

# The Developmental Mental-Disorder Histories of Adults With Posttraumatic Stress Disorder: A Prospective Longitudinal Birth Cohort Study

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Clinical and epidemiologic studies have established that posttraumatic stress disorder (PTSD) is highly comorbid with other mental disorders. However, such studies have largely relied on adults' retrospective reports to ascertain comorbidity. The authors examined the developmental mental health histories of adults with PTSD using data on mental disorders assessed across the first 3 decades of life among members of the longitudinal Dunedin Multidisciplinary Health and Development Study; 100% of those diagnosed with past-year PTSD and 93.5% of those with lifetime PTSD at age 26 had met criteria for another mental disorder between ages 11 and 21. Most other mental disorders had first onsets by age 15. Of new cases of PTSD arising between ages 26 and 32, 96% had a prior mental disorder and 77% had been diagnosed by age 15. These data suggest PTSD almost always develops in the context of other mental disorders. Research on the etiology of PTSD may benefit from taking lifetime developmental patterns of comorbidity into consideration. Juvenile mental-disorder histories may help indicate which individuals are most likely to develop PTSD in populations at high risk of trauma exposure.

*Keywords:* posttraumatic stress disorder, trauma, comorbidity, birth cohort, epidemiology

The high comorbidity between posttraumatic stress disorder (PTSD) and other mental disorders has implications for treatment, research, and prevention. Clinicians gather data on the lifetime mental health histories of adult clients with PTSD to inform their case conceptualizations and treatment planning. Researchers use information on the developmental mental health history of adults with PTSD to inform hypotheses about nosology and etiology. However, what is known about PTSD

comorbidity is largely limited to retrospective studies of individuals interviewed in adulthood. In prior work, we conducted follow-back analyses of lifetime mental disorders in adults with anxiety disorders who are members of a prospective–longitudinal cohort followed from birth to age 32 (Gregory et al., 2007). The current article provides a detailed examination of the developmental mental health histories of adults with PTSD from this same cohort.

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Karestan C. Koenen is supported in part by MH070627 and MH078928 from the National Institute of Mental Health. The Dunedin Multidisciplinary Health and Development Research Unit is supported by the New

Zealand Health Research Council. This research received support from the United Kingdom Medical Research Council (Grant G0100527), from the National Institute of Mental Health (Grants MH45070 and MH49414), and from the William T. Grant Foundation. Terrie E. Moffitt and Avshalom Caspi are Royal Society Wolfson Research Merit Award holders.

We thank the Dunedin Study members, their parents and teachers, and study founder Phil Silva. This study protocol was approved by the institutional review boards of the Institute of Psychiatry, University of Wisconsin, and the Dunedin School of Medicine. The data analysis was approved by the Human Subjects Committee at the Harvard School of Public Health. Study members gave informed consent before participating.

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Clinical and epidemiologic studies have established that PTSD is highly comorbid with other mental disorders (Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Such studies have also used retrospectively reported age-of-onset data to show that preexisting major depression, anxiety disorders, and conduct disorder are associated with increased risk of developing PTSD in trauma-exposed adults (Breslau, 2002). However, our understanding of PTSD comorbidity remains constrained by two limitations of extant research.

First, PTSD comorbidity studies rely almost exclusively on retrospective recall of lifetime diagnoses. Adults with PTSD may be more likely to recall prior mental health problems than adults without PTSD because of the phenomenon of mood-dependent recall (L. H. Cohen, Towbes, & Flocco, 1988), inflating the association between PTSD and other mental disorders. In addition, adults with PTSD may preferentially recall symptoms of other disorders that are similar to their current PTSD symptoms. Such recall bias would specifically inflate associations between PTSD and anxiety disorders or major depression and attenuate those with externalizing disorders. Second, trauma-exposed controls are not consistently used in PTSD comorbidity studies. This is problematic because the diagnosis of PTSD is predicated on exposure to a potentially traumatic event, and mental disorders increase risk of trauma exposure (Breslau, 2002). Thus, inferences about the developmental mental-disorder history of adults with PTSD should be made in comparison with adults who were also exposed to potentially traumatic events but did not develop PTSD.

We examined developmental mental-disorder histories in an unselected sample of adults with PTSD, using data on mental disorders assessed across the first 3 decades of life among members of the longitudinal Dunedin Multidisciplinary Health and Development Study. Examining developmental patterns of comorbidity in non-clinic-referred samples, such as the Dunedin cohort, is important, as estimates of PTSD comorbidity based on clinical samples may be inflated. The probability that an individual will seek treatment is higher among those with two or more comorbid diagnoses (P. Cohen & Cohen, 1984; Kim-Cohen et al., 2003; Newman et al., 1996).

