The Epidemiology of Posttraumatic Stress Disorder: What Is the Extent of the Problem?

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Until recently, our understanding of posttraumatic stress disorder (PTSD) relied almost entirely on studies of war veterans and disaster victims. A handful of epidemiologic studies have now been conducted that investigate the natural course of PTSD as it occurs in the general population. Estimates of PTSD prevalence have tended to vary according to the diagnostic criteria used to define the disorder, assessment procedures, sample characteristics, and the definition of qualifying traumatic events. This article reviews key findings from these studies to provide insight into the burden of PTSD in the general population. Possible reasons for the observed difference in lifetime prevalence of PTSD between the sexes (a female-to-male lifetime prevalence ratio of 2:1 is typically reported) and factors thought to be associated with an increased risk for the disorder after exposure to trauma are reviewed.

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Posttraumatic stress disorder (PTSD) was officially defined in 1980 according to a range of syndromal responses to extreme stressors. The original DSM-III classification[1] has since been revised through DSM-III-R[2] into DSM-IV.[3] Expansion of the definition of the stressors that qualify for diagnosis, that is, traumatic events that are believed to cause PTSD, has influenced estimates of the prevalence of PTSD in the general population.

PTSD diagnostic criteria have been defined elsewhere in this publication (see reviews by Shalev[4] and by Yule[5]). However, several key points of interest relating to the DSM-IV deserve further mention. The range of "qualifying" traumatic events has been expanded from the core category of traumas that have initially been used to define PTSD, that is, military combat, disaster, and criminal violence. For the first time, the death of a loved one from any cause, including natural causes, is included as a stressor, as long as it is "sudden and unexpected." Previously, the death of a loved one had to be "violent." The revised definition has also introduced a subjective component, requiring that "the person's response involved intense fear, helplessness, or horror."[3(p428)] The timing of this response has not been specified. The requirement for significant distress or impairment reflects a more stringent definition of PTSD, particularly in epidemiologic samples of the general population (as opposed to clinical practice, where impairment is often the reason for seeking treatment). Of the 3 symptom groups that constitute PTSD in DSM-IV ("reexperiencing the trauma," "avoidance and numbing," and "hyperarousal"), the avoidance and numbing criterion is the least frequently met and is the critical one for a diagnosis of PTSD; only a small fraction of those who meet DSM-IV diagnostic requirements in other symptom groups meet the avoidance/numbing criterion.

PTSD IN THE GENERAL POPULATION

Since 1980, most PTSD research has been carried out with Vietnam combat veterans and specific samples of the population that have been exposed to disasters. Only a relatively small number of studies have been conducted in the general population. These studies provide estimates of the prevalence of PTSD in the community, as well as the distribution of PTSD across different subgroups. They also suggest risk factors predisposing to the disorder and describe aspects of the natural history of PTSD as it is experienced in communities that are not exposed to disaster conditions (Table 1).[6–11]

To date, surveys of the general population indicate that PTSD affects about 1 in 12 adults at some time in their lives, equivalent to approximately 15% to 24% of those exposed to traumatic events.[6,9] In each of the studies reviewed below that included both males and females, exposure to trauma is lower in females than males. However, a 2:1 ratio of female-to-male lifetime prevalence of PTSD is typically reported.[6,9]

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Table 1. Lifetime Prevalence of Posttraumatic Stress Disorder (PTSD) (%)

	Exposure		PTSD	
Study	Men	Women	Men	Women
Breslau et al, 1991[6]	43.0	36.7	6.0	11.3
Norris, 1992[7]	73.6	64.8	–	–
Resnick et al, 1993[8]	–	69.0	–	12.3
Kessler et al, 1995[9]	60.7	51.2	5.0	10.4
Breslau et al, 1997[10]	–	40.0	–	13.8
Stein et al, 1997[11]	81.3	74.2	–	–

DSM-III-R PTSD in the General Population

We studied a random sample of 1007 young adults (21–30 years of age) in southeast Michigan to determine the prevalence of PTSD (according to DSM-III-R criteria) and associated risk factors.[6] A total of 394 respondents (39.1%) reported exposure to 1 or more traumatic event. Exposure was more common in men (43.0%) than women (36.7%) but was unrelated to race or marital status. Other risk factors for exposure to traumatic events were low education (i.e., less than college education), a history of childhood conduct problems, neuroticism, extroversion, and a family history of psychiatric disorder or substance problems.

