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Posttraumatic Stress without Trauma in Children

William E. Copeland, PhD^a, Gordon Keeler, MA^a, Adrian Angold, MRCPsych^a, and E. Jane Costello, PhD^a

^aDuke University Medical Center

Abstract

Objective—It remains unclear the degree to which children show signs of posttraumatic stress disorder (PTSD) after experiencing low-magnitude stressors, milder than those required for the DSM-IV PTSD extreme stressors criterion.

Methods—A representative community-based sample of 1420 children, ages 9, 11, and 13 at intake, was followed annually through age 16. Low-magnitude and extreme stressors as well as subsequent posttraumatic stress symptoms were assessed with the Child and Adolescent Psychiatric Assessment. Two measures of posttraumatic stress symptoms were used: 1) at least one symptom of painful recall, hyper-arousal, and avoidance (*sub-clinical PTSD*); and 2) *painful recall* only.

Results—During a three-month period, low magnitude stressors occurred four times as often as extreme stressors (24.0% vs. 5.9%). Extreme stressors elicited painful recall in 8.7% of cases and sub-clinical PTSD in 3.1%, compared to much lower rates, 4.2% and 0.7%, for low magnitude stressors. Because of their higher prevalence, however, low-magnitude stressors accounted for two-thirds of cases exhibiting painful recall and half of cases with sub-clinical PTSD. Moreover, exposure to low-magnitude stressors predicted symptoms even among youth with no prior lifetime exposures to an extreme stressor.

Conclusion—Relative to low-magnitude stressors, extreme stressors place children at greater risk for symptoms. Nevertheless, a sizable group of children manifesting posttraumatic-stress symptoms only will have experienced a low-magnitude stressor.

Keywords

PTSD; trauma; childhood; epidemiology

Introduction

Researchers have long debated the advantages and disadvantages of relatively broad or restrictive definitions of the stressor criterion for Posttraumatic Stress Disorder (PTSD)^{1–4}. Prior to DSM-IV, the stressor definition reflected the implicit view that only certain, relatively rare and extreme events commonly elicit PTSD. The DSM-III and DSM-III-R, therefore, defined the stressor criterion according to extreme, objective characteristics of the event^{5, 6}. Subsequent studies challenged this view: 1) Exposure to the extreme stressors defined by DSM-III and DSM-III-R appeared to be relatively common, occurring, for example, in approximately half of respondents in the National Comorbidity Survey.⁷ 2) Such events did not invariably lead to PTSD symptoms. For example, the conditional risk for PTSD following trauma

Address for correspondence: William E. Copeland, Ph.D. Center for Developmental Epidemiology Duke University Medical Center Department of Psychiatry and Behavioral Sciences Box 3454 Durham NC 27710 Phone: (919) 687-4686 Fax: (919) 687-4737.

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exposure was only 9.2% in the Detroit Area Survey of Trauma.⁸ 3) Pre-trauma factors moderated the risk for PTSD.^{7, 8} Finally, 4) evidence suggested that milder stressors, not meeting the extreme-stressor definition, also could elicit PTSD. As a result, the stressor criterion was expanded in the DSM-IV⁹ and incorporated information about the individual's response to the event^{4, 10}.

The DSM-IV field trial² tested five alternative stressor definitions ranging from a nonrestrictive criterion in which any event that was followed by the development of criteria B, C, and D was sufficient for a PTSD diagnosis, to the more stringent DSM-III-R definition. In a community sample, rates of lifetime PTSD varied only by 3–4% across these stressor definitions in criterion A. The authors concluded that the different stressor definitions in criterion A had “minimal impact on PTSD prevalence across all proposed criteria” and that the stressor definition should not be based upon events' rarity. Of note, implications for youth were somewhat unclear, since the trial included mostly adults, a few adolescents, and no children.

Several lines of evidence suggest that the response to negative events differs between children and adults. Children possess immature social and cognitive capacities that might moderate the effects of trauma or influence expressions of symptoms.¹¹ Consistent with this possibility, a recent meta-analysis suggests that PTSD is rare in childhood, with an estimated rate of 0.6% (SE=0.2), compared to higher rates in adulthood.¹² This could either reflect age-related differences in symptom expression or in stress-related vulnerability. Regardless, questions arise from such data on the manner in which children respond to a range of negative events. In particular, it remains unclear the degree to which children develop signs of PTSD after experiencing relatively mild events, below the current DSM-IV extreme-stressor threshold.^{13–15}