This birth cohort was first evaluated for current and lifetime PTSD at 26 years of age, as part of a comprehensive psychiatric assessment. Other mental disorders were assessed starting at age 11. We used prospective data on psychiatric diagnoses to conduct a follow-back analysis of lifetime comorbidity from 11 to 21 years of age. We then focused specifically on the association between adult PTSD and juvenile mental disorders spanning the age period from 11 to 15. Growing evidence suggests many mental disorders have first onsets during this period, making early adolescence a propitious target for intervention (Kessler et al., 2005). To inform nosology, we also examined whether PTSD at age 26 was more likely to be associated with a developmental history of internalizing or externalizing disorders. One limitation of the PTSD assessment at age 26 was that the interview did not ascertain the age of onset for PTSD cases. It was unclear, therefore, whether or not the other disorders were antecedent to PTSD. To address this question, we further report on the mental disorder histories of new cases of PTSD with onsets between age 26 and 32, to determine whether such new cases appeared in the absence of prior mental disorders.

## Method

### Participants

Participants are members of the Dunedin Multidisciplinary Health and Development Study, a longitudinal investigation of the health and behavior of a complete cohort of children born during a 1-year period in 1972–73 in Dunedin, New Zealand. The base sample for the longitudinal study consisted of 1,037 individuals (52% male; 91% of eligible births). Cohort members represent the full range of socioeconomic status in the general population of New Zealand's South Island and are primarily White.

The Dunedin sample has been assessed at ages 3, 5, 7, 9, 11, 13, 15, 18, 21, 26, and most recently at age 32, when we saw 972 participants (96% of living cohort members). The research procedure involves bringing 4 study members per day (including emigrants living overseas) to the research unit for an 8-hr day of tightly scheduled individual interviews and tests. Each research topic is presented in private as a standardized module by a different trained examiner in counterbalanced order throughout the day. After a complete description of the study, written informed consent was obtained.

### Measures

Mental disorders were assessed in private, standardized interviews, using the Diagnostic Interview Schedule for Children (A. Costello, Edelbrock, Kalas, Kessler, & Klaric, 1982) at the younger ages (11–15 years) and the Diagnostic Interview Schedule (Robins, Cottler, Bucholz, & Compton, 1995) at the older ages, with a reporting period of 12 months at each age. Modifications, procedures, reliability, validity, prevalence, and evidence of impairment have been described in detail at ages 11, 13, 15, 18, 21, and 26 (Kim-Cohen et al., 2003). At ages 26 and 32, diagnoses were made according to criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994). At ages 21 and 18, disorders were diagnosed according to then-current criteria of the *DSM-III-R* (3rd ed., revised; APA, 1987); and at ages 15, 13, and 11, according to criteria from the *DSM-III* (3rd ed.; APA, 1980). Dunedin cohort 12-month prevalence rates in young adulthood closely matched those from the National Comorbidity Survey (Kessler et al., 1994; Newman et al., 1996). Interviews were conducted by experienced clinicians who had tertiary degrees in social work, medicine, and clinical psychology and were blind to study members' psychiatric history.

The PTSD assessment in this cohort has been described in detail previously (Koenen, Moffitt, Poulton, Martin, & Caspi, 2007). Briefly, PTSD was assessed for the first time in this cohort at age 26, using a modified version of the Diagnostic Interview Schedule for *DSM-IV* (DIS-IV; Robins et al., 1995). This assessment was initiated with the question:

Now I would like to ask you about terrible or frightening experiences you may have had at any time in your life. After a frightening or horrible experience, some people can't get it out of their mind. They may lose interest in other people or activities, they may not sleep well, they may become very jumpy and easily startled or frightened. Have you ever had an experience that caused you problems like these?

Participants were considered trauma exposed if they answered "yes" to this gate question ( $n = 265$ ). Participants who had

experienced more than one “horrible experience” were asked to choose their worst experience, get that experience clear in their minds, and answer PTSD diagnostic questions on the basis of that experience. The types of worst events reported were sudden unexpected death by trauma of a close family member or friend (38%); personal assault or victimization (32%); serious accidents (14%); hearing about or witnessing a close friend or relative experiencing an assault, serious accident, or serious injury (12%); personal illness (3%); and natural disaster (1%). For the participants who reported a horrible experience, the interviewer went on to query specific PTSD symptoms. Participants received a PTSD diagnosis if they met the B, C, D, E, and F criteria for PTSD according to *DSM-IV*.

