ORIGINAL PAPER

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Post-traumatic stress disorder

The role of trauma, pre-existing psychiatric disorders, and gender

■ **Abstract** *Background* The study is aimed at investigating the influence of trauma type, pre-existing psychiatric disorders with an onset before trauma, and gender on post-traumatic stress disorder (PTSD). *Methods* Traumas, PTSD and psychiatric disorders were assessed in a representative sample of 4075 adults aged 18–64 years using the Composite International Diagnostic Interview. Pre-existing DSM-IV diagnoses of anxiety disorders, depressive disorders, somatoform disorders, alcohol abuse and dependence, nicotine dependence, gender, and the type of trauma were analysed with logistic regressions to estimate the influence of these factors on the risk for developing PTSD. *Results* The lifetime prevalence of exposure to any trauma did not vary by gender. The conditional probability of PTSD after exposure to trauma was higher in women (11.1% SE = 1.58) than men (2.9% SE = 0.83). Univariate analyses showed that pre-existing anxiety disorders, somatoform disorders and depressive disorders significantly increase the risk of PTSD. Multivariate analyses revealed that specific types of trauma, especially rape and sexual abuse, pre-existing anxiety disorders and somatoform disorders are predictors of an increased risk of PTSD, while gender and depressive disorder were not found to be independent risk factors. *Conclusion* Women do not have a higher vulnerability for PTSD in general. However, especially sexually motivated violence and pre-existing anxiety disorders are the main reasons for higher prevalences of PTSD in women.

■ **Key words** PTSD · trauma · psychiatric disorder · gender

Introduction

Post-traumatic stress disorder (PTSD) has first been recognized and systematically diagnosed among Vietnam veterans. Later the diagnosis was applied to a wide range of traumas experienced by individuals in war or in civil life. Most of the investigations of PTSD have been conducted in clinical samples or selected samples of subjects exposed to specific traumatic events. More recent studies have started to investigate PTSD in population samples. The estimated prevalence rates of exposure to trauma were 21.4% in adolescents aged 14–24 years [31], 39.1% in young adults aged 21–30 years [7], and 55.7% in a sample aged 15–54 years [24]. Life-time prevalence of PTSD showed rates of 1.7% in adolescents [31], 7.8% in young adults [7], 9.2% in adults aged 15–54 years [24], and 7.9% (1.3% in complete forms and 6.6% sub-threshold forms of PTSD) in a sample aged between 18 and 95 years [15]. The conditional risk of PTSD after exposure to trauma ranged between 7.8% [31] and 23.6% [7].

The type of traumatic events plays a crucial role in the development of PTSD. Rape, sexual abuse and other personal assaults were associated with a higher risk of PTSD compared to less personally traumatic events such as serious accidents [4–8, 11, 24, 26, 31, 32]. A meta-analysis on predictors of PTSD suggests that peritraumatic psychological processes, namely negative emotions and dissociation, are the strongest predictor of PTSD [29]. However, the relation of peritraumatic emotions and PTSD was found to be

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higher in samples suffering from interpersonal violence [12] than in persons having had a motor vehicle accident [16].

Post-traumatic stress disorder is comorbid with other psychiatric disorders. A psychiatric history has consistently been found to be a risk factor of PTSD [12]. Particularly anxiety, depressive and substance-related disorders are correlated with PTSD [4, 9, 12, 22, 31]. PTSD occurs as both a primary and a secondary disorder. Psychiatric disorders may increase the risk of PTSD, and vice versa [31]. Furthermore, psychiatric disorders increase the risk of exposure to trauma as well as the onset of PTSD after exposure [13]. The prevalence of anxiety disorders, somatoform disorders, and depressive disorders are generally higher in women, while the prevalence of substance use disorders is higher in men [28].

