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## Epidemiology of posttraumatic stress disorder: prevalence, correlates and consequences

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### Abstract

**Purpose of review**—This review discusses recent findings from epidemiological surveys of traumatic events and posttraumatic stress disorder (PTSD) globally, including their prevalence, risk factors, and consequences in the community.

**Recent findings**—A number of studies on the epidemiology of PTSD have recently been published from diverse countries, with new methodological innovations introduced. Such work has not only documented the prevalence of PTSD in different settings, but has also shed new light on the PTSD conditional risk associated with specific traumatic events, and on the morbidity and comorbidities associated with these events.

**Summary**—Recent community studies show that trauma exposure is higher in lower-income countries compared with high-income countries. PTSD prevalence rates are largely similar across countries, however, with the highest rates being found in postconflict settings. Trauma and PTSD-risk factors are distributed differently in lower-income countries compared with high-income countries, with sociodemographic factors contributing more to this risk in high-income than low-income countries. Apart from PTSD, trauma exposure is also associated with several chronic physical conditions. These findings indicate a high burden of trauma exposure in low-income countries and postconflict settings, where access to trained mental health professionals is typically low.

### Keywords

DSM-5 criteria; epidemiology; posttraumatic stress disorder

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### Conflicts of interest

There are no conflicts of interest.

## INTRODUCTION

Early work on the epidemiology of posttraumatic stress disorder (PTSD) demonstrated high disorder prevalence in high-income countries, sociodemographic correlates (e.g., female sex), and the associated significant subsequent comorbidity and morbidity [1–4]. Recent epidemiological studies from around the world have included low and middle-income countries [5<sup>1</sup>,6<sup>2</sup>,7,8,9<sup>3</sup>,10<sup>4</sup>,11, 12<sup>5</sup>,13], providing novel evidence on the distribution of trauma and PTSD cross-nationally. In this review, we focus on recent findings from the World Mental Health (WMH) surveys in particular [5<sup>1</sup>,6<sup>2</sup>,8,10<sup>4</sup>,12<sup>5</sup>], and compare these with previous work.

In most epidemiological surveys, respondents report lifetime exposure to a large number of traumas, precluding the separate assessment of PTSD for each traumatic event experienced by every respondent [1,4,5<sup>1</sup>,11]. Historically, studies have asked respondents to nominate the worst traumatic event they had ever experienced, and assessed PTSD in relation to that worst event. Because worst traumas are not the most commonly experienced events in the population and, presumably, have a higher risk of PTSD than typical traumas, this approach overestimates conditional risk of PTSD [1,4,11].

In the WMH studies, this problem was resolved by assessing PTSD for both the nominated worst lifetime trauma and another computer-generated ‘random’ event selected from among the respondent’s other lifetime traumas. Sample weights were applied to create an accurate distribution of traumatic events in the sample population [5<sup>1</sup>]. Further justification for focusing this review largely on the WMH’s surveys is that they were undertaken in a large number of countries using the same assessment tools, allowing rigorous examination of a broad range of risk factors for PTSD (including traumatic events), as well as the consequences of traumatic-event exposure and PTSD.

## MATERIALS AND METHODS

In this review, we conducted a literature search on *Pubmed* using the terms ‘trauma’ and ‘posttraumatic stress disorder’ in combination with ‘prevalence’, ‘distribution’, ‘epidemiology’, or ‘survey’. We selected mainly studies published between 2013 and 2015 but included a number of older publications to provide background and context to this review. Among recent publications, we focused the review on work from the WMH surveys due to their national and cross-national samples and their comprehensive treatment of traumatic event exposures and outcomes.

## CROSS-NATIONAL VARIATION IN TRAUMATIC EVENT DISTRIBUTION

There are many different ways of classifying traumatic events, and this often causes difficulties in comparing their distributions in different settings. The WMH surveys used the WHO Composite International Diagnostic Inventory (CIDI) to identify up to 29 different types of traumatic events [14]. These traumatic events were then categorized into eight classes [5<sup>1</sup>]: war events, physical violence, sexual violence, accidents, unexpected death of a loved one, network events (involving others in one’s social network), witnessing trauma,

and other trauma comprising other traumatic events not included in the CIDI list and 'private events' that respondents did not report because of embarrassment.