The lifetime prevalence of PTSD in the cohort at age 26 was 9.6% ( $n = 93$ ; 11.8% for women, 7.6% for men). Of those with lifetime PTSD, 43% ( $n = 40$ ) were on medication for or met criteria for PTSD in the past year.

PTSD was assessed via the same procedure at age 32. Participants were queried as to whether they had had a “frightening or horrible” experience since the age 26 assessment. (Recall for the years between ages 26 and 32 was enhanced using the life history calendar method; see Belli, Shay, & Stafford, 2001). Those who endorsed such an experience were then evaluated for PTSD. The types of worst events included sudden unexpected death of a close family member or friend (22.2%), personal assault or victimization (15.5%), serious accidents (9.6%), hearing about or witnessing a close friend or relative experiencing an assault or serious injury (23.8%), personal illness (10.0%), natural disaster (1.7%), terrorism or war (1.3%), and other personal traumas (15.9%). Participants were classified as new cases of PTSD if they met criteria for the disorder for the first time at the age-32 assessment ( $n = 27$ ).

## Results

We conducted logistic regression analyses adjusted for sex to test whether adults with PTSD, assessed as lifetime or current, were significantly more likely to have been diagnosed with another mental disorder than trauma-exposed adults who did not develop PTSD. The strength of the association between PTSD and other mental disorders is presented by odds ratios, adjusted for sex (AOR), with 95% confidence intervals (CI). Significance tests were performed using the Wald chi-square.

### *Lifetime Mental-Disorder History and PTSD Through Age 26*

Table 1 presents the prevalences of other mental disorders assessed prospectively from the ages of 11 to 21 in adults with PTSD compared to those who experienced a trauma but did not develop PTSD. In total, over 93% of participants diagnosed with lifetime PTSD and 100% of those with current PTSD at age 26 had received another mental-disorder diagnosis by age 21. Adults with PTSD at age 26, whether assessed as lifetime or current, were significantly more likely to have been diagnosed with major depression, an anxiety disorder other than PTSD, conduct disorder, marijuana dependence, or alcohol dependence by age 21 than trauma-exposed adults who did not develop PTSD. Moreover, adults diagnosed with PTSD at age 26 were almost as likely to have had an externalizing (current PTSD = 75.0%; lifetime PTSD = 64.1%) as an internalizing (current PTSD =

85.0%; lifetime PTSD = 79.1%) disorder diagnosis from 11 to 21 years of age.

The majority of other mental disorders associated with PTSD had onsets at or before age 15. Over 66% of adults with lifetime PTSD and 60% of those with current PTSD had received a mental-disorder diagnosis by age 15, compared to a minority of those who experienced a trauma but did not develop PTSD (38.5%). The prevalence of juvenile mental health histories of specific disorders among adults exposed to a trauma who did or did not develop PTSD are presented in Figure 1. Participants with PTSD, compared to the trauma exposed who did not develop PTSD, were significantly more likely to have had a mental-disorder diagnosis by age 15, current AOR = 2.4; 95% CI, 1.2–4.9;  $\chi^2(1) = 6.01$ ,  $p = .01$ ; lifetime AOR = 3.2; 95% CI, 1.9–5.4;  $\chi^2(1) = 17.93$ ,  $p < .001$ . Adults with PTSD were especially likely to have had a juvenile anxiety disorder, current AOR = 2.2; 95% CI, 1.0–4.7;  $\chi^2(1) = 4.17$ ,  $p < .05$ ; lifetime AOR = 2.7; 95% CI, 1.5–4.7;  $\chi^2(1) = 11.27$ ,  $p = .001$ . They were also more likely to have had juvenile depression, current AOR = 3.6; 95% CI, 1.3–9.6;  $\chi^2(1) = 6.36$ ,  $p = .01$ ; lifetime AOR = 2.4; 95% CI, 1.0–5.5;  $\chi^2(1) = 3.91$ ,  $p = .048$ . In addition, adults with lifetime PTSD were significantly more likely to have been diagnosed with conduct disorder by age 15, AOR = 2.1; 95% CI, 1.2–3.7;  $\chi^2(1) = 6.10$ ,  $p = .01$ ; adults with current PTSD also had higher prevalences of conduct disorder, AOR = 1.8; 95% CI, 0.8–3.9,  $\chi^2(1) = 2.32$ ,  $p = .13$ , but this association was not statistically significant.