Although women were found to be less likely than men to experience a trauma, studies in the general population found approximately a two-fold higher prevalence of PTSD in women than in men [7, 15, 18, 24]. However, a fine-grained analysis showed that women have a higher risk of exposure to those traumata that are associated with a high probability of PTSD [24] and they have a greater likelihood of developing PTSD once exposed [5, 8, 17, 24, 34]. Pre-existing anxiety disorder or major depressive disorder might play a role in the observed gender difference in PTSD, while other significant risk factors for PTSD seemed to be unrelated to gender difference in PTSD [8]. A meta-analysis of risk factors for PTSD showed that gender was a risk factor in the majority of civilian studies but not in military samples. Factors such as psychiatric history had a more uniform predictive effect than gender [12]. A recent review concluded that the higher vulnerability of women for PTSD could be due to the methodology used, the higher prevalence of sexual abuse and rape in women, the different coping styles of women and men, the more limited socio-economic resources of women, or biological sex differences [17]. To date, there is a lack of population-based studies providing data to analyze the multiple risk situation of women and to further explain their increased susceptibility to PTSD. However, the investigations have pointed out the importance of ongoing research on trauma and PTSD based on general population samples, since the influence of trauma type, psychiatric co-morbidity and gender on the onset of PTSD is still unclear [4, 7, 11, 15, 18, 24, 26, 31, 32, 34].

The Manual of Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, [1] as well as the International Classification of Mental Diseases of the World Health Organization (ICD-10) [39] define that a PTSD may follow a wide range of traumas experienced by individuals in war or in civil life. The definition of "traumatic events" varies between former and current diagnostic classification systems and between studies on PTSD. The DSM-IV includes the "stressor criterion," which requires that the person's response to the trauma involves intense fear, helplessness or horror. Events classified as less extreme are explicitly excluded. This clearly departs from earlier DSM editions, which defined a traumatic event as an overwhelming experience outside the usual range [4]. According to DSM-IV, PTSD is diagnosed after a traumatic event. The person's reaction is characterized by persistent symptoms of re-experiencing the trauma and the feelings of intense fear, helplessness or horror through internal or external cues, avoidance of stimuli associated with the trauma, emotional numbing, and an increased arousal. However, PTSD is only diagnosed if the symptoms cause clinically significant distresss or impairment in social, occupational or other important areas of functioning. To overcome methodological difficulties, the assessment of trauma and PTSD should be carried out with standardized diagnostic instruments yielding data, which are comparable and comprehensible [4, 23]. Advanced diagnostic instruments, like the Composite International Diagnostic Interview (CIDI), have been developed to overcome methodological shortcomings. They provide an opportunity to assess trauma and PTSD, as well as the associated psychiatric disorders in a comparable standard [23].

Our study has been designed (1) to assess trauma and PTSD, as well as pre-existing psychiatric disorders with a standardized instrument providing data with respect to DSM-IV diagnoses in a representative population sample, (2) to estimate the impact of pre-existing psychiatric disorders on the incidence of PTSD after exposure to traumatic events, (3) to analyse gender differences on trauma and PTSD, and (4) to find an empirical model to assess the extent to which the type of trauma, pre-existing psychiatric disorders and gender are associated with an increased risk of PTSD after exposure to trauma.

Materials and methods

■ Sample

The population of interest here was defined as individuals aged 18–64 years, not living in institutions, with their only or main residence in the northern German city of Lübeck or one of 46 surrounding communities, constituting the catchment area of the city. The aim of selecting the communities was to have a precise representation of the region with regard to the settlement structure. The selection of the 46 surrounding communities was based on a geographic system, clustering and dividing all German communities into so-called BIK-City-Regions [3]. Simplified, this is comparable to differentiation between urban and rural areas, considering the interweaving of the communities. Every community located in an a priori defined area of about 50-km diameter was included in the sampling area. The region is a typical Mid-European area that has not been at war since the Second World War. There were no natural catastrophes in the area in the 20th century. Crime rates in Germany are comparable to other Mid-European countries. They are higher in the northern part of Germany and the crime rates of Lübeck are in the range of 12,000–15,000 criminal offences per year and 100,000 inhabitants. This is a typical rate for towns with 100,000–500,000 inhabitants in North Germany [14, 21, 25].