The WMH surveys documented significant differences in the prevalence and distribution of traumatic events across the world. The South African Stress and Health Survey, for example, reported a lifetime traumatic event prevalence rate of 73.8%, which was higher than in other surveys in Europe and Japan where the rate was in the range of 54–64% [6<sup>11</sup>, 8,10<sup>11</sup>,12<sup>11</sup>]. At 54%, Spain has the lowest reported prevalence of trauma exposures [12<sup>11</sup>], followed by Italy's 56.1% [6<sup>11</sup>], and Japan's 60% [10<sup>11</sup>]. Northern Ireland's rate of 60.6% was the highest among surveys in Europe [8].

Variation in the rates of trauma exposure across the world, as well as the prevalence of specific traumatic events, appears to reflect historical, cultural, and political factors that vary across regions. For example, South Africa's history of state-sanctioned discrimination and political violence, coupled with rising rates of criminal assault in public spaces may contribute to the higher rates of trauma exposure compared to Europe and Japan [15]. Consistent with this idea, physical violence and witnessing trauma occurring to another person contributed the largest proportion of all lifetime traumatic events in South Africa [5<sup>11</sup>], whereas in Europe accidents and unexpected death of a loved one were the biggest contributors to the burden of trauma [6<sup>11</sup>,7,12<sup>11</sup>]. Similarly, Northern Ireland's long history of civil conflict is likely to have contributed to its high prevalence of traumatic event exposure [8]. Indeed, in Northern Ireland war events contribute a significant proportion of the trauma burden in addition to network events and accidents [8]. A pattern similar to that observed in most European countries was reported in Japan, where network events, unexpected death of a loved one and accidents contributed the greatest proportion of traumatic events [10<sup>11</sup>]. However, up to 10% of Japanese respondents reported experiencing 'private events' for which they did not have to describe content, perhaps reflecting the role of culture in determining which traumatic events are easily shared with strangers, and which should be kept private [10<sup>11</sup>].

## CORRELATES OF TRAUMATIC EVENT EXPOSURE

Factors associated with traumatic event exposure vary across different regions of the world. For example, employment status is the only sociodemographic factor associated with risk of traumatic event exposure in South Africa, with homemakers being at significantly lower risk of traumatic event exposure compared with those who were employed [5<sup>11</sup>]. In other WMH surveys, female sex was associated with reduced risk of traumatic event exposure [6<sup>11</sup>, 8,12<sup>11</sup>], a pattern that is similar to previous work in the United States and other high-income countries [1,4]. Other sociodemographic factors are also associated with reduced risk of traumatic event exposure in some European countries, including low education in Spain and Italy [6<sup>11</sup>,12<sup>11</sup>], and low income in Northern Ireland [8]. In Italy, those who were never married and those aged 18–44 years had lower risk of traumatic event exposure than married and older individuals, respectively [6<sup>11</sup>]. Other factors are associated with increased risk of traumatic event exposure, including previous marriage in the Spain survey and other employment status (including unemployment) in the Northern Ireland study [8,12<sup>11</sup>].

Similarly, in Japan, unemployment and marital status were associated with increased risk of traumatic event exposure [10<sup>11</sup>].

The varying impact of sociodemographic factors on the risk of traumatic event exposure may reflect differences in social and political contexts, but is more likely associated with overall levels of traumatic event exposure in the community. Whereas the high prevalence of traumatic event exposure in South Africa eliminated differences due to sociodemographic factors, in countries with lower traumatic event exposure rates sociodemographic differences in exposure are more apparent.

## CROSS-NATIONAL DIFFERENCES IN THE PREVALENCE OF POSTTRAUMATIC STRESS DISORDER

Lifetime prevalence of PTSD also varies across the WMH surveys when examining prevalence using a randomly selected traumatic event rather than the worst event. Lifetime prevalence is similar in South Africa (2.3%), Spain (2.2%), and Italy (2.4%) [5<sup>11</sup>,6<sup>11</sup>,12<sup>11</sup>], where as the prevalence was lower in Japan (1.3%) [10<sup>11</sup>]. Northern Ireland, in contrast, reported the highest lifetime PTSD prevalence of 8.8% [8].