The rate of DSM-III-R PTSD in exposed individuals was 23.6%, equivalent to a lifetime prevalence of PTSD in the total sample of 9.2%. The prevalence of PTSD was higher in women (11.3%) than in men (6.0%). Despite the lower prevalence of exposure to trauma among women compared with men, of those women who were exposed, 30.7% had PTSD compared with 14% of exposed men. Excluding rape (reported by women alone), this greater vulnerability was largely due to the female reaction to learning about or witnessing violent traumatic events to others. Similar findings have previously been reported by Kessler and McLeod.[12] In addition to female sex, factors associated with increased risk for PTSD following trauma exposure included early separation from parents, neuroticism, and preexisting psychiatric disorder. A family history of anxiety, depression, psychosis, and antisocial behavior significantly increased an individual's vulnerability to the effects of a traumatic event. Of the 93 respondents with PTSD, 75.3% had a preexisting anxiety or depressive disorder or family history of anxiety. This compared with a rate of 50% in those without PTSD.

From this study,[6] we could surmise that PTSD is one of the more common psychiatric disorders among young adults, after phobia, major depression, and alcohol and drug dependence. The reported lifetime prevalence of PTSD in the sample (9.2%) far exceeded previous estimations[13,14] in which only approximately 1% of the total population was estimated to meet all criteria for lifetime PTSD using the older DSM-III definition and an older assessment interview. The data also indicate that PTSD does not occur randomly in a population, but that specific risk factors are associated not only with its development following trauma exposure but also with exposure to traumatic events. Therefore, in a random sample of the population, certain individuals are at higher risk than others for PTSD.

Demographic Factors

In a further sample of 1000 adults from 4 southern U.S. metropolitan areas damaged by Hurricane Hugo, Norris[7] examined the frequency and impact of 10 potentially traumatic events. The sample was evenly divided according to race (black and white individuals), sex (men and women), and age (younger, middle-aged, and older adults). In the year prior to the study, 21% of the sample experienced at least 1 of the 10 traumatic events, and when assessed over their lifetimes, this figure increased to 69%. Overall, sexual assault was associated with the highest (current) prevalence of PTSD (13.6%), while tragic death (loss of a loved one by homicide, suicide, or accident) occurred most often (30.2%). Numerous differences were identified across demographic groups. For example, lifetime trauma exposure was higher among white individuals and men than among black individuals and women, and although younger adults appeared to show the highest rates of PTSD, black men appeared the most vulnerable to the effects of the traumatic events. Women were more than twice as likely as men to show symptoms of PTSD following exposure to violent crime (12% vs. 6%, respectively; $p < .05$).

Overall, the data suggested current prevalence rates for PTSD in the order of 7% to 11% for those who were exposed to violent crimes, deaths, or accidents and rates of 5% to 8% for those exposed to various environmental hazards. These rates of current disorder are similar to those reported by Kilpatrick and Resnick[15] and, consistent with previous findings,[16] are approximately one third the lifetime rates we previously reported.[6] As we had observed, Norris[7] also noted the greater vulnerability of women to the symptoms of PTSD following trauma exposure.

PTSD in Women

Resnick and colleagues[8] surveyed a national sample of 4008 women to determine both the lifetime prevalence of PTSD and current prevalence (within the previous 6 months) following exposure to crime and other civilian traumatic events. Overall, 69.0% of the sample reported experience of at least 1 traumatic event in their lifetime, and 35.6% were exposed to crime. The overall lifetime prevalence of PTSD was 12.3%, and current prevalence was 4.6%. The rate of PTSD was significantly higher in crime victims compared with noncrime victims (25.8% vs. 9.4%, respectively). Highest rates of PTSD (38.5% lifetime, 17.8% current) were reported among women exposed to physical assault and/or rape.