Table 1 Characteristics of the study sample and the sub-sample exposed to any trauma

Characteristics	Study sample $n = 4075$	Exposed to trauma $n = 806$	P
Gender			
Male	50.2%	50.9%	0.664[b]
Female	49.8%	49.1%	
Mean age	41.6 (SD = 12.9)	42.8 (SD = 13.3)	0.002[c]
Marital status			
Married	59.7%	56.9%	0.075[b]
Never married or separated	40.3%	43.1%	
Educational level[a]			
<10 years of school	47.3%	47.9%	0.149[d]
10–11 years of school	31.5%	29.3%	
>11 years of school	20.9%	22.9%	
Living area			
Luebeck town	65.2%	62.7%	0.090[b]
Surrounding communities	34.8%	37.3%	

[a] One person was excluded because of missing data and 29 were excluded because they were still in school
[b] Pearson chi-square, 2×2 table, df = 1
[c] T-Test
[d] Pearson chi-square, 3×2 table, df = 2

In the year of data collection, the total population living in this area consisted of 325,107 individuals, with two-thirds of them in the core area of Lübeck. Considering the inclusion criteria of the study, 193,452 citizens remained in the target population. A proportional random sample of 5,829 individuals was drawn from the 47 registration office files. During a continuous data collection period between July 1996 and March 1997, a total of 4,093 (70.2%) completed the interview. Eighteen of the completed interviews could not be analyzed due to non-systematic reasons occurring after the regular administration of the interview (parts of the material were lost or because of technical problems). The final sample was found to be representative for the region with respect to the sociodemographic structure. More details are described elsewhere [27].

The extensive quality assurance measures and the training of the 56 psychiatric lay interviewers employed in the project are described elsewhere. [27]

■ Diagnostic assessment

Instruments were administered in a computer-assisted personal interview (CAPI). Case identification was done by the fully structured and standardized M-CIDI [37], a German modified extended and DSM-IV adapted version of the WHO CIDI [33]. A series of validity and reliability studies reported good to excellent psychometric properties of the CIDI and M-CIDI [2, 36]. The CIDI is recommended for conducting general population-based assessment of PTSD [4]. The M-CIDI material includes a respondent's booklet to support the comprehensibility of the interview. The assessment of trauma was supported by a list of typical PTSD events (Table 2) to minimize respondent's shame during the exploration by avoiding direct articulation.

The M-CIDI was also used for the diagnostic assessment of DSM-IV non-psychotic mental Axis-I disorders. Onset and termination of diagnoses were assessed and available for data analysis. If a disorder was present at some time within the year preceding the interview, 12-month diagnoses were assigned. The current study incorporated the aggregated diagnoses "anxiety disorder" (panic disorder, agoraphobia, social phobia, simple phobia, generalized anxiety disorder, obsessive-compulsive disorder, and anxiety disorder not otherwise specified), "depressive disorder" (major depression and dysthymia), "somatoform disorder" (somatization disorder, undifferentiated somatoform disorder, conversion disorder, pain disorder, hypochondriasis, and body dysmorphic disorder), "alcohol abuse or dependence," and "nicotine dependence." Disorders were defined as "pre-existing psychiatric disorder" if the age at onset was lower than the age at appearance of trauma. The

recall and dating of traumas and psychiatric diagnoses were optimized by a special M-CIDI training for the interviewer. This training includes techniques to facilitate accurate reporting. The training was given to the interviewer by a trainer who was experienced in conducting this training for several years to optimize quality of data collection, especially to overcome problems in determining the age of onset for psychiatric diseases [38].