In general, however, the lifetime prevalence rates in the WMH surveys are lower than those found in previous studies that employed the worst event method. The manner in which subtle methodological shifts give rise to different PTSD prevalence estimates in epidemiological studies is emphasized in the work by Beals *et al.* [16]. In their study of two Native American reservation communities, using the ‘single worst trauma’ method, lifetime PTSD prevalence rates ranged from 5.9 to 14.8%, while using questions asking about the ‘three worst traumas’ yielded higher PTSD prevalence rates of 8.9 to 19.5%. Breslau *et al.* [17], in comparing the ‘worst event’ method and the ‘random event’ method in determining conditional prevalence of PTSD, concluded that ‘focus on the worst traumas overestimates the probability of PTSD associated with the entire class of PTSD-level traumas’ in a community sample. In this study, the conditional prevalence of PTSD using the ‘random event’ method was 9.2% while using the ‘worst event’ method it was 13.6%.

Increasing use of the ‘random event’ method in community surveys of trauma and PTSD will, therefore, generate more accurate population-level statistics on PTSD risk, and facilitate cross-national comparisons of traumatic event exposure and PTSD-conditional risk.

## CORRELATES OF POSTTRAUMATIC STRESS DISORDER

Conditional risk of PTSD refers to the prevalence of PTSD among those exposed to traumatic events, as opposed to the overall prevalence of PTSD regardless of traumatic event exposure [5<sup>11</sup>]. Apart from Northern Ireland where the conditional prevalence was 17.6%, the other WMH surveys found relatively low-conditional prevalence rates of PTSD in all countries that measured it [8]. In the South African survey, the PTSD conditional prevalence was 3.5% [5<sup>11</sup>], quite similar to the 3.3% prevalence in Spain [12<sup>11</sup>], and slightly higher than the 2.5% rate in Italy [6<sup>11</sup>].

In reference to PTSD risk associated with specific event types, in South African PTSD conditional risk after trauma exposure was highest for witnessing traumatic events, consistent with high rates of severe violence in public spaces in South Africa [5<sup>11</sup>]. This differs from findings in the other WMH surveys wherein sexual and physical violence (Japan, Spain, and Northern Ireland), unexpected death of a loved one (in Spain), and events categorized as other (Italy, Northern Ireland) carried the highest conditional risk of PTSD [6<sup>12</sup>,8,10<sup>13</sup>,12<sup>14</sup>].

The unique role of witnessing trauma in causing PTSD in South Africa has been attributed to the history of political and criminal violence that often occurs in public settings in South Africa [15]. Findings in the other WMH surveys argue for a more conventional argument that people are often reluctant to report details of events that carry the highest risk of PTSD. For instance, in Japan and in the European surveys, events categorized as ‘other’ had a particularly high PTSD-conditional risk. It has been suggested that this category, which includes ‘private’ events that the respondent does not want to disclose to the interviewer and ‘other’ events not on the traumatic event list, may include particularly severe and stigmatized events that would have a higher conditional risk of PTSD than other events [10<sup>15</sup>].

Unexpected death of a loved one was associated with a high conditional risk of PTSD and was also responsible for a large proportion of all PTSD cases in several of the WMH European surveys. Changes in PTSD criterion A in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) requiring that ‘in cases of actual or threatened death of a family member or friend, the event(s) must have been violent or accidental’ may have an impact on the PTSD-conditional risk associated with unexpected death of a loved one [18]. In the past, any unexpected death of a loved one, even due to illness, would have qualified as a traumatic event. The new criterion is more restrictive and will likely reduce the probability of a PTSD assessment being made in some cases not involving violence or accidental deaths.

Concerning sociodemographic correlates of PTSD, the South African survey once again differs significantly from the Japanese and European surveys. Female sex was associated with elevated PTSD risk in all the countries surveyed except South Africa where sociodemographic factors showed very little association with PTSD risk [5<sup>16</sup>,6<sup>17</sup>,8,10<sup>18</sup>,12<sup>19</sup>]. Additionally, low education in Italy [6<sup>20</sup>], and age under 65 years, being married, being retired, and having ‘other’ employment status (which included unemployment) in Northern Ireland [8] were associated with increased PTSD risk. As discussed earlier, the lack of association between sociodemographic factors and PTSD risk has been attributed to the unique history of trauma exposure in South Africa, where institutionalized violence and traumatization were common features during the apartheid regime, with almost the entire population being exposed at some point [19].

