Epidemiologic Studies of Trauma, Posttraumatic Stress Disorder, and Other Psychiatric Disorders

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This paper reviews recent epidemiologic studies of posttraumatic stress disorder (PTSD) in the general population. Estimates of the prevalence of exposure to traumatic events vary with the method used to ascertain trauma exposure and the definition of the stressor criterion. Changes in the DSM-IV definition of “stressor” have increased the number of traumatic events experienced in the community that can be used to diagnose PTSD and thus, the number of PTSD cases. Risk factors for PTSD in adults vary across studies. The 3 factors identified as having relatively uniform effects are 1) preexisting psychiatric disorders, 2) a family history of disorders, and 3) childhood trauma. In civilian populations, women are at a higher risk for PTSD than are men, following exposure to traumatic events. Most community residents have experienced 1 or more PTSD-level traumas in their lifetime, but only a few succumb to PTSD. Trauma victims who do not succumb to PTSD are not at an elevated risk for the subsequent onset of major depression or substance use disorders, compared with unexposed persons.

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Highlights

In their lifetime, most community residents have experienced 1 or more traumatic events at the level of posttraumatic stress disorder (PTSD).

Only a few of those ever exposed to traumatic events have developed PTSD.

Exposed persons with PTSD have an elevated risk for other psychiatric and substance use disorders.

Trauma victims who have not developed PTSD are not at an elevated risk for the subsequent onset of major depression and substance use disorders, compared with unexposed persons.

Key Words: epidemiology, posttraumatic stress disorder, trauma, major depression, substance use disorders, comorbidity
population (4–11). These studies describe the prevalence of traumatic events and PTSD and their distribution across population subgroups. They identify risk factors for trauma exposure and PTSD and describe aspects of the course of PTSD, including duration of symptoms and comorbidity with other psychiatric disorders.

This paper reviews results from these studies. It focuses also on core methodologic issues for research in this growing field. It addresses changes in the definition of the stressor criterion in the DSM-IV and presents data on the implications of the DSM-IV shift toward an emphasis on the subjective experience of trauma victims and a more inclusive variety of stressors. Approaches to measuring exposure to traumatic events and PTSD are discussed. This review also provides a summary of findings on the prevalence of trauma exposure and PTSD and a brief summary of findings on risk factors. Research on other psychiatric disorders that might be attributed to traumatic events, the logic of the approach to this inquiry, and the implications of recent findings are discussed in more detail.

The Definition of Trauma and PTSD

According to the current nosology expressed in the DSM-IV, the core features of PTSD comprise a stressor criterion that defines the etiologic event and a configuration of symptoms, drawn from 3 groups, that define the characteristic PTSD syndrome (3). The 3 symptom groups that constitute the PTSD syndrome are as follows: reexperiencing the trauma in nightmares, intrusive memories, or “flashbacks” (Criterion B); numbing of affect and avoidance of thoughts, acts, and situations that symbolize the trauma (Criterion C); and symptoms of excessive arousal (Criterion D). The diagnosis requires the persistence of symptoms for at least 1 month (Criterion E) and clinically significant distress or impairment (Criterion F).

The DSM-IV definition of the PTSD syndrome is little changed from earlier DSM editions. However, the stressor criterion in DSM-IV clearly departs from earlier DSM editions. The pervasive experience was originally defined as an overwhelming experience outside the usual range. The DSM-IV redefined traumatic experiences in subjective terms. The current definition is 2-part: the first part (Criterion A1) defines the range of qualifying stressors, and the second part (Criterion A2) requires that “the person’s response involved intense fear, helplessness, or horror.” Criterion A1 broadens the variety of qualifying traumatic events. In addition to the original core category of traumas used to define PTSD (military combat, disaster, and criminal violence), the expanded DSM-IV definition attempts to cover all possible events that clinicians might regard as potentially culminating in PTSD symptoms. Although stressors classified as less extreme are explicitly excluded (for example, spouse leaving or being fired [3, p 427]), the DSM-IV list of examples is clearly more inclusive than earlier DSM editions. For the first time, death of a loved one from any cause (including natural causes) qualifies as a stressor, as long as it was “sudden and unexpected.” Being diagnosed with a life-threatening illness is another example of the wider range of traumatic events included in the new definition. The DSM-IV revision—the broader range of qualifying traumatic events and the added criterion of a specific emotional response—deemphasizes the objective features of the stressors and highlights the clinical principle that people may perceive and respond differently to outwardly similar events.