### *Mental-Disorder History of First-Onset PTSD Cases*

Table 1 presents the prevalence of other mental disorders assessed prospectively from the ages of 11 to 21 in first-onset cases of PTSD compared to those who experienced a trauma between the ages of 26 and 32 but did not develop PTSD. Cases with past PTSD were excluded from this analysis. Of the 27 new cases of PTSD with first onset following the age 26 assessment, 25 (92.6%) met criteria for another mental disorder by 21 years of age. An additional participant had a first diagnosis at age 26. Therefore, 26 (96.3%) out of 27 new cases of PTSD had a history of one or more mental disorders that were clearly antecedent to PTSD in order of onset. The comparison group consisted of participants who reported they experienced a potentially traumatic event between ages 26 and 32 but never met criteria for PTSD ( $n = 211$ ). First-onset PTSD cases between ages 26 and 32 were significantly more likely to have been diagnosed with major depression, an anxiety disorder other than PTSD, conduct disorder, and marijuana dependence than trauma-exposed adults who did not develop PTSD.

The prevalence of juvenile mental health histories of specific disorders among adults exposed to a trauma who did or did not develop PTSD between ages 26 and 32 are presented in Figure 2. Participants who developed PTSD, compared to those who experienced trauma but did not develop PTSD, were more likely to have had a mental-disorder diagnosis by the age of 15, 77.8% vs. 38.7%; AOR = 5.5; 95% CI, 2.1–14.2;  $\chi^2(1) = 12.32$ ,  $p < .001$ . By age 15, new cases of PTSD were more likely than those who experienced trauma but did not develop PTSD to have had an anxiety disorder, 51.9% vs. 22.3%; AOR = 4.2; 95% CI, 1.8–9.8;  $\chi^2(1) = 11.00$ ,  $p = .001$ , or conduct disorder, 40.7% vs. 19.6%; AOR = 2.7; 95% CI, 1.1–6.5;  $\chi^2(1) = 5.08$ ,  $p = .02$ , and exhibited a trend toward being more likely to have

Table 1

Prevalence of Mental Disorders From Ages 11 to 21 by Trauma Exposure and Posttraumatic Stress Disorder at Ages 26 and 32

Developmental mental disorder diagnosis <sup>a</sup> (ages assessed)	Age 26			Ages 26 to 32	
	No PTSD <i>n</i> = 174 No. (%)	Lifetime PTSD <i>n</i> = 93 No. (%)	Current PTSD <i>n</i> = 40 No. (%)	No PTSD <i>n</i> = 211 No. (%)	New PTSD <i>n</i> = 27 No. (%)
Any disorder other than PTSD (11, 13, 15, 18, 21)	123 (71.5)	86 (93.5)	40 (100)	152 (73.4)	25 (92.6)
Any internalizing disorder (11, 13, 15, 18, 21)	104 (60.5)	72 (79.1)	34 (85)	12.6 (61.5)	23 (85.2)
Major depressive episode (11, 13, 15, 18, 21)	66 (39.8)	50 (54.9)	26 (65)	73 (36.1)	16 (59.3)
Anxiety disorder (11, 13, 15, 18, 21) <sup>b</sup>	80 (47.1)	61 (67.8)	27 (67.5)	102 (50.0)	21 (77.8)
Any externalizing disorder (11, 13, 15, 18, 21)	65 (38.5)	59 (64.1)	30 (75.0)	80 (39.2)	17 (63.0)
Attention-deficit/hyperactivity disorder (11, 13, 15)	7 (4.2)	9 (9.9)	3 (7.5)	17 (8.4)	3 (11.1)
Conduct disorder (11, 13, 15, 18, 21)	40 (23.5)	42 (45.7)	19 (47.5)	51 (24.5)	12 (44.4)
Substance use disorders (18, 21)	47 (27.3)	42 (45.7)	24 (60.0)	53 (25.5)	13 (48.1)
Alcohol dependence (18, 21)	25 (14.6)	24 (26.1)	11 (27.5)	26 (12.5)	10 (37.0)
Marijuana dependence (18, 21)	30 (17.4)	37 (40.2)	22 (55.0)	45 (21.6)	10 (37.0)