## CONSEQUENCES OF POSTTRAUMATIC STRESS DISORDER

PTSD is associated with serious consequences that may lead to poor quality of life and increased use of health and other social services. Duration of PTSD symptoms may,

therefore, serve as an indicator of the impact of the condition on an individual's life. The WMH surveys assessed the duration of symptoms and identified the traumatic events responsible for the longest duration of symptoms.

The South African WMH study demonstrated that chronicity of PTSD symptoms was greatest for witnessing traumatic events [5<sup>11</sup>], whereas in the European surveys sexual and physical violence and war events were associated with the longest duration of symptoms [6<sup>11</sup>,8,12<sup>11</sup>]. In Japan, on the contrary, network events and 'other' events were associated with the longest duration of symptoms [10<sup>11</sup>].

These differences highlight the role of culture in determining mental health outcomes of traumatic event exposure. For instance, as argued in Atwoli *et al.* [5<sup>11</sup>], the prominence of witnessing events for PTSD burden in South Africa may be related to the cultural philosophy of *ubuntu*, which has been described as an African world-view that emphasises 'group solidarity, conformity, compassion, respect, human dignity, humanistic orientation, and collective unity' [20]. Previous research on witnessing infliction of pain on others, and among high-risk groups such as war journalists and rescue workers supports the notion that witnessing trauma can be just as 'toxic', or even more 'toxic' than direct experience of trauma [21,22].

In Japan, on the contrary, the contribution of network events to more chronic symptoms has been attributed to the Japanese culture that emphasizes firm adherence of Japanese couples to their role as parents, as well as a closer relationship between parents, especially mothers, and their children [10<sup>11</sup>].

Scott *et al.* [23] have recently demonstrated in a large cross-national WMH study that trauma exposure itself has downstream effects on physical health independent of PTSD effects. The effect was linked to the number of traumatic events an individual was exposed to, with exposure to four or more traumatic events being associated with a wide range of chronic physical conditions including arthritis, back and neck pain, frequent or severe headaches, heart disease, high blood pressure, asthma, peptic ulcers, chronic lung disease, and stroke. Keyes *et al.* [24] also linked a number of traumatic events to the development of arthritic conditions in the Detroit Neighborhood Study in the United States, providing further evidence of the role of traumatic event exposure in development of general medical conditions. More research is ongoing in this field, but the implications for care of people with chronic physical conditions are clear. Addressing traumatic event exposure is going to be an important strategy in the prevention and early management of chronic physical conditions whose burden is high and rising in all parts of the world.

## CONCLUSION

In this review, we have identified several key issues emerging from recent epidemiological work on trauma and PTSD.

First, although traumatic event prevalence rates are higher in countries emerging from conflict, the distribution of traumatic event types varies significantly by region. The impact

of the sociopolitical environment on the distribution of traumatic events is apparent from these findings.

Second, lifetime prevalence of PTSD in most community surveys using the ‘random event’ method is lower than in previous studies that used the ‘worst event’ method of assessing PTSD. The importance of capturing a broad range of traumatic events in a community survey has, thus, been demonstrated, providing the justification for continued use of the ‘random event’ method in future community surveys of trauma and PTSD.

Third, several sociodemographic factors are associated with traumatic event exposure and PTSD in high-income settings, but not in low-income and postconflict societies such as South Africa. Although the risk factors in the high-income settings reflect existing knowledge on PTSD risk factors, the high rate of traumatic event exposure across all sociodemographic groups in South Africa eliminates most possible associations between the sociodemographic factors and traumatic event exposure and PTSD.

Finally, we have reviewed recent data that shows the increasingly important role played by traumatic event exposure in the risk of developing chronic physical conditions. It is clear that addressing the high and rising burden of chronic physical conditions must include interventions mitigating the impact of traumatic event exposure and PTSD on the occurrence of these conditions.

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