■ Data analysis

All analyses employed the SPSS program package Version 12.0. Analyses included descriptive statistics and logistic regressions. Univariate analyses used chi-square test (χ^2) or Fisher's exact test. The risk of PTSD after exposure (conditional risk) is analyzed based on 806 persons reporting at least one traumatic event that fulfilled the stressor criterion. The associations of risk factors and the conditional risk of PTSD were estimated using odds ratio (OR) and 95% confidence intervals (CI). Adjusted OR were calculated in logistic regression models. Multivariate logistic regressions were used to identify independent predictors of PTSD. We included pre-existing psychiatric disorders and female gender as potential risk-factors. The model was controlled for age [12, 20].

Results

■ Characteristics of the sample

Table 1 describes the composition of the sample with complete data ($n = 4,075$) and the sub-sample of persons exposed to any traumatic event. The sub-sample of persons exposed to traumatic events did not differ from the total sample of the study.

■ Lifetime prevalence of exposure to traumatic events

The lifetime prevalence of exposure to any trauma did not vary by gender (Table 2). Women were more likely to be victims of rape attacks or sexual abuse, and men were more likely to be physically threatened, attacked, injured or tortured, were more often exposed to serious accidents, and witnessed more often

Table 2 Lifetime prevalence of exposure to traumatic events in women and men

Terrible experiences and catastrophes [a]	Women [b] n = 2025 % exposed (SE)	Men [b] n = 2,042 % exposed (SE)	p[c]
1. You've had a terrible experience during a war.	3.0 (0.4)	2.4 (0.3)	0.113
2. You were seriously physically threatened (for example, with a weapon), attacked, injured or tortured.	5.1 (0.5)	6.9 (0.6)	0.012
3. You were the victim of a rape attack.	2.5 (0.3)	0.1 (0.1)	<0.000
4. You were sexually abused as a child (that is, before the age of 14), that is, someone forced you to commit sexual acts against your will or such acts were done to you.	2.6 (0.4)	0.3 (0.1)	<0.000
5. You were the victim of a natural catastrophe.	0.4 (0.1)	0.3 (0.1)	0.493
6. You had a serious accident.	5.4 (0.5)	9.4 (0.6)	<0.000
7. You were imprisoned, were taken hostage or were the victim of a kidnapping.	0.2 (0.1)	0.2 (0.1)	0.495
8. You witnessed one of the events above happen to another person. Whom: .... Which of the events listed above? Number: [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]	2.6 (0.4)	3.8 (0.4)	0.018
9. Was there another terrible event or catastrophe that hasn't been mentioned? [d] Which:	3.0 (0.4)	1.4 (0.3)	<0.000
Subjects with exposure to any of these nine events.	20.0 (0.9)	19.5 (0.9)	0.347

[a]Original items of M-CIDI-LT Respondent's Booklet
[b]Five women and three men were excluded because of not responding to all or part of the post-traumatic stress disorderss questions
[c]Pearson chi-square, 2×2 table, df = 1
[d]Within this category, 41.1% reported death of a relative or friend

any traumatic event happened to other persons. The category "another event or catastrophe" was more often reported by women than men. Within this category, 41% reported to have experienced the death of a relative or friend, with no significant difference between women (1.1%, SE = 0.2) and men (0.7%, SE = 0.2). Other traumas reported in this category were significantly (P < 0.01) more frequent in women (1.9%, SE = 0.3), than in men (0.7%, SE = 0.2).