The National Comorbidity Survey

In a large PTSD survey of the general population (5877 individuals aged 15–54 years), the National Comorbidity

Survey[9] reported a significant difference in lifetime prevalence of any trauma between males (60.7%) and females (51.2%). The estimated lifetime prevalence of PTSD (according to DSM-III-R criteria) was 7.8%. Females were found to be more than twice as likely as males to have lifetime PTSD (10.4% vs. 5.0%; $p < .05$). Therefore, although males were more likely than females to experience at least 1 trauma, females were more likely than males to experience a trauma associated with a greater probability of PTSD. Consistent with previous observations, traumas most commonly associated with PTSD in females were rape and sexual molestation, and in males, combat exposure and witnessing trauma to others.

Relationship of PTSD to Other Psychiatric Disorders

We assessed the impact of PTSD[10] (according to the DSM-III-R) on the subsequent development of psychiatric disorders in a sample of 801 mothers of children who had previously participated in a study[17] of cognitive and psychiatric outcomes related to low birth weight. The overall lifetime prevalence of traumatic events and PTSD was 40.0% and 13.8%, respectively. The lifetime prevalence of comorbidity in subjects with PTSD (N = 111) with any psychiatric disorder included within the analysis was 73%. PTSD was associated with an increased risk for first-onset major depression and alcohol abuse or dependence. Additionally, preexisting major depression was associated with an increased vulnerability to PTSD following trauma, as well as an increased risk of trauma exposure. Those women who were exposed to trauma but did not develop PTSD were at an increased risk for first-onset alcohol abuse or dependence but not major depression.

Full and Partial PTSD in the Community

In a community survey of 1002 individuals from Winnipeg, Canada, Stein and colleagues[11] examined the 12-month prevalence of both subsyndromal or subthreshold "partial" PTSD (fewer than the required number of DSM-IV criterion C or D symptoms) and full PTSD (meeting all DSM-IV criteria). The relative importance and functional significance of these 2 presentations was also investigated. The estimated prevalence of both was higher in women than men; full PTSD, 2.7% in women and 1.2% in men; partial PTSD, 3.4% in women and 0.3% in men. While full PTSD caused significantly greater interference with work or school activities than did partial PTSD, those individuals with partial symptoms experienced more occupational impairment than those who did not have PTSD but were traumatized.

The prevalence of "subthreshold" or partial PTSD observed in this community study is consistent with previous reports in Vietnam veterans[18,19] and victims of sexual abuse, among others.[20–22] In Stein and colleagues'[11] community sample, partial PTSD appeared to be particularly prevalent among women and to cause impairment comparable to that observed in those with full PTSD when considered in terms of interference with social and family functioning.

DETROIT AREA SURVEY OF TRAUMA

We examined trauma and subsequent risk for PTSD (as defined in the DSM-IV[3]) in a community sample of 2181 persons aged 18 to 45 years.[23] Participants were from the Detroit area, a 6-county area inhabited by > 4 million people, of whom nearly 2 million are aged 18 to 45 years. All respondents were asked whether they had ever experienced any trauma(s) from a list of 19 traumatic events. The list represented the DSM-IV definition of stressors. These events were grouped into 4 categories as listed below:

1. Assaultive violence: combat, rape, held captive/tortured, shot/stabbed, sexual assault, mugged/held-up/threatened, badly beaten
2. Other injury or shocking experience: accident, fire/flood/earthquake, life-threatening illness, witnessed violence, discovered a dead body
3. Learning about trauma to a loved one (family member or close friend)
4. Sudden unexpected death of a loved one

Trauma Exposure

The lifetime prevalence of exposure to one or more traumatic events was 89.6%. The most prevalent trauma, reported by 60% of the sample, was sudden unexpected death of a loved one. Lifetime exposure was higher for men than women. For any trauma, the prevalence was 92.2% for men and 87.1% for women. The mean number of distinct traumatic events in persons exposed to any trauma was 5.3 and 4.3 for men and women, respectively.[23]

Looking in more detail at events involving assaultive violence, women were found to report rape and sexual assault more frequently than men. However, men were more likely than women to report all other types of assaultive violence (e.g., badly beaten, mugged/threatened with a weapon, shot/stabbed) (Table 2).