A recent report from a general population study that used the DSM-IV suggests that the net effect of the wider variety of events and the added subjective component has been to increase by more than 20% the total number of qualifying events, compared with previous DSM definitions (12). The subjective component of the DSM-IV stressor criterion did little to offset the effect of the broadened range of qualifying stressors: approximately 90% of those who have ever been exposed to 1 or more stressors have responded with “intense fear, helplessness or horror” to 1 (the worst) of their stressors. There has also been a considerable increase in PTSD cases, with most of the added cases attributable to a single type of trauma; namely, “learning about unexpected death of a close relative/friend” (12). The DSM-IV definition requires, for the first time, that the syndrome cause significant distress or impairment—an addition that renders the diagnostic definition of PTSD more stringent. This is particularly true in epidemiologic surveys of the general population, as opposed to clinical practice, where impairment or distress are generally the reasons for seeking treatment. In the study described above (10,12), the requirement that the syndrome cause significant distress or impairment led to a reduction by approximately 25% in the number of PTSD cases identified (unpublished data).

Assessing Exposure to Traumatic Events and PTSD in Community Studies

The standard measurement procedure in contemporary epidemiologic studies of psychiatric disorders (including PTSD) has been the National Institute of Mental Health-Diagnostic Interview Schedule (NIMH-DIS) and the World Health Organization-Composite International Diagnostic Interview (WHO-CIDI), which is based on the DIS (13–15). These structured interviews are designed to be administered by experienced interviewers without clinical training. The PTSD section inquires about lifetime history of traumatic events and asks respondents to nominate the worst event ever experienced. It then elicits information about PTSD symptoms connected with that event. Some epidemiologic studies have introduced modifications to the NIMH-DIS—chiefly, in the
approach to eliciting information about exposure to traumatic events (5,6).

Estimates of the prevalence of exposure to traumatic events vary according to the inclusiveness of the stressor criterion and the methods used to measure exposure to qualifying stressors. In the DSM-III and DSM-III-R, qualifying stressors were defined as events that would be “distressing to almost everyone” and as “generally outside the range of usual human experience.” Typical PTSD traumas were military combat, rape, physical assault, natural disaster, witnessing violence, and learning about violent injury or a violent death of a loved one. DSM-IV has broadened the stressor criterion beyond the earlier definition, as described above. According to one study, the impact of the revision on the lifetime prevalence has been an increase from 68.1% to 89.6% (12).

Differences in estimates of the prevalence of exposure to traumatic events across epidemiologic studies that predate the 1994 publication of the DSM-IV reflect differences in measurement approaches. The key difference is between studies that used the revised NIMH-DIS, which elicits history of exposure to traumatic events with a single question incorporating examples of typical PTSD events (13), and studies that used a list of events and inquired about each event separately (5,6). The use of a list of events and the number of events included in the list have important implications for estimating the prevalence of traumatic events. Using a list, compared with using a single question, and using a long vs a short list, yields higher prevalence estimates of trauma exposure and higher estimates of the average number of traumas per exposed person. A list of events has become the standard measurement procedure, incorporated into current versions of the major structured interviews—the WHO-CIDI and the DIS for DSM-IV (14,15).