■ Lifetime prevalence and conditional risk of PTSD

The lifetime prevalence of PTSD was 1.4% (SE = 0.18). The 12-month prevalence was 0.7% (SE = 0.13). Both prevalence measures were signifi-

cantly higher in women, 2.2% (SE = 0.32) versus 0.6% (SE = 0.17) and 1.1% (SE = 0.23) versus 0.3% (SE = 0.12). The conditional risk of PTSD after exposure to trauma was 6.9% (SE = 0.89). It was significantly higher in women (11.1% SE = 1.58) than in men (2.9% SE = 0.83). In addition to these gender differences, the conditional risk of PTSD varied between types of trauma. The highest risk for PTSD was found in persons who had been victims of a rape attack or sexually abused. Women had a significantly higher risk for PTSD than men, when they where physically threatened (Table 3). The mean age of onset of PTSD was 24 years, 22 years in women and 30 years in men (T = −1,9, df = 54, P = 0.068). The mean duration of PTSD was 12 years, 13.5 years in

Table 3 Post-traumatic stress disorder (PTSD) after exposure to trauma in women and men

Terrible experiences and catastrophes[a]	N, women/men	PTSD in women n	PTSD in women % (SE)	PTSD in men n	PTSD in men % (SE)	p[b]
1. Experience during war	61/48	3	4.9 (2.8)	0	0.0	0.171
2. Physically threatened	104/140	18	17.3 (3.7)	7	5.0 (1.9)	0.002
3. Rape attack	51/2	20	39.2 (6.9)	1	50.0 (50.0)	0.640
4. Sexually abused	53/7	16	30.2 (6.4)	2	28.6 (18.4)	0.651
5. Natural catastrophe	8/7	1	12.5 (12.5)	0	0.0	0.533
6. Serious accident	109/191	8	7.3 (2.5)	5	2.6 (1.2)	0.053
7. Imprisoned, taken hostage, victim of a kidnapping	5/4	0	0.0	0	0.0	–
8. Witnessed	53/78	5	9.4 (4.0)	2	2.6 (1.8)	0.095
9. Other events [c]	61/29	9	14.8 (4.6)	3	10.3 (5.8)	0.459
Any event	410/396	44	11.1 (1.6)	12	2.9 (0.8)	<0.001

[a]Original items see Table 2
[b]Pearson chi-square for difference between women and men, 2×2 table, df = 1. For diagnoses with expected counts smaller than 5 in one cell Fisher's exact test were used
[c]Within this category, 41.1% reported death of a relative or friend

Table 4 Post-traumatic stress disorder (PTSD) after exposure to trauma in persons with pre-existing psychiatric disorders

Pre-existing disorder[a]	N	PTSD		OR [b]	95% CI
		n	% (SE)		
Alcohol dependence or abuse	49	3	6.1 (3.5)	0.87	0.26–2.88
Nicotine dependence	96	7	7.3 (2.7)	1.06	0.47–2.41
Anxiety disorder	104	19	18.3 (3.8)	4.02	2.21–7.30
Somatoform disorder	68	15	22.1 (5.1)	4.81	2.50–9.25
Depressive disorder	27	7	25.9 (8.6)	5.21	2.10–12.93
Any pre-traumatic psychiatric disorder	235	30	12.8 (2.2)	3.07	1.77–5.31
No pre-traumatic psychiatric disorder	571	26	4.6 (0.9)	0.33	0.19–0.57
All subjects exposed to trauma	806	56	6.9 (0.89)	1.00 [c]	–

OR, Odds ratio; CI, Confidence interval
[a]Disorder with an age of onset before the age at appearance of trauma
[b]Compares the risk for PTSD in disordered subjects to subjects not suffering from this type of preexisting disorder
[c]Reference

women and 6.8 years in men ($T = 1.5$, df = 52, $P = 0.134$). Two cases were excluded from the analysis of duration, because the termination of disorder could not be ascertained in the interview. Among persons with a live-time diagnoses of PTSD, 30 individuals (54%), 23 women (54.8%) and seven men (58%), were still suffering from this disorder in the year of the interview.

■ Pre-existing psychiatric disorders and the conditional risk of PTSD

The univariate analyses of pre-existing psychiatric disorders showed that "anxiety disorder", "somatoform disorder", and "depressive disorder" were significantly associated with increased odds of PTSD. "Alcohol dependence or abuse" and "nicotine dependence" were not found to be risk factors. Subjects with at least one pre-existing psychiatric disorder had a threefold higher risk of PTSD, compared to those who had no pre-existing psychiatric disorder (Table 4).