	Age 26			
	Lifetime PTSD vs. No PTSD		Current PTSD vs. No PTSD	
	AOR (95% CI)	Wald $\chi^2(1)$	AOR (95% CI)	Wald $\chi^2(1)$
Any disorder other than PTSD (11, 13, 15, 18, 21)	5.67 (2.32, 13.89)	14.43, <i>p</i> < .001	not calculable	not calculable
Any internalizing disorder (11, 13, 15, 18, 21)	2.58 (1.38, 4.81)	8.88, <i>p</i> = .003	4.02 (1.55, 10.43)	8.19, <i>p</i> = .004
Major depressive episode (11, 13, 15, 18, 21)	1.93 (1.13, 3.29)	5.77, <i>p</i> = .016	3.02 (1.44, 6.31)	8.63, <i>p</i> = .003
Anxiety disorder (11, 13, 15, 18, 21) <sup>b</sup>	2.39 (1.38, 4.14)	9.69, <i>p</i> = .002	2.38 (1.13, 4.99)	5.22, <i>p</i> = .022
Any externalizing disorder (11, 13, 15, 18, 21)	3.14 (1.82, 5.41)	16.87, <i>p</i> < .001	5.25 (2.36, 11.65)	16.47, <i>p</i> < .001
Attention-deficit/hyperactivity disorder (11, 13, 15)	2.78 (0.98, 7.89)	3.70, <i>p</i> = .06	1.99 (0.48, 8.27)	0.89, <i>p</i> = .345
Conduct disorder (11, 13, 15, 18, 21)	2.90 (1.66, 5.04)	14.14, <i>p</i> < .001	3.04 (1.47, 6.28)	9.05, <i>p</i> = .003
Substance use disorders (18, 21)	2.44 (1.41, 4.22)	10.13, <i>p</i> < .001	4.54 (2.14, 9.63)	15.54, <i>p</i> < .001
Alcohol dependence (18, 21)	2.15 (1.14, 4.07)	5.55, <i>p</i> = .018	2.27 (1.00, 5.16)	3.84, <i>p</i> < .05
Marijuana dependence (18, 21)	3.41 (1.90, 6.14)	16.79, <i>p</i> < .001	6.67 (3.06, 14.54)	22.80, <i>p</i> < .001

	Ages 26 to 32	
	New PTSD AOR(95%CI)	vs.NoPTSD Wald $\chi^2(1)$
Any disorder other than PTSD (11, 13, 15, 18, 21)	4.55 (1.04, 19.87)	4.06, <i>p</i> = .044
Any internalizing disorder (11, 13, 15, 18, 21)	4.10 (1.34, 12.54)	6.12, <i>p</i> = .013
Major depressive episode (11, 13, 15, 18, 21)	2.85 (1.23, 6.58)	5.96, <i>p</i> = .015
Anxiety disorder (11, 13, 15, 18, 21) <sup>b</sup>	4.00 (1.52, 10.56)	7.83, <i>p</i> = .005
Any externalizing disorder (11, 13, 15, 18, 21)	2.58 (1.08, 6.16)	4.58, <i>p</i> = .032
Attention-deficit/hyperactivity disorder (11, 13, 15)	1.23 (0.33, 4.61)	0.10, <i>p</i> = .757
Conduct disorder (11, 13, 15, 18, 21)	2.38 (1.01, 5.59)	3.93, <i>p</i> = .047
Substance use disorders (18, 21)	2.67 (1.13, 6.35)	4.97, <i>p</i> = .026
Alcohol dependence (18, 21)	4.14 (1.62, 10.58)	8.81, <i>p</i> = .003
Marijuana dependence (18, 21)	2.02 (0.84, 4.89)	2.45, <i>p</i> = .12

Note. All participants in this analysis were exposed to trauma. PTSD = posttraumatic stress disorder; AOR = adjusted odds ratio; CI = confidence interval.

<sup>a</sup> Twelve-month diagnoses. Sample size fluctuates because of missing data.