When assessed according to other injury or shocking experience, men were found to be more likely than women to report witnessing acts of violence and severe accidents. No differences were found between the sexes, however, in terms of exposure to disaster.[23]

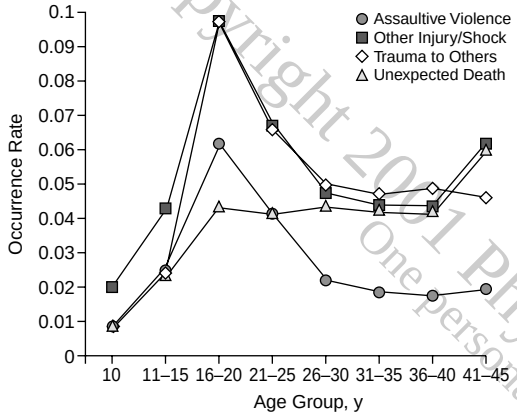
Occurrence rates of trauma exposure by age. The rates of the 4 classes of trauma (assaultive violence, other injury/shock, trauma to others, unexpected death) peaked in the 16- to 20-year age period (Figure 1). However, marked differences were observed across classes of trauma in the pattern of rates over the life span of the respondents. The probability of assaultive violence declined significantly after 20 years of age and continued to decline in the third and fourth decades (a decline in the fourth dec-

Table 2. Lifetime Prevalence of Exposure to Assaultive Events by Sex (%)[a]

Assaultive Event	Men	Women
Military combat	2.8	0.2
Rape	1.1	9.4
Held captive/tortured	1.7	2.0
Shot/stabbed	8.2	1.8
Sexual assault	2.8	9.4
Mugged/threatened	34.0	16.4
Badly beaten	13.1	9.8

[a]Data from Breslau et al.[24]

Figure 1. Occurrence Rates of Exposure to Trauma by Age (both sexes)[a]



[a]Adapted from Breslau et al.,[23] with permission. For each age interval, the occurrence rate is estimated from the number of exposures divided by the number of person-years at that interval.

ade was not found in men). In contrast to assaultive violence, the probabilities of exposure to other injury or shocking events, or learning about trauma to others, which also declined after 20 years of age, did not continue to decline after 25 years. Sudden unexpected death of a loved one was the only trauma to remain at the high level it reached at 16 to 20 years of age until 40 years, and to subsequently increase between 41 and 45 years.[23]

Conditional Risk of PTSD

The studies discussed above, and others, highlight the extremely high proportion of the population who are subjected to a range of traumatic experiences throughout life. Key etiologic questions in PTSD research concern the subsequent probability, or conditional risk, of developing PTSD.

The conditional risk of PTSD is defined as the probability of developing PTSD in persons exposed to trauma. The conditional risk of PTSD is key to several important questions in PTSD research. For example, what is the probability of PTSD given exposure to a specific traumatic event? Do events differ with respect to their PTSD-inducing effects? Which events carry the highest risk?

Table 3. The Conditional Risk of Posttraumatic Stress Disorder by Sex (%)[a]

Stressor	Men	Women
Assaultive violence	6.0	35.7
Other injury	6.6	5.4
Learning about trauma to others	1.4	3.2
Sudden unexpected death	12.6	16.2
Any trauma	6.2	13.0

[a]Data from Breslau et al.[24]

Estimates of the conditional risk of PTSD are derived from information on the prevalence of exposure and the proportion of those exposed who meet criteria for PTSD. Estimates of the prevalence of PTSD have previously been made by examining the PTSD effects of traumatic events nominated by respondents as the worst or most upsetting they have ever experienced.[9,25] This approach allows an efficient estimation of the prevalence of PTSD because the nominated worst events are those most likely to lead to PTSD. However, because these worst events represent the extreme end of the distribution of qualifying traumatic events, this approach is likely to overstate the conditional risk of PTSD.[23] We addressed the problem of bias in estimating the conditional risk of PTSD due to focusing on worst events in the Detroit Area Survey.[23]