Prior community-based studies examining this issue generally only consider relatively severe events, meeting the DSM-IV stressor criterion^{16–18}. While this is understandable, inclusion of additional events would permit comparisons between such ‘extreme stressors’ and other negative events of lower magnitude, in terms of associated risk for PTSD symptoms. Several outcomes of such research are possible. First, consistent with the implicit approach in DSM-IV, both types of events could elicit negative outcomes, but only extreme stressors might elicit PTSD symptoms. Alternatively, both types of events could elicit both negative outcomes and PTSD symptoms, but the conditional risk from extremes stressors might be greater than for other, lower-magnitude negative events. Vulnerability to events might also differ as a function of pre-stress factors, as has been suggested by some (but not all¹⁹) previously-reported studies.^{20–22}

Any study comparing response to extreme and lower magnitude stressor must grapple with the fact that people experiencing any form of traumatic event are likely to experience multiple negative events.^{16, 23, 24} As such, any association between a mild stressor and PTSD symptoms could reflect the influence of a previously-occurring, more extreme stressor in the individual, which might sensitize the individual to the milder, later-occurring stressor. Adult and child studies of PTSD do indeed suggest that previously-exposed individuals are *sensitized* to the effects of subsequent trauma^{16, 25, 26}. However, no community-based, prospective studies in youth examine unique effects of multiple extreme stressors on a range of negative outcomes.

The current study compares the strength of the association that either low-magnitude or more extreme stressors manifest with PTSD symptoms.¹⁶ The study relied on a measure of PTSD symptoms but could not formally test associations with the diagnosis of PTSD, which was rare in this sample, as in previous community-based sample of children.¹² Nevertheless, even sub-clinical symptoms of PTSD are important to recognize in children,^{28–30} since children with

such symptoms do not differ significantly in terms of impairment or distress from children meeting full criteria for PTSD.³⁰

Methods

Sample

The Great Smoky Mountains Study (GSMS) is a longitudinal study of the development of psychiatric and substance use disorders and need for mental health services in rural and urban youth^{31, 32}. In 1993, a representative sample of 1,420 children aged 9, 11, and 13 at intake was recruited from 11 counties in western North Carolina. Potential participants were selected from the population of some 20,000 children, using a household equal probability, accelerated cohort design. American Indian children were oversampled, to make up 25% of the final sample. The final sample consisted of 350 Indian children (81% of those recruited) and 1,070 non-Indian children (80% of those recruited); 92.5% of the latter were White and 7.5% African-American. In the analyses, each individual's contribution was weighted proportionately to their probability of selection into the study, so that the results are representative of the whole population of children of this age. The average response rate at each wave was 83%. Attrition and non-response did not differ among the study groups considered here and were not associated with psychiatric status. This paper presents data on 6,674 parent-child pairs of interviews carried out across the age range 9 through 16.

Procedure

Children and their primary caregiver (biological mother 83% of the time) were interviewed separately in their homes or a convenient location by trained interviewers that were residents of the study area. Interviewers were trained by Department of Social Services staff in the requirements for reporting abuse or neglect. Before the interviews began, parent and child signed informed consent/assent forms approved by the Duke University Medical Center Institutional Review Board.

Measures

Extreme stressors, other negative events, and associated posttraumatic stress symptoms were assessed using the life events and posttraumatic stress sections of the *Child and Adolescent Psychiatric Assessment* (CAPA)³³. The life events section includes 17 potentially traumatic events (i.e., those meeting the criteria for DSM-IV PTSD criterion A 'extreme stressors'; e.g. physical abuse, violent death of a loved one) and 15 events not meeting criterion A that have commonly been associated with anxiety or depression in children^{34, 35}. The parent or child was queried about occurrence of each event within the past 3 months and when it had occurred. Criterion A events were also assessed for lifetime occurrence. A reliability study with 58 parents and children interviewed twice by different interviewers found fair to excellent test-retest reliability (intraclass correlations .58 to .83 depending on the informant and type of event)³³. A list of events and 3-month prevalence rates is presented has been provided in a prior publication³⁶.

For each event, the interviewer administered a screen to determine whether the three key symptoms clusters of PTSD (painful recall, avoidance, hyperarousal) were 1) present *during the past three months* and 2) linked to the event under discussion. Painful recall/re-experiencing was assessed first, and if it was endorsed, the interviewer inquired about avoidance and hyperarousal. Painful recall/re-experiencing is defined as involving unwanted, painful, and distressing recollections, memories, thoughts, or images of the life event. In young children, this might involve repetitive play, trauma-specific re-enactment, or nightmares. This procedure was instituted to avoid false positives and to reduce the length of the interview³³. If at least minimal or higher levels of all three symptoms were endorsed, then the detailed PTSD module

was completed. Because very few children met full diagnostic criteria for PTSD, two measures of PTSD symptoms were used: 1) Endorsing the presence of at least one symptom of painful recall, hyperarousal, and avoidance, which was defined as *sub-clinical PTSD*; and 2) Reporting *painful recall* only.

