DSM–IV* requirements.

Procedure

Telephone interviews were conducted in English or Spanish, based on each participant's preference. Computer-assisted telephone interviewing technology was used to guide the interview process, and supervisors conducted random checks of data entry accuracy and interviewers' adherence to assessment procedures. Two steps were taken to increase the likelihood that adolescents answered questions in an open and honest manner, with a reasonable degree of privacy. First, the interviewer specifically asked whether the adolescent was in a location where they could be assured of privacy and could answer freely. If the adolescent indicated that they could not, the interviewer offered to call back at another time when privacy was more likely. Second, the interview was designed primarily with closed-ended questions, enabling adolescents to respond to questions with a simple "yes" or "no", or other one-word or phrase answers. Thus, if someone in the home were listening to a respondent's answers, he or she would be unlikely to hear anything that would place the respondent at risk. Adolescents received a certificate of participation in the "National Survey of Adolescents" and a check for $5. See Kilpatrick et al. (2000) for additional information on participant protection.

Results

Data Analysis

Prevalence and comorbidity data are presented first, followed by risk factor findings. Hierarchical logistic regression was used to identify odds ratios (ORs) and to test the hypothesis that exposure to interpersonal violence is associated with an increased risk of PTSD, MDE, and SA/D after controlling for demographics and familial substance use problems. The hierarchy consisted of three steps and was structured as follows: (a) demographics (i.e., race and ethnicity variables, gender, age), (b) family factors (i.e., familial alcohol use problems, familial drug use problems), and (c) interpersonal violence (i.e., sexual assault, physical assault, witnessed violence). An alpha level of .05 was chosen a priori.

Prevalence and Comorbidity

Overall, 15.5% of boys and 19.3% of girls had at least one of the three mental health problems (see Table 1). Roughly twice the proportion of girls than boys met criteria for PTSD (6.3% vs. 3.7%) and MDE (13.9% vs. 7.4%). Girls and boys had relatively similar prevalences of SA/D (6.2% vs. 8.2%). For the full sample, nearly three fourths of the PTSD cases had at least one comorbid diagnosis, whereas fewer than two fifths of MDE and SA/D cases had a comorbid diagnosis.

Comorbidity for each pair of diagnoses ranged from 1.1–1.8% for boys and 1.5–4.4% for girls (note that these percentages do not correspond to those listed in Table 1 because mutually exclusive categories were used to delineate patterns of comorbidity in Table 1). These data are broken down further in Table 2. High comorbidity was found between PTSD and MDE, as 29% of MDE cases also met criteria for PTSD and 62% of PTSD cases also met MDE criteria. Comorbidity was lowest for boys with SA/D: Roughly 1 in 7 had comorbid PTSD, and 1 in 6 had comorbid MDE.

Risk Factors and Protective Factors

Results of hierarchical logistic regression analyses are provided in Tables 3 and 4. Note that, to minimize loss of statistical power associated with low base rates, criterion variables for Table 4 Analyses A, B, and C were nonmutually exclusive (e.g., 32 of 119 participants with comorbid PTSD and MDE also met criteria for SA/D). Intercorrelations for risk factors and criterion variables are provided in Table 5.

Noncomorbid diagnoses. In the final multivariable logistic regression, demographic variables significantly associated with noncomorbid PTSD were Hispanic ethnicity (OR = 4.1 vs. White, non-Hispanic), African American race (OR = 2.5 vs. White, non-Hispanic), and age (OR = 1.3 per year increase). Interpersonal violence variables (i.e., witnessed violence, sexual assault, physical assault) did not significantly increase risk of noncomorbid PTSD in the final model (recall that, because of the high prevalence of comorbid diagnoses among PTSD cases, only 1.4% of sample met criteria for noncomorbid PTSD). Demographic variables significantly associated with noncomorbid MDE in the final model were female gender (OR = 1.9 vs. male adolescents), age (OR = 1.1 per year increase), familial alcohol use problems (OR = 1.6 vs. none), and physical assault (OR = 2.2 vs. none). For noncomorbid SA/D, variables associated significantly in the final model included the following: (a) female gender (OR = 0.5 vs. male adolescents) and African American race (OR = 0.3 vs. White, non-Hispanic) were protective factors; (b) age (OR = 2.0 per year increase) and family history of alcohol abuse problems (OR = 1.8 vs. none) were risk factors; and (c) witnessed violence (OR = 2.6 vs. none) and physical assault (OR = 1.8 vs. none) also were risk factors.