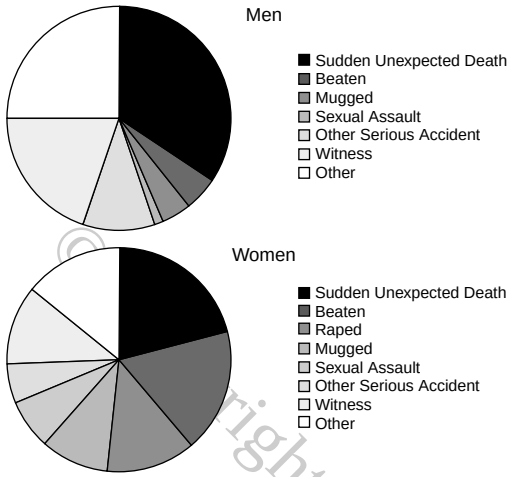
In the survey, each respondent was asked whether he or she had ever experienced any of the 19 events previously described. When an event type was endorsed, the respondent was asked about the number of times this type of event had occurred and age at each occurrence. In persons with more than 1 event, an event was randomly selected from the list of each respondent (computer generated), and PTSD symptoms associated with this event were identified (information was also gathered on the worst and earliest traumas).

The conditional risk of PTSD following exposure to trauma was 9.2%. This is lower than the risk associated with worst traumatic events; in this study, the probability of PTSD associated with worst events was 13.6% (17.7% in women and 9.5% in men). These results are consistent with the assumption that previous studies have overestimated the conditional risk of PTSD by focusing on the worst events.

Sex differences and assaultive violence. For any trauma type, the conditional risk was 2-fold greater in women (13.0%) than in men (6.2%, $p < .001$, women:men [W:M] ratio = 2.10) (Table 3). This difference was primarily due to the greater probability of women to develop PTSD following assaultive violence.[23,24] The conditional risk of PTSD associated with assaultive violence was 35.7% in women versus 6.0% in men ($p < .001$, W:M ratio = 5.95). In contrast, the sex differences in the other categories of traumatic events were not significant.

The distribution of the randomly selected events across types within the assaultive violence category varied between the sexes. The conditional risk of PTSD across these

Figure 2. Precipitating Events in Posttraumatic Stress Disorder (%)[a]



[a]Data from Breslau et al.[24]

event types was therefore compared. Women had a higher risk of PTSD for all but 1 type of assaultive violence (shot/stabbed) in which sex comparisons could be made. When rape was excluded from the analysis, the conditional risk for PTSD associated with assaultive violence in the remaining sample (N = 1925) was 32.3% in women and 6.0% in men ($p < .001$, W:M ratio = 5.39). The overall conditional risk of PTSD associated with any trauma (excluding rape) was 11.5% in women and 6.2% in men ($p < .01$, W:M ratio = 1.85).[24] It was therefore concluded that female vulnerability to PTSD is not generalized but specific to assaultive violence. Similar findings, although not explicitly noted, have been reported in previous studies.[9]

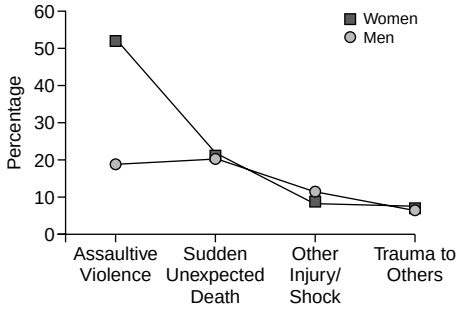
Precipitating Events

Overall, 54.1% of PTSD cases in women were due to assaultive violence (beaten, mugged, sexually assaulted), compared with 15.4% in men (Figure 2).[23] The sudden unexpected death of a loved one was associated with a moderate probability of PTSD (14.3%). However, because of its high rate in the sample, it contributed a large proportion of PTSD cases (31%). Sudden unexpected death of a loved one was the single most frequent precipitating event for both sexes (38.5% men, 26.6% women).[24]

Avoidance and Numbing

As discussed, the avoidance/numbing criterion is critical to the diagnosis of PTSD. It is the least frequently met and is therefore the limiting criterion. Women reported higher rates of reexperiencing and hyperarousal across all 4 categories of trauma. However, a significantly higher prevalence of avoidance/numbing in women versus men was observed only in response to assaultive violence (52.2% vs. 18.8%, respectively; $p < .001$) (Figure 3).[24]

Figure 3. Percentage of Individuals Meeting the Avoidance/Numbing Criterion by Sex and Event Category[a]



[a]Data from Breslau et al.[24]

The difference between men and women was especially pronounced for numbing symptoms.