Analyses

Prevalence estimates, odds ratios, and group comparisons were calculated using the SAS program PROC GENMOD with the general estimation equations option to account for both the sampling design and within-subject correlations. Robust variance estimates (i.e., sandwich type estimates) were used, together with sampling weights, to adjust the standard errors of the parameter estimates to account for the multiphase sampling design. The use of multiwave data with the appropriate sample weights thus capitalized on the multiple observation points over time, while controlling for the effect on variance estimates of repeated measures.

Results

Prevalence

Table 1 displays three month prevalence estimates for both high and low magnitude events and the two event-related outcomes - painful recall only and sub-clinical PTSD. The rates for the event-related outcomes are base rates, considering all children in the sample, and therefore are *not* conditional on event exposure. The prevalence estimates are presented by sex and age group. During any three-month period, about four times more children reported a low-magnitude event than an extreme stressor (24.0% vs. 5.9%, $p < .001$). This 4:1 ratio for low relative to high-magnitude exposures, however, was not reflected in the outcome data (see Table 1): Despite the markedly greater rate of low-magnitude events, painful recall associated with low magnitude events was only twice as common as painful recall associated with high magnitude events (1.0% vs. 0.5%, $p < .02$). Moreover, similar numbers of subclinical PTSD cases were found for the low-magnitude and high-magnitude events (0.2% vs. 0.2%, $p = .56$), despite the markedly higher rate of low-magnitude events. Thus, while low-magnitude events are far more common than high magnitude events, these data suggest that they are far less likely to be associated with symptoms. Nevertheless, due to their high prevalence, overall, low-magnitude events accounted for 68.9% cases of painful recall and 47.9% cases of subclinical PTSD.

The consistency of this general pattern was compared across gender and age groups. Both types of events were slightly more common in adolescence than in childhood (lower magnitude events: OR = 1.2, CI, 1.0–1.4, $p = .03$ and extreme stressors: OR = 1.4, CI, 1.0–2.0, $p = .05$). Subclinical PTSD with extreme stressors was more common in adolescence (OR = 5.4, CI, 1.2–23.2, $p = .02$), but rates of all other PTSD outcomes were invariant with age. Although rates of events did not vary by gender, females had somewhat higher rates of both PTSD-related outcomes. Subclinical PTSD following lower magnitude events was much more common in females than males (OR = 7.1, CI, 1.2–43.1, $p = .03$), although the base rates for both males and females were below 0.5%.

Conditional Rates

Table 2 presents the rates for various outcomes only for children reporting exposure to an event, i.e., conditional rates for the various outcomes. Low-magnitude events produced more cases of children with PTSD-related symptoms than high-magnitude events, due to the very high rate of these low-magnitude events. However, the less-common, high-magnitude events were more potent predictors of symptoms: Conditional rates were significantly higher for high relative to low-magnitude events (painful recall: 8.7% vs. 4.2%, $p = .05$; and subclinical PTSD: 3.1% vs. 0.7%, $p < .03$). Females were generally more vulnerable to both types of negative

events. Following extreme stressors, girls were more likely than boys to develop painful recall (OR = 3.1, CI, 1.1–9.1, $p=.04$). Similarly, for low-magnitude event, girls also had higher rates than boys for sub-clinical PTSD (OR = 6.5, CI, 1.0–40.9, $p=.04$), but not for painful recall (OR = 1.5, CI, 0.6–3.5, $p=.34$). There were no differences for either outcome by age.

Not all lower magnitude events had similar conditional rates. Some events almost never resulted in subsequent symptoms (conditional risk <1.0%; e.g., new child in home, moving house), whereas risks associated with others were similar to or greater than the average response to high magnitude events. In terms of painful recall, such high-risk, low-magnitude events included death of a loved one (6.5%; SE=5.1), parental separation (9.1%; SE=4.8), breaking up with a best friend (9.0%; SE=4.0) or breaking up with a boy/girlfriend (6.6%; SE=2.8). Similarly, cases of sub-clinical PTSD in response to lower magnitude events were almost entirely accounted for by parental separation (4.1%; SE=3.5), breaking up with a best friend (2.1%; SE=2.1) or breaking up with a boy/girlfriend (1.5%; SE=1.3). A full list of conditional rates for both outcomes for each of the lower magnitude events is available from the first author by request.