Comorbid diagnoses. Significant results of the final multivariable logistic regression for comorbid PTSD and MDE included the following: (a) female gender (OR = 2.5 vs. male adolescents); (b) history of familial drug use problems (OR = 2.0 vs. none); and (c) witnessed violence (OR = 2.9 vs. none), sexual assault (OR = 2.4 vs. none), and physical assault (OR = 2.8 vs. none) all increased risk.

With respect to comorbid PTSD and SA/D, variables significantly associated with increased risk were (a) age (OR = 1.4 per year increase); (b) family history of alcohol use problems (OR = 2.5 vs. none); and (c) witnessed violence (OR = 9.0 vs. none), sexual assault (OR = 6.7 vs. none), and physical assault (OR = 2.8 vs. none).

Significant risk and protective factors for comorbid MDE and SA/D in the final multivariable logistic regression model were the following: (a) African American race (OR = 0.2 vs. White, non-Hispanic) was a protective factor; (b) age (OR = 1.3 per year increase) was a risk factor; and (c) sexual assault (OR = 4.4 vs. none) and witnessed violence (OR = 6.0 vs. none) were risk factors.

Table 2
Patterns of Comorbidity for Adolescent PTSD, MDE, and SA/D

Diagnosis	Comorbid diagnoses (%)		
	PTSD	MDE	SA/D
Boys			
PTSD (n = 74)	—	47.3	29.7
MDE (n = 149)	23.5	—	18.1
SA/D (n = 163)	13.5	16.6	—
Girls			
PTSD (n = 119)	—	70.6	24.2
MDE (n = 265)	31.7	—	17.0
SA/D (n = 117)	24.6	38.5	—

Note. PTSD = posttraumatic stress disorder; MDE = major depressive episode; SA/D = substance abuse/dependence.

Table 1
Prevalence and Comorbidity of Adolescent PTSD, MDE, and SA/D

Mental health problem	Boys		Girls	
	n	Prevalence (%)	n	Prevalence (%)
Overall prevalence				
PTSD	74	3.7	119	6.3
MDE	149	7.4	265	13.9
SA/D	163	8.2	117	6.2
Noncomorbid prevalence				
PTSD only	26	1.3	29	1.5
MDE only	96	4.8	159	8.3
SA/D only	123	6.1	67	3.5
Comorbid prevalence				
PTSD + MDE only	26	1.3	61	3.2
PTSD + SA/D only	13	0.7	6	0.3
MDE + SA/D only	18	0.9	22	1.2
PTSD + MDE + SA/D	9	0.5	23	1.2
No diagnosis	1,691	84.5	1,537	80.7

Note. n_{males} = 2,002, $n_{females}$ = 1,904. PTSD = posttraumatic stress disorder; MDE = major depressive episode; SA/D = substance abuse/dependence. Time frame was prior 6 months for PTSD and MDE, prior 12 months for SA/D. Data are weighted to reflect U. S. Bureau of the Census (1988) estimates of age and race.

Table 3

Hierarchical Logistic Regression Results: Risk Factors for Adolescent PTSD, MDE, and SA/D