Estimates of the conditional probability of PTSD are derived from information on the prevalence of exposure to 1 or more qualifying events (the denominator) and the proportion of those exposed who meet criteria for PTSD in connection with 1 of their events (the numerator). Estimates of the overall conditional risk for PTSD depend in part on the stressor definition. A definition that includes only rare and highly traumatic events will yield a lower prevalence of exposure and a higher conditional risk for PTSD, compared with an inclusive definition that encompasses a wide range of events. In addition, a measurement procedure such as a single question, which yields a lower prevalence of exposure, yields a higher conditional risk for PTSD, compared with procedures that yield a higher prevalence of exposure, such as a list of events. It appears that using a list vs a single item (or a long vs a short list) enhances recall of events that are less memorable but also less likely to have led to PTSD.

Kessler and others identified a methodological issue in community studies of PTSD (7,16). When 2 or more qualifying traumas were reported, previous studies focused on traumatic events selected by the respondent as the worst or the most upsetting ever experienced. This approach is an efficient way to identify persons with PTSD and estimate the prevalence of the disorder. Only a few respondents who fail to meet PTSD diagnostic criteria for their worst trauma are likely to meet criteria for other traumas they experienced (17). The worst-event method has also been used to estimate the conditional risk for PTSD. The worst events yield estimates of the probability of PTSD in persons who have experienced 1 or more traumas in their lifetime and allow the investigation of risk factors and consequences of PTSD among this group. However, the approach has been suspected of overstating the conditional risk for PTSD associated with the class of DSM-qualifying events as a whole (that is, typical trauma) (7,16).

An alternative to inquiring about PTSD symptoms in relation to all reported events, which would impose too great a respondent’s bias, involves selecting a random event from the complete list of traumatic events reported by each respondent. Such an approach, together with a weighting procedure to adjust for differences in the selection probabilities of events across respondents, provides a representative sample of qualifying, or typical, traumatic events. This method was used in a recent survey of the general population, and several reports have been published based on it (for example, 10,12,18,19). A comparison of the estimates based on the 2 methods—the randomly selected events and the worst events—suggests that the worst events moderately overstate the conditional risk for representative (typical) traumas. Specifically, the conditional probability of PTSD based on the sample of the worst events was 13.6%; based on the representative sample of events, it was 9.2% (10). This new method provides an estimate of the conditional probability of PTSD following typical traumas. However, it is incapable of identifying all (or nearly all) those who met criteria for PTSD following exposure to traumatic events, either in a lifetime or during a specified time period. In other words, the randomly selected events cannot replace the worst events as a shortcut when an inquiry about all traumatic events is not feasible.

### Prevalence of Exposure to Traumatic Events and Conditional Risk for PTSD

As summarized above, the lifetime prevalence of exposure to traumatic events varies across epidemiologic studies as a function of the combined effects of differences in the stressor definitions and ascertainment methods. Earlier studies (4–8, 11) reported estimates of exposure ranging from 40% to 60%, whereas a recent study that used the DSM-IV enlarged definition approached 90% (10). Despite the differences across
studies, all studies reported a higher prevalence of exposure in men than in women. Although consistent across studies, the sex difference in exposure is modest, with a prevalence ratio in men vs women of less than 1.2 to 1. The average number of traumatic events reported by exposed men exceeds the corresponding average in women. Several surveys reported that the prevalence estimates of rape or sexual assault other than rape were higher in women than in men; the lifetime occurrences of other events involving assaultive violence, accidents, and witnessing violence were higher in men than in women (for example 5,7,9,10).

Despite large differences in the prevalence of exposure to traumatic events across studies, the lifetime prevalence of DSM-III-R PTSD varied within a narrow range: 5% to 6% in men and 10% to 14% in women. The lifetime prevalence of DSM-IV PTSD was higher, reflecting the enlarged stressor criterion that includes relatively common traumatic events (10,20).