Multiple Exposures

Children also were assessed for prior stress exposure. Exposure to multiple events was common. Of those with a recent low-magnitude event, 17.4% (SE=1.5) reported no prior extreme stressor or low-magnitude event, 13.0% (SE=1.6) reported prior low-magnitude events only, 23.6% (SE=1.6) reported only prior extreme stressor exposure, and 38.2% (SE=2.2) reported prior exposure to both extreme stress and low-magnitude events. It is plausible that most symptomatic children exposed to recent low-magnitude events had also experienced prior exposure to extreme stressors. This possibility was evaluated, as shown in Figure 1.

Figure 1 displays conditional risks for painful recall (A) and sub-clinical PTSD (B) following low-magnitude events. Even children with no prior exposure to an extreme stressor displayed PTSD symptoms. Exposure to a prior extreme stressor did not further increase risk for painful recall or sub-clinical PTSD. This result, however, could be influenced by the duration of time between the events, such that severe events occurring in the distant past do not modulate the relationship between more recent low-magnitude events and symptoms. We evaluated this possibility in logistic regression models predicting PTSD symptoms following low-magnitude events. In each model, predictors were included for both types of events occurring in the recent past (<1 year ago) or the distant past (>1 year ago). Results for these models are presented in table 3. In these models, it was clear that recent extreme stressors did increase risk for both types of posttraumatic stress following low-magnitude events.

Discussion

Posttraumatic stress disorder is one of the few DSM-IV disorders defined by its etiology. As such, the definition of the stressor criterion constrains the scope of the diagnosis. Among individuals exposed to low-magnitude events, a small proportion displayed PTSD symptoms compared with those exposed to extreme stressors. Nevertheless, because low-magnitude events are far more common than extreme stressors, low-magnitude events generated a greater proportion of the children with negative outcomes, accounting for half of cases of subclinical PTSD and two thirds of cases reporting painful recall only. Most children with PTSD symptoms following low-magnitude events developed these symptoms following interpersonal loss: death of a loved one, parental separation, breakup with a best friend, or breakup with a boy/girlfriend. Thus, while extreme stressors were the more *potent* risk factors for PTSD symptoms, low-magnitude events account for a significant portion of children with symptoms.

Many children had experienced multiple events over their lifetime and most children with PTSD symptoms following low-magnitude events had also have experienced extreme stressors. Extreme stressors occurring more than a year prior to the recent event tended to have little impact on risk, but recent extreme stressors increased risk 3-fold to 6-fold following subsequent low-magnitude events. These findings are only partially consistent with data in adult samples,^{25, 26} though both sets of findings emphasize the impact of recent stressors.

One goal of the current study was to inform efforts to classify antecedents of traumatic stress in children. A few recommendations are warranted. First, our results do support the need to clearly distinguish extreme and low-magnitude events, since the risk for stress-related symptoms is distinctly higher with extreme events. At the same time, the results also suggest the importance of recognizing the risk associated with low-magnitude events. This reflects the high prevalence of such events, despite their lower conditional probability of predicting PTSD symptoms. Moreover, this relatively modest risk increases when children exposed to mild stress also have a history of significant stress within the past year as well as for those with a prior anxiety history, and an adverse family environment¹⁶. Thus, determining a child's relative risk for PTSD symptoms should involve consideration of the event type, recent event history, and developmental context.

This study compared the sequelae of different types of stressful events, yet very few children in the study met criteria for full-blown PTSD. This is clearly *not* because of lack of event exposure since the majority of children had been exposed to an extreme stressor by age 16. The most likely explanation is that the DSM-IV cut-offs for criteria B, C and D were derived from studies of adults and the optimal algorithm for PTSD in children may require substantially fewer symptoms^{28–30}. This is an issue currently under study for DSM-5. A number of other epidemiologic samples of PTSD in childhood have reported similarly low rates^{16, 37, 38} (see^{18, 27} for population-based studies with higher rates). It is also possible, however, that the lower rates of PTSD may be attributable to our use of a screen questions. Subjects are required to display at least one general symptom from each symptom cluster (i.e., painful recall, hyperarousal, and avoidance) to proceed to the full PTSD module. For example, the screen for painful recall probes for unwanted, painful, and distressing recollections, memories, thoughts, or images of the life event (including repetitive play or trauma-specific re-enactment). This screen overlaps with the first three symptoms listed in criterion B, but not the last two. Therefore, some children may have met criterion B based upon the symptoms not assessed. The use of screens likely results in a modest reduction in the sensitivity to detect full-blown PTSD.