Risk factor	Step					Final model				
	B	SE	W	OR	CI (95%)	B	SE	W	OR	CI (95%)
Regression A: Posttraumatic stress disorder (PTSD) only										
Step 1										
Gender	0.16	0.27	0.36	1.18	0.69–2.01	0.12	0.29	0.16	1.12	0.64–1.98
Age	0.28	0.09	11.02	1.33***	1.12–1.57	0.23	0.09	6.58	1.25**	1.06–1.49
African American	1.13	0.33	11.88	3.08***	1.63–5.85	0.92	0.34	7.44	2.50**	1.29–4.82
Hispanic	1.54	0.35	19.05	4.68***	2.34–9.37	1.42	0.36	15.56	4.13***	2.04–8.36
Native American	−0.41	1.15	0.13	0.66	0.07–6.29	−0.70	1.15	0.37	0.50	0.05–4.75
Asian American	1.33	0.89	2.25	3.80	0.66–21.75	1.46	0.90	2.67	4.32	0.75–24.97
Step 2										
Fam Alc	0.76	0.33	5.38	2.13*	1.12–4.02	0.48	0.34	2.04	1.62	0.84–3.13
Fam Drg	0.09	0.42	0.05	1.10	0.48–2.51	−0.02	0.42	0.00	0.98	0.43–2.25
Step 3										
Witnessed violence						0.39	0.32	1.46	1.48	0.78–2.79
Sexual assault						0.58	0.37	2.51	1.79	0.87–3.68
Physical assault						0.43	0.32	1.81	1.54	0.82–2.89
Regression B: Major depressive episode (MDE) only										
Step 1										
Gender	0.60	0.13	19.86	1.82***	1.40–2.36	0.66	0.14	21.91	1.93***	1.47–2.55
Age	0.15	0.04	13.90	1.16***	1.07–1.25	0.11	0.04	7.00	1.11**	1.03–1.20
African American	−0.25	0.20	1.47	0.78	0.53–1.16	−0.40	0.21	3.81	0.67	0.45–1.00
Hispanic	0.26	0.22	1.36	1.29	0.84–2.00	0.16	0.23	0.48	1.17	0.75–1.82
Native American	0.38	0.31	1.49	1.46	0.80–2.66	0.15	0.31	0.22	1.16	0.63–2.14
Asian American	0.45	0.51	0.78	1.57	0.58–4.25	0.55	0.51	1.13	1.73	0.63–4.73
Step 2										
Fam Alc	0.66	0.17	15.83	1.93***	1.40–2.67	0.46	0.17	7.11	1.58**	1.13–2.21
Fam Drg	0.26	0.20	1.65	1.30	0.87–1.93	0.06	0.21	0.09	1.06	0.71–1.59
Step 3										
Witnessed violence						0.14	0.15	0.89	1.15	0.86–1.55
Sexual assault						−0.01	0.21	0.00	0.99	0.65–1.49
Physical assault						0.77	0.16	23.72	2.15***	1.58–2.93
Regression C: Substance abuse/dependence (SA/D) only										
Step 1										
Gender	−0.62	0.16	14.96	0.54***	0.39–0.74	−0.65	0.18	13.62	0.52***	0.37–0.74
Age	0.71	0.06	131.38	2.04***	1.80–2.30	0.67	0.06	107.95	1.95***	1.72–2.21
African American	−0.89	0.30	9.10	0.41**	0.23–0.73	−1.34	0.31	19.18	0.26***	0.14–0.48
Hispanic	0.10	0.27	0.13	1.10	0.65–1.86	−0.14	0.28	0.24	0.87	0.51–1.50
Native American	0.49	0.36	1.86	1.62	0.81–3.26	0.08	0.37	0.05	1.09	0.53–2.24
Asian American	−0.34	0.91	0.14	0.71	0.12–4.27	−0.11	0.93	0.01	0.90	0.15–5.55
Step 2										
Fam Alc	0.91	0.19	23.35	2.49***	1.72–3.60	0.61	0.19	9.91	1.84**	1.26–2.68
Fam Drg	0.42	0.23	3.18	1.52	0.96–2.40	0.10	0.24	0.19	1.11	0.70–1.77
Step 3										
Witnessed violence						0.95	0.19	26.34	2.59***	1.80–3.73
Sexual assault						0.27	0.24	1.23	1.31	0.82–2.10
Physical assault						0.57	0.18	9.95	1.77**	1.24–2.51

Note. N = 3,907. W = Wald statistic; OR = odds ratio; CI = confidence interval; Fam Alc = familial alcohol abuse; Fam Drg = familial drug abuse.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