IMPLICATIONS OF EARLY AND/OR PRIOR TRAUMA EXPOSURE

Exposure to prior trauma, especially in childhood, may impact the outcome of a subsequent trauma and risk for PTSD. High rates of childhood trauma have been reported in Vietnam veterans with PTSD.[16,26,27] Likewise, the effects of childhood trauma have been reported in relation to a variety of psychiatric disorders,[28] and a number of psychological explanations have been proposed. For example, Brown and colleagues[29] suggested that the enduring vulnerability to anxiety disorders that originates in experiences of childhood may involve cognitive predispositions such as helplessness and that "experiences in childhood may set-up long-term sensitization to danger."

The relationship between prior trauma exposure and PTSD effects of subsequent traumas was further investigated in the Detroit Area Survey[30] and revealed the following:

1. Prior exposure involving assaultive violence was associated with a higher risk of PTSD from a subsequent trauma, compared with prior exposure that did not involve assaultive violence (10 times greater risk for second event if index event is assaultive violence).
2. The passage of time did not reduce the relative risk for assaultive violence, but it did for other stressors.
3. Multiple (≥ 2) exposures to assaultive violence in childhood were associated with a high risk (4.7) of PTSD following exposure in adulthood.
4. A single prior exposure to assaultive violence, whether in childhood or later in life, was associated with an increased risk of PTSD in adulthood.
5. Controlling for prior exposure, female odds for PTSD from the index event were more than 2-fold higher than males.

In summary, these findings indicate that individuals who have previously been exposed to trauma, particularly trauma involving assaultive violence, are at greater risk of PTSD following subsequent trauma than those who have not previously been exposed. These findings also replicate those of earlier studies conducted with Vietnam veterans.[16,26,27]

CONCLUSIONS

Over the last decade, several epidemiologic studies have provided insight into the burden of PTSD in the general population. These investigations indicate that PTSD is not a rare psychiatric disorder, but occurs in as many as 1 in 12 adults at some time in their lives. The lifetime prevalence estimates of PTSD in the general population are higher than earlier studies, employing more restrictive diagnostic criteria and assessment instruments, tended to suggest. In addition to underlining the importance of PTSD as a severe and disabling illness, these more recent findings provide evidence of a significantly higher prevalence of PTSD in women than men.

Overall estimates of the lifetime prevalence of PTSD in females are approximately twice those of prevalence in males. In studies conducted prior to the introduction of DSM-IV criteria, estimates ranged from 10% to 14%. The Detroit Area Survey reports a lifetime prevalence of PTSD in females (according to DSM-IV criteria) of approximately 18%. The duration of PTSD symptoms also differs between the sexes; the mean duration of symptoms is nearly 4 times greater in females (mean = 48 months) than in males (mean = 12 months) (see outcomes review by Breslau[31] elsewhere in this supplement). At the core of the heavy burden of PTSD in females, both in terms of lifetime prevalence and persistence of the disorder, is the unique role of assaultive violence. Females are at greater risk of PTSD than males when exposed to traumatic events involving assaultive violence, and this sex difference persists virtually unchanged when females' higher exposure to rape is accounted for.

Females were far more likely than males to respond to assaultive violence with symptoms of avoidance and numbing, and this finding accounts, in large part, for the greater risk females have for PTSD following exposure to events in the assaultive violence category. It can be hypothesized that exposure to assaultive violence is far more threatening and injurious to most females, given the high probability that the perpetrators are males who wield greater physical power.

The heaviest burden of PTSD is likely to be borne by women in late adolescence and early adulthood when their risk for exposure to assaultive violence is at its peak. The risk for exposure to assaultive violence falls thereafter, although past exposure to assaultive violence increases the vulnerability of both males and females to the PTSD effects of subsequent traumas for many years. Further research investigating the role of assaultive violence in the observed sex differences in PTSD is warranted.

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