At the same time, the same screen structure was used following lower magnitude events and extreme stressors. Thus, even if our estimates for overall PTSD symptomatology are low, this would have affected high and low magnitude groups equally. Our primary conclusion, then, that cases with posttraumatic stress symptoms may be under-identified with a strict application of the A1 criterion would not have been affected by use of the screen. It is also important to note that very few studies can evaluate the stressor criterion because most began after the advent of the DSM-IV, and so only assess for PTSD symptoms following those events already codified in the its stressor criterion. This study is unusual in its ability to inform our understanding of the differential effects of high versus lower magnitude events in children, even if it cannot usefully speak to the risk for full-blown DSM-IV PTSD, and may underestimate rates of PTSD symptoms overall.

Conclusion

Posttraumatic Stress Disorder is a relatively new addition to the Diagnostic and Statistical Manual, only appearing the 1980⁶. Since that time much work has been done to better understand risk for posttraumatic symptoms in adult community samples^{7, 25, 39}. But research

on PTSD in children has often focused on clinical samples or groups of children exposed to a single traumatic event. The current study supports the DSM-IV extreme stressors as most likely to elicit posttraumatic stress symptoms, but also suggests as a troubling public health concern that many, if not most, of children experiencing significant levels of posttraumatic stress or PTSD symptoms will be unidentified if we fail to assess the impact of lower magnitude events.

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Abbreviations

PTSD	Posttraumatic stress disorder
PTS	posttraumatic stress

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Figure 1.

Effect of prior event exposures on response to a recent low-magnitude event. Figures display conditional rates for painful recall **(A)** and sub-clinical PTSD **(B)**.

Table 1
Comparison of prevalence estimates of lower magnitude events, extreme stressors, painful recall and sub-clinical PTSD

	Lower Magnitude Events			Extreme Stressors		
	Event	Painful Recall	Sub-clinical PTSD	Event	Painful Recall	Sub-clinical PTSD
	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)
Total	24.0 (1.1)	1.0 (0.2)	0.2 (0.1)	5.9 (0.5)	0.5 (0.1)	0.2 (0.1)
Age						
9 to 13	21.8 (1.4)	0.9 (0.3)	0.2 (0.1)	4.8 (0.7)	0.4 (0.2)	0.1 (0.1)
14 to 16	25.7 (1.3)	1.0 (0.3)	0.2 (0.1)	6.6 (0.7)	0.6 (0.2)	0.3 (0.2)
Gender						
Females	25.0 (1.6)	1.2 (0.3)	0.3 (0.2)	5.9 (0.7)	0.7 (0.2)	0.2 (0.1)
Males	23.2 (1.5)	0.8 (0.2)	0.04 (0.02)	6.0 (0.7)	0.3 (0.1)	0.2 (0.1)

Note. PTSD = Post-traumatic Stress Disorder.

Table 2

Conditional probabilities for painful recall and sub-clinical for lower magnitude events and extreme stressors

	Lower Magnitude Events		Extreme Stressors	
	Painful Recall	Sub-clinical PTSD	Painful Recall	Sub-clinical PTSD
	% (SE)	% (SE)	% (SE)	% (SE)
Total	4.2 (0.9)	0.7 (0.5)	8.7 (2.1)	3.1 (1.3)
Age				
9 to 13	3.9 (1.1)	0.6 (0.4)	8.7 (3.1)	1.0 (0.5)
14 to 16	4.4 (1.2)	0.8 (0.5)	8.4 (2.7)	5.2 (2.5)
Gender				
Females	5.0 (1.4)	1.2 (0.9)	13.2 (3.8)	3.5 (1.7)
Males	3.4 (1.1)	0.2 (0.1)	4.9 (2.2)	2.9 (2.1)

Note. PTSD = Post-traumatic Stress Disorder; --- = no case

Table 3

Regression models predicting conditional risk for PTSD symptoms following a low-magnitude event from prior event exposures.

	Painful Recall		Sub-clinical PTSD	
	OR	95%CI	OR	95%CI
Distant extreme stressor	0.3*	0.1, 0.6	1.2	0.3, 4.1
Distant lower magnitude	1.6	0.7, 3.6	1.4	0.8, 2.4
Recent extreme stressor	3.0*	1.0, 9.2	6.2*	1.4, 27.2
Recent lower magnitude	1.9	0.8, 4.4	1.8	0.5, 6.0

Distant events occurred more than a year prior to the current event. Recent events had occurred within the past year.

*
p<.05