This study examined the prevalence, comorbidity, and demographic and social correlates of PTSD, MDE, and SA/D with a national probability sample of adolescents. Major findings were as follows: (a) prevalences of PTSD, MDE, and SA/D were high in this young population; (b) 15.5% of boys and 19.3% of girls had at least one of the three diagnoses within the year prior to the interviews; (c) nearly three fourths of all adolescents diagnosed with PTSD had at least one comorbid diagnosis; (d) relative to race/ethnicity, demographic characteristics of gender and age tended to be more consistently linked to outcomes; (e) interpersonal violence (i.e., sexual and physical assault, witnessed violence) increased risk of these disorders and of comorbidity after controlling for demographic variables and familial substance use problems; and (f) associations between interpersonal violence vari-

Table 4

Hierarchical Logistic Regression Results: Risk Factors for Comorbidity

Risk factor	Step					Final model				
	B	SE	W	OR	CI (95%)	B	SE	W	OR	CI (95%)
Regression A: Comorbid PTSD and MDE										
Step one										
Gender	0.95	0.20	21.72	2.58***	1.73–3.85	0.93	0.22	17.96	2.54***	1.65–3.90
Age	0.15	0.06	7.52	1.17**	1.05–1.30	0.01	0.06	0.05	1.01	0.90–1.14
African American	0.28	0.25	1.26	1.32	0.82–2.13	−0.14	0.26	0.32	0.87	0.53–1.43
Hispanic	0.14	0.34	0.17	1.15	0.59–2.23	−0.12	0.35	0.13	0.88	0.45–1.75
Native American	0.04	0.52	0.01	1.04	0.38–2.84	−0.55	0.53	1.08	0.58	0.20–1.63
Asian American	0.28	0.79	0.12	1.32	0.28–6.14	0.59	0.81	0.52	1.80	0.37–8.82
Step two										
Fam Alc	0.81	0.22	13.34	2.24***	1.45–3.46	0.26	0.23	1.29	1.30	0.83–2.03
Fam Drg	1.04	0.23	20.00	2.82***	1.79–4.44	0.68	0.24	8.13	1.97**	1.24–3.14
Step three										
Witnessed violence						1.07	0.25	19.24	2.92***	1.81–4.72
Sexual assault						0.89	0.23	14.48	2.43***	1.54–3.84
Physical assault						1.02	0.22	20.57	2.76***	1.78–4.28
Regression B: Comorbid PTSD and SA/D										
Step one										
Gender	0.30	0.29	1.14	1.36	0.78–2.37	−0.23	0.34	0.47	0.79	0.41–1.54
Age	0.52	0.10	25.77	1.68***	1.38–2.06	0.34	0.11	9.15	1.41**	1.13–1.76
African American	0.32	0.36	0.81	1.38	0.68–2.79	−0.32	0.39	0.68	0.73	0.34–1.55
Hispanic	−0.03	0.54	0.00	0.97	0.34–2.78	−0.29	0.57	0.26	0.75	0.25–2.27
Native American	−0.83	1.19	0.48	0.44	0.04–4.52	−1.67	1.21	1.92	0.19	0.02–2.00
Asian American	−3.63	8.53	0.18	0.03	0.00–4.8e+5	−3.96	12.51	0.10	0.02	0.00–8.5e+8
Step two										
Fam Alc	1.67	0.31	28.83	5.32***	2.89–9.79	0.93	0.32	8.47	2.53**	1.36–4.73
Fam Drg	0.96	0.34	8.14	2.60**	1.35–5.01	0.61	0.35	3.04	1.83	0.93–3.63
Step three										
Witnessed violence						2.20	0.65	11.34	9.04***	2.51–32.55
Sexual assault						1.91	0.35	30.33	6.73***	3.42–13.27
Physical assault						1.04	0.38	7.39	2.84**	1.34–6.04
Regression C: Comorbid MDE and SA/D										
Step one										
Gender	0.57	0.25	5.35	1.77*	1.09–2.86	0.25	0.28	0.79	1.28	0.74–2.20
Age	0.40	0.08	25.34	1.50***	1.28–1.75	0.27	0.09	9.72	1.31**	1.11–1.55
African American	−1.33	0.56	5.66	0.27*	0.09–0.79	−1.87	0.57	10.96	0.15***	0.05–0.47
Hispanic	−0.38	0.49	0.61	0.68	0.26–1.78	−0.71	0.50	2.00	0.49	0.19–1.31
Native American	0.27	0.55	0.24	1.31	0.45–3.84	−0.44	0.57	0.60	0.64	0.21–1.96
Asian American	−1.40	2.10	0.44	0.25	0.00–15.16	−1.10	2.13	0.27	0.33	0.01–21.51
Step two										
Fam Alc	0.97	0.28	12.29	2.64***	1.53–4.53	0.44	0.28	2.45	1.56	0.90–2.70
Fam Drg	1.00	0.30	11.19	2.71***	1.51–4.86	0.60	0.31	3.80	1.82	0.99–3.33
Step three										
Witnessed violence						1.78	0.36	24.05	5.95***	2.92–12.13
Sexual assault						1.49	0.29	25.65	4.43***	2.49–7.88
Physical assault						0.31	0.29	1.14	1.36	0.77–2.38