■ Multivariate analysis of risk factors

To identify independent predictors of PTSD in subjects who reported at least one trauma, multivariate logistic regression analyses were performed (Table 5). The dependent variable was whether or not PTSD was developed after exposure to trauma. The best fitting model was hierarchical, using a direct multivariate regression for the types of traumas and a forward stepwise regression for the risk factors. All types of trauma were entered simultaneously and the risk factors were included by stepwise logistic regression. The model building process with PTSD as the dependent variable resulted in a final model with the traumas "rape attack," "sexual abuse," "other events," and "physically threatened" as significant predictors of an increased risk of PTSD. "Natural catastrophe," "witnessed," "serious accident," and "experience during war" were not found to be an increased risk for PTSD. "Pre-existing anxiety disorder," "pre-existing so-

Table 5 Multivariate logistic regression model of traumas and factors increasing the conditional risk of post-traumatic stress disorder (PTSD)[a]

	OR	95% CI	P
Traumas			
Rape attack	8.17	3.63–18.37	<0.001
Sexually abused	6.83	2.95–15.81	<0.001
Other events [b]	3.53	1.47–8.44	0.005
Physically threatened	2.25	1.13–4.45	0.021
Natural catastrophe	1.14	0.11–12.09	0.916
Witnessed	1.12	0.43–2.10	0.820
Serious accident	0.75	0.35–1.61	0.460
Experience during war	0.39	0.08–1.80	0.226
Risk factors [c]			
Pre-traumatic anxiety disorder	2.84	1.36–5.93	0.005
Pre-traumatic somatoform disorder	2.84	1.25–6.45	0.012
Age	1.03	1.00–1.06	0.049

OR, Odds ratio; CI, Confidence interval
[a]All types of trauma were entered simultaneously, and all risk factors were included by stepwise logistic regression. The item "imprisoned, taken hostage victim of a kidnapping" was excluded from this analysis because only five women and four men reported this event and not one of them had a PTSD
[b]Within this category 41.1% reported death of a relative or friend
[c]Gender and the pre-existing disorders "depressive disorder," "alcohol dependence and abuse," and "nicotine dependence" were not retained in the model

matoform disorder" and age of the subject were significant predictors of an increased risk of PTSD. Female gender, depressive disorder, substance dependence and abuse were not retained in the model ($\chi^2 = 102,247$, df = 12, $P < 0.001$, Table 4). The model had an overall correct prediction of 93.3%. Pre-existing depressive disorders were less frequent ($n = 27$) than pre-existing anxiety disorders ($n = 104$). Fourteen of the 27 subjects with a pre-existing depressive disorder had a co-morbid anxiety disorder. Additionally, five of seven subjects with a pre-existing depressive disorder and the PTSD diagnosis had a co-morbid anxiety disorder.

Discussion

The study reveals new knowledge about the influence of trauma type, preexisting psychiatric disorders and

gender on the onset of PTSD. One major new finding is that female gender was not revealed to be an independent risk factor for PTSD. However, consistent with former studies, women were more often victims of traumatic events with a high conditional risk of PTSD, such as sexual abuse or rape attack. The mutivariate analyses revealed that specific types of trauma and pre-existing anxiety disorders and somatoform disorders increase the risk of PTSD, but female gender was not retained in the model as an independent risk factor, thus the risk of PTSD is not increased for women in general. We conclude that women suffer more often than men from risk factors concerning type of trauma and pre-existing psychiatric disorders but do not have a higher vulnerability for PTSD in general.