The higher prevalence of PTSD in women is a function of the sex difference in the conditional probability of PTSD. Women are approximately twice as likely as men to succumb to PTSD following traumatic events. Even when cases with rape are excluded or when event type is controlled, women have a higher rate of PTSD following traumatic experiences than do men (7,9,10,21). There is evidence to suggest that women’s greater PTSD risk may not be a generalized vulnerability but, rather, a specific vulnerability to the PTSD-inducing effects of assaultive violence (7,19,21). The sex difference in the risk for PTSD is not attributable to sex differences in history of previous exposure to trauma or sex differences in preexisting psychiatric disorders (18,20).

Risk Factors for Exposure to Traumatic Events

Traumatic events are not random. The prevalence of exposure varies across subgroups of the population classified by sociodemographic characteristics. Men, the young, and members of minority groups residing in inner cities have higher lifetime risk for exposure to assaultive violence, compared with women, older persons, and residents of middle-class suburbs (10). Men are also at higher risk than women for exposure to serious accidents and to witnessing violence perpetrated on others. With respect to other event types—events grouped under learning about trauma to others or learning about the unexpected death of a loved one—differences by sociodemographic characteristics are trivial (10,20). There is evidence that a history of exposure to trauma predicts new exposure (22).

Personality traits of neuroticism and extroversion, early conduct problems, family history of psychiatric disorders, and preexisting psychiatric disorders are associated with increased risk for exposure to traumatic events defined according to DSM-III-R (4,7,22–24). The applicability of these findings to the enlarged definition of stressors in DSM-IV is uncertain.

Risk Factors for PTSD Following Exposure to Traumatic Events

A recent metaanalysis identified 3 risk factors for PTSD that are reported consistently across studies: psychiatric history, history of childhood trauma, and family history of psychiatric disorders (25). With respect to other risk factors investigated in that analysis, effects varied across studies. For example, sex differences in the risk for PTSD following exposure that were observed across studies of civilian samples were nonexistent among Vietnam veterans. Studies of military samples found that younger age at trauma was a risk factor for PTSD, whereas studies of the general population failed to find age-at-trauma effects (18). The metaanalysis did not examine the suspected risk factors of neuroticism and prior exposure to traumatic events (other than childhood abuse) (4,22).

Other Posttrauma Disorders

Epidemiologic studies of general population samples have confirmed earlier observations from clinical samples and samples of Vietnam veterans that persons diagnosed with PTSD have high rates of other psychiatric disorders (4,7). These include major depression, anxiety disorders (other than PTSD), and substance use disorders. Alternative explanations have been proposed for the association of PTSD and these disorders. First, preexisting psychiatric disorders may increase the likelihood of PTSD by increasing the risk for exposure to traumatic events of the type that lead to PTSD or increase victims’ susceptibility to the PTSD-inducing effects of trauma. For example, drug use disorder has been suspected of increasing the likelihood of PTSD because it is associated with lifestyles that involve an elevated risk for exposure to violence. Similarly, there is evidence that a history of major depression increases the risk for exposure to traumatic events (17), as it does for exposure to ordinary stressful life events (26). Second, PTSD may be a causal risk factor for other psychiatric disorders. Use of alcohol or drugs to relieve the distressing symptoms of PTSD may increase the likelihood of dependence; major depression may develop as a complication of PTSD and its associated impairment. Third, the associations may be noncausal, reflecting shared genetic or environmental factors. Genetic factors common to PTSD and substance use disorders have been reported (27,28). Also, personality traits (primarily, neuroticism) and family history of major depression have been implicated separately in the development of PTSD, as well as in the development of major depression (4,17,29).
A suspected shared environmental risk factor for PTSD comorbid with other psychiatric disorders is exposure to trauma (30,31). It has been suggested that traumatic events leading to PTSD also induce diatheses for other disorders (32). Although PTSD has been defined as the signature disorder in victims of traumatic events, stressors—both those that qualify for the diagnosis of PTSD and those that do not—may also precipitate other disorders. According to this hypothesis, some trauma victims develop PTSD, whereas others develop major depression or substance use disorder, depending on their preexisting vulnerabilities. Comorbidity of PTSD with other disorders would thus reflect the cooccurrence of distinct diatheses (32,33). The notion that traumatic events cause various disorders apart from PTSD and that there may be distinct diatheses determining the specific psychiatric sequelae of trauma originated in observations of high rates of various disorders among trauma victims. For example, rates of depression and anxiety disorders (other than PTSD) appeared elevated in trauma patients admitted to the emergency room (34). Similarly, an elevated rate of major depression that was equal to the rate of PTSD was found in a survey of New York City residents several months after the attacks on the World Trade Center of September 11, 2001 (35). However, these data, in themselves, do not indicate that exposure to traumatic events was the cause.