Note. N = 3,907. PTSD = posttraumatic stress disorder; MDE = major depressive episode; W = Wald statistic; OR = odds ratio; CI = confidence interval; SA/D = substance abuse/dependence; Fam Alc = familial alcohol abuse; Fam Drg = familial drug abuse.
* $p < .05$.   ** $p < .01$.   *** $p < .001$.

ables and comorbid diagnoses tended to be identified with greater consistency and strength than associations between interpersonal violence and noncomorbid diagnoses.

Prevalence and Comorbidity Findings

In this study, we identified 12-month SA/D prevalence estimates of 8.2% for boys and 6.2% for girls. Although Kessler et al. (1994)

found a relatively similar 12-month SA/D prevalence for women ages 15–24 years (9.2%), the percentage of men in this cohort that met criteria for SA/D (23.4%) was more than twice as high as that reported here. This discrepancy likely reflects age differences across samples. A follow-up analysis with adolescents ages 12 to 14 in the present sample indicated SA/D prevalence estimates of 1.2% for boys and 2.1% girls. In comparison, SA/D was more

Table 5
Intercorrelations for Risk-Factor Variables

Risk factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gender	—														
2. Age	.00	—													
3. Caucasian	-.02	.01	—												
4. African American	.01	.00	—	—											
5. Hispanic	.01	.00	—	—	—										
6. Native American	.00	-.01	—	—	—	—									
7. Asian American	.01	-.02	—	—	—	—	—								
8. Fam Alc	.06***	.08***	-.07***	.01	.05***	.08***	-.02	—							
9. Fam Drg	.06***	.05***	-.06***	.06***	.01	.04*	-.02	.25***	—						
10. WV	-.09***	.16***	-.18***	.15***	.06***	.06***	-.03	.21***	.15***	—					
11. SA	.18***	.12***	-.09***	.07***	.02	.05***	.00	.16***	.08***	.19***	—				
12. PA	-.09***	.11***	-.11***	.10***	.02	.05**	-.03	.22***	.21***	.36***	.23***	—			
13. PTSD	.06***	.09***	-.07***	.06***	.04*	-.01	.01	.14***	.12***	.16***	.21***	.20***	—		
14. MDE	.11***	.09***	-.01	-.02	.02	.02	.01	.15***	.12***	.15***	.17***	.19***	.38***	—	
15. SA/D	-.04*	.23***	.03	-.05**	.01	.02	-.02	.17***	.11***	.22***	.18***	.20***	.17***	.14***	—

Note. $N = 3,907$. Fam Alc = familial alcohol abuse; Fam Drg = familial drug abuse; WV = witnessed violence; SA = sexual assault; PA = physical assault; MDE = major depressive episode; SA/D = substance abuse/dependence; PTSD = posttraumatic stress disorder. Variables are distributed as follows: (a) gender is dichotomous (1 = boys, 2 = girls), (b) age is continuous (range = 12–17 years), (c) race/ethnicity variables are dichotomous (0 = no, 1 = yes); and (d) Fam Alc, Fam Drg, WV, SA, PA, PTSD, MDE, and SA/D are dichotomous (0 = no, 1 = yes).
$* p < .05.$ $** p < .01.$ $*** p < .001.$

prevalent among girls (10.3%) and boys (15.2%) ages 15 to 17; these percentages among older adolescents in the present sample are more comparable with those reported for Kessler et al.'s (1994) 15–24-year-old cohort.