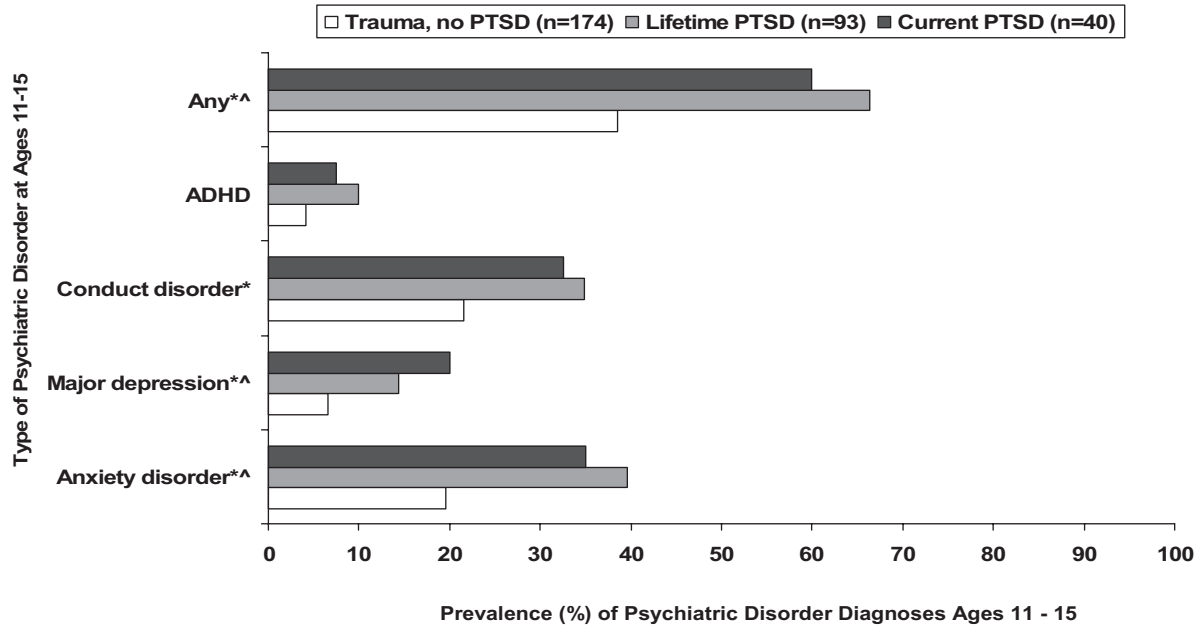
<sup>b</sup> Between ages 11 and 15, anxiety disorders included overanxious disorder, separation anxiety, and phobias. Between ages 18 and 21, anxiety disorders included generalized anxiety disorder, social phobia, agoraphobia, obsessive-compulsive disorder, specific phobia, and panic.

had depression, 18.5% vs. 7.9%; AOR = 2.7; 95% CI, 0.9–8.0;  $\chi^2(1) = 3.04, p = .08$ .

## Discussion

This study is the first of which we are aware to examine current and lifetime mental-disorder comorbidity in adults with PTSD using a prospective follow-back design. Our data reveal that non-comorbid PTSD is virtually nonexistent in our sample. This was

true whether PTSD was assessed as current or lifetime at age 26 and when we considered new cases of PTSD that occurred between age 26 and 32. The vast majority of those diagnosed with PTSD at age 26 (100% of current, 93.5% of lifetime) met criteria for another mental disorder between the ages of 11 and 21. In fact, most adults diagnosed with PTSD at the age-26 assessment (60% current, 66.3% lifetime) had received a mental-disorder diagnosis by age 15, compared to a minority of those who experienced a



*Figure 1.* Prevalence (percentages) of first diagnosis of psychiatric disorders at ages 11 to 15 among those assessed for posttraumatic stress disorder at age 26. Asterisk indicates  $p < .05$  based on the statistical significance of the adjusted odds ratio of the association between lifetime posttraumatic stress disorder (PTSD) diagnosis among the trauma exposed at 26 years of age and disorders at 11 to 15 years of age; ^ indicates  $p < .05$  based on the statistical significance of the adjusted odds ratio of the association between current PTSD at 26 years of age and disorders at 11 to 15 years of age. Trauma, no PTSD = reference group for all analyses; ADHD = attention-deficit/hyperactivity disorder.

trauma but did not develop PTSD (38.5%). Among new cases of PTSD at age 32, 96.3% had a prior mental-disorder diagnosis, and most (77.8%) had been diagnosed with another disorder by age 15. When lifetime mental disorders are diagnosed prospectively, PTSD comorbidity is even higher than previously reported. Moreover, most other mental disorders associated with PTSD have first onsets by age 15.