Extending previous findings our multivariate analysis of risk factors shows that a pre-existing anxiety disorder is a more important predictor of PTSD than depressive disorders. It is assumed that the variable "pre-existing depressive disorder" was "bumped out" by the variable pre-existing anxiety disorder, mainly due to the fact that depressed persons predominantly develop PTSD if they have a comorbid anxiety disorder [20, 35].

Additional findings of our study are: (1) life-time exposure to any trauma in our study is lower compared with previous studies; (2) in contrast to previous findings, the lifetime prevalence of exposure to any trauma did not differ between women and men; (3) consistent with previous studies, the prevalence of PTSD was higher in women than in men; (4) the conditional risk of PTSD after exposure to sexually motivated violence does not differ between women and men. The lower prevalence of exposure to trauma, compared to previously published studies, might result from the fact that Germany has low crime rates, a strict gun control policy, is rarely exposed to natural catastrophes, and was not at war since 1945. This finding is in line with other studies based on Mid-European samples [19, 31]. The risk of PTSD after exposure to rape or sexual abuse did not differ significantly between women and men. In men, these events are very rare, and as a consequence thereof the confidence interval is large. Previous studies had the same limitation. Consistent with our results, these studies have not found gender differences in the conditional risk of PTSD after exposure to these specific events and have also not found that women are less or more distressed by these events. For example, in the National Comorbidity Survey of the US population 65% (SE = 15.6) of men and 45.9% (SE = 5.9) of women were diagnosed to have PTSD after rape [24]. In addition, one methodological study on PTSD reveals that "sexual assault other than rape" were reaching the stressor criterion of PTSD according to DSM-IV in 87.5% of women and 92.7% in men [10]. On the other hand, the same study showed that women might have different experiences than men if

they are "badly beaten". This event has reached the stressor criterion in 99.5% of the women, but only in 55.8% of the men. "Badly beaten" is a less precise formulated event, and might not cover the same events in women compared to men. The stronger relation of interpersonal and sexual violence with PTSD compared to other events can be explained by a higher peritraumatic distress during the traumatic event. This interpretation is supported by the meta-analysis of Ozer et al. [29]. Accordingly to these findings, a recent neuropsychological study found in assaulted victims as compared to those not assaulted had higher cerebral blood flows in the right hemisphere, when they were exposed to auditory recall of trauma. This brain activity was assumed to be associated with a higher emotional respond to the exposure [30].

In the multivariate model, sexually motivated violence such as rape attacks and sexual abuse are the events with the highest impact on the occurrence of PTSD. Pre-existing anxiety disorder and pre-existing somatoform disorders were also associated with an increased risk of PTSD. It is well known that these disorders are more prevalent in women than in men, but to date it remains an open question if anxiety and somatoform disorders are risk factors for PTSD or if this relation is caused by a shared vulnerability. However, previous studies did not control the gender differences in preexisting psychiatric disorders and the specific types of trauma, but assumed that women have a higher vulnerability [6]. Our analyses showed that the higher risk of PTSD in women is mainly due to the higher risk of being a victim of sexually motivated violence and the higher prevalence of pre-existing psychiatric disorders. Up to now we do not know if there are biological reasons that women are more likely to suffer from these disorders or if it is derived from their gender role [17].

The methodological strength of this investigation is given by the representative population sample, diagnosed by a standardized state-of-the-art instrument including onset and termination of diagnoses. Limitations of the study are given by the sample size, which is too small to analyze infrequent traumatic events in several subgroups. Comparisons with former studies, most of them carried out in the USA, are limited by different living conditions.

We conclude with three implications for future studies about traumata and PTSD: (1) Biological sex differences and gender role aspects of pre-existing psychiatric disorders should be integrated in a bio-psycho-social model to better explain the onset of PTSD. (2) To reveal gender differences in exposure to trauma, further research needs to be more precise in assessing types of trauma, because less precise assessments, such as "badly beaten," might cover different types of trauma for women and men. (3) Finally, for future studies it might be useful to assess the death of a relative or friend as a separate trauma category.

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