Overall prevalences of MDE and PTSD generally were lower here than those reported by Kessler et al. (1994). However, this was expected because Kessler et al. assessed lifetime PTSD and past-12-months MDE. In contrast, we assessed past-6-months PTSD and MDE. Thus, for MDE, prevalence estimates in Kessler et al. were higher than those reported here (16.6% vs. 13.9% for women, 9.1% vs. 7.4% for men). Similarly, lifetime PTSD prevalences were higher for girls in Kessler et al. (10.3%) relative to those presented here (6.3%). For boys, however, lifetime-PTSD estimates reported by Kessler et al. were lower than 6-month estimates reported here (2.8% vs. 3.7%). One explanation for this latter finding may lie in the difference in structure of the PTSD interviews used in each study. In particular, Kessler et al. assessed PTSD with an emphasis on linking symptoms to specific stressor events, whereas stressor events and PTSD symptoms were assessed independently in this study. Saunders et al. (1999) discussed several strengths associated with the latter method of assessment that led to its use in the NSA.

Risk- and Protective-Factor Findings

The hypothesis that interpersonal violence would be associated with increased risk of PTSD, MDE, and SA/D after considering demographics and familial substance use problems was generally supported. Specifically, physical assault and witnessed violence both emerged as significant predictors of outcome in four of the six regression analyses, whereas sexual assault was identified as a significant risk factor in each of the three comorbidity analyses. These findings support and build upon prior studies that have established a link between interpersonal violence and mental health outcomes (e.g., Boney-McCoy & Finkelhor, 1995, 1996; Kessler et al., 1995; Resnick et al., 1993). In this study, findings were particularly noteworthy with respect to the consistent association between interpersonal violence and both SA/D and MDE. Less consistency in the identification of trauma-related risk factors for these diagnoses has been evident in prior research.

In the prediction of noncomorbid disorders, age was the most consistently identified risk factor, with older age being associated with increased risk for each of the three diagnoses. However, correlation coefficients (Table 5), suggest that older adolescents also were more likely than younger adolescents to report familial alcohol and drug use-problems, witnessed violence, sexual assault, and physical assault. Thus, relations between age and mental health outcomes may be strengthened, in part, through shared variance with these stressful life circumstances. Gender, familial alcohol use problems, and physical assault also emerged as correlates of both noncomorbid MDE and noncomorbid SA/D, but not of noncomorbid PTSD. The low base rate of noncomorbid PTSD in this sample, 55 of 3,906 cases (1.4%, vs. 6.5% for noncomorbid MDE and 4.9% for noncomorbid SA/D), may have contributed to these differing patterns of findings by weakening statistical power. Statistical relations between race, ethnicity, and outcome variables were complex, with different patterns of findings emerging from each analysis outlined in Table 3. Finally, initial (step-level) risk ratios between familial alcohol use problems and mental health

outcomes tended to weaken as interpersonal violence variables were entered into the regression equation, suggesting that the relation between family alcohol use and mental health outcomes is at least partially moderated by adolescents' exposure to interpersonal violence.

Risk-factor analyses for comorbidity yielded a relatively consistent pattern of findings. In particular, interpersonal violence (i.e., sexual assault, physical assault, witnessed violence) consistently emerged as a strong predictor of each pattern of comorbidity after controlling for demographic and family variables. In several instances, demographic and familial variables that were significantly associated with comorbidity at each step in the multivariate analyses did not remain so in the final model after interpersonal violence variables were entered. A final important finding was that interpersonal violence was a stronger risk factor for each pair of comorbid mental health problems than it was for each of the three individual noncomorbid diagnoses.