To test whether exposure to traumatic events increases the risk for a psychiatric disorder other than PTSD (for example, major depression), it is necessary to compare the disorder’s incidence in persons exposed to trauma who did not develop PTSD with the incidence in persons not exposed to trauma (36). That is, with respect to psychiatric disorders other than PTSD, evaluating the potential causal role of exposure to trauma requires a different approach from that used to estimate the risk for PTSD. By definition, PTSD requires a link to an identifiable qualifying stressor, and the symptoms of PTSD are closely connected with that stressor. In consequence, the risk for PTSD in trauma victims is measured by a conditional probability or conditional risk (that is, risk for those exposed to the stressor). In contrast, the definition of major depression, anxiety, or substance use disorder does not require a link to a stressor, and these disorders can occur without a stressor. In consequence, the association between trauma exposure and subsequent occurrence of major depression (or other disorders) is measured by a ratio of risks, or by a relative risk estimate (that is, risk for depression among those exposed divided by risk among those not exposed). Without such a comparison of risks, we could not test whether the risk among exposed persons is in fact higher than it would have been if they were not exposed to trauma. By definition, PTSD has no such an alternative. A relative risk for PTSD with respect to the presence or absence of a stressor cannot be estimated.

The DSM’s essential linking of PTSD with a traumatic experience is difficult to challenge, given the way in which PTSD has been understood and described from its early origins: without exposure to trauma, what is posttraumatic about the ensuing syndrome of traumatic memories and associated distressing symptoms? Such is clearly not the case with major depression or substance use disorders.

Further, to evaluate the role of trauma exposure in the onset of another disorder, it is not sufficient to show that the disorder’s rate is higher in exposed than in nonexposed persons. Support for the hypothesis that trauma is associated with an increased risk for major depression (or another disorder), independent of its PTSD-inducing effects, requires evidence of a higher incidence of the disorder in exposed persons who did not succumb to PTSD, compared with nonexposed persons. Evidence of an increased risk for the disorder in trauma victims with PTSD but not in trauma victims without PTSD would not support the hypothesis. It would suggest instead that PTSD might cause the disorder or that shared antecedent factors other than trauma exposure account for the PTSD–other disorder link.

Reports based on prospective and retrospective data show a markedly increased risk for major depression in trauma-exposed persons with PTSD (23). Elevated risk for major depression was not reported in trauma-exposed persons without PTSD, compared with nonexposed persons (17,23). This pattern of a markedly higher rate of major depression in victims with PTSD can also be observed in reports from other studies that did not explicitly address this question, including postdisaster studies (35,37). For example, although the New York City survey conducted after the attacks on the World Trade Center found similar rates of PTSD and major depression (35), hand calculations of reported numbers reveal that the prevalence of major depression in persons with PTSD was 49%, and in those without PTSD, it was only 6.5%. The latter figure is not far from what could be expected for past-30-day major depression in the general population (38).

With respect to the relation of substance use disorders to trauma exposure and PTSD, a recent report shows an increased risk for the subsequent onset of nicotine dependence and drug abuse or dependence in trauma victims with PTSD but not in those without PTSD, compared with unexposed persons (39,40). (The results on nicotine dependence are equivocal, and a modestly elevated risk in trauma victims in the absence of PTSD has not been safely ruled out.)