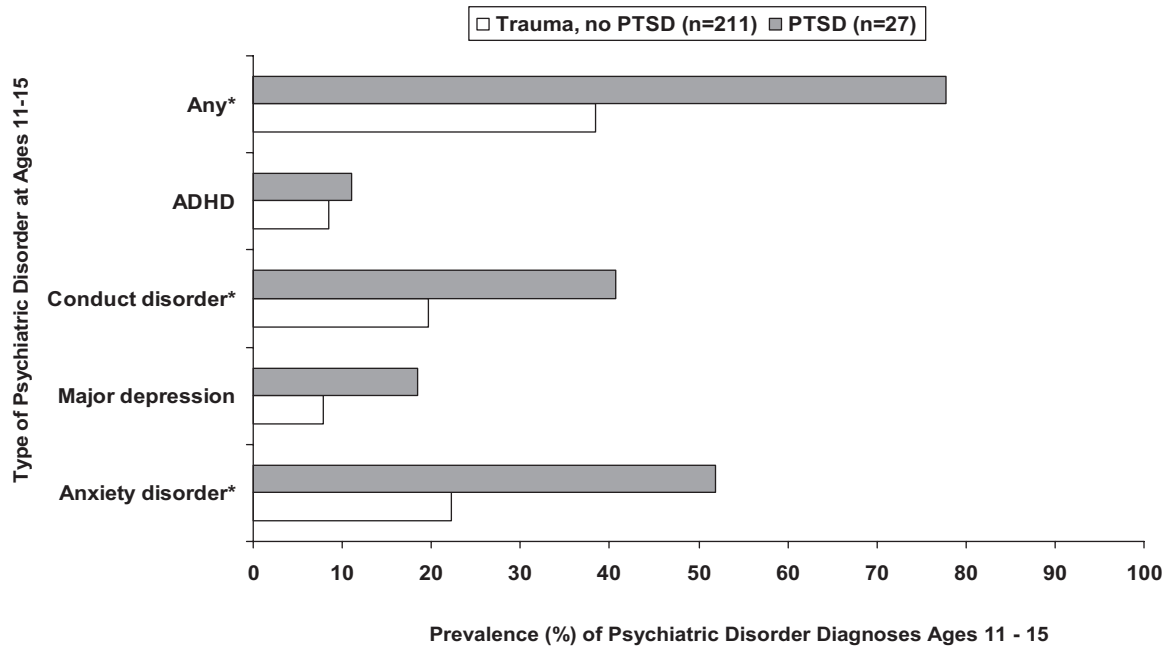
Ideally, we would have assessed PTSD concurrently with other mental disorders throughout the study's 3 decades. Instead, PTSD was not assessed until age 26, and the age-26 interview did not record age of onset for lifetime PTSD, which prevented us from ascertaining whether other disorders antedated PTSD for the age-26 cases. However, we were able to show that other disorders were present prior to PTSD for the group of PTSD cases who had clear first onset after age 26. The prevalence of mental-disorder diagnoses prior to age 21 was similar for PTSD cases up to age 26 (93.5%), current PTSD cases at age 26 (100%), and PTSD cases with first onset after age 26 (96.3%), suggesting that other disorders may antedate PTSD. Moreover, data from other birth cohorts that have concurrently assessed PTSD and other mental disorders beginning in childhood suggest that PTSD is rare in prospective epidemiologic community samples of children before age 15 but that other mental disorders (e.g., conduct disorder) are common (J. E. Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Ford, Goodman, & Meltzer, 2003).

Our developmental findings illustrate some of the challenges in classifying PTSD under current psychiatric nosology. In *DSM-IV* (1994), PTSD is classified as an anxiety disorder. Consistent with

this classification, most adults with PTSD at age 26 had a developmental history of anxiety disorders, evidence of narrow homotypic comorbidity. At the same time, adult PTSD was associated with both juvenile and young-adult histories of major depression, providing evidence of broad homotypic comorbidity. However, comparisons between trauma-exposed adults who did versus those who did not develop PTSD showed that an externalizing history predicted PTSD over and above its capacity to also predict trauma exposure. Furthermore, a substantial minority (40.7%) of new cases of PTSD at age 32 had received a conduct disorder diagnosis by 15 years of age. Thus, our findings revealed strong evidence of heterotypic comorbidity in the lifetime mental health histories of adults with PTSD.