Relations between gender and mental health functioning are well documented (e.g., Hanna & Grant, 1997; Kessler et al., 1994) and consistently suggest that men and adolescent boys are at heightened risk for SA/D and at lower risk for PTSD and MDE relative to women and adolescent girls. However, in this study, gender was not significantly associated with risk for noncomorbid PTSD and also was not associated with risk for comorbid SA/D and PTSD or comorbid SA/D and MDE. These findings suggest that clinicians working with trauma-exposed youth should be cautious not to underestimate the importance of comprehensive screening for PTSD and MDE among boys, or for SA/D among girls (Hanna & Grant, 1997). Rather, irrespective of the gender of the victim, comprehensive assessment should continue to be emphasized for purposes of case conceptualization and treatment formulation. Of additional importance, the high prevalence of SA/D among boys (15.2%) and girls (10.3%) ages 15–17, when considered in conjunction with results indicating increased risk of SA/D among interpersonally victimized adolescents, implies that substance use should be carefully assessed and monitored regularly for trauma-exposed adolescents referred for treatment.

Limitations

Assessment was retrospective and based on self-report, thereby introducing potential recall biases. Also, participants were contacted only once, precluding a longitudinal analysis of outcomes. Finally, the use of telephone interviews precluded recruitment of adolescents who resided in homes without telephones, homeless youth, or youth residing in institutions. However, such excluded individuals constitute a relatively small proportion of the U.S. adolescent population.

Conclusions

The present findings represent an important advance in the literature with respect to the prevalence, comorbidity, and risk/protective factors associated with adolescent PTSD, MDE, and SA/D. The prevalence of PTSD in this probability sample of adolescents is particularly noteworthy because it indicates that a high percentage of youth in the United States encounter traumatic events and experience significant emotional responses associated with these events. Furthermore, the high prevalence of comorbid

disorders among interpersonally victimized adolescents underscores the complex pattern of symptoms with which such adolescents may present. Additional research with longitudinal designs is needed to capture patterns of adolescent victimization experiences and mental health problems over time (e.g., Boney-McCoy & Finkelhor, 1996), thereby strengthening implications for clinical practice. Research that examines a broader range of risk and protective factor variables (e.g., social support variables) and that further explores potential mechanisms by which exposure to violence increases risk of these disorders as well as patterns of comorbidity is also needed. Finally, research is needed to determine whether early intervention with young victims of violence can reduce risk of subsequent mental health problems and, conversely, whether early intervention with adolescents experiencing these disorders can help reduce their risk of violent victimization.

References

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: Author.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Angold, A., Costello, E. J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry, 40,* 57–87.

Boney-McCoy, S., & Finkelhor, D. (1995). Psychosocial sequelae of violent victimization in a national youth sample. *Journal of Consulting and Clinical Psychology, 63,* 726–736.

Boney-McCoy, S., & Finkelhor, D. (1996). Is youth victimization related to trauma symptoms and depression after controlling for prior symptoms and family relationships? A longitudinal, prospective study. *Journal of Consulting and Clinical Psychology, 64,* 1406–1416.

Breslau, N., Davis, G. C., Andreski, P., & Peterson, E. (1991). Traumatic events and posttraumatic stress disorder in the community. The 1996 Detroit Area Survey of Trauma. *Archives of General Psychiatry, 48,* 216–222.

Duncan, R. D., Saunders, B. E., Kilpatrick, D. G., Hanson, R. F., & Resnick, H. S. (1996). Childhood physical assault as a risk factor for PTSD, depression, and substance abuse: Findings from a national survey. *American Journal of Orthopsychiatry, 66,* 437–448.

Galea, S., Ahern, J., Resnick, H., Kilpatrick, D., Bucuvalas, M., Gold, J., et al. (2002). Psychological sequelae of the September 11 terrorist attacks in New York City. *New England Journal of Medicine, 346,* 982–987.

Hanna, E. Z., & Grant, B. F. (1997). Gender differences in *DSM–IV* alcohol use disorders and major depression as distributed in the general population: Clinical implications. *Comprehensive Psychiatry, 38,* 202–212.