The findings regarding elevated rates of subsequent major depression, nicotine dependence, and drug use disorder in trauma victims with PTSD but not in those without PTSD, compared with nonexposed persons, narrow potential explanations of the relation between PTSD and the subsequent
onset of these disorders. PTSD may be a determinant of these disorders, or PTSD and each of these disorders may have a shared diathesis or shared environmental causes other than trauma exposure. The extent to which a diathesis shared with PTSD accounts for the elevated risk for other disorders may vary across disorders. The PTSD–major depression association may primarily reflect a shared diathesis (23). Evidence that preexisting major depression and family history of major depression are associated with increased risk for PTSD following trauma exposure support this interpretation (17,23,24,29). The PTSD–drug use disorder association may reflect primarily a causal effect of PTSD (40), although a common genetic contribution to the association has also been reported (27,28).

Recent results on the relation between PTSD and the risk for alcohol use disorders in exposed persons suggest the possibility that female, but not male, trauma victims who did not succumb to PTSD may be at increased risk for alcohol use disorder (17,39). Previous research in Vietnam combat veterans and civilian victims of traumatic events generally found considerably stronger associations between trauma exposure and alcohol use disorder when PTSD was present, rather than absent (30,41). Some studies found weak or no association between trauma exposure and drinking or alcohol use disorder (37,42). Notably, there is little support for the notion that male trauma victims (whose risk for PTSD is generally lower than that of female trauma victims) respond to traumatic experiences by abusing alcohol or drugs. Such a susceptibility would result in an increased risk for alcohol and drug use disorders in trauma-exposed men without PTSD, relative to unexposed men.

Epidemiologic studies have consistently reported that only a small subset of trauma victims succumb to PTSD; most do not. Recent studies indicate that trauma victims who do not succumb to PTSD (that is, most victims) are not at a markedly elevated risk for the subsequent first-onset of other psychiatric disorders, compared with unexposed persons. The excess incidence of the first onset of other disorders following trauma exposure is concentrated primarily in the small subset of trauma victims with PTSD. These observations suggest that PTSD identifies a subset of trauma victims at considerable risk for a range of disorders. The extent to which the increased risk for these other disorders represents shared diatheses vs complications of PTSD may vary across disorders. Studies designed to test genetic and environmental factors in PTSD and comorbid disorders are needed.

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Résumé : Études épidémiologiques des traumatismes, du syndrome de stress post-traumatique et d’autres troubles psychiatriques

Cet article examine les récentes études épidémiologiques du syndrome de stress post-traumatique (SSPT) dans la population générale. Les estimations de la prévalence des expositions à des événements traumatiques varient selon la méthode utilisée pour évaluer l’exposition au traumatisme et la définition du critère du stresseur. Les changements de la définition de « stresseur » du DSM-IV ont augmenté le nombre d’événements traumatiques vécus dans la communauté qui peuvent être utilisés pour diagnostiquer un SSPT, et par conséquent, le nombre de cas de SSPT. Les facteurs de risque du SSPT chez les adultes varient selon les études. Les 3 facteurs déterminés comme ayant des effets relativement uniformes sont 1) des troubles psychiatriques préexistants, 2) des antécédents familiaux de troubles et 3) un traumatisme dans l’enfance. Dans les populations civiles, les femmes sont à plus grand risque de SSPT que les hommes, par suite d’une exposition à des événements traumatiques. La plupart des résidents d’une communauté ont fait l’expérience d’un ou de plusieurs événements traumatiques de niveau SSPT dans leur vie, mais seulement quelques-uns succombent au SSPT. Les victimes de traumatismes qui ne succombent pas au SSPT ne sont pas à risque accru d’apparition ultérieure de la dépression majeure ou de troubles liés à une substance, comparativement aux personnes non exposées.