### Limitations

The strengths of the current study include the use of a birth cohort, prospective and current measures of psychiatric diagnoses, and low attrition. However, the present study also has several limitations. First, our ascertainment of trauma-exposure asked respondents if they had any horrible experience that gave them difficulties such as sleep disturbance or jumpiness. As a result, our trauma-exposed group was selected for respondents who recalled at least a minor, acute reaction to the trauma and did not include those who did not experience any acute reaction. This likely excluded participants with less severe events, increasing the similarity between the trauma-exposed no-PTSD and PTSD groups and attenuating differences in comorbidity. Due to time con-



*Figure 2.* Prevalence (percentages) of first diagnosis of psychiatric disorders at ages 11 to 15 among cases of posttraumatic stress disorder (PTSD) with first onset between 26 and 32. Asterisk indicates  $p < .05$  based on the statistical significance of the adjusted odds ratio of the association between new PTSD diagnosis and disorders at 11 to 15 years of age. Participants who experienced a trauma between 26 and 32 years of age and never met diagnostic criteria for PTSD comprise the reference group for the analysis. Trauma, no PTSD = reference group for all analyses; ADHD = attention-deficit/hyperactivity disorder.

straints, it was not possible for the Dunedin team to interview participants more extensively to ascertain trauma history details, such as the age or chronicity of exposure. Therefore, we cannot test whether the association between other mental disorders and PTSD is mediated or moderated by trauma characteristics. Second, our assessment of PTSD was not longitudinal; although all other disorders were assessed prospectively and repeatedly, PTSD was assessed for the first time in this cohort at age 26. The interview covered a lifetime reporting period and did not retrospectively ascertain age of onset. Therefore, we were unable to examine temporal order between diagnoses of other mental disorders and PTSD diagnosed at age 26. Other mental disorders may have developed subsequent to PTSD in some cases. Future research would benefit from prospective assessments of both PTSD and other mental disorders from childhood through adulthood. This limitation was addressed by calculating antecedent disorder histories of PTSD cases with new onset between the study's age-26 and age-32 assessments; in this group, too, virtually all PTSD cases had a prior psychiatric history with antecedent onset established. Third, mental disorders were first examined when study members were 11 years old. It is possible that some children experienced disorders before this age (Kessler et al., 2005). This, together with 1-year gaps in juvenile diagnoses and 2-year gaps in young adult diagnoses, means that some participants experienced mental disorders not included in this report. However, we know of no reason why episodes of disorder undetected during study gaps should be different in one or the other of the study groups compared here. Fourth, results of the present study are limited to a single, contemporary cohort of New Zealand young adults. Although lifetime

rates of PTSD at age 26 in this cohort (11.8% for women, 7.6% for men) were similar to those reported by the NCS (Kessler et al., 1995) for young adults in the same age range (11.2% for women, 5.6% for men), further research is required to determine whether our findings will generalize to other times and places.

#### *Conclusions and Directions for Future Research*

We examined the developmental mental health histories of adults with PTSD who were members of the Dunedin Study and were followed from birth through age 32. Ours is the first study to our knowledge that has systematically examined the association between adult PTSD and data on a range of mental-disorder diagnoses assessed prospectively, starting in early adolescence. Our data and those from other epidemiologic and clinical studies suggest that rates of lifetime comorbidity in PTSD are higher than those observed for many other common mental disorders (Brown et al., 2001; Kessler et al., 1995; Kim-Cohen et al., 2003). These findings suggest PTSD develops in the context of other forms of psychopathology, which has implications for research on PTSD etiology. Almost all the adults in our study diagnosed with PTSD at age 26 or 32 were diagnosed with another mental disorder by age 21. Most had received another mental-disorder diagnosis by the age of 15. Although this temporal sequence is likely not specific to PTSD and could stem in part from the typical ages of onset of commonly co-occurring conditions, research on the etiology of PTSD may benefit from taking lifetime developmental patterns of comorbidity into consideration. Moreover, research

aimed at understanding the structure and etiology of PTSD comorbidity is sorely needed.

Finally, our findings have implications for the treatment of PTSD in adults and the prevention of the disorder. Clinicians who serve clients with PTSD commonly collect information about other current psychiatric difficulties, such as major depression and substance use disorders. However, our data suggest that adults with PTSD are also likely to have a history of other mental disorders, and for many individuals this history extends back to early adolescence. PTSD clinicians may, therefore, find their treatment approach informed by integrating information on clients' developmental mental health histories into their case conceptualization. Moreover, the majority of adults with PTSD met criteria for a juvenile mental disorder. Juvenile mental-disorder histories may provide information on which individuals are most at risk of developing PTSD in populations at high risk of trauma exposure, such as military personnel and first responders.

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Received May 15, 2006

Revision received January 14, 2008

Accepted January 14, 2008 ■