Helzer, J. E., Robins, L. N., & McEvoy, L. N. (1987). Post-traumatic stress disorder in the general population. Findings of the Epidemiologic Catchment Area Survey. *New England Journal of Medicine, 17,* 1630–1634.

Kessler, R. C. (2002). *National Comorbidity Survey, 1990–1992* [Computer file]. Conducted by University of Michigan, Survey Research Center. 2nd ICPSR ed. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [producer and distributor].

Kessler, R. C., Avenevoli, S., & Merikangas, K. R. (2001). Mood disorders in children and adolescents: An epidemiologic perspective. *Society of Biological Psychiatry, 49,* 1002–1014.

Kessler, R. C., Davis, C. G., & Kendler, K. S. (1997). Childhood adversity and adult psychiatric disorder in the U. S. National Comorbidity Survey. *Psychological Medicine, 27,* 1101–1119.

Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., et al. (1994). Lifetime and 12-month prevalence of *DSM–*

III–R psychiatric disorders in the United States: Results from the National Comorbidity Survey. *Archives of General Psychiatry, 51,* 8–19.

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52,* 1048–1060.

Kessler, R. C., & Walters, E. E. (1998). Epidemiology of *DSM–III–R* major depression and minor depression among adolescents and young adults in the National Comorbidity Survey. *Depression and Anxiety, 7,* 3–14.

Kilpatrick, D. G. (2002, March). *Making sense of rape in America: Where do the numbers come from and what do they mean?* Violence Against Women Supplement Meeting, Centers for Disease Control, Atlanta, GA.

Kilpatrick, D. G., Acierno, R., Resnick, H. S., Saunders, B. E., & Best, C. L. (1997). A 2-year longitudinal analysis of the relationships between violent assault and substance use in women. *Journal of Consulting and Clinical Psychology, 65,* 834–847.

Kilpatrick, D. G., Acierno, R., Saunders, B., Resnick, H. S., Best, C. L., & Schnurr, P. P. (2000). Risk factors for adolescent substance abuse and dependence: Data from a national sample. *Journal of Consulting and Clinical Psychology, 68,* 19–30.

Kilpatrick, D. G., Resnick, H. S., Saunders, B. E., & Best, C. L. (1989). *The National Women's Study PTSD Module.* Charleston, SC: National Crime Victims Research and Treatment Center, Department of Psychiatry & Behavioral Sciences, Medical University of South Carolina.

Koss, M. P. (1993). Detecting the scope of rape: A review of prevalence research methods. *Journal of Interpersonal Violence, 8,* 198–222.

Resnick, H. S., Kilpatrick, D. G., Dansky, B. S., Saunders, B. E., & Best, C. L. (1993). Prevalence of civilian trauma and posttraumatic stress disorder in a representative national sample of women. *Journal of Consulting and Clinical Psychology, 61,* 984–991.

Romano, E., Tremblay, R. E., Vitaro, F., Zoccolillo, M., & Pagani, L. (2001). Prevalence of psychiatric diagnoses and the role of perceived impairment: Findings from an adolescent community sample. *Journal of Child Psychology & Psychiatry, 42,* 451–461.

Saunders, B. E., Kilpatrick, D. G., Hanson, R. F., Resnick, H. S., & Walker, M. E. (1999). Prevalence, case characteristics, and long-term psychological correlates of child rape among women: A national survey. *Child Maltreatment, 4,* 187–200.

Shaffer, D., Fisher, P., Dulcan, M. K., Davies, M., Piacentini, J., Schwab-Stone, M. E., et al. (1996). The NIMH Diagnostic Interview Schedule for Children version 2.3 (DISC-2.3): Description, acceptability, prevalence rates, and performance in the MECA study. *Journal of the American Academy of Child and Adolescent Psychiatry, 35,* 865–866.

U. S. Bureau of the Census. (1988). Projections of the population of states by age, sex, and race: 1988 to 2010. *Current population reports,* P-25, No. 1017. Washington, DC: U.S. Government Printing Office.